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Attorneys for Plaintiffs
KONINKLIJKE PHILIPS ELECTRONICS N.V. and
U.S. PHILIPS CORPORATION

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

KONINKLIJKE PHILIPS ELECTRONICS N.V. and U.S. PHILIPS CORPORATION,

Plaintiffs,

v.

NATIONAL FILM LABORATORIES, INC. d/b/a CREST NATIONAL GROUP, INC., RONALD STEIN, STEVEN STEIN, ELAINE STEIN, MARTIN ROSS, and LORRAINE ROSS,

Defendants.

CASE NO. 2:12-cv-04576-GAF-FFM

FIRST AMENDED COMPLAINT FOR BREACH OF CONTRACT, BREACH OF FIDUCIARY DUTY, FRAUDULENT TRANSFER, AND UNLAWFUL DIVIDEND

DEMAND FOR JURY TRIAL

Dept.: Ctrm. 740, Roybal
Judge: Hon. Gary A. Feess

Discovery cut-off: TBD
Pretrial Conference: TBD
Trial date: TBD

Plaintiffs Koninklijke Philips Electronics N.V. and U.S. Philips Corporation (collectively, "Philips") allege upon knowledge as to themselves and their own actions, and upon information and belief as to all other matters, against Defendants National Film Laboratories, Inc. d/b/a Crest National Group ("Crest"), Ronald Stein, Steven Stein, Elaine Stein, Martin Ross, and Lorraine Ross, as follows:

JURISDICTION AND VENUE

1. This Court has subject matter jurisdiction of this action under 28 U.S.C. § 1332. The amount in controversy exceeds $75,000, exclusive of interest and costs, and there is complete diversity of citizenship between Plaintiffs and Defendants.

2. Venue for Philips' claims is proper in this District under 28 U.S.C. §§ 1391(b) and (c) and 1400(b) because, among other things, one or more of the acts giving rise to the claims alleged herein took place in this District and because each Defendant resides in this District, purposefully engaged in the activity alleged herein in this District, and/or has substantial, continuous, and systematic contacts with this District and with the State of California.

NATURE OF THE ACTION

3. This is a Complaint for breach of contract, breach of fiduciary duty, fraudulent transfer, and breach of California Corporations Code §§ 500 and 501.

4. Philips administers a worldwide program that licenses manufacturers to use Philips' patented technology in the production of CD, DVD, and Blu-ray discs. National Film Laboratories, Inc. d/b/a Crest National Group ("Crest") is a manufacturer of DVD Video and DVD-ROM discs ("DVD discs") that signed license agreements with Philips. The license agreements required Crest to report the sale of and pay royalties to Philips on each DVD disc that Crest makes and sells. The license agreements also required Crest to and pay additional royalties on each DVD disc incorporating the AC-3 audio technology (AC-3 DVDs). The license agreements also required Crest to keep accurate books and records

reflecting its sales of DVD discs and AC-3 DVDs.

5. In violation of the license agreements, Crest neither accurately reported the number of AC-3 DVD discs that it sold nor paid all the royalties due to Philips. Consequently, Philips terminated Crest's license agreements relating to DVD discs and AC-3 DVDs.

6. Crest, acting at the direction of and aided and abetted by Ronald, Steven and Elaine Stein, as well as Martin and Lorraine Ross (collectively "the Steins" or "the Stein Family"), made DVD discs without paying royalties to Philips. Further, the Steins diverted assets from Crest to the detriment of creditors, including Philips, and manipulated assets and liabilities, including properties, among their various corporate entities in an effort to avoid exposure. As a result, Crest executed an assignment for the benefit of creditors in November 2012 with reported assets of less than $75,000.

7. Philips seeks damages and injunctive relief to redress Crest's contractual breaches and the Steins' unlawful conduct as owners and managers of Crest, as well as avoidance of the Steins' unlawful transfer of Crest assets and disgorgement of unlawful distributions received by the Steins.

THE PARTIES

8. Plaintiff Koninklijke Philips Electronics N.V. is a Dutch corporation having an office and principal place of business in Eindhoven, The Netherlands.

9. Plaintiff U.S. Philips Corporation is a Delaware corporation with its principal place of business at 1251 Avenue of the Americas, New York, New York.

Individual Defendants

10. Defendant Crest is a California corporation with its principal place of business at 3845 E. Coronado St., Anaheim, CA.

11. Defendant Ronald Stein is a resident of California and conducts business or has conducted business at 3845 E. Coronado St. Anaheim, CA, in the

Central District of California.

12. Ronald Stein is the president and part owner of Crest. In that capacity, he directs and controls the day-to-day operations of Crest.

13. Defendant Elaine Stein is a resident of California and conducts business or has conducted business at 3845 E. Coronado St. Anaheim, CA, in the Central District of California.

14. Elaine Stein is a board member and part owner of Crest. In that capacity, she directs and controls the day-to-day operations of Crest.

15. Defendant Steven Stein is a resident of Indiana and conducts business or has conducted business at 3845 E. Coronado St. Anaheim, CA, in the Central District of California.

16. Steven Stein is part owner of Crest. In that capacity, he directs and controls the day-to-day operations of Crest.

17. Defendant Martin Ross is a resident of California and conducts business or has conducted business at 3845 E. Coronado St. Anaheim, CA, in the Central District of California.

18. Martin Ross is part owner of Crest. In that capacity, he directs and controls the day-to-day operations of Crest.

19. Defendant Lorraine Ross is a resident of California and conducts business or has conducted business at 3845 E. Coronado St. Anaheim, CA, in the Central District of California.

20. Lorraine Ross is part owner of Crest. In that capacity, she directs and controls the day-to-day operations of Crest.

Crest as Alter Ego of the Stein Family

21. Crest is the agent, subsidiary, and alter ego of the Stein Family because, among other things:

(a) On information and belief, the Steins have used Crest's corporate funds, including through Crest's corporate American Express account, to

purchase personal items, including vacations, groceries, pharmaceuticals, and clothing.

(b) On information and belief, the Steins have also used Crest's corporate funds to purchase or contribute to the purchase of luxury automobiles for their own personal use, including, but not limited to the purchase of a Porsche automobile for the personal use of Ronald Stein.

(c) On information and belief, Crest, at the direction of the Steins, purchased an Aston Martin automobile with company funds for Ronald Stein's personal use, and then later sold the vehicle to him at a rate far below its market value.

(d) As detailed further below, on information and belief, the Steins have diverted assets from Crest to the detriment of creditors, including Philips, and have manipulated assets and liabilities, including properties, among their various corporate entities in an effort to avoid exposure.

(e) On information and belief, Ron Stein colluded with the vendor managing the liquidation of Crest property at auction to transfer Crest property to third parties through less-than-arm's length transactions to the detriment of Crest's creditors, including Philips.

THE PATENT-IN-SUIT

22. United States Patent No. 5,790,512 ("the '512 Patent"), entitled "Optical Information Carrier," was duly and legally issued on August 4, 1998. U.S. Philips Corporation is the owner by assignment of all right, title, and interest in the '512 Patent. A copy of the '512 Patent is attached as Exhibit A.

FACTUAL BACKGROUND

Breach of the License Agreements

23. Philips offers makers of CD and DVD discs licenses to patents it understands to be necessary to the manufacture of CD and DVD discs that comply with the technical specifications that ensure that CD and DVD discs function

properly in CD and DVD players and DVD-ROM readers.

24. Philips and Crest entered into a patent license agreement effective July 1, 2002: the DVD Video Disc and DVD ROM Disc Patent License Agreement ("DVD Agreement") (attached as Exhibit B).

25. The '512 Patent is among the patents Philips licensed to Crest under the DVD Agreement.

26. Philips and Crest entered into a separate patent license agreement effective July 1, 2002: the Patent License Agreement for the Use of AC-3 Technology in the Manufacture of DVD Video Discs ("AC-3 Agreement," and, collectively with the DVD Agreement, the "License Agreements") (attached as Exhibit C).

27. Under the License Agreements, Crest agreed to: (1) submit accurate quarterly royalty statements enumerating DVD discs manufactures; (2) make quarterly royalty payments; (3) maintain adequate records to allow verification of all statements made in quarterly royalty statements; and (4) submit to and willingly cooperate with an annual audit.

28. Crest repeatedly breached the License Agreements by, among other things, failing to submit royalty reports timely and failing to make quarterly royalty payments due under the License Agreements. In fact, Crest made no royalty payments under the License Agreements after the first quarter of 2009.

29. On November 17, 2011—after receiving no royalty payments for almost three years—Philips terminated the License Agreements between itself and Crest pursuant to §10.2 of the DVD Agreement and § 6.2 of the AC-3 Agreement. Philips' written notice terminating the License Agreements is attached as Exhibit D.

30. As a direct and proximate result of Crest's breaches of the License Agreements, including their obligation to pay royalties, Philips has suffered damages in an amount known only to the Crest.

31. After Philips terminated Crest's License Agreements, Crest, aided and abetted by and acting at the direction of the Steins, made DVD discs without a license from, and without paying royalties to, Philips.

32. Crest makes or has made DVD discs at its principal place of business at 3845 E. Coronado St. Anaheim, CA.

The Steins' Dissipation of Crest Assets and Crest's Assignment For the Benefit of Creditors

33. Crest contends that it began liquidation of its tangible assets in April 2012 and ceased operations in June 2012. On or about November 16, 2012, Crest executed an assignment for the benefit of creditors (the "Assignment"), reporting total assets of "approximately $57,000 cash in its bank account, residual unsold office furniture and production equipment having an appraised value of about $13,000 before expenses, and outstanding accounts receivable with an estimated collectable value of less than $5,000." *In re Nat. Film Labs. Inc.*, Case No. 2:13-bk-26779-RK, Dkt. 11 ¶ 2 (C.D. Cal.) (Answer).

34. On information and belief, prior to the execution of the Assignment, the Steins diverted assets from Crest to the detriment of creditors, including Philips, and manipulated assets and liabilities, including properties, among their various corporate entities in an effort to avoid exposure.

35. On information and belief, Ron Stein colluded with the vendor managing the liquidation of Crest property at auction to transfer Crest property to third parties through less-than-arm's length transactions to the detriment of Crest's creditors, including Philips.

36. As reported by the Assignee, Crest's records show that over $500,000 in "potentially preferential" payments were paid by Crest to its Owners, including the Steins, during the year prior to the Assignment. *Id.*, Dkt. No. 24 at 10 (Assignee's Motion to Dismiss).

37. On information and belief, in addition to transferring assets out of

Crest prior to the Assignment, the Steins caused Crest to execute millions of dollars in promissory notes for their own benefit and in an attempt to assert priority over Crest's remaining assets at the time of the Assignment, to the detriment of Crest's creditors, including Philips. Upon execution of the Assignment, Crest reported debt of over ten million dollars in outstanding promissory notes to "related parties." *Id*., Dkt. No. 11 at ¶ 2 (Answer). The Steins then attempted to file secured claims for these amounts. *Id*., Dkt. No. 24 at 7-8 (Assignee's Motion to Dismiss).

FIRST CLAIM FOR RELIEF

Breach of Contract against Crest and the Stein Family

38. Philips realleges and incorporates by reference paragraphs 1 through 37 hereof as if set forth herein in full.

39. As stated above, Crest has failed to submit royalty reports, and has failed to make each royalty payment in full, as required by the License Agreements. DVD Agreement, §§ 4.2, 4.3; AC-3 Agreement, §§ 3.1, 3.2.

40. These defaulted royalty payments accrue interest at the rate of 2% per month. DVD Agreement, § 4.4; AC-3 Agreement, § 3.5.

41. Crest's failure to submit these royalty statements breaches its obligations under §4.3 of the DVD Agreement and §3.2 of the AC-3 Agreement.

42. Crest's failure to cease manufacture of DVD discs breaches at least its obligations under §10.6 of the DVD Agreement.

43. Philips duly has performed all its obligations under the License Agreements.

44. Because Crest is the alter ego of the Steins, they are jointly and severally liable for Crest's breaches of the License Agreements.

45. As a result of Crest's breaches of the License Agreements, Philips has suffered and will continue to suffer damages in an amount to be determined by the court.

SECOND CLAIM FOR RELIEF

Breach of Fiduciary Duty against the Stein Family

46. Philips realleges and incorporates by reference paragraphs 1 through 45 hereof as if set forth herein in full.

47. As officers and directors of Crest, the Steins each owed a fiduciary duty to the creditors of Crest, including Philips, to avoid taking any actions to divert, dissipate or unduly risk corporate assets that might otherwise be used to pay creditors' claims, including any acts that involve self-dealing or the preferential treatment of creditors. *See Berg & Berg Enterprises, LLC v. Boyle*, 178 Cal. App. 4th 1020, 1041 (2009).

48. The transfers and related actions orchestrated by the Steins, as alleged herein, caused substantially all of Crest's assets to be diverted and dissipated for the purpose of benefitting the Steins personally at the expense of the creditors of Crest, including Philips.

49. The actions of the Steins, as alleged herein, were made at a time when Crest was insolvent or in the zone of insolvency.

50. The Steins' actions in orchestrating transfers to themselves or to entities which they personally owned or in which they otherwise held a controlling interest, for less than reasonably equivalent value, violated their fiduciary duties in that they were done for the purpose of, and had the effect of, conferring benefits to the Steins directly and/or to entities owned and controlled by the Steins at the expense of Crest and its creditors, including Philips.

51. As a direct and proximate result of the Steins' actions, Philips has suffered damages in an amount to be determined by the court.

52. The actions of the Steins as alleged herein were done with malice and oppression such that imposition of punitive damages pursuant to California Civil Code section 3294(a) is appropriate.

THIRD CLAIM FOR RELIEF

Fraudulent Transfer in Violation of California Civil Code § 3439 et seq. Against the Stein Family

53. Philips realleges and incorporates by reference paragraphs 1 through 52 hereof as if set forth herein in full.

54. As alleged herein, the Steins orchestrated a transaction or series of transactions wherein assets of Crest were transferred to the Steins or entities which they personally owned or in which they otherwise held a controlling interest, prior to Crest's execution of the Assignment.

55. These transfers were made with the actual intent to hinder, delay or defraud Philips, as the obligations owed by Crest to Philips were not assumed by the Steins or any transferee entities, but were isolated in Crest. Alternatively, these transfers were fraudulent as to Philips because (a) Crest's liabilities to Philips arose prior to the transfers; (b) Crest did not receive a reasonably equivalent value in exchange for the transfers; and (c) at the time of the transfers, Crest was insolvent or became insolvent as a result of the transfers.

56. As a result of the foregoing, Philips is entitled to avoidance of the fraudulent transfers alleged herein to the fullest extent required to satisfy Crest's liabilities to Philips.

FOURTH CLAIM FOR RELIEF

Violation of California Corporations Code §§ 500 and 501 – Unlawful Dividend, Derivatively on Behalf of Crest, Against the Stein Family

57. Philips realleges and incorporates by reference paragraphs 1 through 56 hereof as if set forth herein in full.

58. As alleged herein, the Steins were shareholders of Crest and received distributions from Crest at a time when Crest had negative net worth and was unable to meet its liabilities, or, as a result of the distributions, became unable to meet its liabilities as they became due.

59. The Steins knowingly and willingly approved the distributions, and had knowledge, at the time they received the distributions, of facts indicating the impropriety of such distributions.

60. Philips is a creditor of Crest whose debts or claims arose prior to the time of the distributions to the Steins. Philips did not consent to the distributions.

61. The actions alleged herein constitute violations of California Corporations Code sections 500 and 501, thereby injuring Crest and its creditors, including Philips.

62. California Corporations Code sections 316(a) and 506(b) authorize an action in the name of the corporation to enforce liabilities to creditors arising from violations of California Corporations Code sections 500 and 501.

63. The Steins are liable for the full amount of the liabilities owed to nonconsenting creditors, including Philips. The Steins are jointly and severally liable to Crest for the full amount of the damages and injuries suffered by Crest's nonconsenting creditors, plus interest thereon.

PRAYER FOR RELIEF

WHEREFORE, Philips prays for:

1. A judgment awarding Philips damages to compensate for Crest's failure to make timely and complete royalty payments due under the License Agreements;

2. A preliminary and permanent injunction ordering Crest to specifically perform its obligations under the License Agreements by accurately accounting to Philips for all DVD discs it manufactured, sold or otherwise disposed of prior to and over the course of the License Agreements;

3. A judgment awarding Philips punitive damages for the Steins' breaches of fiduciary duty;

4. A judgment avoiding the transfer of assets by the Steins out of Crest to the fullest extent required to satisfy Crest's liabilities to Philips and for damages in an amount sufficient to satisfy Philips' claim;

5. A judgment for disgorgement of all distributions received by the Steins in violation of Corporations Code sections 500 and 501, and for a judgment, jointly and severally, against all directors of Crest who approved the illegal distributions, for the benefit of the creditors of Crest;

6. A judgment awarding Philips its costs and attorneys' fees; and

7. Such other and further relief as this Court deems just and proper.

Dated: February 6, 2014 MAYER BROWN LLP

By: /s/ Edward D. Johnson

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Attorneys for Plaintiffs Koninklijke Philips Electronics N.V. and U.S. Philips Corporation

DEMAND FOR JURY TRIAL

Pursuant to Federal Rule of Civil Procedure 38(b) and Local Rule 38-1, Plaintiffs request a jury trial on all triable issues.

Dated: February 6, 2014

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Attorneys for Plaintiffs Koninklijke Philips Electronics N.V. and U.S. Philips Corporation

EXHIBIT A

US005790512A

United States Patent [19]

Put et al.

[11] Patent Number: 5,790,512

[45] Date of Patent: Aug. 4, 1998

[54] **OPTICAL INFORMATION CARRIER**

[75] Inventors: **Paul L. M. Put; Albericus A. M. Hoevenaars**, both of Eindhoven, Netherlands

[73] Assignee: **U.S. Philips Corporation**, New York, N.Y.

[21] Appl. No.: **755,614**

[22] Filed: **Nov. 25, 1996**

Related U.S. Application Data

[62] Division of Ser. No. 362,622, Dec. 22, 1994, Pat. No. 5,605,782.

[30] **Foreign Application Priority Data**

Dec. 24, 1993 [BE] Belgium 09301461
Aug. 5, 1994 [EP] European Pat. Off. 94202262

[51] **Int. Cl.**[6] **G11B 7/24**

[52] **U.S. Cl.** **369/275.4**; 369/275.3; 369/116

[58] **Field of Search** 369/275.4, 275.3, 369/275.2, 275.1, 116, 110, 44.32, 58, 112, 100, 109, 32, 54, 44.14, 44.41, 44.26, 283, 288; 428/641, 64.2, 64.4

[56] **References Cited**

U.S. PATENT DOCUMENTS

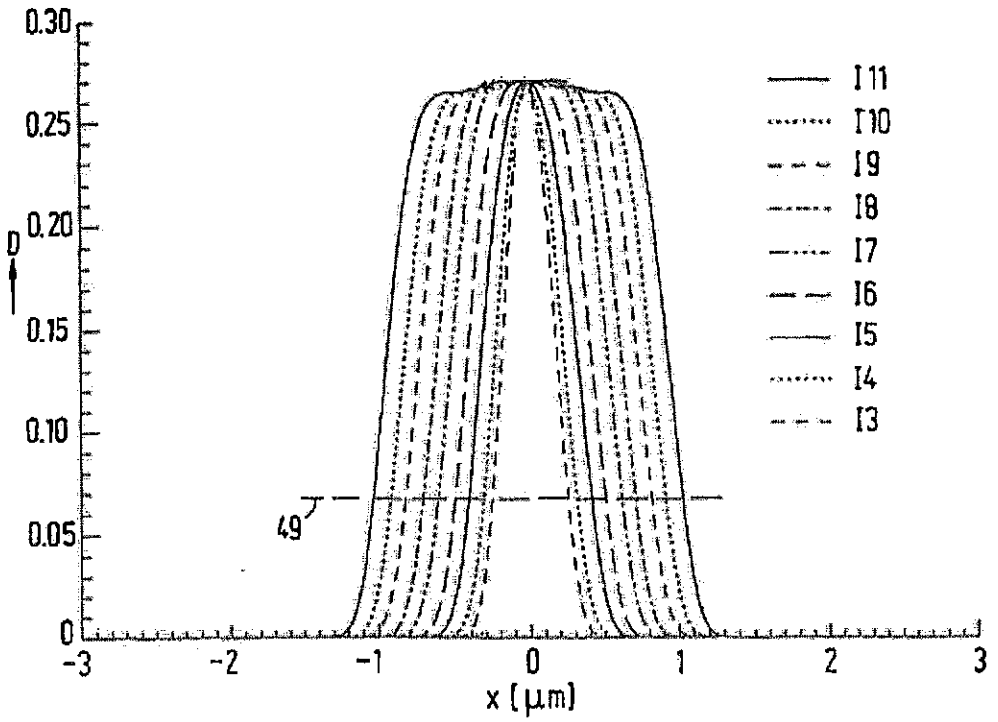
5,003,527	3/1991	Matsumoto et al.	369/100
5,040,165	8/1991	Taii et al.	369/275.4
5,442,615	8/1995	Ohsato et al.	369/100
5,492,744	2/1996	Koike et al.	428/641

Primary Examiner—Ali Neyzari
Attorney, Agent, or Firm—Edward W. Goodman

[57] **ABSTRACT**

A method for manufacturing optical information carriers, in which a photoresist layer (20) on a master disc (5) is exposed by a radiation beam (19). The intensity of the radiation beam is controlled by a modulator (14) and a control device (10) in such a manner that the exposure dose has a constant predetermined value over the length of a recorded area, which value is independent of the length of the area.

10 Claims, 11 Drawing Sheets



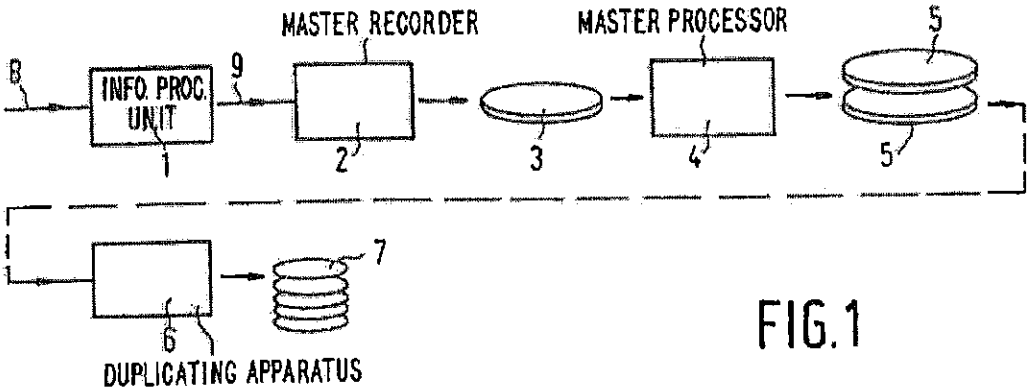


FIG.1

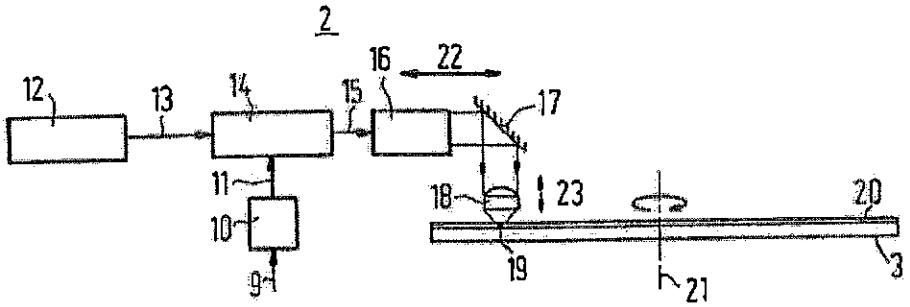
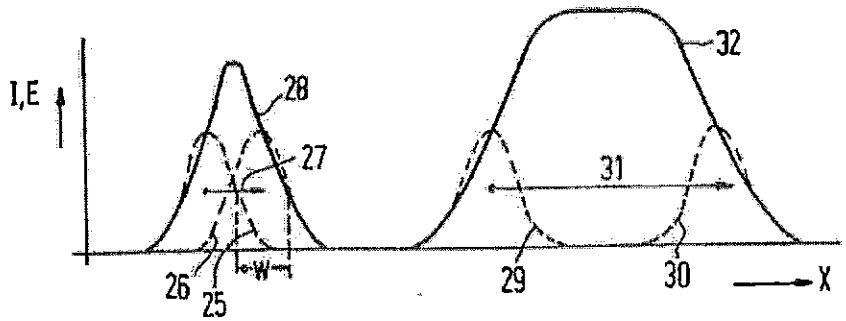


FIG.2



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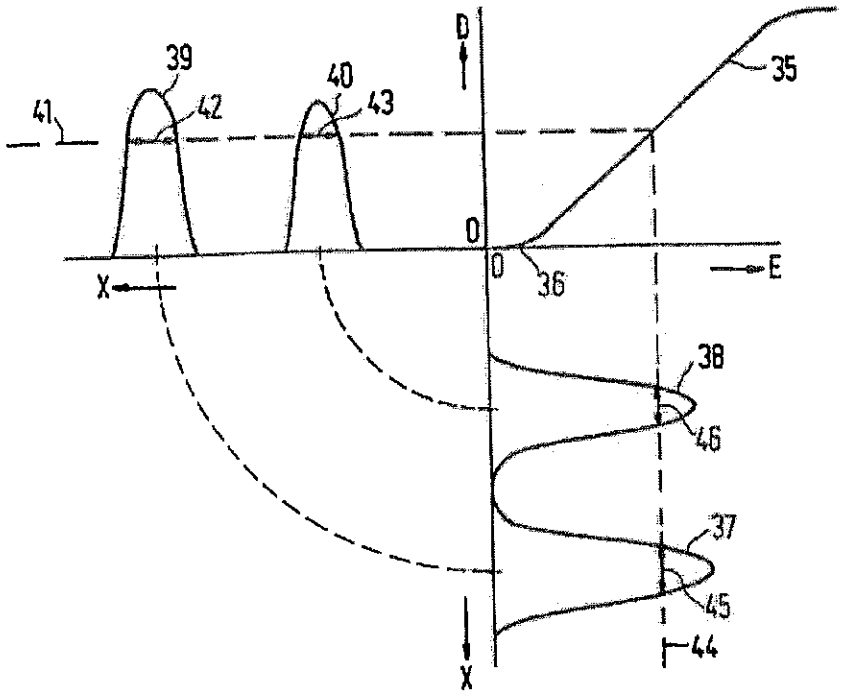
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FIG. 4a

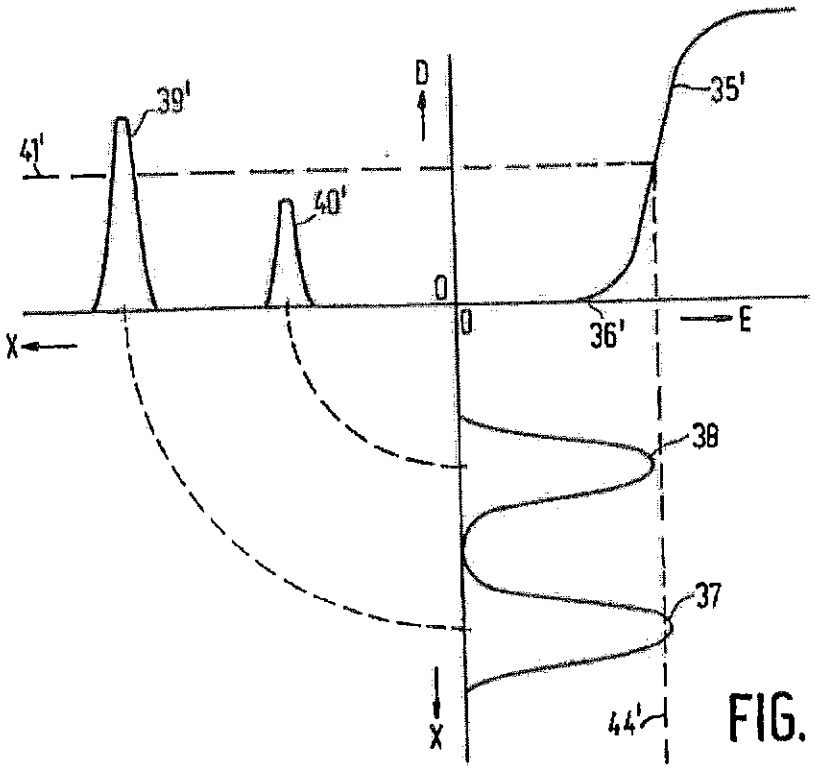
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FIG. 4b

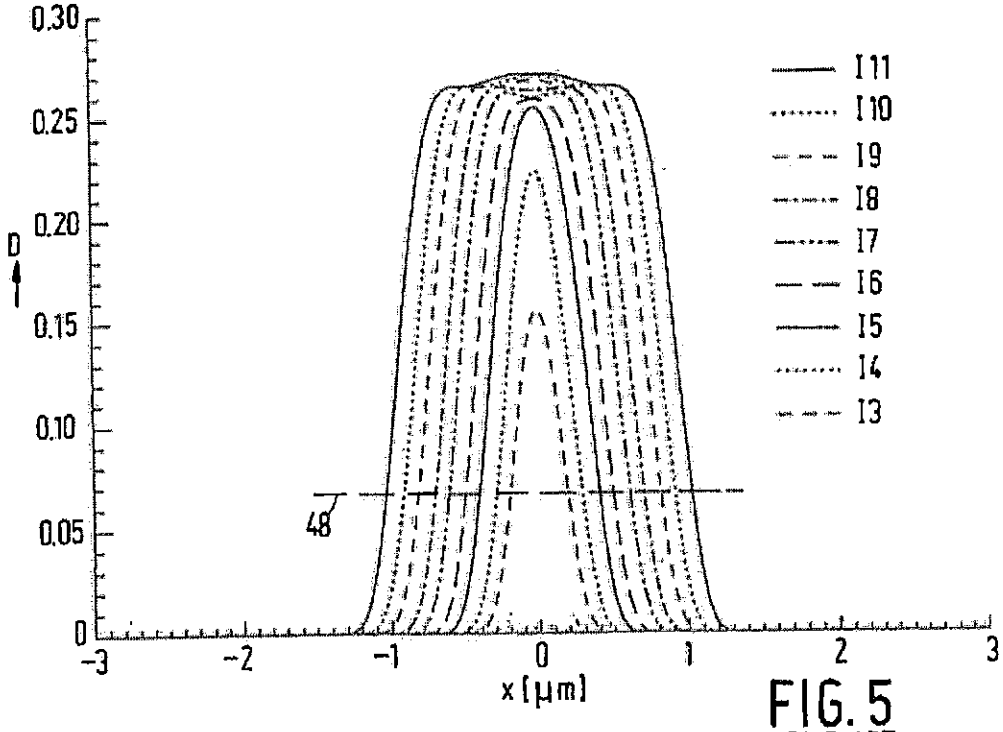

FIG. 5
PRIOR ART

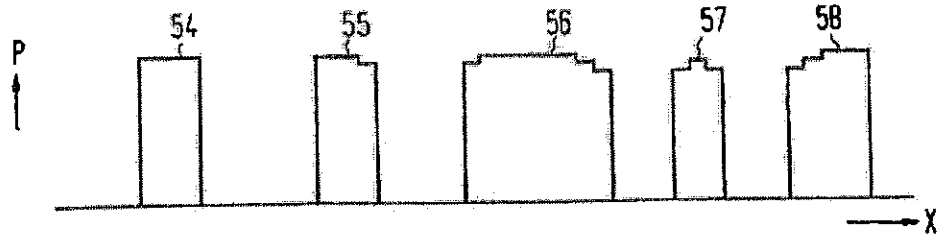

FIG.12

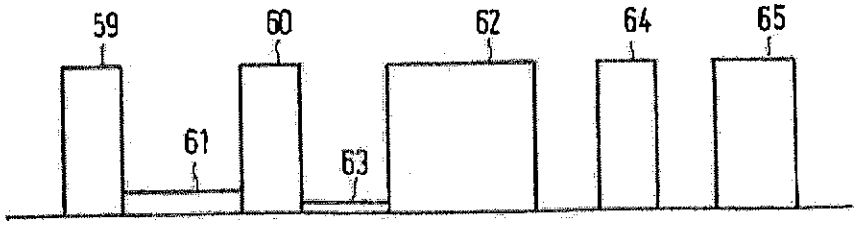

FIG.13

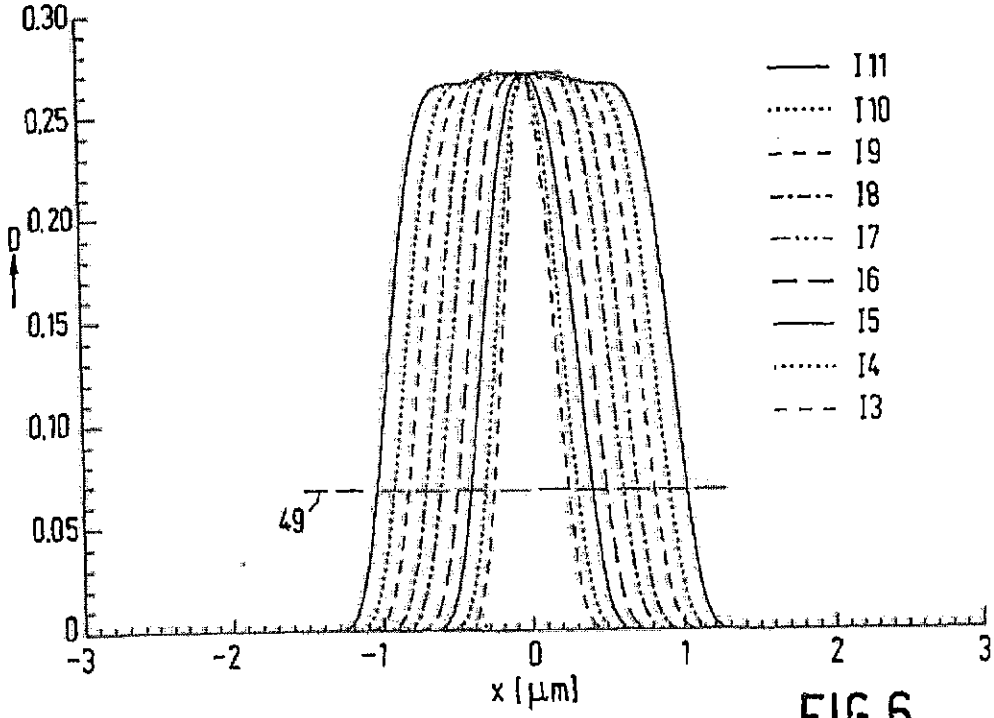
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FIG.6

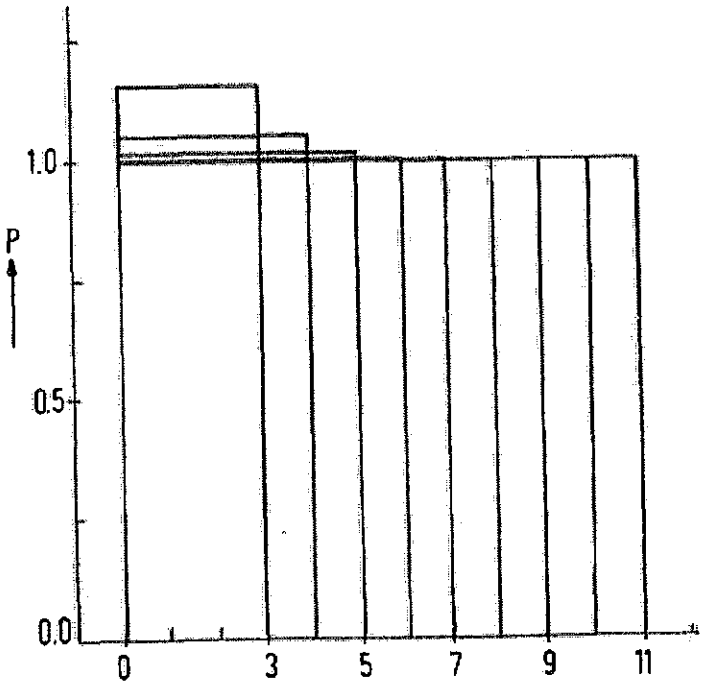
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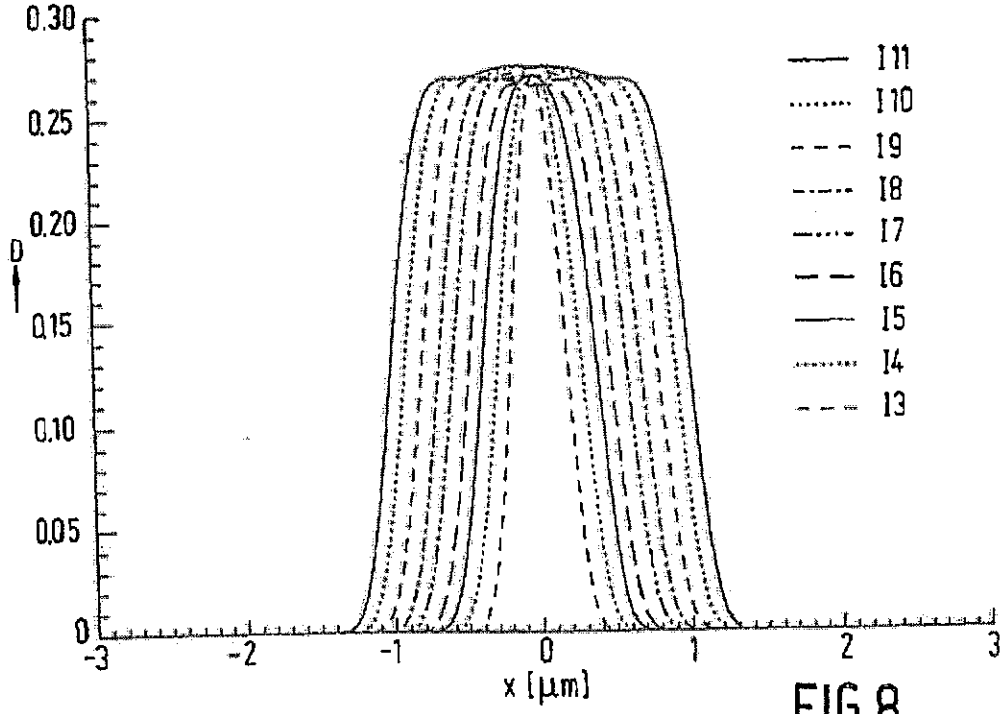
FIG.7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I7
I6
I5
I4
I3

FIG.8

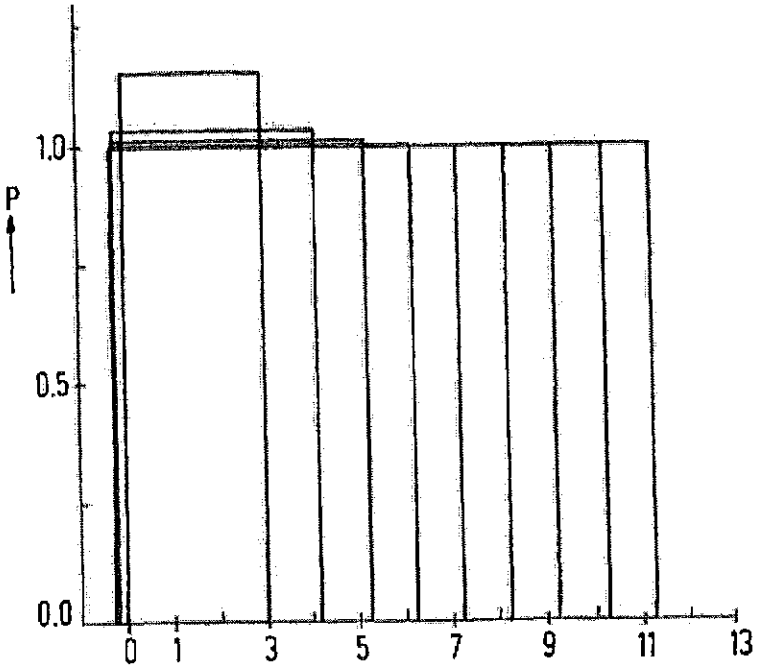
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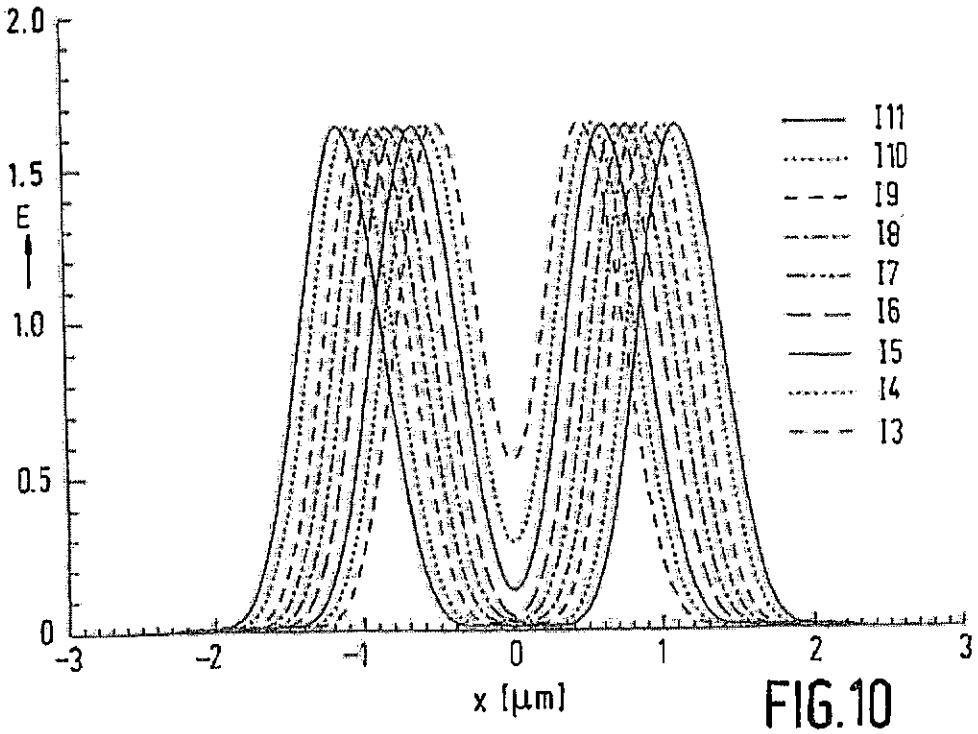
FIG.9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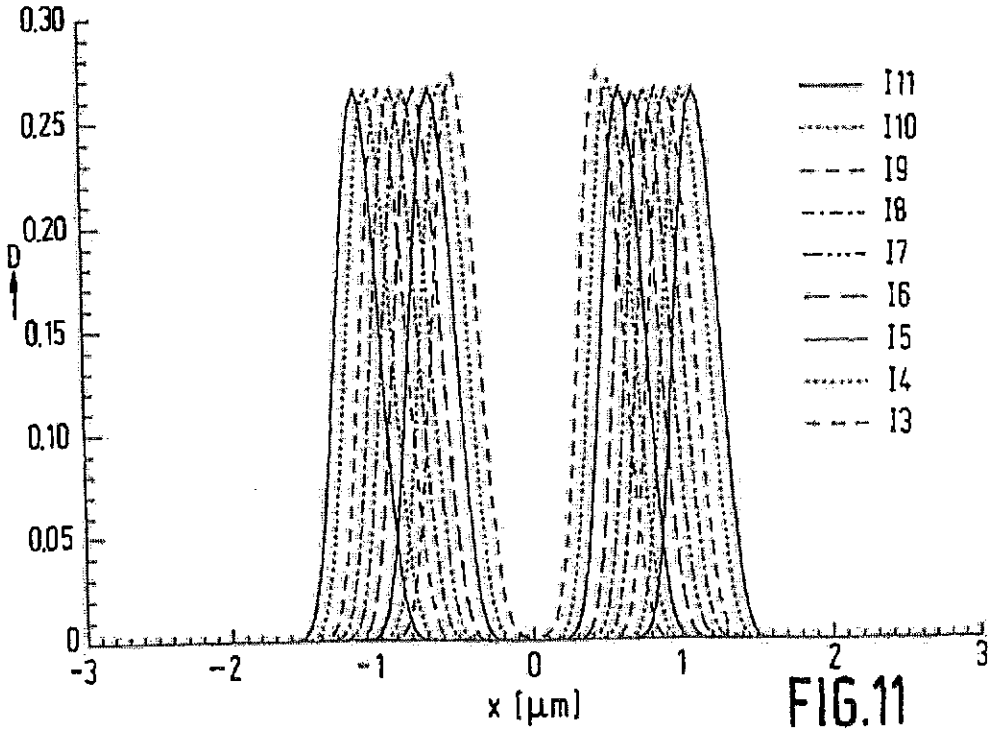
0.5
0
-3
-2
-1
0
1
2
3
x [μm]
I11
I10
I9
I8
I7
I6
I5
I4
I3

FIG.10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0.25
0.20
D
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0.10
0.05
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-3
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-1
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1
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x [μm]
I11
I10
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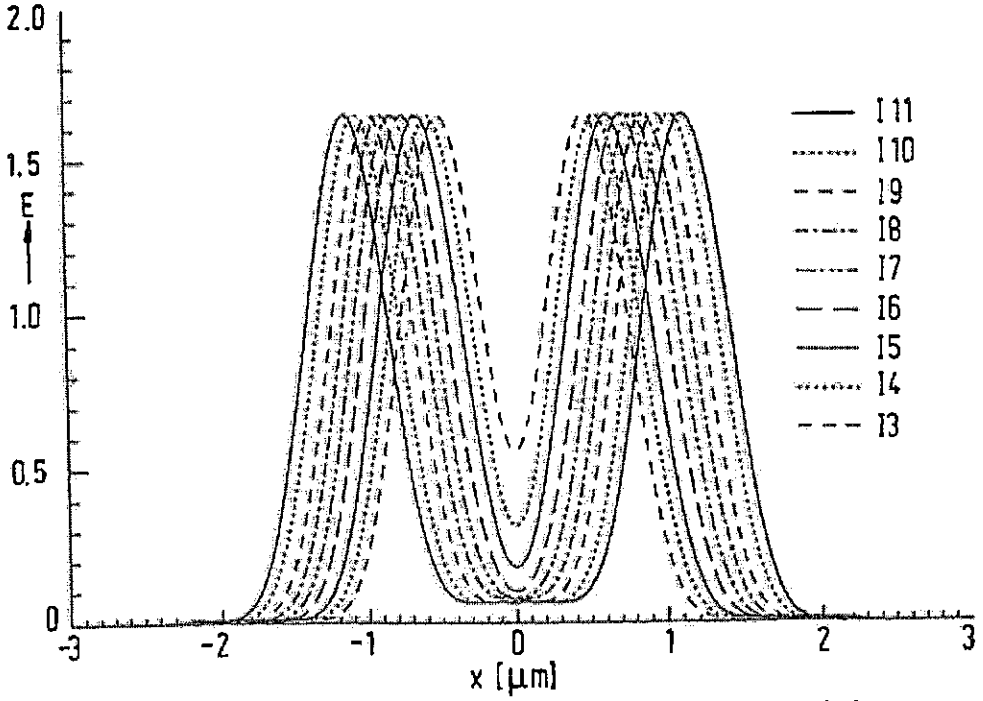
I8
I7
I6
I5
I4
I3

FIG.11


2.0
1.5
E
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0.5
0
-3
-2
-1
0
1
2
3
x [μm]
I 11
I 10
I 9
I 8
I 7
I 6
I 5
I 4
I 3

FIG.14

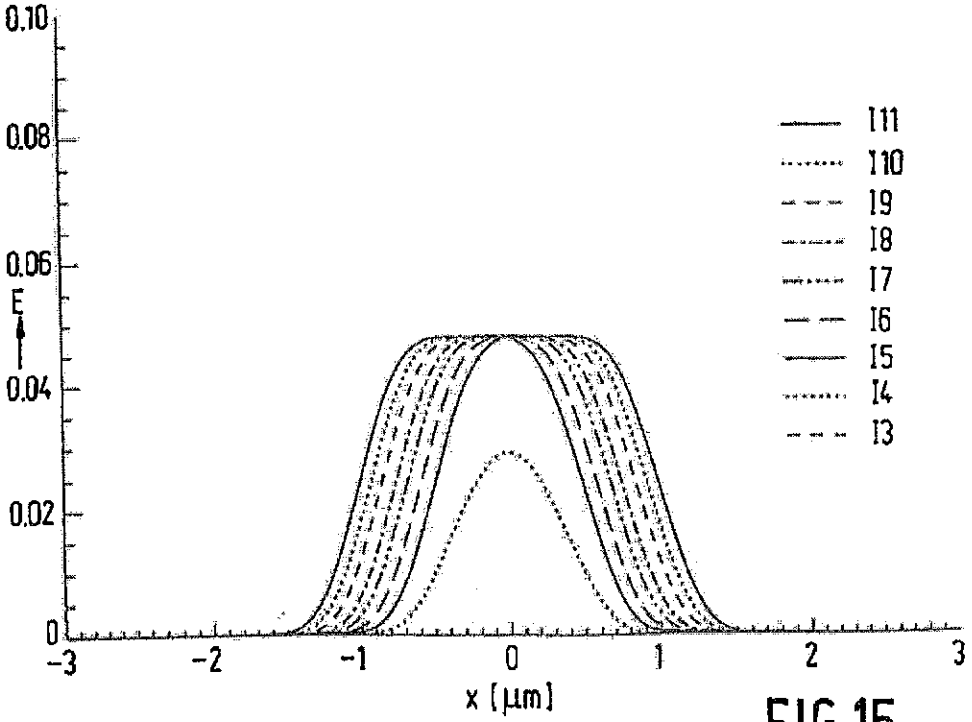
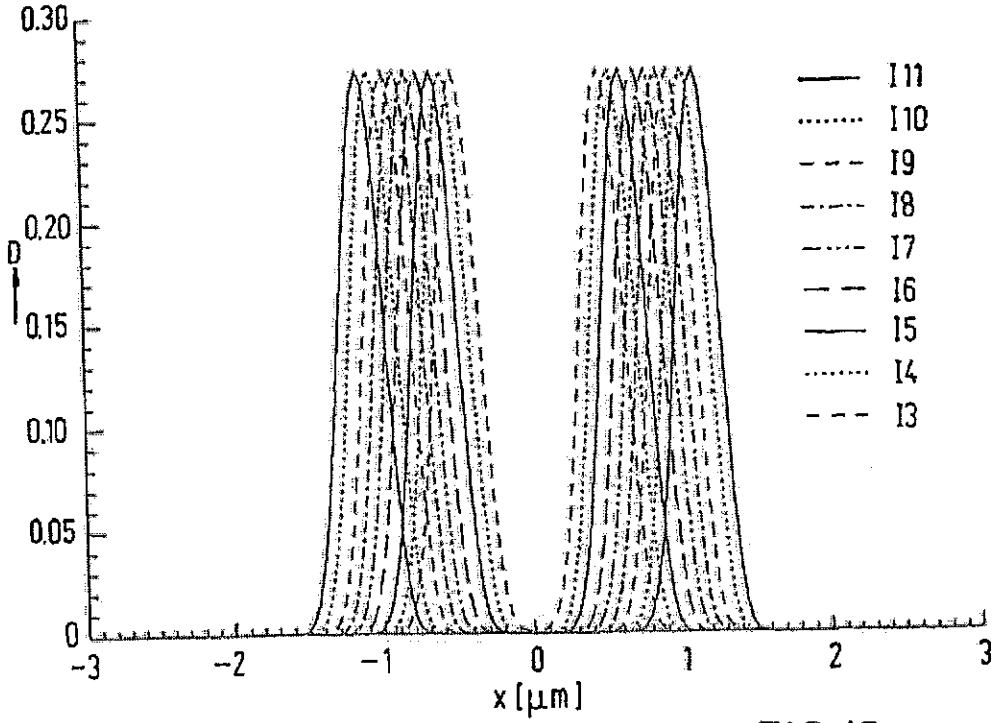

0.10
0.08
0.06
E
0.04
0.02
0
-3
-2
-1
0
1
2
3
x [μm]
I 11
I 10
I 9
I 8
I 7
I 6
I 5
I 4
I 3

FIG.15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0.25
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0.15
0.10
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0
D
-3
-2
-1
0
1
2
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x [μm]
I 11
I 10
I9
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I6
I5
I4
I3

FIG.16

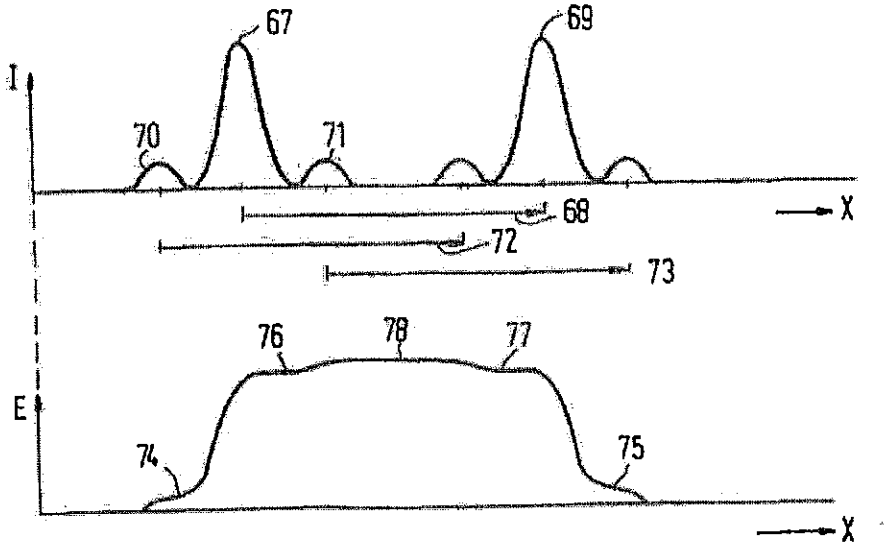
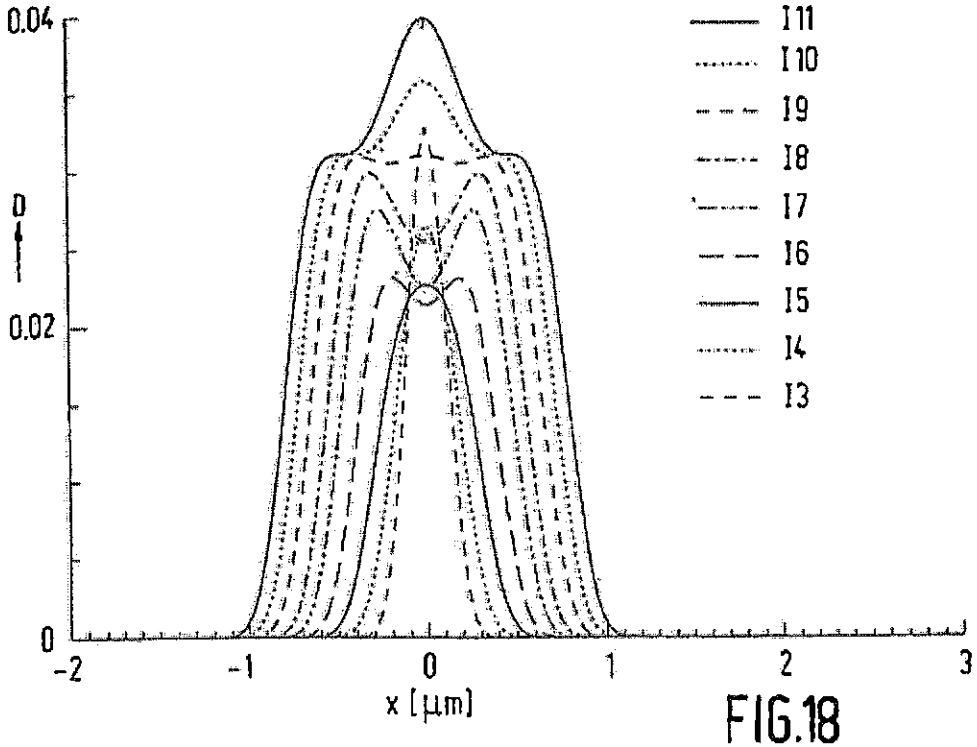

I
67
69
70
71
68
72
73
X
E
76
78
77
74
75
X

FIG.17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x [μm]
I11
I10
I9
I8
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I5
I4
I3

FIG.18

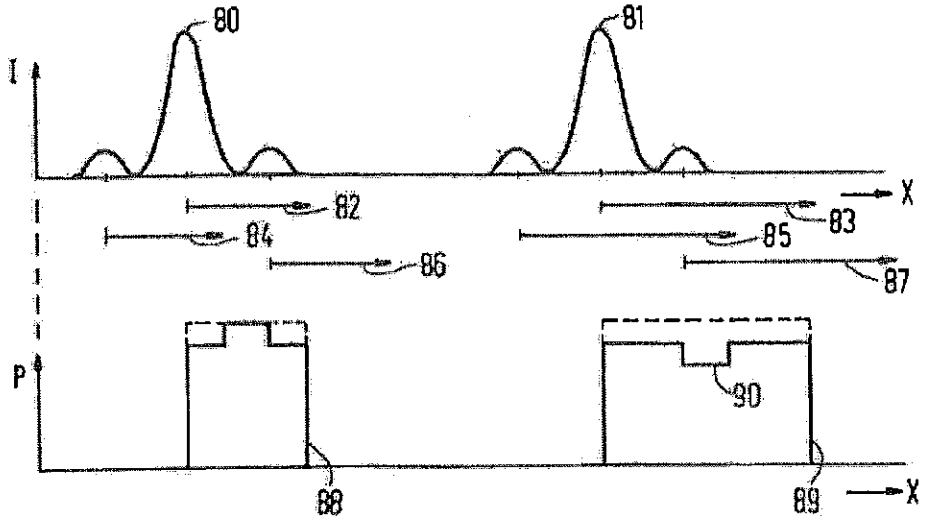
I
80
81
X
82
83
84
85
86
87
P
88
89
90
X

FIG.19

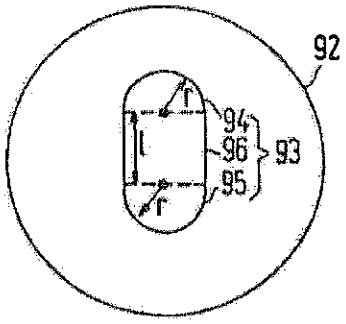

FIG. 20

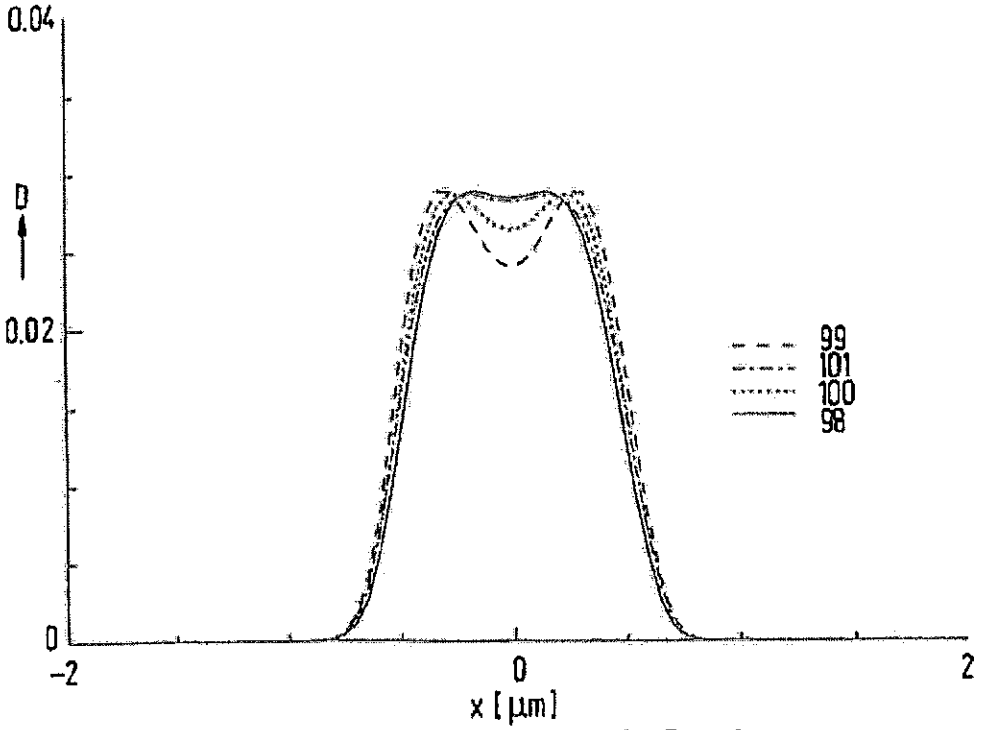

FIG. 21

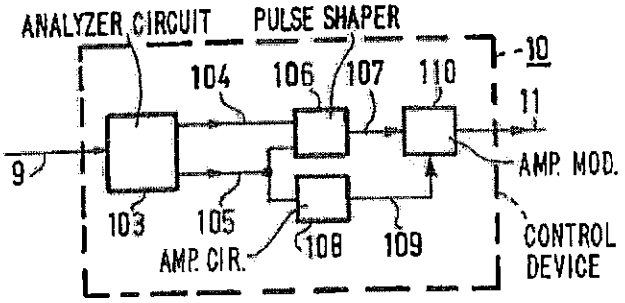

FIG. 22

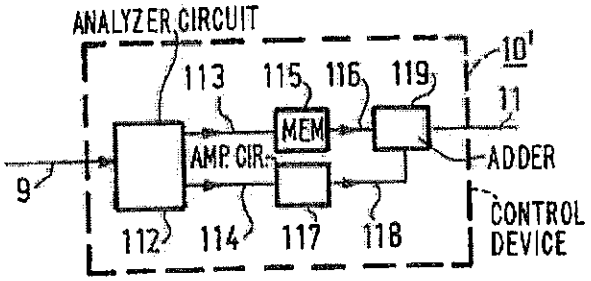

FIG. 23

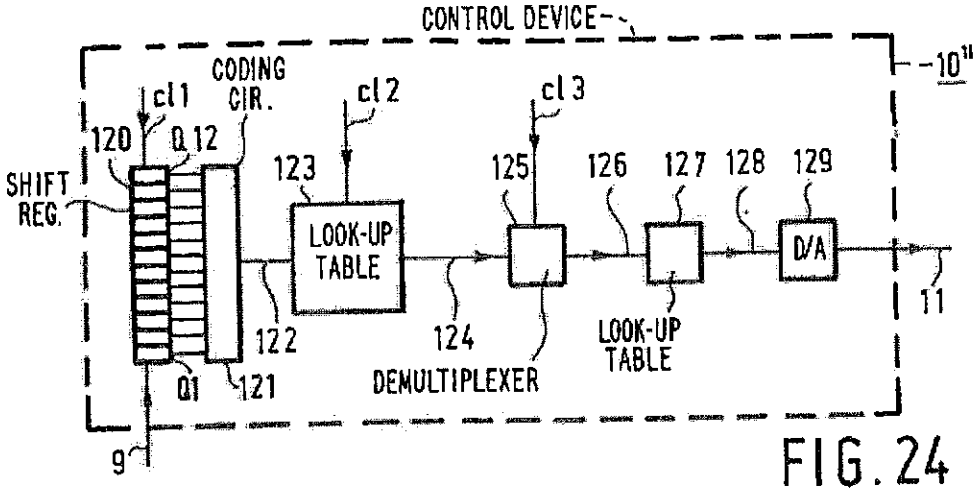

FIG. 24

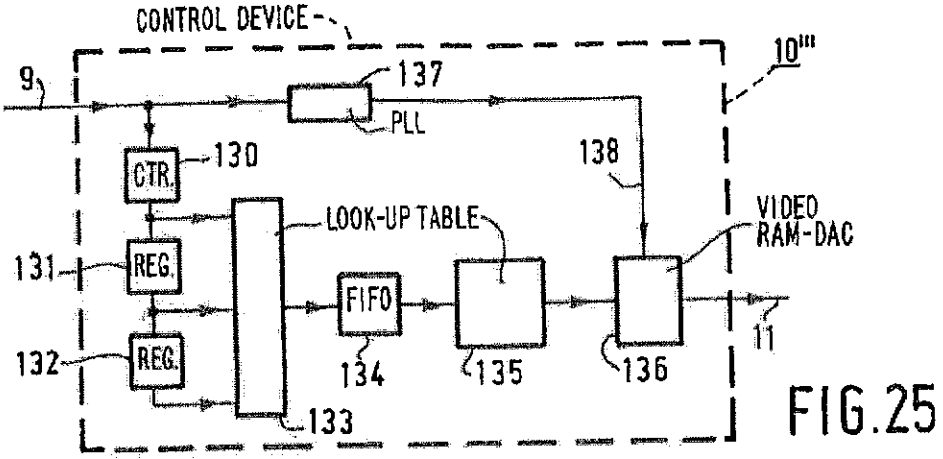

FIG. 25

OPTICAL INFORMATION CARRIER

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a division of U.S. patent application Ser. No. 08/362,622, filed Dec. 22, 1994, now U.S. Pat. No. 5,605,782.

BACKGROUND OF THE INVENTION

1. Field Of The Invention

The invention relates to a method of manufacturing an optical information carrier by recording information, comprising information units, in a master disc, in which a radiation beam scanning the master disc is modulated in power by the information and exposes a photoresist layer of the master disc to form a pattern of short and long exposed areas, and subsequently, the photoresist is developed to form a pattern of information areas, the beginning and duration of the exposure for each exposed area being determined by the associated information unit. The invention also relates to an arrangement for carrying out the method and to an optical information carrier obtained by carrying out the method.

An information unit is a portion of an information stream represented by a single feature on the master disc. For example, if a digital information signal alternately has a value zero and one and a signal portion having the value one results in an exposed area whose length is determined by the length of time for which the signal has the value one, this portion of the information signal is an information unit. An exposed area is called short if its length is smaller than twice the diameter of the radiation spot formed on the photoresist layer by the radiation beam, the diameter being the distance between two diametrically disposed points within the radiation spot where the local intensity is equal to half the maximum intensity in the radiation spot. For an Airy intensity profile formed by an objective lens, said diameter is equal to half the quotient of the wavelength of the radiation and the numerical aperture of the objective lens. An information area is an area on the master disc having properties which can be transferred to information carriers by a replication process, the corresponding areas on the information carriers being also referred to as information areas. Hereinafter, the term "area" without any further qualification refers to an exposed area in the photoresist, unless otherwise stated.

In the method of manufacturing an optical information carrier, the information is first inscribed in the master disc by exposure of the photoresist layer. The photoresist layer is subsequently developed, as a result of which information areas, for example, in the form of pits, are formed at the location of the exposed areas. Although hereinafter the information areas will often be referred to as pits, it will be obvious that these areas may also comprise hills. Subsequently, the master disc is provided with a metal layer. After the metal layer has been removed from the photoresist layer, it forms a die with a negative impression of the pattern of pits. The pattern of pits of the die is then transferred to a multitude of optical information carriers by a replication process such as, for example, a plastics moulding process, which information carriers may subsequently be provided with one or more layers to make them reflecting and/or inscribable. In an information carrier which cannot be inscribed by the user, the pattern of pits represents the recorded user information. In an inscribable information carrier, the pattern of pits may represent not only user information but also tracking information by means of which a radiation beam, used for reading or writing information, can be guided over the information carrier.

The information density on the information carrier can be increased by arranging the pits closer to one another. However, more densely packed pits give rise to a deterioration of the quality of the signal generated when the information on the information carrier is read, as a result of which the reliability with which the information is read decreases. The deterioration of the quality inter alia manifests itself in increased jitter, i.e., an increase of irregular random variations of the signal. In order to enable an information signal to be derived from the information carrier with a sufficiently low jitter in the case of higher densities, the pits in the master disc should have a very accurately defined position and shape. One of the problems which limit an increase in information density is that with a constant power of the radiation beam during the recording of information in the master disc the short pits appear to become narrower than the long pits.

2. Description of the Related Art

U.S. Pat. No. 5,040,165 discloses a method of manufacturing an optical information carrier, which aims to solve the above problem. The power of the radiation beam exposing the photoresist layer is chosen to be 25% to 100% higher for recording short areas than for recording long areas. However, tests conducted on information carriers manufactured by means of this method reveal that the envisaged reduction of jitter is not achieved. Moreover, the ratio between the power for recording short areas and that for recording long areas appears to depend strongly on the type and condition of the photoresist used on the master disc, so that the quality of the information carriers obtained from different master discs is different.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a method of the type defined in the opening paragraph which does not have the drawbacks of the known method.

To this end the method in accordance with the invention is characterized in that the exposure dose has substantially a constant predetermined value over the length of each recorded area, this value being independent of the length.

The invention is based on the recognition of the fact that the shape of the contrast curve of the photoresist layer is decisive for the ultimate shape of the pits in the information carrier. The contrast curve represents the development rate of the photoresist as a function of the exposure dose, which is the time-integrated amount of radiation per unit of area incident at a given location. The photoresists used for optical recording until now have a fairly linear contrast curve, i.e., an exposure dose which is twice as large yields a development rate which is twice as high. For optical recording with higher densities, it is now envisaged to use high-contrast photoresists in order to enable small well-defined pits to be formed. A first characteristic of a high-contrast photoresist is its threshold. An exposure dose below the threshold value provides a negligibly low development rate. A second characteristic of a high-contrast photoresist is that above the threshold value, the development rate increases very rapidly as a function of the exposure dose. The known method uses two different intensities for writing short areas and long areas, which generally results in two different exposure doses. This leads to different development rates for the short and the long areas, the difference in development rate increases as the contrast increases. The shape, i.e., the length, width and/or depth, of the short and the long pits

formed after development of the photoresist, therefore depends critically on the differences in radiation power used during exposure.

A second drawback of the known method is its sensitivity to changes in the shape of the contrast curve, which can be understood as follows. The amount of photoresist material which is transformed by a given exposure dose is comparatively insensitive to the temperature. Conversely, the development rate, i.e., the rate at which the transformed material is dissolved in a developer, depends strongly on both the temperature and the characteristics of the photoresist and on the concentration of the developer. The shape of the contrast curve is determined by the characteristics of the photoresist and the developer, and therefore, turns out to be strongly dependent on the temperature, composition and age of the photoresist. Since the contrast curve gives the relationship between the exposure dose and the development rate, a change of the contrast curve will result in a change of the development rate. As the contrast curve for high-contrast photoresists is very steep, the variations of the development rate for these photoresists are substantial and depend strongly on the exact exposure dose. For this reason, the shape of the pits cannot be controlled satisfactorily in the known method.

The method according to the invention, however, is highly insensitive to the exact shape of the contrast curve as a result of the method of exposure of the photoresist layer. For this purpose, the power of the radiation beam is controlled in such a manner that the exposure dose has substantially a constant value over the length of an exposed area, the value being equal for areas of different lengths. Substantially equal means equal within about ±3%. For this, the leading and trailing portions of each area have been ignored and the exposure is measured along the centerline of the exposed areas. As a result of the equal exposure doses, the development rate for each area is also equal regardless of the shape of the contrast curve. If the shape of the contrast curve deviates from the presumed shape, the development rate of both short and long areas will change similarly. The change in development rate can be corrected simply by appropriately reducing or extending the development time for the photoresist layer. Thus, the short and long pits will be given the desired shape independently of the exact shape of the contrast curve. As a result, jitter is reduced, and, consequently, the length of the pits and the distances between the pits can be reduced in order to increase the information density on the information carrier.

The radiation beam forms a radiation spot with a certain intensity profile on the photoresist layer. During writing, the radiation spot is moved over the photoresist layer. The exposure dose at an arbitrary location of the photoresist layer is therefore determined by the convolution of the profile and its displacement. When a small area is exposed, the displacement of the radiation spot is small relative to the size of the radiation spot, in contrast with a long area, where the displacement is larger than the size of the radiation spot. As a result of the convolution effect, the exposure dose in a small area is consequently lower than the exposure dose in a long area. A special embodiment of the method in accordance with the invention is therefore characterized in that the power of the radiation beam during exposure of short areas is made higher than the power of the radiation beam during exposure of long areas, so that the exposure dose in short and long areas is substantially equal. The value of the power as a function of the length of an area to be exposed follows from the requirement that the local exposure dose should have substantially the same constant predetermined value for all the areas.

In certain situations, the last-mentioned embodiment of the method leads to comparatively short exposed areas in the photoresist layer when long information units are written, and thus to comparatively short pits. This could be corrected by a slightly longer development of the photoresist layer. However, the short areas are then also developed longer, as a result of which the short pits would become too long. An embodiment of the method in accordance with the invention is therefore characterized in that the duration of the exposure of a long area is selected to be longer than the duration of the associated information unit. The magnitude of the extension is independent of the slope of the contrast curve and is between a few percent and about 20 percent for long areas and zero for short areas.

A special embodiment of the method, according to the invention, is characterized in that the exposure of a long area is started before the beginning of the associated information unit. Since recording in a photoresist is a symmetrical process, the extension of the exposure time should be symmetrical relative to the nominal location of the area, i.e., exposure should begin sooner and stop later than prescribed by an information unit.

The intensity profile of the radiation spot generally has a central lobe of high intensity surrounded by, generally ring-shaped, side lobes of lower intensity. During writing, the radiation spot moves over the photoresist layer, as a result of which some locations on the photoresist layer are irradiated successively by both the central lobe and one or more side lobes. By now reducing the power of the radiation beam at such locations, according to a special embodiment of the method of the invention, it is yet possible to obtain a constant exposure dose over the length of an exposed area.

When the information density of the information carrier is to be increased, the areas on the master disc have to be recorded closer to one another. When a first area is exposed, both an adjacent second area and the part of the photoresist layer disposed between these areas will be exposed to a low dose owing to the size of the radiation spot. In this intermediate area, the exposure dose will remain below the threshold of the contrast curve and will not lead to the formation of information areas. In the second area, the low dose is added to the exposure dose already administered or to be administered to form this second information area. The addition leads to a slightly higher exposure dose for the second area than in the case that the two areas would be remote from one another. Owing to the steepness of the contrast curve, this slight increase of the exposure dose of the second area results in a noticeable increase in development rate. As a consequence, information areas which are situated closer to one another become larger than information areas which are situated farther apart. This distortion gives rise to increased jitter. The method can be modified in two different manners in order to correct for the effect described above.

In a first modification, the method, according to the invention, is characterized in that during the recording of two adjacent areas, the part of each area situated nearest the other area is recorded with a power of the radiation beam which is a monotonically non-decreasing function of the distance between the two areas. During writing, the power in the radiation beam is controlled in such a manner in dependence upon the distances from the adjacent areas that the exposure dose in the area has the required constant value, so that no distortion dependent on the distance between the areas occurs.

In a second modification the method, according to the invention, is characterized in that during passage between

two areas, the radiation beam has a power lower than the power for recording these areas and the power has a monotonic non-decreasing relationship with the distance between the two areas. In this way, it is achieved that an adjacent area is given a fixed additional exposure independently of the distance from other areas. Jitter is now reduced because all the areas have the same distortion. The additional exposure dose should be smaller than about three percent of the constant, predetermined value of the exposure dose.

According to the invention, an arrangement for carrying out the method is provided, this arrangement comprising an apparatus for recording information in a master disc by exposure with a radiation beam according to a pattern of short and long exposed areas, this apparatus comprising a radiation source for producing a radiation beam, an intensity modulator, and a control device associated with said modulator, an optical system for forming a radiation spot on the master disc by means of the radiation beam, and means for moving the master disc and the radiation spot relative to one another. The arrangement is characterized in that the control device is adapted to control the modulator in such a manner that the exposure dose has substantially a constant predetermined value over the length of an exposed area, which value is independent of said length. Such an apparatus is also called a master recorder.

A special embodiment of the arrangement, according to the invention, is characterized in that the control device comprises a memory for storing the relationship between, on the one hand, the duration of the information units and, on the other hand, at least one of the parameters the beginning, the duration, and the power of the exposure.

In a preferred embodiment, the control device comprises a coding circuit for assigning a code to an information unit in the information to be recorded, this code representing the length of the information unit and is associated with an address of the memory. Whereas, the information is, in general, presented as a serial data stream, the code may be a presented as a parallel data stream. The code can thus be processed in parallel at a lower clock frequency than the information. As a consequence, components of the control device need not be designed for very high clock frequencies and may be standard components.

For recording information with a high density, the arrangement is preferably characterized in that the optical system includes a filter. A filter enables the amplitude or the phase of the radiation to be influenced in such a manner that the size of the central lobe of the radiation spot is reduced, as a result of which the exposed areas can also become smaller.

A special embodiment of the arrangement, according to the invention, is characterized in that the filter comprises an elliptical phase plate. The elliptical shape enables the power of the side lobes of the intensity profile in the writing direction to be reduced in comparison with a circular phase plate, as a result of which the write strategies in accordance with the invention yield a better result.

It is to be noted that European Patent Application 0,411,525 discloses a rectangular phase plate having a length equal to the diameter of the pupil of the optical system. However, by means of such a phase plate, it is not possible to form a radiation spot suitable for a master recorder, which spot should have small dimensions in two directions.

An optical information carrier manufactured by means of the method, according to the invention, is characterized in that the lengths of the information areas deviate less than 10% from the lengths of the associated information units.

This deviation is smaller than that of information carriers not manufactured by means of the method in accordance with the invention. The smaller deviation leads to a reduction of jitter in the read signal obtained from the information carrier.

The optical information carrier is further characterized in that the distances between adjacent information areas deviate less than 50 nm from the distances between the associated information units. A more accurate definition of the distances between adjacent information areas, like the more accurate definition of the lengths of the information areas, also leads to a reduced jitter.

The optical information carrier is further characterized in that the spread in width of the information areas is smaller than 30 nm. A well-defined width of the information areas yields a well-defined magnitude of the read signal. This also results in a reduction of jitter.

BRIEF DESCRIPTION OF THE DRAWINGS

Some embodiments of the invention will now be described in more detail, by way of example, with reference to the drawings. In the drawings:

FIG. 1 shows an arrangement for manufacturing information carriers;

FIG. 2 shows an apparatus for recording information in a master disc;

FIG. 3 gives the intensity and exposure dose as a function of the location on the master disc;

FIG. 4*a* shows the relationship between exposure dose and development rate for a low-contrast photoresist;

FIG. 4*b* shows the relationship between exposure dose and development rate for a high-contrast photoresist;

FIG. 5 shows development profiles for EFM information units recorded without a write strategy;

FIG. 6 shows development profiles for EFM information units recorded with the first write strategy;

FIG. 7 gives the power of the radiation beam in accordance with the first write strategy as function of the length of the area to be written;

FIG. 8 shows development profiles for EFM information units recorded with the second write strategy;

FIG. 9 gives the power of the radiation beam in accordance with the second write strategy as function of the length of the area to be written;

FIG. 10 gives exposure doses for a series of two short areas at different distances;

FIG. 11 shows the development profiles associated with the dose profiles in FIG. 10;

FIG. 12 gives the power of the radiation beam in accordance with the third write strategy for a series of areas to be written;

FIG. 13 gives the power of the radiation beam in accordance with the fourth write strategy for a series of areas to be written;

FIG. 14 gives exposure doses in accordance with the fourth strategy for a series of two short areas at different distances;

FIG. 15 gives the exposure doses in the intermediate areas of FIG. 14;

FIG. 16 shows the development profiles associated with the dose profiles in FIG. 14;

FIG. 17 shows an intensity and dose profile with the effect of the side lobes of the intensity profile;

FIG. 18 shows development profiles for EFM information units recorded with a filtered radiation beam;

FIG. 19 gives an intensity profile and the power of the radiation beam in accordance with a fifth write strategy;

FIG. 20 shows the pupil of the objective lens of the master recorder with an elliptical phase plate;

FIG. 21 shows development profiles for an I9 signal with and without phase plate;

FIG. 22 shows a first embodiment of the control device of the master recorder;

FIG. 23 shows a second embodiment of the control device;

FIG. 24 shows a third embodiment of the control device; and

FIG. 25 shows a fourth embodiment of the control device.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows an arrangement for manufacturing an optical information carrier. Such an arrangement generally comprises an information processing unit 1, an apparatus for recording information in a master disc 3, or master recorder 2, an apparatus 4 for processing the master disc 3 and making dies 5 by means of the master disc 3, and a duplicating apparatus 6 for making impressions of the dies in information carriers 7. Information 8 to be recorded on the information carriers is applied to an input of information processing unit 1. The information includes tracking information to be recorded in a geometry of, for example, tracking grooves or tracking pits, address information to enable given locations on the information carrier to be identified, information to enable a subsequent correction of read errors and, if required, data which can be read by the user of the information carrier. The information processing unit 1 derives signals 9 for controlling master recorder 2 from the input information 8. With the aid of the control signals, the master recorder records the information in master disc 3 as a pattern of exposed areas in a photoresist layer. In an exposed area, the radiation of the beam is absorbed so that locally, the material in the photoresist is transformed and the solubility of the photoresist layer changes. The solubility, and hence the rate of development of the photoresist layer, increases as the exposure dose increases. The master recorder is an essential part of the arrangement and will be discussed in more detail hereinafter. The photoresist layer of master disc 3 is developed in apparatus 4, thereby converting the exposure pattern into a pattern of information areas in the form of pits and/or grooves in the photoresist layer. Subsequently, a metal layer is deposited onto the photoresist layer. After removal from the photoresist layer, the metal layer forms a die 5 with an impression of the pattern of pits. By means of such a die, duplicating apparatus 6 makes impressions of the pattern of pits in information carriers by means of, for example, a plastics molding process or a replication process based on photopolymerization, a so-called 2P process. From a single master disc 3, a plurality of dies 5 can be made, and with each die, hundreds to a few thousands of information carriers 7 can be made, so that thousands to millions of identical information carriers can be manufactured by means of a single master disc. The method may comprise a plurality of duplication steps, in which a plurality of dies are made from a single die.

FIG. 2 shows an embodiment of master recorder 2 for inscribing the round master disc 3. It will be evident that with a slight modification, such a recorder can also be adapted to inscribe masters of other form, for example, rectangular masters for making rectangular optical information cards or elongated masters for making optical tape. Master recorder 2 comprises a radiation source 12, for example, an argon-ion laser, which produces a radiation beam 13. The power of the radiation beam is pulse-modulated by an electro-optical or acousto-optical modulator 14 in dependence upon an output signal 11 of a control device 10, which has an input for receiving signals 9 from information processing unit 1. The control device converts signals 9 into signals suitable for controlling modulator 14. When a radiation source which can be modulated rapidly, such as, for example, a semiconductor laser, is used, the laser can be controlled directly by control device 10, and the radiation source 12 and modulator 14 will form a single device. An intensity-modulated radiation beam 15 from the modulator 14 is focused to form a radiation spot 19 on the photoresist layer 20 of the master disc 3, for example, by a beam widener 16, a mirror 17 and an objective lens 18. By rotating the master disc about an axis of rotation 21 and, at the same time, moving optical elements 17 and 18 in a radial direction 22, it is possible to write concentric or spiral tracks in the photoresist layer. As a result of the movement of the radiation spot and the photoresist layer relative to one another, the length of time of an information unit and the associated exposure time can be converted to a length of the information unit and of the exposure. During recording, the radiation beam is kept in focus on the photoresist layer in that objective lens 18 is made to follow a vertical movement 23 of the master disc via feedback. If the master disc rotates with a constant angular velocity, the power in the radiation beam should increase as a linear function of the radius of the track to be written in order to maintain a constant exposure dose. This slow variation of the power can be effected by modulator 14.

The effect of the mutual displacement of radiation spot 19 and master disc 3 during the recording of an area in the photoresist layer will be illustrated with reference to FIG. 3. When an area is recorded in the photoresist layer, the photoresist layer is irradiated by radiation spot 19. A dashed curve 25 in FIG. 3 represents the intensity profile of the radiation spot as a function of the location. The location x on the photoresist layer in the direction of movement of the radiation spot is plotted along the horizontal axis, the intensity I being plotted along the vertical axis. For the sake of simplicity, the intensity is represented as a bell-shaped curve, although the curve will generally have a so-called Airy profile, which is characteristic of a diffraction-limited radiation spot formed by a lens having a circular aperture. Curve 25 shows the profile at the instant at which the radiation beam is turned on to expose an area, and a curve 26 shows the profile at the end of the exposure after a displacement represented by an arrow 27. The exposure dose of the photoresist layer in the exposed area is the convolution of the intensity profile and the displacement thereof. The dose profile, which is the exposure dose as a function of the location, is represented by a solid curve 28 in the Figure, for which the exposure dose E is plotted along the vertical axis. The length of the exposed area in the situation shown is short in comparison with the diameter of the intensity profile of the radiation spot, which is referenced w in the Figure.

FIG. 3 also shows the situation for exposure of a comparatively long area. When exposure begins, the intensity profile is given by a dashed curve 29, which has the same shape as intensity profile 25; at the end, it is given by a curve 30, after the center of the profile has performed a travel represented by an arrow 31, whose length is greater than twice the diameter of intensity profile 29. The associated

dose profile, represented by a curve 32, has a flat maximum which is slightly higher than the maximum of curve 28. The maximum exposure dose of curve 32 is reached only in areas where the intensity profile has moved over a distance greater than approximately twice the diameter of the profile.

During the developing process, the exposed areas of the photoresist layer are dissolved in a developer liquid. The contrast curve of the photoresist dictates the relationship between the dissolution rate, also called development rate, and the exposure dose, as is shown in FIG. 4a. The top-right quadrant of the Figure shows a typical contrast curve 35 for a photoresist having a comparatively low contrast, the exposure dose E being plotted along the horizontal axis and the development rate D along the vertical axis. A threshold value 36 represents the exposure dose below which an exposure gives a negligibly small development rate. The bottom-right quadrant shows the dose profile of two areas, i.e., the exposure dose as a function of the location x on the photoresist layer. The maximum of dose profile 37 of the first area is slightly higher than the maximum of dose profile 38 of the second area, which difference may have been caused as explained with reference to FIG. 3. By means of the contrast curve shown in the top-right quadrant, the exposure doses in the bottom-right quadrant can now be translated into development rates shown in the top-left quadrant, which rates are again represented as a function of the location x on the photoresist layer. Thus, dose profiles 37 and 38 yield development profiles 39 and 40, respectively. During development, the photoresist layer dissolves at a rate proportional to the development profile. At the location of development profiles 39 and 40, this results in information areas in the form of pits in the photoresist layer, whose depth, length and width depend on the shape of the contrast curve and the development time. The exact shape of the pit is not determined entirely by the shape of the development profile but also depends on other factors in the development process. One of these factors is that the direction of the development rate is always perpendicular to a surface to be developed, so that at the beginning of the development process, the rate is perpendicular to the photoresist layer but is perpendicular to the inclined walls of a pit already formed. Since the thickness of the photoresist layer is generally equal to the desired depth of an information area or pit, which depth is comparatively small, a short development time already results in a pit of a depth equal to the thickness of the photoresist layer. Consequently, prolonged exposure will not cause the depth to change and only the length and width of the pit will increase proportionally to the development rate at a given location on the photoresist layer.

The length of a pit may be defined in various ways, for example, as the length of that part of a pit which has a depth equal to the thickness of the photoresist layer, or of that part of the pit situated between the positions at the leading and trailing edge where the depth is equal to half the thickness of the photoresist layer. For a given development process, this depth d, whose value depends on the adopted definition, is reached in a time t, which complies with t=d/D, where D is the development rate. The points of development profiles 39 and 40 which have been developed to a depth d in the time t are situated on a so-called development line, represented by a line 41 in FIG. 4a. After termination of the process, the developed pits have lengths represented by arrows 42 and 43. In the case of a longer development time, line 41 is situated at a lower development rate D because the product of t and D is constant for the development line, as this development line is associated with a particular, constant value of the depth d. As a result, the lengths of the resulting pits increase. The slope of the walls of the pits is determined by the slope of profiles 39 and 40, where these profiles intersect line 41. Owing to the comparatively low threshold 36 in contrast curve 35, side lobes or minor lobes of the two profiles 37 and 38 may give rise to elongation of the pits. The slightly different exposure doses of profiles 37 and 38 in FIG. 4a result in two pits of different lengths, represented by arrows 42 and 43. Contrast curve 35 relates the development line to an exposure dose line 44 in the bottom-right quadrant of the Figure. Intersections 45 and 46 with dose profiles 37 and 38 represent the lengths of the ultimately formed pits. The lengths of arrows 45 and 46 are equal to those of arrows 42 and 43, respectively.

Similarly to FIG. 4a, FIG. 4b shows a relationship between exposure dose and development rate but now for a photoresist of high instead of low contrast. The high contrast manifests itself in the slope of contrast curve 35' and the high threshold 36'. Dose profiles 37 and 38 in FIG. 4b are equal to the dose profiles in FIG. 4a. However, the resulting development profiles 39' and 40', respectively, deviate considerably from profiles 39 and 40. In the first place, the steeper contrast curve results in steeper walls of the pits and hence in narrower pits. Moreover, owing to the high threshold 36', the side lobes of the two profiles 37 and 38 do not give rise to elongation of the pits. As a result, the pits thus formed can be smaller and can be packed more densely, so that the information density of the information carrier increases. Secondly, there is a substantial difference between the maximum development rates of the two profiles 39' and 40' in spite of the comparatively small difference between the maximum exposure doses of profiles 37 and 38. The fact that the small differences give rise to such a strong effect is due to the steepness of the contrast curve 35' and an exposure dose line 44' lying close to the maximum of the profiles 37 and 38. When a high-contrast photoresist is used, the length and width of the resulting pits will therefore depend strongly on the exact value of the exposure dose in the exposed areas. The pit formed by development profile 39' will be longer and wider than the pit formed by profile 40'. The differences between the shapes of the two pits depends, moreover, on the exact conditions of the development process. This is clarified by means of the extreme case shown in FIG. 4b, where, for a particular development process, development line 41' intersects development profile 39' and is situated above profile 40'. Profile 39' results in a pit developed to the required depth, whereas profile 40' yields a pit not having the required depth. The resulting variation in depth, width and length of the pits in the master disc is transferred to the information carriers by the replication process, and leads to an increased jitter during reading of the information carriers. Differences in exposure doses cannot be corrected by a change in development time during the development process.

The shape of the pits is influenced not only by the exposure dose, but also by the parameters of the development process. Aging of the photoresist used for the photoresist layer, a variation of the concentration of ingredients of the photoresist and a variation of the developer concentration all lead to a variation of the slope and threshold value of contrast curves 35 and 35'. This results in a change of development profiles 39, 40 and 39', 40', respectively. These changes can be corrected only partly by means of a longer or shorter development time.

In general, the information units to be recorded on the master disc have different durations, resulting in exposed areas of different lengths. The exposure dose for any arbitrary length of the exposed areas can be determined from a

convolution of the intensity profile of the radiation spot and the displacement of the radiation spot in the manner as described with reference to FIG. 3. After that, the development rate for the various areas can be determined via contrast curves 35 and 35' in FIGS. 4a and 4b, respectively. The desired length of the exposed areas in the photoresist layer is dictated by the desired information density and the information coding method. In order to obtain a high density, the length of the shortest area is minimized. In some situations, it is desirable to record areas of a length shorter than twice the diameter of the radiation spot, i.e., shorter than the quotient of the radiation wavelength and the numerical aperture of the objective lens 18 in the case of an Airy intensity profile. A customary method of coding digital signals is the so-called eight-to-fourteen modulation (EFM). Hereinafter, the EFM coding has been used by way of example, but the invention is not limited to this coding. In the case of EFM coding, the length of time of the information units in the digital information signal is an integral multiple of a fixed basic time, which multiple lies between 3 and 11. A part of the information signal with a duration of a basic time is called a bit cell. The basic time can be translated into a basic length via the speed of movement of the radiation spot over the photoresist layer. The information units and the associated information areas are therefore designated I3 to I11, depending on their lengths. The information stored in the so-called Compact Disc is EFM coded.

FIG. 5 shows development profiles for EFM areas I3 to I11 having a basic length of 208 nm, for which a pulsed radiation spot with an Airy intensity profile and a constant power during the pulse, independent of the length of the areas to be recorded, and a high-contrast photoresist have been used. The profiles have been obtained during recording on a master disc with a high information density by means of a radiation beam whose wavelength is 458 nm and an objective lens 18 with a numerical aperture of 0.45. The profiles shown apply to the axis of a track written by the radiation spot, x being the distance along this axis. The Figure shows that the short areas I3, I4 and I5 in the center, i.e., for x=0, have a comparatively low development rate as compared with the longer areas. This is caused by the fact that the short areas have received a lower maximum exposure dose than the I6 and longer areas, where the maximum exposure dose as shown by curve 32 in FIG. 3 is reached. As a result of the convolution effect, as explained hereinbefore with reference to FIG. 3, the development rate for the short areas is substantially lower than for the long areas. If a development line 48 is situated at the level shown in FIG. 5 the lengths of the pits formed for I3, I4 and I5 areas appear to be substantially shorter than the lengths of the associated information units, i.e., 3, 4 and 5 times the basic length of the EFM coding, whereas the lengths of longer pits are slightly too short. The discrepancy between the deviations from the length of short pits and that of long pits renders the read signal generated by these pits highly unreliable. U.S. Pat. No. 5,040,165 discloses a method which improves the length of the short pits by making the power in the radiation beam higher during the recording of such short areas than during the recording of long areas. This results in a higher maximum exposure dose and a higher maximum development rate for the short areas. Although this known method yields an improvement of the length of the pits, the problem of a strong dependence of the pit shape on the exact exposure dose and on the value of the parameters of the development process, as described in the previous paragraph, persists.

According to the invention, the deviations from the desired length and width of the pits or information areas are reduced considerably by giving the dose profiles of all areas, both the short and the long ones, substantially the same maximum exposure dose. As a result of this, the maximum development rate of all the development profiles becomes the same so that no undesirable variations in pit length and width depending on the development process arise. "Substantially the same" means the same within about 3 percent. Should an exposure dose have become too high or too low for all the areas, correction is possible, if the dose is above the threshold, by slightly reducing or increasing the development time so as to obtain the desired shape of the resulting pits. The exposure method in accordance with the invention also reduces the dependence of the pit shape on development process parameters. The exposure method ensures that all development profiles 37, 38 have the same slope at the location of intersection with exposure dose line 44. If all development profiles become less high as a result of a change of the contrast curve, the pits become narrower and shorter to the same extent when the development conditions remain the same. During the development, the length of each pit can subsequently be increased by the same amount so as to obtain the desired length by slightly increasing the development time relative to the nominal development time.

FIG. 6 shows, for EFM coded signals I3 to I11, the development profiles as obtained by using the first write strategy in accordance with the invention, for which the maximum exposure doses in the exposed areas have been equalized. The power in the radiation beam depends on the length of the information unit in a manner as shown in FIG. 7, in which the number of basic lengths of the information unit has been plotted along the horizontal axis, and the normalized power P of the radiation beam along the vertical axis. The power for areas shorter than I6 increases as the length of the areas decreases. The decrease can be approximated mathematically by an exponential function. In the Figure, the power for I3 is 15% higher than for I11. The magnitude of the power for equal exposure doses can be calculated from the convolution of the intensity profile of the radiation spot and its displacement. The power in the laser beam in the example shown in FIG. 7 is modulated by changing the transmission of the modulator 14 in the laser beam. It is also possible to change the power of the laser beam by changing the repetition frequency of short pulses of laser radiation. The repetition frequency is so high that a series of such short pulses causes substantially the same irradiation pattern on the master disc as a single long pulse. A short information unit, such as an I3, is recorded with a higher repetition frequency of the short pulses than a long information unit, such as an I11. The higher repetition frequency increases the average power of the radiation beam, which is required for recording short information units.

A further advantage of the first strategy, apart from the insensitivity to variations in the development process parameters, is that the width of the pits is independent of the length of the pits, in contradistinction to the teaching of U.S. Pat. No. 5,040,165. If short pits are narrower than long pits, as in the case of recording without any write strategy, the read signal produced by the short pits will be comparatively small. If short pits are wider than long pits, as resulting from the write strategy known from said United States patent, the amplitude of the read signal originating from the short pits will be larger, but the jitter of the read signal will also be comparatively high. Moreover, as a result of this larger width, the tracks of the information carrier cannot be arranged sufficiently close to one another, which limits the increase in information density. It appears that the read

signal jitter is minimal in the case of an equal width for short and long pits, which is the case when the first write strategy in accordance with the invention is used.

Under certain circumstances, it may occur, depending on the basic length of the information areas, the numerical aperture of the optical system and the wavelength of the radiation beam, that, in the case of the first write strategy, the lengths of the resulting short pits are too great or the lengths of the short pits are too small. In order to solve this problem, the invention provides a second write strategy. In accordance with this strategy, the exposure time for the long areas is first of all slightly increased. Secondly, in order to maintain the nominal location of the information area, exposure is extended symmetrically both at the leading and the trailing end of each long information unit. In the third place, the development time is increased or reduced, if necessary, to such an extent that the shortest information area has the desired length of the information unit. Such a reduction or increase of the development time, respectively, corresponds to an upward or downward shift of development line 49 in FIG. 6. This results in all the information areas being shortened or extended. FIG. 8 shows the development profiles for the areas I3 to I11 obtained with the second write strategy. FIG. 9 shows the corresponding power of the radiation beam as a function of the length of the information units. As compared with FIG. 7, where the second write strategy has not been used, it is clearly visible that with the second write strategy, the actual exposure for the area I4 and the longer areas begins before the beginning of the information unit, i.e., before the length 0 on the horizontal axis of the Figure. When the radiation power is delivered by a beam of short pulses, the average power can be adjusted by varying the repetition frequency of the pulses. The advancement of the exposure for the longer information units can be achieved by a change in the phase of the short pulses.

So far, only the effects which occur when isolated areas are exposed have been considered. If the information density is increased, problems will arise because not only the areas themselves, but also, the distances between the areas become smaller. The dose profiles of adjacent areas will then overlap and the shape of the resulting information areas will become dependent on the distance between adjacent areas. FIG. 10 illustrates this effect for a series of pairs of adjacent I3 dose profiles, an intermediate area being situated between the two profiles of each pair, which intermediate area has a length which is a multiple of the basic length, as indicated in the Figure. The profiles correspond to an NA of 0.45 and a λ of 458 nm, as for the master recorder described above, and a basic length of 162 nm of the information units. The most prominent effect is the comparatively high exposure dose in the intermediate area. Moreover, there is a slight increase of the maximum dose in the exposed areas themselves as the distance between the areas decreases. FIG. 11 shows the development profiles associated with the dose profiles of FIG. 10 for a high-contrast photoresist. As a result of the threshold of the contrast curve, the comparatively high exposure dose in the intermediate area does not lead to an increased development rate. Conversely, the slightly higher maximum exposure dose of the areas which are closest to one another leads to a significant increase of the maximum development rate owing to the slope of the contrast curve. As a result, pits which are situated close to one another become too large.

This problem is solved by the use of a third write strategy, in accordance with the invention, according to which the power in the radiation beam for recording an area is adapted to the distance from the previously written area and the area to be written subsequently, in such a manner that the desired constant exposure dose is obtained over the length of the area. For each combination of the lengths of three consecutive exposed areas and the two intermediate areas, it is, therefore, required to calculate the power needed for writing the central exposed area. Apart from the lengths of the intermediate areas, allowance is to be made for the lengths of the exposed areas themselves because the power of the radiation beam, and hence, the effect of the overlap, in accordance with the first write strategy depends on the length of the areas. FIG. 12 shows, diagrammatically, the power P of the radiation beam for recording a series of areas in accordance with the third write strategy, where, for the sake of clarity, the nominal power in a pulse is assumed to be independent of the length of the pulse. Pulse 54 has the nominal power because it is spaced so far from the adjacent pulses that the dose profiles do not overlap. Pulse 55 has the nominal power at its left side because of the large distance from pulse 54. At the right-hand side, the power should be reduced slightly because of the overlap of the associated dose profile with that of the next pulse 56. Likewise, the power at the left-hand side of pulse 56 must be reduced. The magnitude of the power reduction can be determined from the shape of the intensity profile of the radiation spot and the distances between the pulses. Owing to the comparatively short distance between pulse 56 and the following pulse 57, both pulses should exhibit a comparatively large power reduction over a larger distance, as is shown in the Figure. The maximum power of pulse 57 does not reach the nominal value because the pulse is comparatively short and the adjacent pulses at both sides are situated at short distances. It is not necessary to reduce the power of the pulses stepwise as shown in the Figure. Reduction is also possible in accordance with, for example, a straight line or a smooth curve. In order to simplify implementation of the third write strategy the power reduction may be applied only to those pulse pairs which have the shortest spacing, for which pulses, the overlap effect is strongest.

A fourth strategy provides an alternative solution for the effect of too large information areas owing to a short distance between them. In this strategy, the intermediate areas are deliberately irradiated. The magnitude of the exposure dose applied between the areas to be written increases with the distance between these areas, and remains below the threshold of the contrast curve. The exposure of these intermediate areas results in a dose profile having side lobes at the location of the adjacent areas. The additional exposure of an adjacent area is now provided both by the side lobe of the dose profile of a preceding area and the side lobe of the dose profile of the intermediate area. As the distance between the two areas increases, the first contribution to the additional exposure decreases but, in accordance with the invention, the second contribution increases so that the additional exposure of the area to be recorded is independent of the distance between the areas. The power in the radiation beam during exposure of the intermediate areas can be determined from the intensity profile of the radiation spot. Each recorded area thus receives an additional exposure dose at the beginning and at the end. The additional exposure dose should be smaller than about three percent of the constant, predetermined value of the exposure dose. Consequently, each resulting information area is slightly widened at the beginning and at the end. Since this widening is the same for all the information areas, both long and short ones, this will not result in a deterioration of the jitter. An advantage of the fourth write strategy as compared with the third strategy is that the power applied to the intermediate

areas depends only on the distance between the exposed areas and not on the lengths of the areas to be written, as in the third strategy. This simplifies power control in the master recorder.

FIG. 13 represents, diagrammatically, the power in the radiation beam during recording of a series of areas in accordance with the fourth strategy. All the pulses have the nominal power, which, for the clarity of the drawing, is assumed to be independent of the length of the pulses. In the intermediate area between pulses 59 and 60, the power is maintained at a comparatively low value 61 for the required additional exposure at the end of the pulse 59 and at the beginning of the pulse 60. The distance between pulse 60 and the next pulse 62 is shorter than the distance between pulses 59 and 60, so that power 63 between pulses 60 and 62 is consequently lower than power 61. The distance between pulses 62 and 64 and between 64 and 65 is so small that no additional exposure is required. FIG. 14 shows a series of pairs of adjacent I3 dose profiles, each pair having an intermediate area with a length as indicated in the Figure, obtained by using the fourth strategy. The maximum exposure doses in each of the recorded areas are equal and independent of the distance between the two recorded areas. On the other hand, the exposure doses in the intermediate areas, i.e., around x=0, have increased in comparison with the situation without this strategy as shown in FIG. 10. The exposure doses in the intermediate areas are shown in FIG. 15, the values plotted along the vertical axis being expressed in the same units as in FIG. 14. The dose for the shortest intermediate area, i.e., I3, is zero. FIG. 16 shows development profiles corresponding to the exposure doses in FIG. 14, for a photoresist with a steep contrast curve. All the development profiles shown now have the same shape independently of the distances between the profiles. The information areas produced upon development will therefore have the same size. The development rate between the profiles is substantially zero despite the comparatively high development doses at these locations, as is apparent from FIG. 14. This advantage is obtained owing to the comparatively high threshold value of a high-contrast photoresist.

The third strategy and the fourth strategy can be combined advantageously to form a fifth strategy. This strategy is first of all characterized in that the power of the radiation beam in the intermediate areas has a comparatively low value, which increases as the length of the intermediate areas increases and, secondly, the power at the beginning and the end of an area to be written has a fixed value slightly lower than the nominal value. Exposure of the intermediate areas results in a fixed additional exposure at the beginning and the end of the areas, as explained for the fourth strategy. Reduction of the power at the beginning and the end by a fixed amount compensates for the additional exposure and ensures that the exposure dose is constant over the length of each area independently of the distance between the areas. The resulting information areas consequently have equal widths independently of the distance to adjacent areas. Power control in the fifth strategy is just as simple as in the fourth strategy because the power in the intermediate areas depends only on the length of the intermediate areas and because the power for all the areas to be recorded is corrected in a similar way independently of the length of the area and of the distances from adjacent areas.

FIGS. 6 and 8 show that the development profiles for areas recorded in accordance with the first and the second strategy, respectively, do not have a flat maximum but exhibit slight deviations which depend on the length of the areas. The deviations primarily affect the width of the resulting information areas. In the case of the development profile for, for example, the information area 111 in FIG. 8, the development rate for x=0 is slightly higher than for x=0.6 μm. The development profile in a direction perpendicular to the x direction or write direction, i.e., in a direction perpendicular to the plane of drawing, determines the width of the information area. For x=0, this profile is therefore wider than for x=0.6 μm. As a consequence, the resulting information area for x=0 is wider than for x=0.6 μm. The non-constant width of the information areas results in increased jitter of the read signal. The cause for this is found to reside in the effect the side lobes of the intensity profile have on the convolution of the intensity profile with its displacement, and in the highly non-linear contrast curve. This will be explained with reference to FIG. 17. The upper half of the Figure shows an intensity profile of a radiation spot on the photoresist layer during the recording of an area, the profile moving over a distance represented by an arrow 68 from the starting position of the peak 67 to the end position indicated by peak 69. The base of the profile has two side lobes 70, 71 which are characteristic of the first bright ring of the Airy profile. The displacement of left-hand side lobe 70 during recording is represented by an arrow 72 and that of right-hand side lobe by an arrow 73. The lower half of the Figure shows the corresponding exposure dose on the photoresist layer as a dose profile. The dose profile has side lobes 74, 75 owing to the exposure by the side lobes 70 and 71 of the intensity profile. Portion 76 of the dose profile is caused by exposure by both side lobe 70 and peak 67 of the intensity profile, as is apparent from the overlap of arrows 68 and 72. Portion 77 of the dose profile is a summation of exposure by peak 67 and side lobe 71. A central raised portion 78 of the dose profile is caused by exposure with side lobe 70, side lobe 71 and peak 67 of the intensity profile, as is apparent from the overlap of arrows 68, 72 and 73. Since the intensity profile is substantially rotationally symmetrical, it will be evident that the exposure dose in the central portion, which dose is slightly higher than in adjacent portions 76 and 77, leads to a slightly wider dose profile in a direction perpendicular to the plane of drawing at the location of the central portion. This comparatively small widening of the dose profile, which is caused by the overlap of the exposure by side lobes 70, 71 of the intensity profile, results in a substantial widening of the development profile owing to the steep slope of the contrast curve. As a consequence, the resulting information area will be wider halfway its length than at the ends. In the case of displacements of the radiation spot smaller than shown in FIG. 17, dose profiles may arise with a central dip which represents a local constriction of the resulting information areas. Such width variations lead to increased jitter.

The above problem of width variations occurs increasingly in master recorders having a filtered objective lens. The purpose of filtering is to change the amplitude or the phase of the radiation emerging from the objective lens in such a manner that the cross-section of the radiation spot at half the maximum intensity level is narrowed, which enables recording with a high density. However, filtering causes the power in the side lobes of the intensity profile of the radiation spot to increase. This results in an increase of the variations in the exposure doses and, hence, of the variations in the width of the information areas. FIG. 18 shows an example of variations in the development profiles for EFM information units with a basic length of 162 nm recorded in accordance with the second strategy in a photoresist having a steep contrast curve, with λ=458 nm, an objective lens with NA=0.45 and a filter comprising a circular 180° phase

plate disposed in the center of the pupil of the objective lens and having a radius equal to 0.3 times the radius of the pupil. It is obvious that in this case, the side lobes will affect both the width and the length of the resulting information areas.

The adverse effects of the side lobes on the information areas are compensated for if a sixth strategy according to the invention is used. The sixth strategy compensates for the additional exposure dose in the center of the areas which is caused by the side lobes of the intensity profile. The height of the side lobes and the distance from the side lobes to the peak of the intensity profile can be calculated fairly accurately from the wavelength, the numerical aperture of the objective lens, the intensity distribution over the pupil of the objective lens, and the shape of the phase plate, if present. By means of the convolution of the intensity profile with the displacement of this profile, it is possible to calculate the required power in the radiation beam at any instant during the displacement in order to obtain a constant exposure dose over the length of the area. A correction for the side lobes of the dose profiles, such as, for example, the side lobes 74 and 75 in FIG. 17, is not necessary because these are smaller than the threshold of the contrast curve and will giver rise to a negligible development rate. FIG. 19 shows two examples of the effect of the sixth strategy. The upper half of this Figure shows the starting positions of two intensity profiles 80, 81 for recording a comparatively short and a comparatively long area, respectively. Arrows 82, 83 denote the respective displacements of the peak of the intensity profile during recording. Arrows 84, 85 and 86, 87 represent the displacements of the left-hand and right-hand side lobes of the intensity profiles. The lower half of the Figure shows the associated variation of the power P of the radiation beam as function of the displacement of the radiation spot over the photoresist layer for recording the short area and the long area. The broken lines in both power distribution profiles 88 and 89 represent the power in the case that no write strategy would have been used. The power distribution profile 88 for the short area shows that the power at the beginning and the end of the profile is lower than in the case of a profile without write strategy, indicated by a dashed line. The lengths of the two areas with reduced power correspond to the length of overlapping of arrows 82, 84 and 82, 86, respectively. When the long area is recorded, power distribution profile 89 is lowered over the entire length. An additional dip 90 in the center of the profile compensates for the three-fold overlap of arrows 83, 85 and 87. The three-fold overlap corresponds to raised portion 78 in the dose profile in FIG. 17.

The sixth strategy described above compensates for the effects of the side lobes of the intensity profile of the radiation spot. However, the compensation becomes less effective when the side lobes are more pronounced. Allowance is to be made for this in the design of the filter for the objective lens. Therefore, the phase plate is preferably not circular but elliptical. FIG. 20 shows a pupil 92 of the objective lens in which a 180° phase plate 93 is disposed, which phase plate comprises two semi-circular parts 94, 95 each having a radius r and a rectangular part 96 having a length 1. Owing to this shape, a part of the power in the side lobes is transferred from the horizontal direction in FIG. 10 to the vertical direction or, in relation to the write process, from the write direction to a direction perpendicular thereto. In this last-mentioned direction, side lobes have little effect on the development process because the total exposure dose in this direction remains below the threshold of the contrast curve. Another advantage of the elliptical phase plate is that the intensity loss produced by it is smaller than that produced by the circular phase plate for a similar narrowing of the central lobe. In accordance with the invention, the parameters r and 1 of the phase plate as a fraction of the pupil radius are in the range $0<r<0.4$ and $0<1<0.5$, and are preferably about r=0.18 and 1=0.3. The maximum intensity of the side lobes in the horizontal or write direction in the last-mentioned case is only approximately 40% of the maximum intensity of the side lobes in the vertical direction, i.e., in a direction perpendicular to the write direction.

The elliptical phase plate narrows the central lobe of the intensity profile in a similar way as the circular phase plate, so that short recorded areas can become even shorter. However, when long areas are exposed, the comparatively strong side lobes overlap with the central lobe so that an exposed area is elongated. The elongation can be used advantageously instead of, or in addition to, the elongation obtained with the second strategy, which also enables long areas to be prolonged. FIG. 21 shows the effect of the phase plate on the development profile of the comparatively long 19 information unit. A solid line 98 represents the development profile obtained without a phase plate, a dashed line 99 represents the profile obtained with the circular phase plate, and a dotted line 100 represents the profile obtained with the elliptical phase plate, a strategy in accordance with the invention being used in none of these cases. The Figure clearly shows the elongation of the profile caused by the circular phase plate. The elongation caused by the elliptical phase plate is slightly smaller owing to the smaller side lobes in the write direction. The sag in the peak of the development profile is 17% for the circular phase plate and only 8% for the elliptical phase plate. Consequently, compensation for profile 100 by the sixth strategy is easier than for profile 99. A dash-dot line 101 represents the compensated profile obtained with the circular phase plate. When very long structures such as, for example, tracking grooves are recorded it is advisable to rotate the elliptical phase plate through 90° in the plane of this plate so that the major axis of the phase plate extends in the write direction, in order to obtain narrower grooves.

The write strategies, in accordance with the invention, can each be used individually or in a combination of two or more strategies. By means of the write strategies, information areas can be obtained whose length is of the order of $\lambda/(2NA)$. The use of the strategies yields information carriers of which substantially all the information areas have lengths which deviate less than 50 nm from the lengths of the associated information units. A relatively small number of information areas associated with defects of the information carrier may have larger deviations without impairing the operation of a reading device. The number depends on the strength of the error-correction capabilities of suitable reading devices and is, in general, of the order of 1 per mil of the total number of information areas. The length of an information unit can be derived from the duration of the information unit and the scanning speed of the reading device. The deviation often shows a Gaussian distribution. The standard deviation of the distribution, i.e., of the length, is less than 14 nm when the second strategy in accordance with the invention is used, and less than 10 nm when the second strategy is used in combination with one or more of the other strategies. The lengths of the intermediate areas have similar deviations from the desired lengths. The deviations of the lengths of information areas and intermediate areas on an information carrier from the information units associated with the information areas and the intermediate areas can be measured by means of a time interval analyzer and an optical scanning device suitable for reading the information carrier

under investigation. By means of such a measurement, it is also possible to derive the lengths of the information units so that said deviations can also be determined for an information carrier of which the lengths of the information areas are not given. The spread in width of the information areas is less than 30 nm, i.e., the difference between the widest and the narrowest information area on an information carrier is smaller than 30 nm, apart from a few incorrectly formed information areas. As the lower limit of the spread, 1 nm may be taken by way of delimitation from Figures in the literature showing information areas of exactly equal widths. However, such Figures are not representative of the actual situation and said literature does not yet recognize the problem for which the present invention provides solutions. The small deviations of the length and width of the information areas obtained in accordance with the invention lead to an acceptably low jitter in the read signal produced when reading such information carriers.

To carry out the write strategies in accordance with the invention, master recorder 2 shown in FIG. 2 should be adapted in a special manner. Control device 10 should convert input signals 9, representing the information to be recorded, into output signal 11 in such a manner that modulator 14 controlled by this device produces such a power modulation of radiation beam 15 that the exposure dose is constant over the lengths of the exposed areas. FIG. 22 shows an example of control device 10 which controls the exposure dose in accordance with the second write strategy. An analyzer circuit 103 derives, from the information units in the input signal 9, a trigger signal 104, which indicates at which instant an information unit starts, and a length signal 105, which is representative of the length of this information unit. A pulse shaper circuit 106 subsequently generates a pulsed signal 107 with the aid of the trigger and the length signal. The start of each pulse in signal 107 is advanced relative to the trigger signal by a time interval determined by the length of the information unit. FIG. 9, which has been discussed above, gives an example of the length-dependent advancement of the output pulse for EFM coded information units. The length of the output pulse has been extended depending on the length of the information unit, of which FIG. 9 also gives an example. An amplitude circuit 108 converts the length signal 105 into an amplitude signal 109 by means of which the power of the radiation beam is controlled in a manner as shown, for example, in FIG. 9. Finally, an amplitude modulator 110 generates a pulsed output signal 11 whose pulse starting instants and lengths depend on signal 107 and whose amplitudes depend on amplitude signal 109. For EFM coded information units, these pulses may have the shape as shown in FIG. 9. Output signal 11 controls modulator 14 so as to control the power in the radiation beam.

FIG. 23 shows a second embodiment of the control device 10', which controls the exposure dose in accordance with the second, the fifth and the sixth write strategy. An analyzer circuit 112 derives, from input signal 9, a first length signal 113, which represents the length and the starting instant of an information unit in input signal 9, and a second length signal 114, which represents the nominal distance between the preceding and the current information unit. The first length signal 113 is applied to an input of a memory circuit 115, in which pulse waveforms of different lengths and amplitudes are stored. Depending on the value of the length signal, a pulse waveform is selected and is output as an output pulse in a signal 116. The beginning of the output pulse has been shifted relative to the start of the information unit and the length of the output pulse has been increased relative to the length of this unit, both as prescribed by the second strategy. The amplitude of the output pulse is varied over the length of the pulse in a manner as prescribed by the fifth and the sixth strategy. The second length signal 114 is applied to an amplitude circuit 117, which, in accordance with the fifth strategy, converts the length into a signal 118 whose amplitude depends on the value of the second length signal and which represents the power in the radiation beam between the recorded areas. An adder circuit 119 adds signals 116 and 118 to form output signal 11.

24 shows a third embodiment of the control device 10", which has a great flexibility regarding adaptation of the write strategy. Moreover, it has the advantage that the information units to be recorded can be processed real-time at high speed because at several stages of the processing, the data is processed in parallel instead of serially. The information units of input signal 9 are input in a shift register 120. The size of the shift register is 12 cells, suitable for processing EFM coded signals. However, the register may have any size required for a specific code. The information units shift through the register at a rate of one bit cell per clock pulse of a clock signal cl1. At each clock pulse, the contents of the cells of the register are available at outputs Q1 to Q12 of the register. The outputs Q1 to Q12 are connected to inputs of a coding circuit 121. The coding circuit produces an output signal 122 each time the value of output Q11 is different from the value of output Q12. At that instant, the coding circuit determines the number of consecutive binary 'ones' or 'zeros' in the output signals up to Q11. If, for example, the signals Q8 to Q12 have the values 01110, then the coding circuit will detect an I3 information unit to be recorded. The coding circuit assigns a unique code to the combination of input signals of the circuit by means of a first look-up table integrated in the coding circuit. The look-up table has one entry for each series of 'ones' and for each series of 'zeros' that may occur in the input signal 9.

The code is transmitted as a parallel output signal 122 to a second look-up table 123. Look-up table 123 specifies, for each code, a sequence of amplitude values to be transmitted as output signal 11 to modulator 14. In order to be able to provide sufficient time resolution in output signal 11, each bit cell of the input signal 9 is divided in 32 consecutive sub-cells. Therefore, look-up table 123 gives, for each code at its input, a number of amplitude values at an output 124 equal to 32 times the number of bit cells belonging to the code. The output of look-up table 123 is clocked with a clock signal cl2, which is synchronized with clock signal cl1. The code input in the look-up table 123 preferably comprises an address and a length value. The address points to the location of the first amplitude value in the look-up table pertaining to the code, whereas the length indicates the number of amplitude values pertaining to the code. Once a new code is transmitted to look-up table 123, read-out starts at the address transmitted and ends a number of clock cycles later as indicated by the length transmitted. At the completion of the read-out of the amplitude values pertaining to the code, the next code is available at the input of the look-up table 123, and the next read-out cycle can start. The amplitude values are symbolic values, indicating a level, e.g., high, medium and low for a three-level amplitude control. The control uses preferably 256 levels, each coded in 8 bits. The amplitudes are transmitted as a 32-bit parallel output signal 124, i.e., four amplitude values in parallel. Clock signal cl2 runs therefore 32/4=8 times as fast as clock signal cl1.

Output signal 124 is demultiplexed from 32-bit to 8-bit wide signals in demultiplexer 125, which runs on a clock signal cl3, again synchronized with clock signal cl1 and

running 32 times as fast as cl1. The 8-bit parallel output signal 126 of the demultiplexer are input in a relatively small and fast look-up table 127, translating the symbolic amplitude values at its input in real amplitude values at its output. The output signal 128 of look-up table 127 is connected to a fast digital-to-analog converter 129 transforming the digital input values to analog output values. The conversion rate is equal to 32 times the frequency of clock signal cl1. The analog output values constitute output signal 11 for controlling modulator 14 and hence, the power of the radiation beam. Demultiplexer 125, look-up table 127 and converter 129 are commercially available in a single unit in the form of a fast so-called video RAM-DAC.

The use of symbolic values in look-up table 123 has the advantage that a write strategy can be implemented for all information units in the input signal without regard to the precise values of the amplitudes. The values of the amplitudes are stored in look-up table 127, and can easily be adapted to the specific recording and development conditions, without modifying the rather extensive look-up table 123. In case this flexibility is not needed, the real amplitudes can be stored in look-up table 123, and look-up table 127 can be dispensed with. Although the functioning of control device 10" has been described for the implementation of the first strategy, only modifying the power of the radiation beam, the other strategies according to the invention can equally be implemented in the control device. The second write strategy may be implemented by increasing the number of amplitude values pertaining to a code in look-up table 123, thereby providing leading and trailing values as required by this strategy. The number of amplitude values in look-up table 123 for the intermediate areas must be reduced accordingly. In the third strategy, the amplitudes depend on the length of the area to be recorded and on the lengths of the preceding and following intermediate areas. An implementation must therefore comprise a shift register of a length equal to the longest area to be recorded plus twice the length of the longest intermediate area, i.e., 33 cells for an EFM input signal. The coding circuit must give a unique code to each combination of an area to be recorded and the two neighboring intermediate areas.

FIG. 25 shows a fourth embodiment of the control device 10", in which the shift register 123 of the third embodiment is replaced by a counter 130. The counter counts the number of consecutive binary zeros and ones in the input signal 9. At a transition from zero to one in the input signal, the counting starts. At the next one to zero transition, the counting stops, the contents of a first register 131 is transferred to a second register 132, next, the count, representing the length of the information unit, is transferred from the counter 130 to the first register 131, and counter 130 is set to zero. At said one to zero transition in the input signal, counter 130 starts counting the number of consecutive zeros in the input signal. At the following zero to one transition, this number of zeros is transferred to register 131 after the contents of this register have been transferred to register 132. Consequently, the outputs of register 131, register 132 and counter 130 represent the length of an information area to be recorded and the lengths of the preceding and the following intermediate areas, respectively, or the lengths of an intermediate area and the preceding and following information areas. When the control device is adapted for the first write strategy, i.e., the power of the radiation beam for writing an information area is modified independent of the length of the neighboring intermediate areas, only the output of the counter or one of the registers is needed. When the control device is adapted for the third write strategy, in which the power does depend on the lengths of the neighboring intermediate areas, the outputs of counter 130, register 131 and register 132 are needed.

The outputs of counter 130, register 131 and register 132 are connected to a first look-up table 133, where they form an address. The entry of the look-up table belonging to the address contains an address and a length value, comparable to the entries of the look-up table in the coding circuit 121 of the third embodiment of the coding device. The address and length value are transferred to a second look-up table 135 via a first-in first-out (FIFO) buffer 134. Each address value points to a specific location in the second look-up table. At each location, i.e., for each information area or intermediate area, a sequence of amplitude values corresponding to radiation beam powers is stored. The length of the sequence is equal to the length value given by the first look-up table. The amplitude values are symbolic values, for instance coded in 256 levels, as in look-up table 123 of the third embodiment. The time resolution of the control device is increased by providing several amplitude values, e.g., 32, for each bit cell of the input signal 9. When the duration of a bit cell is, for instance, 250 ns, the second look-up table provides 32 8-bit values to be output in this 250 ns. The clock frequency of the second look-up table is reduced by outputting the amplitude values 32 bits in parallel.

The amplitude values of the second look-up table are input in a combined demultiplexer, third look-up table and digital-to-analog converter, which may be a so called video RAM-DAC 136. The demultiplexer changes the 32-bit wide input signals to four serial 8-bit wide signals, thereby increasing the clock frequency of the signals by a factor of four. The symbolic amplitude values represented by the 8-bit wide signals are converted to real amplitude values by the third look-up table. The fast digital-to-analog converter changes the digital real amplitude values to analog amplitude values at a rate of 32 times the rate of the bit cells in the input signal 9. The analog amplitude values constitute output signal 11 for controlling modulator 14 and hence the power of the radiation beam.

A phase-locked loop circuit 137 generates a clock signal 138 with a frequency 32 times the bit cell frequency of the input signal 9. Clock signal 138 is used as input for the RAM-DAC 136, FIFO buffer 134 at the output of the first look-up table 133 buffers the address and length values from table 133 before they are input to look-up table 135. The buffer compensates timing variations in clock signal 138 introduced by circuit 137. The buffer 134 also compensates the difference between the rate at which the address and length values are generated by the first look-up table 133 and the rate at which the values are needed at the input of the second look-up table 135. When, for example, in the input signal 9, an I11 information unit is followed by an I3 intermediate area, the address and length value for the I11 area is generated immediately after the end of the I11, and three bit cell times later, the address and length value for the I3 intermediate area is generated. When the I11 address and length value is input to the second look-up table 135, it takes 11 bit cell times to output all amplitude values. Only after all amplitude values have been output, the I3 address and length value can be input in the second look-up table. Hence, the I3 address and length value must wait about 8 bit cell times in buffer 134.

The fourth embodiment of the control device has the same flexibility for adaptation to write strategy and codes as the third embodiment.

It will be apparent from the above description that the strategies in accordance with the invention can be used in

any desired combination and implemented in control device 10 of the master recorder 2. Generally, more strategies will have to be used as the density of the information to be recorded increases. It has been found that the use of these strategies enables master discs having an information density four times as high as that of a conventional Compact Disc to be recorded by means of a master recorder designed for recording master discs for these conventional Compact Discs.

Although the strategies in accordance with the invention offer substantial advantages when high-contrast photoresists are used, they will also yield advantages, even though smaller, when low-contrast photoresists are used. Recording information in a master disc is essentially a special form of writing patterns with closely spaced details by means of a radiation beam in a photoresist layer on a substrate which is also used for manufacturing, for example, diffraction gratings. Therefore, the method and information carrier described above are to be understood to include such methods and substrates.

We claim:

1. An optical information carrier comprising a substrate having information units stored thereon, in which the information units are stored on the substrate in the form of information areas each having a length, wherein the lengths of substantially all information areas deviate less than 50 nm from the lengths of the associated information units.

2. An optical information carrier comprising a substrate having information units stored thereon, in which the information units are stored on the substrate in the form of information areas each having a length, wherein the difference between the lengths of the information areas and the lengths of the associated information units have a standard deviation of less than 10 nm.

3. An optical information carrier comprising a substrate having information units stored thereon, in which the information units are stored on the substrate in the form of information areas, each having a length, and intermediate areas between adjacent information areas, each of said intermediate areas also having a length, wherein the lengths of substantially all intermediate areas deviate less than 50 nm from the distances between the associated information units.

4. An optical information carrier comprising a substrate having information units stored thereon, in which the information units are stored on the substrate in the form of information areas, each having a length, and intermediate areas between adjacent information areas, each of said intermediate areas also having a length, wherein the differences between the lengths of the intermediate areas and the lengths of the associated information units have a standard deviation of less than 10 nm.

5. An optical information carrier comprising a substrate having information units stored thereon, in which the information units are stored on the substrate in the form of information areas each having a width, characterized in that the spread in width of the information areas is smaller than 30 nm.

6. An optical information carrier according to claim 1, in which the information areas are pits in a layer of the optical information carrier.

7. An optical information carrier according to claim 2, in which the information areas are pits in a layer of the optical information carrier.

8. An optical information carrier according to claim 3, in which the information areas are pits in a layer of the optical information carrier.

9. An optical information carrier according to claim 4, in which the information areas are pits in a layer of the optical information carrier.

10. An optical information carrier according to claim 5, in which the information areas are pits in a layer of the optical information carrier.

* * * * *

EXHIBIT B

38878

DVD VIDEO DISC AND DVD ROM DISC PATENT LICENSE AGREEMENT

This Agreement is entered into this 1st day of July, 2002 by and between

KONINKLIJKE PHILIPS ELECTRONICS N.V., having its registered office in Eindhoven, The Netherlands, (hereinafter referred to as "Philips")

and

NATIONAL FILM LABORATORIES, INC. d/b/a CREST NATIONAL, having its registered office in 6721 Romaine Street, Hollywood, CA 90038 (hereinafter referred to as "Licensee")

WHEREAS, Philips, Sony Corporation of Japan ("Sony"), Pioneer Corporation of Japan ("Pioneer"), Hitachi Ltd. of Japan, Matsushita Electric Industrial Co. Ltd. of Japan, Mitsubishi Electric Corporation of Japan, Thomson Multimedia of France, Time Warner Entertainment Company L.P. of the USA, Toshiba Corporation of Japan, and Victor Company of Japan Ltd. of Japan, have defined a new system, which has been presented under the name DVD-Video System, as well as a system, which has been presented under the name DVD-ROM System, said systems hereinafter defined, and collectively referred to as the "DVD Systems";

WHEREAS, the DVD Systems result from research and development efforts of each of the companies mentioned above;

WHEREAS, the DVD Systems specifications and the right to use the DVD logo can be obtained from the entity known as the DVD Format/Logo Licensing Corporation, based in Tokyo, Japan;

WHEREAS, Philips, Sony and Pioneer each own certain patents relating to the DVD Systems;

WHEREAS, Philips has been authorized by Sony and Pioneer to grant licenses under certain patents relating to the DVD Systems, which are owned or controlled by Sony and its Associated Companies (as hereinafter defined) and by Pioneer and its Associated Companies respectively, as well as such patents relating to the DVD Systems which are jointly owned by Pioneer, Sony and/or Philips, while Sony and Pioneer each retain the right also to license their respective patents relating to the DVD Systems separately so that interested manufacturers may opt to take out individual licenses under the relevant patents of each of Philips, Sony and Pioneer instead of a combined license;

WHEREAS, Licensee has requested from Philips a license under the relevant patents of Philips, Sony and Pioneer relating to DVD-Discs and wishes such DVD-Discs to be compatible with devices conforming to the DVD Standard Specifications for any of the relevant DVD Systems; and

WHEREAS, Philips is willing to grant Licensee a license under the relevant patents on the conditions set forth herein;

NOW, THEREFORE, in consideration of the mutual obligations and covenants hereinafter set forth, the parties hereto have agreed as follows:

Article 1 - Definitions

The following terms used in this Agreement shall have the meanings set out below:

1.01 "**Disc**" shall mean a non-recordable reflective disc-shaped information carrier comprising any kind of information including, but not limited to, audio, video, text and/or data related information, which is irreversibly stored in one or more information layers during and as an integral part of the manufacturing process of the disc in a form which is optically readable by playback devices using a laser-beam.

1.02 "**DVD-Video Disc**" shall mean a replicated Disc comprising any kind of information including, but not limited to, audio, video, text, and/or data related information, encoded in digital form, which is optically readable by a DVD-Video Player and by a DVD-ROM Player (as hereinafter defined) and which conforms to the DVD-Video Standard Specifications and the DVD-ROM Standard Specifications, parts 1, 2 and 3 (as hereinafter defined).

1.03 "**DVD-ROM Disc**" shall mean a replicated Disc comprising any kind of information including, but not limited to, audio, video, text, and/or data related information, encoded in digital form, which is optically readable by a DVD-ROM Player (as hereinafter defined) and which conforms to the DVD-ROM Standard Specifications (as hereinafter defined).

The DVD-Video Disc and DVD-ROM Disc together are referred to as "DVD-Disc".

1.04 "**DVD-Video System**" shall mean the Digital Versatile Disc Video System which is capable of storing and reproducing video and sound signals in digital form on DVD-Video Discs.

1.05 "**DVD-ROM System**" shall mean the Digital Versatile Disc ROM System which is capable of storing and reproducing data signals in digital form on DVD-ROM Discs.

1.06 "**DVD-ROM Standard Specifications**" shall mean the specifications for the DVD-ROM System, as specified in the document "DVD Specification for Read-Only Disc, version 1.0 (parts 1 and 2)" of August 1996, or any updated version thereof, as issued by the DVD Format/Logo Licensing Corporation.

1.07 "**DVD-Video Standard Specifications**" shall mean the specifications for the DVD-Video System, as specified in the document "DVD Specification for Read-Only Disc, version 1.0 (part 3)" of August 1996, or any updated version thereof, as issued by the DVD Format/Logo Licensing Corporation.

The DVD-ROM Standard Specifications and the DVD-Video Standard Specifications together are referred to as the "DVD Standard Specifications".

1.08 "**Player**" shall mean a playback device for optically reading information stored on a Disc and converting such information into electrical signals for reproduction purposes.

1.09 **"DVD-Video Player"** shall mean a Player capable of reproducing information stored on a DVD-Video Disc and converting such information into electrical signals, in accordance with the DVD Standard Specifications, which electrical signals are directly capable and intended to be used for visual reproduction through standard television receivers and/or video monitors. Such DVD-Video Player may, in addition to reproducing information on a DVD-Video Disc, also be capable of reproducing information stored on a CD-Audio Disc.

1.10 **"DVD-ROM Player"** shall mean a Player capable of reproducing information stored on a DVD-ROM Disc and/or a DVD-Video Disc and converting such information into electrical signals, in accordance with the DVD-ROM Standard Specifications or the DVD Standard Specifications, which electrical signals are directly capable and intended to be used for reproduction of video, text and data-related information through data handling and/or data processing equipment. Such DVD-ROM Player may, in addition to reproducing information stored on a DVD-Disc, also be capable of reproducing information stored on a CD-Audio Disc and/or a CD-ROM Disc.

The DVD-Video Player and DVD-ROM Player together referred to as "DVD-Player".

1.11 **"Licensed Product(s)"** shall mean a DVD-Video Disc and/or a DVD-ROM Disc, having either a single or dual information layer(s) (which is/are readable from one side of the disc) or two single or dual information layers (which are readable from opposite sides of the disc), manufactured and/or sold in accordance with the provisions hereof, which has been duly reported and on which the royalties due hereunder are paid in accordance with the provisions of this Agreement.

1.12 **"Licensed Patents"** shall mean the patents listed in the relevant Exhibits as selected by Licensee pursuant to Option A and B below.

Option A: Licensee chooses the essential patents listed in Exhibit I, for the use of any one or more of these patents, exclusively for the manufacture and/or sale of DVD-ROM Discs.

Option B: Licensee chooses the essential patents listed in Exhibit II, for the use of any one or more of these patents, exclusively for the manufacture and/or sale of DVD-Video Discs.

Option(s): o A o B ☿ A and B (please tick as appropriate)

Initial: _____

The term **"essential"** as used in relation to patents in this Agreement shall refer to patents, the use of which is necessary (either directly or as a practical matter) for compliance with the Standard Specifications defining the relevant DVD Systems.

Philips will commission an independent patent expert to review the European, Japanese and US patents listed as essential in Exhibits I and II in order to confirm the essentiality of such

patents. In the event that said independent expert would find that any of the patents would not qualify as essential as defined in this Agreement, Philips shall delete such patent (as well as the equivalent national patents) from the relevant Exhibit and such patent will be put on the relevant Exhibit of non-essential patents. Any such finding and deletion however, shall not affect the obligation of Licensee to pay the royalty on each Licensed Product as specified in Article 4.02, provided that, in the event that none of the Licensed Patents would be infringed by the manufacture of Licensed Products within the Territory, Licensee shall have no obligation to pay royalties in respect of Licensed Products manufactured within the Territory and which are directly sold for final use within the Territory or directly exported for final use to a country in which no Licensed Patents subsist. Notwithstanding such deletion, Licensee shall retain the right to continue the use of such deleted patent(s) in accordance with this Agreement, without any additional payment, unless Licensee explicitly notifies Philips in writing of its decision to waive such right.

In the event that Philips or Sony or Pioneer (or any of their Associated Companies) would have additional patents (other than patents acquired from third parties after the date of January 1, 1997) in their respective patent portfolio which are essential to the manufacture, sale or other disposal of Licensed Products and which have a filing date or are entitled to a so-called priority date prior to January 1, 1997, but which have not been listed as essential patents in the respective Exhibits hereto, Philips will notify Licensee accordingly and such additional patents will be added to the Licensed Patents. Any patents as may be added as essential patents to any of the respective Exhibits hereto, will similarly be subject to the review by the independent patent expert in accordance with the preceding paragraph.

The patent lists provided to Licensee upon execution of the Agreement are subject to change in accordance with the provisions of this Agreement. With regard to the rights granted to Licensee hereunder, the patent lists published by Philips on its website (www.licensing.philips.com) or otherwise communicated by Philips to Licensee after the date of execution hereof shall prevail over the lists provided to Licensee upon execution of this Agreement.

1.13 "**Associated Company**" shall mean any one or more business entities (1) owned or controlled by Philips, Sony, Pioneer or Licensee, (2) owning or controlling Philips, Sony, Pioneer or Licensee, or (3) owned or controlled by the business entity owning or controlling Philips, Sony, Pioneer or Licensee at the material time. For the purposes of this definition a business entity shall be deemed to own and/or to control another business entity if more than 50% (fifty per cent) of the voting stock of the latter business entity, ordinarily entitled to vote in the election of directors, (or, if there is no such stock, more than 50% (fifty per cent) of the ownership of or control in the latter business entity) is held by the owning and/or controlling business entity.

For the purpose of this Agreement, Discovision Associates shall not be deemed an Associated Company of Pioneer.

1.14 "**Territory**" shall mean the geographic area known as the United States of America, its territories and possessions.

Article 2 - Grant of rights

Subject to the conditions of this Agreement:

2.01 For the term of this Agreement, Philips hereby grants to Licensee a non-exclusive, non-transferable license under the Licensed Patents selected by Licensee pursuant to Article 1.12 to manufacture Licensed Products within the Territory in accordance with the relevant DVD Standard Specifications and to sell or otherwise dispose of Licensed Products so manufactured in all countries of the world.

2.02 Philips, also on behalf of Sony and Pioneer, further agrees, for as long as this Agreement is in force and effect and Licensee is in full compliance with its obligations hereunder, to grant Licensee upon Licensee's request a non-exclusive, non-transferable license, either by means of a sub-license arrangement or by means of individual licenses from Philips, Sony and/or Pioneer respectively, on reasonable, non-discriminatory conditions, to manufacture Licensed Products in the Territory and to sell or otherwise dispose of Licensed Products so manufactured in all countries of the world, under any patents not yet licensed hereunder and which are essential to the manufacture, sale or other disposal of Licensed Products, for which Philips, Sony and Pioneer and their respective Associated Companies have or may hereafter acquire from third parties the free right to grant licenses. It is acknowledged and agreed that in respect of the patents as may be licensed pursuant to this Article 2.02, additional royalties may have to be paid over and above the royalties specified in Article 4.02.

2.03 Philips, also on behalf of Sony and Pioneer, further agrees, for as long as this Agreement is in force and effect and Licensee is in full compliance with its obligations hereunder, to grant Licensee upon Licensee's request as well as to those of Licensee's Associated Companies who so request, a non-exclusive, non-transferable license, on reasonable, non-discriminatory conditions, either by means of a sub-license arrangement or by means of individual licenses from Philips, Sony and/or Pioneer respectively, to manufacture DVD-Players and to sell or otherwise dispose of such DVD-Players so manufactured in all countries of the world, under any and all present and future patents essential to the manufacture, sale or other disposal of DVD-Players for which Philips, Sony and/or Pioneer and their respective Associated Companies have or may hereafter acquire the free right to grant licenses.

2.04 In consideration of the undertakings set forth in Articles 2.01, 2.02 and 2.03 and similar undertakings by third party licensees of Philips and without prejudice to the provisions of Article 10, for a period of ten years from the Effective Date (as hereinafter defined) Licensee agrees to grant to Philips, Sony, Pioneer and their respective Associated Companies and to other third parties who have entered or will enter into a license agreement with Philips or an Associated Company of Philips concerning DVD-Discs, non-exclusive, non-transferable licenses, on reasonable, non-discriminatory conditions comparable to those set forth herein, to manufacture, sell or otherwise dispose of DVD-Discs, under any and all present and future patents, for which Licensee or its Associated Companies have or may hereafter acquire the right to grant licenses and which are essential to the manufacture, sale or other disposal of such DVD-Discs as correspond with the Licensed Patents selected by Licensee pursuant to Article 1.12 and which patents were first filed in any country of the world prior to the date of termination of this Agreement. For the avoidance of doubt, the undertaking set out in the

preceding sentence shall only apply to those companies which have made the same selection pursuant to Article 1.12 as Licensee and which in that respect accept or have accepted a similar undertaking as contained in this Article 2.04.

2.05 In addition, in consideration of the undertakings set forth in Articles 2.01, 2.02 and 2.03 and similar undertakings by third party licensees of Philips or any of its Associated Companies and without prejudice to the provisions of Article 10, for a period of ten years from the Effective Date, Licensee agrees to grant to Philips, Sony, Pioneer and their respective Associated Companies and to other third parties who have entered or will enter into a license agreement with Philips or an Associated Company of Philips concerning DVD-Players, non-exclusive, non-transferable licenses, on reasonable, non-discriminatory conditions, to manufacture, sell or otherwise dispose of such DVD-Players under any and all present and future patents, for which Licensee or its Associated Companies have or may hereafter acquire the right to grant licenses and which are essential to the manufacture, sale or other disposal of such DVD-Players and which patents were first filed in any country of the world prior to the date of termination of this Agreement. For the avoidance of doubt, the undertaking set out in the preceding sentence shall only apply to those companies which accept or have accepted a similar undertaking as contained in this Article 2.05.

2.06 Philips undertakes that it will offer, at the request of any of Licensee's Associated Companies to any such Associated Company, a non-exclusive and non-transferable license under the Licensed Patents on reasonable and non-discriminatory conditions comparable to those set forth herein, to manufacture, sell or otherwise dispose of DVD-Discs.

In consideration of Philips' undertaking as set out in the preceding paragraph, Licensee undertakes that all of its Associated Companies which have or may hereafter acquire patents essential to the manufacture, sale or other disposal of DVD-Discs and which patents were first filed in any country of the world prior to the date of termination of this Agreement, shall make available licenses under such patents, on reasonable, non-discriminatory conditions comparable to those set forth herein to Philips, any of Philips' Associated Companies and to other third parties who have entered or will enter into a license agreement with Philips or an Associated Company of Philips in respect of DVD-Discs.

2.07 IT IS EXPRESSLY ACKNOWLEDGED AND AGREED THAT:

(I) THE LICENSES AND LICENSE UNDERTAKINGS HEREIN CONTAINED WITH RESPECT TO THE MANUFACTURE OF LICENSED PRODUCTS DO NOT EXTEND TO METHODS OR THE MANUFACTURE OR SALE OF EQUIPMENT FOR COMPRESSION AND/OR DECOMPRESSION OF AUDIO SIGNALS (INCLUDING BUT NOT LIMITED TO THE SYSTEM KNOWN AS MPEG-2 AUDIO) OR FOR THE COMPRESSION OR DECOMPRESSION OF VIDEO SIGNALS IN ACCORDANCE WITH THE SYSTEM KNOWN UNDER THE NAME MPEG-2 VIDEO, NOR TO MASTER RECORDING MACHINES, MACHINES, EQUIPMENT OR METHODS FOR THE REPLICATION OF DISCS, NOR TO THE MANUFACTURE OF MATERIALS OR REPRODUCTION RIGHTS FOR INFORMATION (SUCH AS AUDIO, VIDEO, TEXT AND/OR DATA-RELATED INFORMATION), CONTAINED ON DISCS

TO BE PLAYED BACK ON A PLAYER/RECORDER. FURTHER, THE LICENSE UNDERTAKINGS WITH RESPECT TO THE MANUFACTURE OF RECORDING/PLAYBACK DEVICES DO NOT EXTEND TO THE MANUFACTURE OF COMPONENTS FOR RECORDING/PLAYBACK DEVICES (INCLUDING BUT NOT LIMITED TO SEMICONDUCTOR DEVICES, INTEGRATED CIRCUITS, LASERS, MOTORS AND LENSES), EXCEPT FOR PATENTS RELATING TO CIRCUITRY AND/OR SYSTEM ASPECTS SPECIFIC TO THE DVD SYSTEMS;

(II) THE RIGHTS AND LICENSES GRANTED UNDER THIS AGREEMENT APPLY ONLY TO SUCH PART OF A COMBINATION OF ONE OR MORE LICENSED PRODUCTS OR DVD PLAYERS WITH ANY OTHER ELEMENTS, PRODUCTS, SYSTEMS, EQUIPMENT OR SOFTWARE WHICH IS IN COMPLIANCE WITH THE DVD STANDARD SPECIFICATIONS.

Article 3 – Have made

3.01 The rights granted to Licensee pursuant to Article 2 include the right for Licensee to have Licensed Products made for it by third party manufacturers, duly licensed by Philips under an agreement similar to this Agreement, provided that Licensee will properly identify such third party manufacturer in the royalty reporting forms to be submitted to Philips hereunder, together with the quantities of Licensed Products so purchased.
Conversely, Licensee shall refrain from purchasing or selling DVD-Video Discs and/or DVD-ROM Discs manufactured by any third party not licensed by Philips, where such purchase or sale would constitute an act of infringement of any of the Licensed Patents.

Article 4 - Royalties, Reports and Payments

4.01 In consideration of the rights granted by Philips, Licensee shall, upon execution of this Agreement, make a non-refundable payment of US$ 10,000 (ten thousand US Dollars) to Philips. From this amount of US$ 10,000, an amount of US$ 5,000 (five thousand US Dollars) shall be regarded as an advance payment against royalties payable pursuant to Article 4.02.

4.02 In further consideration of the rights granted hereunder by Philips to Licensee, Licensee agrees to pay to Philips a royalty on each Licensed Product sold by Licensee in which any one or more of the Licensed Patent(s) is (are) used, irrespective of whether such Licensed Patent(s) is (are) used in the country of manufacture, sale or other disposal.

This royalty shall amount to US$ 0.05 (five US Dollar cents) for each such Licensed Product.

Provided that Licensee is in full compliance with its obligations under this Agreement, and subject to Article 5.01, the royalty applicable to Licensed Products sold after July 1, 2002 shall amount to US$ 0.0375 (three and three quarters of a US Dollar cent) instead of the aforementioned rate of US$ 0.05 for each Licensed Product. In the event that Licensee fails to

comply at any time with any of its obligations hereunder, a royalty rate of US$ 0.05 shall apply to Licensee's manufacture and sale of Licensed Products instead of the royalty rate of US$ 0.0375, with immediate effect from the moment of such non-compliance until such moment that Licensee's non-compliance will have been remedied in full.

A Licensed Product shall be considered sold when invoiced or, if not invoiced, when delivered to a party other than Licensee.

No royalties shall be payable on Licensed Products purchased by Licensee on a "have made" basis in accordance with Article 3 from third party manufacturers, duly licensed by Philips, provided that Licensee can demonstrate to Philips' satisfaction, that such third party manufacturer has paid to Philips the royalties due in respect of such Licensed Products.

For the avoidance of doubt, in the event that the manufacture by Licensee of Licensed Products within the Territory would not infringe any of the Licensed Patents, Licensee shall have no obligation to pay royalties in respect of Licensed Products manufactured within the Territory and which are directly sold for final use within the Territory or directly exported for final use to a country in which no Licensed Patents subsist.

4.03 Within 30 days following 31 March, 30 June, 30 September and 31 December of each year during the term of this Agreement, Licensee shall submit to Philips (even in the event that no sales have been made) a written statement in the form as attached hereto as Exhibit C3 (Royalty Reporting Form), signed by a duly authorized officer on behalf of Licensee, setting forth with respect to the preceding quarterly period:

(1) the quantities of DVD-Discs manufactured by Licensee specified per individual type of DVD-Disc;

(2) the quantities of DVD-Discs purchased from other licensed manufacturers in accordance with the provisions of Article 3, specified per individual type of DVD-Disc;

(3) on a per-country basis, specifying for each individual type of DVD-Disc:

(a) the quantities of DVD-Discs sold or otherwise disposed of, specifying the identity of the buyers and the trademarks used on or in connection with the DVD-Discs;

(b) the quantities of DVD-Discs sold to other manufacturers, duly licensed by Philips, specifying the identity of such other manufacturers and the trademarks used on or in connection with the DVD-Discs;

(4) a computation of the royalties due under this Agreement.

Licensee shall pay the royalties due to Philips within 30 days after the end of each quarterly period, in US Dollars.

4.04 In the event that Licensee fails to submit to Philips a Royalty Reporting Form for any royalty reporting period within 30 days from the end of the relevant reporting period in accordance with the provisions of Article 4.03, Licensee shall be obliged to pay to Philips within 30 days after the end of the relevant quarterly period for which the Royalty Reporting Form was not submitted, an estimated royalty (hereinafter referred to as an "Advance"), being an amount equal to the highest amount of royalties due for any royalty reporting period over the preceding eight royalty reporting periods (or over all preceding royalty reporting periods if fewer than eight). Such payment shall be treated as a non-refundable advance, primarily against the royalties and interest for the relevant royalty reporting period and then, if any sum remains, against any future royalties or other payments payable by Licensee hereunder. Licensee acknowledges and agrees that any Advance shall not be due by way of penalty but that such payment shall constitute a non-refundable advance as aforesaid. For the avoidance of doubt: such payment shall be payable without any further notice or action by Philips, legal or otherwise, and shall take effect by virtue of the failure to submit a Royalty Reporting Form on time; the payment by Licensee of an Advance shall not affect Licensee's obligation to submit a Royalty Reporting Form; the payment by Licensee of an Advance shall be without prejudice to any other rights or remedies of Philips, including, without limitation, Philips' right to charge 2% interest per month on overdue payments (including overdue payments of the Advance), and Philips' right to terminate this Agreement in accordance with its provisions. The Advance will not be set off against other sums due to Philips until a Royalty Reporting Form has been submitted in respect of the relevant royalty reporting period. In respect of any royalty reporting period for which an Advance has been paid and the Royalty Reporting Form subsequently submitted, Philips will first set off against the Advance all royalties and interest due for that period. Any remaining sum from the Advance will be set off against further royalty, interest or Advance payments due to Philips hereunder (if any).

4.05 Licensee shall submit to Philips, once per calendar year, an audit statement by its external auditors, who shall be public certified auditors, confirming that the quarterly royalty statements as submitted by Licensee to Philips for the last four quarterly periods, are true, complete and accurate in every respect. Such statement must meet Philips' requirements as specified in the Audit Guidelines attached hereto as Exhibit C1 and shall be submitted to Philips within 90 days following the end of Licensee's financial year. The correctness of this audit statement shall be verified by Philips by means of a work paper review, conducted by one of the public certified auditors selected by Philips. Notwithstanding this audit statement, Philips reserves the right to inspect the books and records of Licensee from time to time in accordance with Article 4.10.

4.06 Within 30 days following the expiration or termination of this Agreement, Licensee shall submit to Philips a certified report on the number of Licensed Products in stock at the time of expiration or termination of this Agreement. Royalties, calculated in accordance with Article 4.02, shall be due and payable on all Licensed Products manufactured prior to, but remaining in stock with Licensee on the date of expiration or termination of this Agreement. For the avoidance of doubt, this Article 4.06 shall be without prejudice to the provisions of Article 10.06.

4.07 Any payment under this Agreement which is not made on the date(s) specified herein, shall accrue interest at the rate of 2% (two per cent) per month (or part thereof) or the maximum amount permitted by law, whichever is lower.

4.08 All payments to Philips under this Agreement shall be made by transfer in such currency, convertible in the sense of Articles VIII and XIX of the Articles of Agreement of the International Monetary Fund, as designated by Philips. The rate of exchange for converting the currency of the Territory shall be the telegraphic transfer selling rate of the designated currency as officially quoted in the Territory by the officially authorized foreign exchange bank for payment of currency transactions on the day that the amount is due and payable.

4.09 All costs, stamp duties, taxes and other similar levies arising from or in connection with the conclusion of this Agreement shall be borne by Licensee. However, in the event that the government of a country imposes any income taxes on payments made by Licensee to Philips hereunder and requires Licensee to withhold such tax from such payments, Licensee may deduct such tax from such payments. In such event, Licensee shall promptly provide Philips with tax receipts issued by the relevant tax authorities so as to enable Philips to support a claim for credit against income taxes which may be payable by Philips and/or its Associated Companies in The Netherlands and to enable Philips to document, if necessary, its compliance with tax obligations in any jurisdiction outside The Netherlands.

4.10 In order that the royalty statements provided for in this Article 4 may be verified, Licensee shall keep complete and accurate books and records and shall keep the books and records available for a period of 5 years following the manufacture, sale or other disposal of each Licensed Product.

In order to verify the correctness of the aforementioned royalty statements, Philips shall have the right to inspect the books and records of Licensee from time to time. Any such inspection shall take place no more than once per calendar year and shall be conducted by a public certified auditor appointed by Philips. Philips shall give Licensee written notice of such inspection at least 7 days prior to the inspection. Licensee shall willingly co-operate and provide all such assistance in connection with such inspection as Philips and/or the auditor may require. The inspection shall be conducted at Philips' own expense, provided that in the event that Licensee has failed to submit royalty statements and/or yearly written statement(s) by its external auditors, as provided for in Article 4.03 and Article 4.05, in respect of the period to which the inspection relates or in the event that any discrepancy or error exceeding 3% (three per cent) of the monies actually due is established, the cost of the inspection shall be borne by Licensee, without prejudice to any other claim or remedy as Philips may have under this Agreement or under applicable law.

Philips' right of inspection as set out in this Article 4.10 shall survive termination or expiration of this Agreement.

4.11 Without prejudice to the provisions of Article 4.10, Licensee shall provide all relevant additional information as Philips may reasonably request from time to time, so as to enable Philips to ascertain which products manufactured, sold or otherwise disposed of by Licensee

are subject to the payment of royalties to Philips hereunder, the patents which have been used in connection with such products, and the amount of royalties payable.

4.12 As a condition precedent to the entry into force of this Agreement, Licensee shall submit to Philips a royalty statement in respect of DVD-Discs manufactured and sold or otherwise disposed of by Licensee before the Effective Date of this Agreement in accordance with the provisions of Article 4.03. Within 7 days following the execution of this Agreement, Licensee shall pay to Philips the royalties on such DVD-Discs, calculated by applying the royalty rate of US$ 0.05 for each such DVD-Disc. The royalty statement shall similarly be subject to Philips' right of audit as set out in Article 4.10. Within 45 days following the execution of this Agreement, Licensee shall submit to Philips an audit statement by its external auditors, who shall be public certified auditors, confirming that this royalty statement is true, complete and accurate in every respect.

Article 5
Manufacturing Equipment Identification System

5.01 Upon signing of the Agreement, Licensee shall submit to Philips an overview of its manufacturing equipment used for the manufacture of Licensed Products. Further, upon any acquisition, transfer or disposal of manufacturing equipment used for the manufacture of Licensed Products, Licensee shall submit to Philips details of any such adjustment(s) to its manufacturing equipment. Further, Licensee shall submit to Philips an overview containing all adjustments to its manufacturing equipment during the preceding year, together with and confirmed by the audit statement referred to in Article 4.05. Such overview shall be in the form as attached hereto as Exhibit C2 (Manufacturing Equipment List), signed by a duly authorized officer on behalf of Licensee. The royalty rate of US$ 0.0375 referred to in Article 4.02 shall only apply to Licensed Products manufactured by Licensee using manufacturing equipment properly identified in the Manufacturing Equipment List and shall be conditional upon Licensee submitting to Philips the audit statement meeting Philips' requirements as set out in the Audit Guidelines, in accordance with the provisions in Article 4.05. In the event that Licensee puts into use newly acquired manufacturing equipment (i.e. manufacturing equipment acquired after May 6, 2002) which has been used for the manufacture of Licensed Products prior to the acquisition by Licensee, the royalty rate of US$ 0.0375 shall only apply if Licensee can demonstrate to Philips' full satisfaction, that the newly acquired manufacturing equipment originates from and has been used by a company which was properly licensed by Philips for the manufacture of Licensed Products and in full compliance with its obligations under its license agreement at the time of the acquisition of the newly acquired manufacturing equipment by Licensee. In the event that Licensee is unable to comply with the requirements under this Article 5.01, a royalty rate of US$ 0.05 shall apply to Licensee's manufacture and sale of Licensed Products instead of the royalty rate of US$ 0.0375.

Article 6 - Most Favourable Conditions

6.01 In the event that licenses under the patents referred to in Article 2 are granted by Philips for Licensed Products to a third party under substantially similar conditions, but at a royalty rate

more favourable than the rate payable by Licensee under this Agreement, Licensee shall be entitled to the same royalty rate as applicable to such third party, provided always that this right of Licensee shall not apply in respect of cross-license agreements or other agreements providing for a consideration which is not exclusively based on payment of royalties and further provided that this right of Licensee shall not apply in respect of licenses or other arrangements made pursuant to a court decision or the settlement of a dispute between Philips and a third party, irrespective of the nature of such dispute, the terms of the court decision or the settlement terms.

Article 7 – No Warranty and Indemnification

7.01 Philips makes no representation or warranty as to the ability of Licensee to achieve interchangeability with respect to Licensed Products. Philips makes no warranty whatsoever that the use of information supplied by Philips does not infringe or may not cause infringement of any industrial or intellectual property rights owned or controlled by third parties, or any industrial or intellectual property rights owned or controlled by Philips, Sony, Pioneer or their respective Associated Companies not licensed pursuant to Article 2.

7.02 It is acknowledged by Licensee that third parties may own industrial and/or intellectual property rights in the field of DVD-Discs. Licensee acknowledges and agrees that Philips, Sony, Pioneer and their respective Associated Companies make no warranty whatsoever that the manufacture, sale or other disposal of any Licensed Product does not infringe or will not cause infringement of any industrial and/or intellectual property rights other than the Licensed Patents. Philips, Sony, Pioneer and their respective Associated Companies shall be fully indemnified and held harmless by Licensee from and against any and all third party claims in connection with DVD-Discs manufactured, sold or otherwise disposed of by Licensee.

Article 8 - Confidentiality

8.01 Licensee shall, during the term of this Agreement as specified in Article 10.01 and for a period of 3 years thereafter, not disclose to any third party any information acquired from Philips or any of Philips' Associated Companies in connection with this Agreement, or use such information for any other purpose than the manufacture or disposal of Licensed Products in accordance with this Agreement. This obligation shall not apply to the extent information so acquired:

(a) was known to Licensee prior to the date on which such information was acquired from Philips or any of Philips' Associated Companies, as shown by records of Licensee or otherwise demonstrated to Philips' satisfaction;

(b) is or has become available to the public through no fault of Licensee;

(c) was or is received from a third party who was under no confidentiality obligation in respect of such information.

8.02 Philips shall, during the term of this Agreement as specified in Article 10.01 and for a period of 3 years thereafter, not disclose to any third party any confidential information obtained in connection with Article 4.03, Article 4.05 and/or Article 5, except that Philips may disclose such information to its external auditors, legal representatives and to the competent courts to the extent this is necessary for Philips in connection with the enforcement of its rights hereunder. Further, Philips shall not use such information for other purposes than to verify Licensee's compliance with its royalty reporting and payment obligations as provided in this Agreement and to enforce Philips' rights hereunder. Philips' obligations set out in this paragraph shall not apply to information referred to in sections a, b and/or c of Article 8.01.

Article 9 – No Assignment

9.01 This Agreement shall inure to the benefit of and be binding upon each of the parties hereto and their respective assignees. It may not be assigned in whole or in part by Licensee without the prior written consent of Philips.

Article 10 - Term and Termination

10.01 This Agreement shall enter into force on the "Effective Date", being the date first written above. In the event that validation of this Agreement is required by the competent governmental authorities, the Effective Date shall be the date of such validation. This Agreement shall remain in force for a period of 10 years from the Effective Date, unless terminated earlier in accordance with the provisions of this Article 10.

10.02 Without prejudice to the provisions of Article 10.03 through 10.06, each party may terminate this Agreement at any time by means of written notice to the other party in the event that the other party fails to perform any obligation under this Agreement and such failure is not remedied within 30 days after receipt of a notice specifying the nature of such failure and requiring it to be remedied. Such right of termination shall not be exclusive of any other remedies or means of redress to which the non-defaulting party may be lawfully entitled and all such remedies shall be cumulative. Any such termination shall not affect any royalties or other payment obligations under this Agreement accrued prior to such termination.

10.03 Philips may terminate this Agreement forthwith by means of notice in writing to Licensee in the event that a creditor or other claimant takes possession of, or a receiver, administrator or similar officer is appointed over any of the assets of Licensee or in the event that Licensee makes any voluntary arrangement with its creditors or becomes subject to any court or administration order pursuant to any bankruptcy or insolvency law.

10.04 Additionally, insofar as legally permitted, Philips may terminate this Agreement at any time by means of written notice to Licensee in case Licensee or an Associated Company of Licensee has been found liable by a competent court or administrative authority to have committed a serious act of piracy with respect to copyrights of third parties.

10.05 Philips shall have the right to terminate this Agreement forthwith or to revoke the license granted under any of Philips', Sony's or Pioneer's respective patents in the event that Licensee or any of its Associated Companies brings a claim for infringement of any of its essential patents relating to DVD-Discs or DVD Players against Philips, Sony, Pioneer or any of their respective Associated Companies and Licensee refuses to license such patents on fair and reasonable conditions.

10.06 Upon the termination of this Agreement by Philips for any reason pursuant to Article 10.02 through 10.05, Licensee shall immediately cease the manufacture, sale or other disposal of DVD-Discs in which any one or more of the Licensed Patents are used. Further, upon such termination, any and all amounts outstanding hereunder shall become immediately due and payable.

10.07 All provisions of this Agreement which are intended to survive (whether express or implied) the expiry or termination of this Agreement, shall so survive.

Article 11 - Miscellaneous

11.01 Any notice required under this Agreement to be sent by either party shall be given in writing by means of a letter or facsimile directed:

in respect of Licensee, to:

National film Laboratories, Inc. d/b/a/ Crest National
6721 Romaine Street
Hollywood, CA 90038

in respect of Philips, to:

Koninklijke Philips Electronics N.V.
c/o Philips International B.V.
Intellectual Property & Standards - Legal Department
P.O. Box 80002, Building SFF-8
5600 JB Eindhoven
The Netherlands
Fax.+31 40 2734131

with a copy to:

U.S. Philips Corporation
580 White Plains Road
Tarrytown, New York 10591

or such other address as may have been previously specified in writing by either party to the other.

11.02 This Agreement sets forth the entire understanding and agreement between the parties as to the subject matter hereof and supersedes and replaces all prior arrangements, discussions and understandings between the parties relating thereto. Neither party shall be bound by any obligation, warranty, waiver, release or representation, except as expressly provided herein, or as may subsequently be agreed in writing between the parties.

11.03 Nothing contained in this Agreement shall be construed:

(a) as imposing on either party any obligation to instigate any suit or action for infringement of any of the patents licensed hereunder or to defend any suit or action brought by a third party which challenges or relates to the validity of any such patents. Licensee shall have no right to instigate any such suit or action for infringement of any of the patents licensed by Philips hereunder, nor the right to defend any such suit or action which challenges or relates to the validity of any such patent licensed by Philips hereunder;

(b) as imposing any obligation to file any patent application or to secure any patent or to maintain any patent in force;

(c) as conferring any license or right to copy or imitate the appearance and/or design of any product of Philips, Sony, Pioneer or any of their Associated Companies;

(d) as conferring any license to manufacture, sell or otherwise dispose of any product or device other than a Licensed Product.

11.04 Neither the failure nor the delay of either party to enforce any provision of this Agreement shall constitute a waiver of such provision or of the right of either party to enforce each and every provision of this Agreement.

11.05 Should any provision of this Agreement be finally determined void or unenforceable in any judicial proceeding, such determination shall not affect the operation of the remaining provisions hereof, provided that, in such event, Philips shall have the right to terminate this Agreement by written notice to Licensee.

11.06 This Agreement shall be governed by and construed in accordance with the laws of The State of New York.

Any dispute between the parties hereto in connection with this Agreement (including any question regarding its existence, validity or termination) shall be submitted to any state or federal courts in The State of New York, provided always that, in case Philips is the plaintiff, Philips may at its sole discretion submit any such dispute either to the state or federal courts in the venue of Licensee's registered office, or to any of the state or federal courts in the Territory having jurisdiction. Licensee hereby irrevocably waives any objection to the jurisdiction, process and venue of any such court and to the effectiveness, execution and enforcement of any order or judgment (including, but not limited to, a default judgment) of any such court in relation to this Agreement, to the maximum extent permitted by the law of

any jurisdiction, the laws of which might be claimed to be applicable regarding the effectiveness, enforcement or execution of such order or judgment.

AS WITNESS, the parties hereto have caused this Agreement to be signed on the date first written above.

KONINKLIJKE PHILIPS ELECTRONICS N.V.

Name:

Title: M. Salekers by proxy

Date:

NATIONAL FILM LABORATORIES, INC. d/b/a/CREST NATIONAL

Name:

Title: SVP

Date: 10/23/02

Exhibit I to the DVD Video Disc and ROM Disc Patent License Agreement

Patents relevant to DVD ROM disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR		GRANT NR	EXPIRY DATE	TITLE
AR	N 014746 -	331023	15-Feb-95			254412	27-Jul-15	EFM+ channel coding
AR	N 014752 -	331070	17-Feb-95			255358	21-Nov-16	Block format error interleaving
AR	N 015093 -	334224	14-Nov-95			AR000131	14-Nov-15	Disc size on disc
AT	N 014351 -	93203684.1	24-Dec-93	0605924-A3		E181614	24-Dec-13	Interlayer crosstalk for Multilayer
AT	N 014746 -	95905746.4	01-Feb-95	0745254-A1		E173110	01-Feb-15	EFM+ channel coding
AT	N 014752 -	95907127.5	14-Feb-95	0698270-A1		E195033	14-Feb-15	Block format error interleaving
AT	N 014950 -	94203621.1	14-Dec-94	0660314-A1		E198386	14-Dec-14	Mastering write strategy
AT	N 015087 -	95934799.8	08-Nov-95	0740832-B1		E193782	08-Nov-15	Data structure indicator in sector header
AT	N 015093 -	95934262.7	31-Oct-95	0740831-A1		E192878	31-Oct-15	Disc size on disc
AT	N 015452 -	96926545.3	26-Aug-96	0789910-A1		E201527	26-Aug-16	DC control for EFM+
AT-EP	N 014986 -	95927046.3	16-Aug-95	0729629-A1			16-Aug-15	Multilayer with spherical abberation control
AT-EP	N 015471 -	95938001.5	06-Dec-95	0745255-A1			06-Dec-15	Layer number info on disc
AU	N 014746 -	95-14240	01-Feb-95	95-14240	692822	692822	01-Feb-15	EFM+ channel coding
AU	N 014752 -	95-15449	14-Feb-95	95-15449	689203	689203	14-Feb-15	Block format error interleaving
AU	N 015087 -	95-37081	08-Nov-95	95-37081	690751	690751	08-Nov-15	Data structure indicator in sector header
AU	N 015093 -	95-36720	31-Oct-95		698869	698869	31-Oct-15	Disc size on disc
AU	N 015452 -	96-66667	26-Aug-96		70391	703791	26-Aug-16	DC control for EFM+
BE	N 014746 -	95905746.4	01-Feb-95	0745254-A1		0745254	01-Feb-15	EFM+ channel coding
BE	N 014752 -	95907127.5	14-Feb-95	0698270-A1		0698270	14-Feb-15	Block format error interleaving
BE	N 015087 -	95934799.8	08-Nov-95	0740832-A1		0740832	08-Nov-15	Data structure indicator in sector header
BE	N 015093 -	95934262.7	31-Oct-95	0740831-A1		0740831	31-Oct-15	Disc size on disc
BE	N 015452 -	96926545.3	26-Aug-96	0789910-A1		0789910	26-Aug-16	DC control for EFM+
BE-EP	N 014986 -	95927046.3	16-Aug-95	0729629-A1			16-Aug-15	Multilayer with spherical abberation control
BG	N 014746 -	100774	01-Feb-95			62106	01-Feb-15	EFM+ channel coding
BG	N 015093 -	100723	31-Oct-95			62105	31-Oct-15	Disc size on disc
BR	N 014746 -	PI9506787.6	01-Feb-95	PI9506787.6		PI9506787.6	01-Feb-15	EFM+ channel coding
BR	N 014746 A	PI9510740.1	01-Feb-95				01-Feb-15	EFM+ channel coding
BR	N 014746 B	PI9510741.0	01-Feb-95				01-Feb-15	EFM+ channel coding
BR	N 015087 -	PI9506632.2	08-Nov-95	PI9506632.2			08-Nov-15	Data structure indicator in sector header
BR	N 015093 -	PI9506626.8	31-Oct-95	PI9506626.8			31-Oct-15	Disc size on disc
BW	N 014746 -	98-00054	22-Apr-98			BW/P/99/00014	22-Apr-18	EFM+ channel coding
BW	N 014752 -	98-00046	21-Apr-98			BW/P99/00023	21-Apr-18	Block format error interleaving
BW	N 015452 -	98-00063	22-Apr-98			BW/P/99/00022	22-Apr-18	DC control for EFM+

All corresponding patent applications, patents, divisions, continuations and reissues based upon any of the patent applications or patents of this list are considered to be included as an integral part of this list

Printdate Friday, June 07, 2002

Patents relevant to DVD ROM disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
CA	N 014746 -	2183355	01-Feb-95			01-Feb-15	EFM+ channel coding
CA	N 014752 -	2160572	14-Feb-95			14-Feb-15	Block format error interleaving
CA	N 015087 -	2181460	08-Nov-95			08-Nov-15	Data structure indicator in sector header
CA	N 015452 -	2205565	26-Aug-96			26-Aug-16	DC control for EFM+
CA	Q 088053 -	591452	17-Feb-89		1320571	20-Jul-10	Affixing readable information on RO-disc
CH	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
CH	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
CH	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
CH	N 015093 -	95934262.7	31-Oct-95	0740831-A1	0740831	31-Oct-15	Disc size on disc
CN	N 014351 -	93121735.0	31-Dec-93	1090668-A		31-Dec-13	Interlayer crosstalk for Multilayer
CN	N 014746 -	95192574.1	01-Feb-95	1155349-A		01-Feb-15	EFM+ channel coding
CN	N 014752 -	95190261.X	14-Feb-95	1125994-A		14-Feb-15	Block format error interleaving
CN	N 014752 A	UNKNOWN	14-Feb-95			14-Feb-15	Block format error interleaving
CN	N 014950 -	94120798.6	23-Dec-94	1119323-A		23-Dec-14	Mastering write strategy
CN	N 014986 -	95190979.7	16-Aug-95	1136357-A	1083131	16-Aug-15	Multilayer with spherical abberation control
CN	N 015087 -	95191995.4	08-Nov-95	1143423-A		08-Nov-15	Data structure indicator in sector header
CN	N 015093 -	95191258.5	31-Oct-95	1138917-A		31-Oct-15	Disc size on disc
CN	N 015452 -	96191244.8	26-Aug-96	1166225-A		26-Aug-16	DC control for EFM+
CN	N 015471 -	95192103.7	06-Dec-95	1144011-A		06-Dec-15	Layer number info on disc
CZ	N 014746 -	96-PV2389	01-Feb-95			01-Feb-15	EFM+ channel coding
CZ	N 014986 -	96-PV1174	16-Aug-95		289539	16-Aug-15	Multilayer with spherical abberation control
CZ	N 015093 -	96-PV2044	31-Oct-95		288682	31-Oct-15	Disc size on disc
DE	N 013547 -	91203264.6	12-Dec-91	0496132-A3	69125264.5	12-Dec-11	System for Multilayer optical disc
DE	N 013547 A	96202520.1	12-Dec-91	0756273-A1	69133021.2	12-Dec-11	System for Multilayer optical disc
DE	N 014351 -	93203684.1	24-Dec-93	0605924-A3	69325437.8	24-Dec-13	Interlayer crosstalk for Multilayer
DE	N 014746 -	95905746.4	01-Feb-95	0745254-A1	69505794.4	01-Feb-15	EFM+ channel coding
DE	N 014752 -	95907127.5	14-Feb-95	0698270-A1	69516126.2	14-Feb-15	Block format error interleaving
DE	N 014789 -	95910709.5	21-Mar-95	0702827-A1	69522880.3	21-Mar-15	DC-free channel code
DE	N 014950 -	94203621.1	14-Dec-94	0660314-A1	69426482.2	14-Dec-14	Mastering write strategy
DE	N 015087 -	95934799.8	08-Nov-95	0740832-A1	69517413.4	08-Nov-15	Data structure indicator in sector header
DE	N 015093 -	95934262.7	31-Oct-95	0740831-A1	69516845.2	31-Oct-15	Disc size on disc
DE	N 015452 -	96926545.3	26-Aug-96	0789910-A1	69612955.8	26-Aug-16	DC control for EFM+
DE	Q 088053 -	89102618.9	16-Feb-89	0329122-A1	68908201.0	16-Feb-09	Affixing readable information on RO-disc
DE-EP	N 013547 B	01204396.4	12-Dec-91	1187116-A1		12-Dec-11	System for Multilayer optical disc
DE-EP	N 014986 -	95927046.3	16-Aug-95	0729629-A1		16-Aug-15	Multilayer with spherical abberation control

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Printdate Friday, June 07, 2002

Patents relevant to DVD ROM disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
DE-EP	N 015471 -	95938001.5	06-Dec-95	0745255-A1		06-Dec-15	Layer number info on disc
DK	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
DK	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
DK	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
ES	N 014746 -	95905746.4	01-Feb-95	0745254-A1	2126877	01-Feb-15	EFM+ channel coding
ES	N 014752 -	95907127.5	14-Feb-95	0698270-A1	2150551	14-Feb-15	Block format error interleaving
ES	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
ES	N 015093 -	95934262.7	31-Oct-95	0740831-A1	0740831	31-Oct-15	Disc size on disc
ES	N 015452 -	96926545.3	26-Aug-96	0789910-A1	0789910	26-Aug-16	DC control for EFM+
FI	N 014746 -	963151	01-Feb-95			01-Feb-15	EFM+ channel coding
FR	N 013547 -	91203264.6	12-Dec-91	0496132-A3	0496132	12-Dec-11	System for Multilayer optical disc
FR	N 013547 A	96202520.1	12-Dec-91	0756273-A1	0756273	12-Dec-11	System for Multilayer optical disc
FR	N 014351 -	93203684.1	24-Dec-93	0605924-A3	0605924	24-Dec-13	Interlayer crosstalk for Multilayer
FR	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
FR	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
FR	N 014789 -	95910709.5	21-Mar-95	0702827-A1	0702827	21-Mar-15	DC-free channel code
FR	N 014950 -	94203621.1	14-Dec-94	0660314-A1	0660314	14-Dec-14	Mastering write strategy
FR	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
FR	N 015093 -	95934262.7	31-Oct-95	0740831-A1	0740831	31-Oct-15	Disc size on disc
FR	N 015452 -	96926545.3	26-Aug-96	0789910-A1	0789910	26-Aug-16	DC control for EFM+
FR	Q 088053 -	89102618.9	16-Feb-89	0329122-A1	0329122	16-Feb-09	Affixing readable information on RO-disc
FR-EP	N 013547 B	01204396.4	12-Dec-91	1187116-A1		12-Dec-11	System for Multilayer optical disc
FR-EP	N 014988 -	95927046.3	16-Aug-95	0729629-A1		16-Aug-15	Multilayer with spherical abberation control
FR-EP	N 015471 -	95938001.5	06-Dec-95	0745255-A1		06-Dec-15	Layer number info on disc
GB	N 013547 -	91203264.6	12-Dec-91	0496132-A3	0496132	12-Dec-11	System for Multilayer optical disc
GB	N 013547 A	96202520.1	12-Dec-91	0756273-A1	0756273	12-Dec-11	System for Multilayer optical disc
GB	N 014351 -	93203684.1	24-Dec-93	0605924-A3	0605924	24-Dec-13	Interlayer crosstalk for Multilayer
GB	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
GB	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
GB	N 014789 -	95910709.5	21-Mar-95	0702827-A1	0702827	21-Mar-15	DC-free channel code
GB	N 014950 -	94203621.1	14-Dec-94	0660314-A1	0660314	14-Dec-14	Mastering write strategy
GB	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
GB	N 015093 -	95934262.7	31-Oct-95	0740831-A1	0740831	31-Oct-15	Disc size on disc
GB	N 015452 -	96926545.3	26-Aug-96	0789910-A1	0789910	26-Aug-16	DC control for EFM+
GB	Q 088053 -	89102618.9	16-Feb-89	0329122-A1	0329122	16-Feb-09	Affixing readable information on RO-disc

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Patents relevant to DVD ROM disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR		GRANT NR	EXPIRY DATE	TITLE
GB-EP	N 013547 B	01204396.4	12-Dec-91	1187116-A1			12-Dec-11	System for Multilayer optical disc
GB-EP	N 014986 -	95927046.3	16-Aug-95	0729629-A1			16-Aug-15	Multilayer with spherical abberation control
GB-EP	N 015471 -	95938001.5	06-Dec-95	0745255-A1			06-Dec-15	Layer number info on disc
GR	N 014746 -	95905746.4	01-Feb-95	0745254-A1		0745254	01-Feb-15	EFM+ channel coding
GR	N 014752 -	95907127.5	14-Feb-95	0698270-A1		0698270	14-Feb-15	Block format error interleaving
GR	N 015087 -	95934799.8	08-Nov-95	0740832-A1		0740832	08-Nov-15	Data structure indicator in sector header
GR	N 015093 -	95934262.7	31-Oct-95	0740831-A1		0740831	31-Oct-15	Disc size on disc
GR	N 015452 -	96926545.3	26-Aug-96	0789910-A1		3036397	26-Aug-16	DC control for EFM+
HK	N 014351 -	98114078.9	24-Dec-93	1012766-A	1012766-A	HK1012766	23-Dec-13	Interlayer crosstalk for Multilayer
HK	N 014746 -	98114079.8	01-Feb-95	1012767-B1	1012767-B	HK1012767	31-Jan-15	EFM+ channel coding
HK	N 014752 -	98114633.7	14-Feb-95	1013358-A	1013358-B	HK1013358	13-Feb-15	Block format error interleaving
HK	N 014789 -	98114634.6	21-Mar-95	1013359-A	1013359-B	HK1013359	20-Mar-15	DC-free channel code
HK	N 014986 -	98114664.9	16-Aug-95	1013366-A	1013366-A		16-Aug-15	Multilayer with spherical abberation control
HK	N 015087 -	98114932.5	08-Nov-95	1013719-A	1013719-B	HK1013719	07-Nov-15	Data structure indicator in sector header
HK	N 015093 -	98114948.7	31-Oct-95	1013722-A	1013722-A	HK1013722	30-Oct-15	Disc size on disc
HK	N 015452 -	98103966.7	26-Aug-96	1004699-A	1004699-A		26-Aug-16	DC control for EFM+
HU	N 014746 -	P9602247	01-Feb-95				01-Feb-15	EFM+ channel coding
HU	N 015093 -	P9601955	31-Oct-95				31-Oct-15	Disc size on disc
HU	N 015452 -	P9801354	26-Aug-96				26-Aug-16	DC control for EFM+
ID	N 014746 -	P-950245	15-Feb-95			ID0005313	15-Feb-15	EFM+ channel coding
ID	N 014752 -	P-950251	16-Feb-95				16-Feb-15	Block format error interleaving
ID	N 015452 -	P-962496	02-Sep-96	016.164A		ID0005386	02-Sep-16	DC control for EFM+
IE	N 014746 -	95905746.4	01-Feb-95	0745254-A1		0745254	01-Feb-15	EFM+ channel coding
IE	N 014752 -	95907127.5	14-Feb-95	0698270-A1		0698270	14-Feb-15	Block format error interleaving
IE	N 015087 -	95934799.8	08-Nov-95	0740832-A1		0740832	08-Nov-15	Data structure indicator in sector header
IE	N 015452 -	96926545.3	26-Aug-96	0789910-A1		0789910	26-Aug-16	DC control for EFM+
IL	N 015452 -	120740	26-Aug-96			120740	26-Aug-16	DC control for EFM+
IN	N 014746 A	98-1577	13-Feb-95			185349	13-Feb-09	EFM+ channel coding
IN	N 014746 B	98-1578	13-Feb-95			184753	13-Feb-09	EFM+ channel coding
IN	N 014746 C	99-312	13-Feb-95				13-Feb-09	EFM+ channel coding
IN	N 014752 -	95-141	14-Feb-95				14-Feb-09	Block format error interleaving
IN	N 014752 A	99-505	14-Feb-95				14-Feb-09	Block format error interleaving
IN	N 015452 -	96-1530	28-Aug-96				28-Aug-10	DC control for EFM+
IT	N 014351 -	93203684.1	24-Dec-93	0605924-A3		0605924	24-Dec-13	Interlayer crosstalk for Multilayer
IT	N 014746 -	95905746.4	01-Feb-95	0745254-A1		0745254	01-Feb-15	EFM+ channel coding

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Patents relevant to DVD ROM disc

COUNTRY	REFERENCE		FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
IT	N 014752	-	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
IT	N 014789	-	95910709.5	21-Mar-95	0702827-A1	0702827	21-Mar-15	DC-free channel code
IT	N 015087	-	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
IT	N 015093	-	95934262.7	31-Oct-95	0740831-A1	0740831	31-Oct-15	Disc size on disc
IT	N 015452	-	96926545.3	26-Aug-96	0789910-A1	0789910	26-Aug-16	DC control for EFM+
IT	Q 088053	-	89102618.9	16-Feb-89	0329122-A1 93-51580BE	0329122	16-Feb-09	Affixing readable information on RO-disc
IT-EP	N 014986	-	95927046.3	16-Aug-95	0729629-A1		16-Aug-15	Multilayer with spherical abberation control
JP	N 013547	-	91-339181	21-Dec-91	92-301226	3110532	21-Dec-11	System for Multilayer optical disc
JP	N 013547	A	99-321703	21-Dec-91	00-137927			System for Multilayer optical disc
JP	N 014351	-	93-350276	28-Dec-93	94-267110		28-Dec-13	Interlayer crosstalk for Multilayer
JP	N 014746	-	95-521693	01-Feb-95	97-512392		01-Feb-15	EFM+ channel coding
JP	N 014752	-	95-521698	14-Feb-95	96-509316		14-Feb-15	Block format error interleaving
JP	N 014789	-	95-525542	21-Mar-95	96-511405		21-Mar-15	DC-free channel code
JP	N 014950	-	94-336413	22-Dec-94	95-320208		22-Dec-14	Mastering write strategy
JP	N 014986	-	96-507906	16-Aug-95			16-Aug-15	Multilayer with spherical abberation control
JP	N 015087	-	96-516712	08-Nov-95	97-507947		08-Nov-15	Data structure indicator in sector header
JP	N 015093	-	96-516706	31-Oct-95	97-507946		31-Oct-15	Disc size on disc
JP	N 015452	-	97-511019	26-Aug-96	98-508456		26-Aug-16	DC control for EFM+
JP	N 015471	-	96-519640	06-Dec-95	97-509776		06-Dec-15	Layer number info on disc
JP	Q 088053	-	89-38492	20-Feb-89	90-56750	2810950	20-Feb-09	Affixing readable information on RO-disc
KR	N 013547	-	91-23288	18-Dec-91		0246282	18-Dec-11	System for Multilayer optical disc
KR	N 013547	A	96-67178	18-Dec-91		254150	18-Dec-11	System for Multilayer optical disc
KR	N 014351	-	94-144	04-Jan-94		289018	04-Jan-14	Interlayer crosstalk for Multilayer
KR	N 014746	-	96-704550	01-Feb-95			01-Feb-15	EFM+ channel coding
KR	N 014752	-	95-704556	14-Feb-95			14-Feb-15	Block format error interleaving
KR	N 014789	-	95-705575	21-Mar-95			21-Mar-15	DC-free channel code
KR	N 014950	-	94-37014	24-Dec-94			24-Dec-14	Mastering write strategy
KR	N 014986	-	96-702076	16-Aug-95			16-Aug-15	Multilayer with spherical abberation control
KR	N 015087	-	96-704010	08-Nov-95			08-Nov-15	Data structure indicator in sector header
KR	N 015093	-	96-703818	31-Oct-95			31-Oct-15	Disc size on disc
KR	N 015452	-	97-702860	26-Aug-96			26-Aug-16	DC control for EFM+
KR	N 015471	-	96-704517	06-Dec-95			06-Dec-15	Layer number info on disc
KR	Q 088053	-	89-001932	18-Feb-89	89-13613 91-7912	50087	04-Oct-06	Affixing readable information on RO-disc
LU	N 014746	-	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
LU	N 014752	-	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving

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Patents relevant to DVD ROM disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
LU	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
MC	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
MC	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
MC	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
MX	N 014746 -	9603394	01-Feb-95		189493	01-Feb-15	EFM+ channel coding
MX	N 015087 -	962808	08-Nov-95			08-Nov-15	Data structure indicator in sector header
MX	N 015452 -	UNKNOWN	26-Aug-96			26-Aug-16	DC control for EFM+
MY	N 014746 -	PI9500357	14-Feb-95		112136	30-Apr-16	EFM+ channel coding
MY	N 014752 -	PI9500378	15-Feb-95				Block format error interleaving
MY	N 014986 -	PI95002460	22-Aug-95				Multilayer with spherical abberation control
MY	N 014986 A	PI20014950	22-Aug-95			22-Aug-15	Multilayer with spherical abberation control
MY	N 014986 B	PI20014949	22-Aug-95			22-Aug-15	Multilayer with spherical abberation control
MY	N 015452 -	PI9603603	29-Aug-96				DC control for EFM+
NL	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
NL	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
NL	N 014950 -	94203621.1	14-Dec-94	0660314-A1	0660314	14-Dec-14	Mastering write strategy
NL	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
NL	N 015093 -	95934262.7	31-Oct-95	0740831-A1	0740831	31-Oct-15	Disc size on disc
NL	N 015452 -	96926545.3	26-Aug-96	0789910-A1	0789910	26-Aug-16	DC control for EFM+
NL	Q 088053 -	89102618.9	16-Feb-89	0329122-A1	0329122	16-Feb-09	Affixing readable information on RO-disc
NO	N 014746 -	19963388	01-Feb-95			01-Feb-15	EFM+ channel coding
NZ	N 014746 -	278137	01-Feb-95	278137	278137	01-Feb-15	EFM+ channel coding
PL	N 014746 -	P319407	01-Feb-95			01-Feb-15	EFM+ channel coding
PL	N 014986 -	P314789	16-Aug-95		180658	16-Aug-15	Multilayer with spherical abberation control
PL	N 014986 A	P336669	16-Aug-95			16-Aug-15	Multilayer with spherical abberation control
PL	N 014986 B	P336670	16-Aug-95		180647	16-Aug-15	Multilayer with spherical abberation control
PL	N 015093 -	P315584	31-Oct-95		180182	31-Oct-15	Disc size on disc
PL	N 015093 A	P337170	31-Oct-95		180307	31-Oct-15	Disc size on disc
PL	N 015452 -	P320006	26-Aug-96			26-Aug-16	DC control for EFM+
PT	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
PT	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
PT	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
PT	N 015093 -	95934262.7	31-Oct-95	0740831-A1	0740831	31-Oct-15	Disc size on disc
PT	N 015452 -	96926545.3	26-Aug-96	0789910-A1	0789910	26-Aug-16	DC control for EFM+
RO	N 014746 -	96-001653	01-Feb-95			01-Feb-15	EFM+ channel coding

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Patents relevant to DVD ROM disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
RO	N 014746 A	01-00059	01-Feb-95			01-Feb-15	EFM+ channel coding
RO	N 015093 -	96-01469	31-Oct-95		113191	31-Oct-15	Disc size on disc
RU	N 014746 -	96116250	01-Feb-95	33	2153707	01-Feb-15	EFM+ channel coding
RU	N 015093 -	96116857	31-Oct-95	96116857		31-Oct-15	Disc size on disc
RU	N 015452 -	97108582	26-Aug-96	15	2153200	26-Aug-16	DC control for EFM+
SE	N 014351 -	93203684.1	24-Dec-93	0605924-A3	0605924	24-Dec-13	Interlayer crosstalk for Multilayer
SE	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
SE	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
SE	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
SE	N 015452 -	96926545.3	26-Aug-96	0789910-A1	0789910	26-Aug-16	DC control for EFM+
SE-EP	N 014986 -	95927046.3	16-Aug-95	0729629-A1		16-Aug-15	Multilayer with spherical abberation control
SG	N 014351 -	9607095.8	24-Dec-93	0048111	48111	24-Dec-13	Interlayer crosstalk for Multilayer
SG	N 014752 -	9607077.6	14-Feb-95	0050623-A	50623	14-Feb-15	Block format error interleaving
SG	N 014986 -	9700759.5	16-Aug-95		37758	16-Aug-15	Multilayer with spherical abberation control
SG	N 015087 -	9702180.2	08-Nov-95		41092	08-Nov-15	Data structure indicator in sector header
SG	N 015093 -	9703040.7	31-Oct-95		42670	31-Oct-15	Disc size on disc
SG	N 015452 -	9703300.5	26-Aug-96		44185	26-Aug-16	DC control for EFM+
SG	Q 088053 -	NOT GIVEN	16-Feb-89		9891411.4	16-Feb-09	Affixing readable information on RO-disc
SI	N 014746 -	95905746.4	01-Feb-95	0745254-A1	9530188	01-Feb-15	EFM+ channel coding
SK	N 014746 -	96-PV1051	01-Feb-95			01-Feb-15	EFM+ channel coding
SK	N 015093 -	96-PV920	31-Oct-95			31-Oct-15	Disc size on disc
TR	N 014746 -	95-0136	15-Feb-95			15-Feb-15	EFM+ channel coding
TR	N 014752 -	95-0143	16-Feb-95		29401	16-Feb-15	Block format error interleaving
TR	N 015093 -	95-1446	17-Nov-95		TR199501446B	17-Nov-15	Disc size on disc
TW	N 014351 -	83101489	22-Feb-94		67573	22-Feb-14	Interlayer crosstalk for Multilayer
TW	N 014746 -	84101360	15-Feb-95	294862	82864	15-Feb-15	EFM+ channel coding
TW	N 014752 -	84101856	28-Feb-95	256904	73076	28-Feb-15	Block format error interleaving
TW	N 014789 -	84101322	14-Feb-95	267279	75391	14-Feb-15	DC-free channel code
TW	N 014950 -	84100644	25-Jan-95	308686	87086	25-Jan-15	Mastering write strategy
TW	N 014986 -	84110771	13-Oct-95	292389	852158	13-Oct-15	Multilayer with spherical abberation control
TW	N 015087 -	84113943	27-Dec-95	292382	82165	27-Dec-15	Data structure indicator in sector header
TW	N 015093 -	84113944	27-Dec-95			27-Dec-15	Disc size on disc
TW	N 015452 -	85112032	02-Oct-96	394931	116382	02-Oct-16	DC control for EFM+
TW	N 015471 -	85102220	27-Feb-96			27-Feb-16	Layer number info on disc
TW	Q 088053 -	78101164	17-Feb-89	128103		17-Feb-09	Affixing readable information on RO-disc

All corresponding patent applications, patents, divisions, continuations and reissues based upon any of the patent applications or patents of this list are considered to be included as an integral part of this list

Patents relevant to DVD ROM disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
UA	N 014746 -	96083269	01-Feb-95		42757	01-Feb-15	EFM+ channel coding
UA	N 015093 -	96072883	31-Oct-95		42015	31-Oct-15	Disc size on disc
US	N 006493 D	06/858550	23-Apr-86		5068846	26-Nov-08	Read out of optical disc via substrate
US	N 013547 V	08/289851	01-Sep-94		5677903	14-Oct-14	System for Multilayer optical disc
US	N 013547 W	08/861351	21-May-97		5841753	18-Apr-12	System for Multilayer optical disc
US	N 013547 X	08/861350	21-May-97			18-Apr-12	System for Multilayer optical disc
US	N 014351 -	08/175331	29-Dec-93		5511057	29-Dec-13	Interlayer crosstalk for Multilayer
US	N 014351 W	08/791097	23-Jan-97		5864530	29-Dec-13	Interlayer crosstalk for Multilayer
US	N 014351 Y	09/442959	18-Nov-99			29-Dec-13	Interlayer crosstalk for Multilayer
US	N 014746 -	08/385533	08-Feb-95		5696505	08-Feb-15	EFM+ channel coding
US	N 014746 A	08/900275	08-Feb-95		5920272	08-Feb-15	EFM+ channel coding
US	N 014746 R	09/899091	08-Feb-95			08-Feb-15	EFM+ channel coding
US	N 014752 -	08/389369	16-Feb-95		5838696	16-Feb-15	Block format error interleaving
US	N 014789 -	08/388865	15-Feb-95		5642113	15-Feb-15	DC-free channel code
US	N 014950 -	08/362622	22-Dec-94		5605782	22-Dec-14	Mastering write strategy
US	N 014950 A	08/755614	25-Nov-96		5790512	22-Dec-14	Mastering write strategy
US	N 015087 -	08/558515	16-Nov-95		5920874	16-Nov-15	Data structure indicator in sector header
US	N 015093 -	08/558517	16-Nov-95		6388962	16-Nov-15	Disc size on disc
US	N 015093 B					16-Nov-15	Disc size on disc
US	N 015093 C	10/134912	29-Apr-02			16-Nov-15	Disc size on disc
US	N 015452 -	08/706048	30-Aug-96		5790056	30-Aug-16	DC control for EFM+
US	N 015471 -	08/573850	18-Dec-95		6370102	18-Dec-15	Layer number info on disc
US	N 015471 A	10/083330	22-Oct-01			18-Dec-15	Layer number info on disc
US	Q 088053 V	07/380676	14-Jul-89		4961077	19-Feb-08	Affixing readable information on RO-disc
VE	N 015093 -	95-2032	17-Nov-95			17-Nov-15	Disc size on disc
VE	N 015452 -	96-1517	30-Aug-96			30-Aug-16	DC control for EFM+
VN	N 014746 -	S19960099	13-Aug-96		1407	13-Aug-11	EFM+ channel coding
VN	N 014986 -	S19962028T1	23-Aug-94		947	23-Aug-09	Multilayer with spherical abberation control
VN	N 014986 A	S19962028T2	23-Aug-94		948	23-Aug-09	Multilayer with spherical abberation control
VN	N 015093 -	S19960035	15-Jul-96		1338	15-Jul-11	Disc size on disc
VN	N 015452 -	S19970327	25-Apr-97		1598	25-Apr-17	DC control for EFM+
ZA	N 014746 -	951115	10-Feb-95		95-1115	10-Feb-15	EFM+ channel coding
ZA	N 014752 -	95-1194	14-Feb-95		95-1194	14-Feb-15	Block format error interleaving
ZA	N 015093 -	959489	08-Nov-95		95-9489	08-Nov-15	Disc size on disc
ZA	N 015452 -	967261	27-Aug-96		96/7261	27-Aug-16	DC control for EFM+

All corresponding patent applications, patents, divisions, continuations and reissues based upon any of the patent applications or patents of this list are considered to be included as an integral part of this list

Printdate Friday, June 07, 2002

Exhibit II to the DVD Video Disc and ROM Disc Patent License Agreement

Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR		GRANT NR	EXPIRY DATE	TITLE
AR	B 033973 -	P960101256	02-Feb-96				02-Feb-16	Subtitle runlength compression
AR	N 014746 -	331023	15-Feb-95			254412	27-Jul-15	EFM+ channel coding
AR	N 014752 -	331070	17-Feb-95			255358	21-Nov-16	Block format error interleaving
AR	N 015093 -	334224	14-Nov-95			AR000131	14-Nov-15	Disc size on disc
AT	B 033973 -	96900402.7	26-Jan-96	0754393-A1		E191600	26-Jan-16	Subtitle runlength compression
AT	N 013409 -	91201373.7	03-Jun-91	0460764-A1		E157801	03-Jun-11	Video block pointers
AT	N 014351 -	93203684.1	24-Dec-93	0605924-A3		E181614	24-Dec-13	Interlayer crosstalk for Multilayer
AT	N 014746 -	95905746.4	01-Feb-95	0745254-A1		E173110	01-Feb-15	EFM+ channel coding
AT	N 014752 -	95907127.5	14-Feb-95	0698270-A1		E195033	14-Feb-15	Block format error interleaving
AT	N 014950 -	94203621.1	14-Dec-94	0660314-A1		E198366	14-Dec-14	Mastering write strategy
AT	N 015087 -	95934799.8	08-Nov-95	0740832-B1		E193762	08-Nov-15	Data structure indicator in sector header
AT	N 015093 -	95934262.7	31-Oct-95	0740831-A1		E192878	31-Oct-15	Disc size on disc
AT	N 015156 -	95943556.1	12-Dec-95	0745307-A1		E188327	12-Dec-15	Subtitle compression (region/subregion)
AT	N 015395 -	96921025.1	12-Jul-96	0787404-A1		E213113	12-Jul-16	Subtitle duration
AT	N 015452 -	96926545.3	26-Aug-96	0789910-A1		E201527	26-Aug-16	DC control for EFM+
AT-EP	N 014986 -	95927046.3	16-Aug-95	0729629-A1			16-Aug-15	Multilayer with spherical abberation control
AT-EP	N 015424 -	96925986.0	02-Aug-96	0784848-A1			02-Aug-16	Path control system for multi-version
AT-EP	N 015471 -	95938001.5	06-Dec-95	0745255-A1			06-Dec-15	Layer number info on disc
AU	B 033973 -	96-43985	26-Jan-96	96-43985	695626	695626	26-Jan-16	Subtitle runlength compression
AU	N 014746 -	95-14240	01-Feb-95	95-14240	692822	692822	01-Feb-15	EFM+ channel coding
AU	N 014752 -	95-15449	14-Feb-95	95-15449	689203	689203	14-Feb-15	Block format error interleaving
AU	N 015087 -	95-37081	08-Nov-95	95-37081	690751	690751	08-Nov-15	Data structure indicator in sector header
AU	N 015093 -	95-36720	31-Oct-95		698869	698869	31-Oct-15	Disc size on disc
AU	N 015156 -	96-45040	12-Dec-95	199645040	701684	701684	12-Dec-15	Subtitle compression (region/subregion)
AU	N 015424 -	96-66304	02-Aug-96	96-66304	714628	714628	02-Aug-16	Path control system for multi-version
AU	N 015452 -	96-66667	26-Aug-96		70391	703791	26-Aug-16	DC control for EFM+
BE	B 033973 -	96900402.7	26-Jan-96	0754393-A1		0754393	26-Jan-16	Subtitle runlength compression
BE	N 013409 -	91201373.7	03-Jun-91	0460764-A1		0460764	03-Jun-11	Video block pointers
BE	N 014746 -	95905746.4	01-Feb-95	0745254-A1		0745254	01-Feb-15	EFM+ channel coding
BE	N 014752 -	95907127.5	14-Feb-95	0698270-A1		0698270	14-Feb-15	Block format error interleaving
BE	N 015087 -	95934799.8	08-Nov-95	0740832-A1		0740832	08-Nov-15	Data structure indicator in sector header
BE	N 015093 -	95934262.7	31-Oct-95	0740831-A1		0740831	31-Oct-15	Disc size on disc
BE	N 015156 -	95943556.1	12-Dec-95	0745307-A1		0745307	12-Dec-15	Subtitle compression (region/subregion)

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Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
BE	N 015395 -	96921025.1	12-Jul-96	0787404-A1	0787404	12-Jul-16	Subtitle duration
BE	N 015452 -	96926545.3	26-Aug-96	0789910-A1	0789910	26-Aug-16	DC control for EFM+
BE-EP	N 014986 -	95927046.3	16-Aug-95	0729629-A1		16-Aug-15	Multilayer with spherical abberation control
BG	N 014746 -	100774	01-Feb-95		62106	01-Feb-15	EFM+ channel coding
BG	N 015093 -	100723	31-Oct-95		62105	31-Oct-15	Disc size on disc
BR	B 033973 -	PI9605110.8	26-Jan-96	PI9605110.8		26-Jan-16	Subtitle runlength compression
BR	N 014746 -	PI9506787.6	01-Feb-95	PI9506787.6	PI9506787.6	01-Feb-15	EFM+ channel coding
BR	N 014746 A	PI9510740.1	01-Feb-95			01-Feb-15	EFM+ channel coding
BR	N 014746 B	PI9510741.0	01-Feb-95			01-Feb-15	EFM+ channel coding
BR	N 015087 -	PI9506632.2	08-Nov-95	PI9506632.2		08-Nov-15	Data structure indicator in sector header
BR	N 015093 -	PI9506626.8	31-Oct-95	PI9506626.8		31-Oct-15	Disc size on disc
BR	N 015156 -	PI9506773.6	12-Dec-95	PI9506773.6		12-Dec-15	Subtitle compression (region/subregion)
BR	N 015424 -	PI9606567.2	02-Aug-96	PI9606567.2		02-Aug-16	Path control system for multi-version
BW	N 014746 -	98-00054	22-Apr-98		BW/P/99/00014	22-Apr-18	EFM+ channel coding
BW	N 014752 -	98-00046	21-Apr-98		BW/P99/00023	21-Apr-18	Block format error interleaving
BW	N 015452 -	98-00063	22-Apr-98		BW/P/99/00022	22-Apr-18	DC control for EFM+
CA	B 033973 -	2187018	26-Jan-96	2187018		26-Jan-16	Subtitle runlength compression
CA	N 013409 -	2043670	31-May-91		2043670	31-May-11	Video block pointers
CA	N 013409 A	2335403	31-May-91		2335403	31-May-11	Video block pointers
CA	N 014746 -	2183355	01-Feb-95			01-Feb-15	EFM+ channel coding
CA	N 014752 -	2160572	14-Feb-95			14-Feb-15	Block format error interleaving
CA	N 015087 -	2181460	08-Nov-95			08-Nov-15	Data structure indicator in sector header
CA	N 015156 -	2183257	12-Dec-95			12-Dec-15	Subtitle compression (region/subregion)
CA	N 015395 -	2200335	12-Jul-96			12-Jul-16	Subtitle duration
CA	N 015424 -	2200346	02-Aug-96			02-Aug-16	Path control system for multi-version
CA	N 015452 -	2205565	26-Aug-96			26-Aug-16	DC control for EFM+
CH	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
CH	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
CH	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
CH	N 015093 -	95934262.7	31-Oct-95	0740831-A1	0740831	31-Oct-15	Disc size on disc
CH	N 015156 -	95943556.1	12-Dec-95	0745307-A1	0745307	12-Dec-15	Subtitle compression (region/subregion)
CH	N 015395 -	96921025.1	12-Jul-96	0787404-A1	0787404	12-Jul-16	Subtitle duration
CN	B 033973 -	96190224.8	26-Jan-96	1148927-A		26-Jan-16	Subtitle runlength compression
CN	N 014351 -	93121735.0	31-Dec-93	1090668-A		31-Dec-13	Interlayer crosstalk for Multilayer
CN	N 014746 -	95192574.1	01-Feb-95	1155349-A		01-Feb-15	EFM+ channel coding

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Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
CN	N 014752 -	95190261.X	14-Feb-95	1125994-A		14-Feb-15	Block format error interleaving
CN	N 014752 A	UNKNOWN	14-Feb-95			14-Feb-15	Block format error interleaving
CN	N 014950 -	94120798.6	23-Dec-94	1119323-A		23-Dec-14	Mastering write strategy
CN	N 014986 -	95190979.7	16-Aug-95	1136357-A	1083131	16-Aug-15	Multilayer with spherical abberation control
CN	N 015087 -	95191995.4	08-Nov-95	1143423-A		08-Nov-15	Data structure indicator in sector header
CN	N 015093 -	95191258.5	31-Oct-95	1138917-A		31-Oct-15	Disc size on disc
CN	N 015156 -	95192413.3	12-Dec-95	1145152-A		12-Dec-15	Subtitle compression (region/subregion)
CN	N 015395 -	96190772.X	12-Jul-96	1163688-A		12-Jul-16	Subtitle duration
CN	N 015424 -	96190862.9	02-Aug-96			04-Aug-16	Path control system for multi-version
CN	N 015424 A	98118677.7	02-Aug-96	1213832-A		02-Aug-16	Path control system for multi-version
CN	N 015452 -	96191244.8	26-Aug-96	1166225-A		26-Aug-16	DC control for EFM+
CN	N 015471 -	95192103.7	06-Dec-95	1144011-A		06-Dec-15	Layer number info on disc
CZ	B 033973 -	96-PV2885	26-Jan-96		289508	26-Jan-16	Subtitle runlength compression
CZ	N 014746 -	96-PV2389	01-Feb-95			01-Feb-15	EFM+ channel coding
CZ	N 014986 -	96-PV1174	16-Aug-95		289539	16-Aug-15	Multilayer with spherical abberation control
CZ	N 015093 -	96-PV2044	31-Oct-95		288682	31-Oct-15	Disc size on disc
CZ	N 015424 -	97-PV1028	02-Aug-96			02-Aug-16	Path control system for multi-version
DE	B 033973 -	96900402.7	26-Jan-96	0754393-A1	69607529.6	26-Jan-16	Subtitle runlength compression
DE	N 013409 -	91201373.7	03-Jun-91	0460764-A1	69127506.3	03-Jun-11	Video block pointers
DE	N 013547 -	91203264.6	12-Dec-91	0496132-A3	69125264.5	12-Dec-11	System for Multilayer optical disc
DE	N 013547 A	96202520.1	12-Dec-91	0756273-A1	69133021.2	12-Dec-11	System for Multilayer optical disc
DE	N 014351 -	93203684.1	24-Dec-93	0605924-A3	69325437.8	24-Dec-13	Interlayer crosstalk for Multilayer
DE	N 014746 -	95905746.4	01-Feb-95	0745254-A1	69505794.4	01-Feb-15	EFM+ channel coding
DE	N 014752 -	95907127.5	14-Feb-95	0698270-A1	69518126.2	14-Feb-15	Block format error interleaving
DE	N 014789 -	95910709.5	21-Mar-95	0702827-A1	69522880.3	21-Mar-15	DC-free channel code
DE	N 014950 -	94203621.1	14-Dec-94	0660314-A1	69426482.2	14-Dec-14	Mastering write strategy
DE	N 015087 -	95934799.8	08-Nov-95	0740832-A1	69517413.4	08-Nov-15	Data structure indicator in sector header
DE	N 015093 -	95934262.7	31-Oct-95	0740831-A1	69516845.2	31-Oct-15	Disc size on disc
DE	N 015156 -	95943556.1	12-Dec-95	0745307-A1	69514212.7	12-Dec-15	Subtitle compression (region/subregion)
DE	N 015395 -	96921025.1	12-Jul-96	0787404-A1	69619091.5	12-Jul-16	Subtitle duration
DE	N 015452 -	96926545.3	26-Aug-96	0789910-A1	69612955.8	26-Aug-16	DC control for EFM+
DE-EP	N 013547 B	01204396.4	12-Dec-91	1187116-A1		12-Dec-11	System for Multilayer optical disc
DE-EP	N 014986 -	95927046.3	16-Aug-95	0729829-A1		16-Aug-15	Multilayer with spherical abberation control
DE-EP	N 015424 -	96925986.0	02-Aug-96	0784848-A1		02-Aug-16	Path control system for multi-version
DE-EP	N 015471 -	95938001.5	06-Dec-95	0745255-A1		06-Dec-15	Layer number info on disc

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Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
DK	N 013409 -	91201373.7	03-Jun-91	0460764-A1	0460764	03-Jun-11	Video block pointers
DK	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
DK	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
DK	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
DK	N 015156 -	95943556.1	12-Dec-95	0745307-A1	0745307	12-Dec-15	Subtitle compression (region/subregion)
DK	N 015395 -	96921025.1	12-Jul-96	0787404-A1	0787404	12-Jul-16	Subtitle duration
ES	B 033973 -	96900402.7	26-Jan-96	0754393-A1	2145991	26-Jan-16	Subtitle runlength compression
ES	N 013409 -	91201373.7	03-Jun-91	0460764-A1	0460764	03-Jun-11	Video block pointers
ES	N 014746 -	95905746.4	01-Feb-95	0745254-A1	2126877	01-Feb-15	EFM+ channel coding
ES	N 014752 -	95907127.5	14-Feb-95	0698270-A1	2150551	14-Feb-15	Block format error interleaving
ES	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
ES	N 015093 -	95934262.7	31-Oct-95	0740831-A1	0740831	31-Oct-15	Disc size on disc
ES	N 015156 -	95943556.1	12-Dec-95	0745307-A1	2143092	12-Dec-15	Subtitle compression (region/subregion)
ES	N 015395 -	96921025.1	12-Jul-96	0787404-A1	0787404	12-Jul-16	Subtitle duration
ES	N 015452 -	96926545.3	26-Aug-96	0789910-A1	0789910	26-Aug-16	DC control for EFM+
ES-EP	N 015424 -	96925986.0	02-Aug-96	0784848-A1		02-Aug-16	Path control system for multi-version
FI	N 014746 -	963151	01-Feb-95			01-Feb-15	EFM+ channel coding
FI	N 015395 -	96921025.1	12-Jul-96	0787404-A1	0787404	12-Jul-16	Subtitle duration
FR	B 033973 -	96900402.7	26-Jan-96	0754393-A1	0754393	26-Jan-16	Subtitle runlength compression
FR	N 013409 -	91201373.7	03-Jun-91	0460764-A1	0460764	03-Jun-11	Video block pointers
FR	N 013547 -	91203284.5	12-Dec-91	0496132-A3	0496132	12-Dec-11	System for Multilayer optical disc
FR	N 013547 A	96202520.1	12-Dec-91	0756273-A1	0756273	12-Dec-11	System for Multilayer optical disc
FR	N 014351 -	93203684.1	24-Dec-93	0605924-A3	0605924	24-Dec-13	Interlayer crosstalk for Multilayer
FR	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
FR	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
FR	N 014789 -	95910709.5	21-Mar-95	0702827-A1	0702827	21-Mar-15	DC-free channel code
FR	N 014950 -	94203621.1	14-Dec-94	0660314-A1	0660314	14-Dec-14	Mastering write strategy
FR	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
FR	N 015093 -	95934262.7	31-Oct-95	0740831-A1	0740831	31-Oct-15	Disc size on disc
FR	N 015156 -	95943556.1	12-Dec-95	0745307-A1	0745307	12-Dec-15	Subtitle compression (region/subregion)
FR	N 015395 -	96921025.1	12-Jul-96	0787404-A1	0787404	12-Jul-16	Subtitle duration
FR	N 015452 -	96926545.3	26-Aug-96	0789910-A1	0789910	26-Aug-16	DC control for EFM+
FR-EP	N 013547 B	01204396.4	12-Dec-91	1187116-A1		12-Dec-11	System for Multilayer optical disc
FR-EP	N 014986 -	95927046.3	16-Aug-95	0729629-A1		16-Aug-15	Multilayer with spherical abberation control
FR-EP	N 015424 -	96925986.0	02-Aug-96	0784848-A1		02-Aug-16	Path control system for multi-version

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Printdate Friday, June 07, 2002

Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR		GRANT NR	EXPIRY DATE	TITLE
FR-EP	N 015471 -	95938001.5	06-Dec-95	0745255-A1			06-Dec-15	Layer number info on disc
GB	B 033973 -	96900402.7	26-Jan-96	0754393-A1		0754393	26-Jan-16	Subtitle runlength compression
GB	N 013409 -	91201373.7	03-Jun-91	0460764-A1		0460764	03-Jun-11	Video block pointers
GB	N 013547 -	91203264.6	12-Dec-91	0496132-A3		0496132	12-Dec-11	System for Multilayer optical disc
GB	N 013547 A	96202520.1	12-Dec-91	0756273-A1		0756273	12-Dec-11	System for Multilayer optical disc
GB	N 014351 -	93203684.1	24-Dec-93	0605924-A3		0605924	24-Dec-13	Interlayer crosstalk for Multilayer
GB	N 014746 -	95905746.4	01-Feb-95	0745254-A1		0745254	01-Feb-15	EFM+ channel coding
GB	N 014752 -	95907127.5	14-Feb-95	0698270-A1		0698270	14-Feb-15	Block format error interleaving
GB	N 014789 -	95910709.5	21-Mar-95	0702827-A1		0702627	21-Mar-15	DC-free channel code
GB	N 014950 -	94203621.1	14-Dec-94	0660314-A1		0660314	14-Dec-14	Mastering write strategy
GB	N 015087 -	95934799.8	08-Nov-95	0740832-A1		0740832	08-Nov-15	Data structure indicator in sector header
GB	N 015093 -	95934262.7	31-Oct-95	0740831-A1		0740831	31-Oct-15	Disc size on disc
GB	N 015156 -	95943556.1	12-Dec-95	0745307-A1		0745307	12-Dec-15	Subtitle compression (region/subregion)
GB	N 015395 -	96921025.1	12-Jul-96	0787404-A1		0787404	12-Jul-16	Subtitle duration
GB	N 015452 -	96926545.3	26-Aug-96	0789910-A1		0789910	26-Aug-16	DC control for EFM+
GB-EP	N 013547 B	01204396.4	12-Dec-91	1187116-A1			12-Dec-11	System for Multilayer optical disc
GB-EP	N 014986 -	95927046.3	16-Aug-95	0729629-A1			16-Aug-15	Multilayer with spherical abberation control
GB-EP	N 015424 -	96925986.0	02-Aug-96	0784848-A1			02-Aug-16	Path control system for multi-version
GB-EP	N 015471 -	95938001.5	06-Dec-95	0745255-A1			06-Dec-15	Layer number info on disc
GR	B 033973 -	96900402.7	26-Jan-96	0754393-A1		0754393	26-Jan-16	Subtitle runlength compression
GR	N 014746 -	95905746.4	01-Feb-95	0745254-A1		0745254	01-Feb-15	EFM+ channel coding
GR	N 014752 -	95907127.5	14-Feb-95	0698270-A1		0698270	14-Feb-15	Block format error interleaving
GR	N 015087 -	95934799.8	08-Nov-95	0740832-A1		0740832	08-Nov-15	Data structure indicator in sector header
GR	N 015093 -	95934262.7	31-Oct-95	0740831-A1		0740831	31-Oct-15	Disc size on disc
GR	N 015156 -	95943556.1	12-Dec-95	0745307-A1		0745307	12-Dec-15	Subtitle compression (region/subregion)
GR	N 015395 -	96921025.1	12-Jul-96	0787404-A1		0787404	12-Jul-16	Subtitle duration
GR	N 015452 -	96926545.3	26-Aug-96	0789910-A1		3036397	26-Aug-16	DC control for EFM+
HK	B 033973 -	98114635.5	26-Jan-96	1013385-A	1013385-B	HK1013385	25-Jan-16	Subtitle runlength compression
HK	N 014351 -	98114078.9	24-Dec-93	1012766-A	1012766-A	HK1012766	23-Dec-13	Interlayer crosstalk for Multilayer
HK	N 014746 -	98114079.8	01-Feb-95	1012767-B1	1012767-B	HK1012767	31-Jan-15	EFM+ channel coding
HK	N 014752 -	98114633.7	14-Feb-95	1013358-A	1013358-B	HK1013358	13-Feb-15	Block format error interleaving
HK	N 014789 -	98114634.6	21-Mar-95	1013359-A	1013359-B	HK1013359	20-Mar-15	DC-free channel code
HK	N 014986 -	98114664.9	16-Aug-95	1013366-A	1013366-A		16-Aug-15	Multilayer with spherical abberation control
HK	N 015087 -	98114932.5	08-Nov-95	1013719-A	1013719-B	HK1013719	07-Nov-15	Data structure indicator in sector header
HK	N 015093 -	98114948.7	31-Oct-95	1013722-A	1013722-A	HK1013722	30-Oct-15	Disc size on disc

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Printdate Friday, June 07, 2002

Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
HK	N 015395 -	98103580.3	12-Jul-96	1004179-A 1004179-A		12-Jul-16	Subtitle duration
HK	N 015452 -	98103966.7	26-Aug-96	1004699-A 1004699-A		26-Aug-16	DC control for EFM+
HU	B 033973 -	P9602710	26-Jan-96			26-Jan-16	Subtitle runlength compression
HU	N 014746 -	P9602247	01-Feb-95			01-Feb-15	EFM+ channel coding
HU	N 015093 -	P9601955	31-Oct-95			31-Oct-15	Disc size on disc
HU	N 015452 -	P9601354	26-Aug-96			26-Aug-16	DC control for EFM+
ID	B 033973 -	P-960281	05-Feb-96	UNKNOWN	ID0006497	05-Feb-16	Subtitle runlength compression
ID	N 014746 -	P-950245	15-Feb-95		ID0005313	15-Feb-15	EFM+ channel coding
ID	N 014752 -	P-950251	16-Feb-95			16-Feb-15	Block format error interleaving
ID	N 015395 -	P-962077	22-Jul-96			22-Jul-16	Subtitle duration
ID	N 015452 -	P-962496	02-Sep-96	016.164A	ID0005386	02-Sep-16	DC control for EFM+
IE	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
IE	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
IE	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
IE	N 015156 -	95943556.1	12-Dec-95	0745307-A1	0745307	12-Dec-15	Subtitle compression (region/subregion)
IE	N 015452 -	96926545.3	26-Aug-96	0789910-A1	0789910	26-Aug-16	DC control for EFM+
IL	B 033973 -	117028	04-Feb-96		117028	04-Feb-16	Subtitle runlength compression
IL	N 015452 -	120740	26-Aug-96		120740	26-Aug-16	DC control for EFM+
IN	B 033973 -	96-159	31-Jan-96			31-Jan-10	Subtitle runlength compression
IN	N 014746 A	98-1577	13-Feb-95		185349	13-Feb-09	EFM+ channel coding
IN	N 014746 B	98-1578	13-Feb-95		184753	13-Feb-09	EFM+ channel coding
IN	N 014746 C	99-312	13-Feb-95			13-Feb-09	EFM+ channel coding
IN	N 014752 -	95-141	14-Feb-95			14-Feb-09	Block format error interleaving
IN	N 014752 A	99-505	14-Feb-95			14-Feb-09	Block format error interleaving
IN	N 015452 -	96-1530	28-Aug-96			28-Aug-10	DC control for EFM+
IT	B 033973 -	96900402.7	26-Jan-96	0754393-A1	0754393	26-Jan-16	Subtitle runlength compression
IT	N 013409 -	91201373.7	03-Jun-91	0460764-A1	0460764	03-Jun-11	Video block pointers
IT	N 014351 -	93203684.1	24-Dec-93	0605924-A3	0605924	24-Dec-13	Interlayer crosstalk for Multilayer
IT	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
IT	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
IT	N 014789 -	95910709.5	21-Mar-95	0702827-A1	0702827	21-Mar-15	DC-free channel code
IT	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
IT	N 015093 -	95934262.7	31-Oct-95	0740831-A1	0740831	31-Oct-15	Disc size on disc
IT	N 015156 -	95943556.1	12-Dec-95	0745307-A1	0745307	12-Dec-15	Subtitle compression (region/subregion)
IT	N 015395 -	96921025.1	12-Jul-96	0787404-A1	0787404	12-Jul-16	Subtitle duration

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Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
IT	N 015452 -	96926545.3	26-Aug-96	0789910-A1	0789910	26-Aug-16	DC control for EFM+
IT-EP	N 014986 -	95927046.3	16-Aug-95	0729629-A1		16-Aug-15	Multilayer with spherical abberation control
IT-EP	N 015424 -	96925986.0	02-Aug-96	0784848-A1		02-Aug-16	Path control system for multi-version
JP	B 033973 -	96-524103	26-Jan-96	98-500273		26-Jan-16	Subtitle runlength compression
JP	N 013409 -	91-159489	04-Jun-91	92-233389	3280999	04-Jun-11	Video block pointers
JP	N 013409 A	01-151175	21-May-01			04-Jun-11	Video block pointers
JP	N 013409 B	01-387556	20-Dec-01			04-Jun-11	Video block pointers
JP	N 013547 -	91-339181	21-Dec-91	92-301226	3110532	21-Dec-11	System for Multilayer optical disc
JP	N 013547 A	99-321703	21-Dec-91	00-137927			System for Multilayer optical disc
JP	N 014351 -	93-350276	28-Dec-93	94-267110		28-Dec-13	Interlayer crosstalk for Multilayer
JP	N 014746 -	95-521693	01-Feb-95	97-512392		01-Feb-15	EFM+ channel coding
JP	N 014752 -	95-521698	14-Feb-95	96-509316		14-Feb-15	Block format error interleaving
JP	N 014789 -	95-525542	21-Mar-95	96-511405		21-Mar-15	DC-free channel code
JP	N 014950 -	94-336413	22-Dec-94	95-320208		22-Dec-14	Mastering write strategy
JP	N 014986 -	96-507906	16-Aug-95			16-Aug-15	Multilayer with spherical abberation control
JP	N 015087 -	96-516712	08-Nov-95	97-507947		08-Nov-15	Data structure indicator in sector header
JP	N 015093 -	96-516706	31-Oct-95	97-507946		31-Oct-15	Disc size on disc
JP	N 015156 -	96-518541	12-Dec-95	97-509552		12-Dec-15	Subtitle compression (region/subregion)
JP	N 015395 -	97-506485	12-Jul-96	98-507607		12-Jul-16	Subtitle duration
JP	N 015452 -	97-511019	26-Aug-96	98-508456		26-Aug-16	DC control for EFM+
JP	N 015471 -	96-519640	06-Dec-95	97-509776		06-Dec-15	Layer number info on disc
KR	B 033973 -	96-705635	26-Jan-96			26-Jan-16	Subtitle runlength compression
KR	N 013409 -	91-9152	03-Jun-91		0245962	03-Jun-11	Video block pointers
KR	N 013547 -	91-23288	18-Dec-91		0246282	18-Dec-11	System for Multilayer optical disc
KR	N 013547 A	96-67178	18-Dec-91		254150	18-Dec-11	System for Multilayer optical disc
KR	N 014351 -	94-144	04-Jan-94		289018	04-Jan-14	Interlayer crosstalk for Multilayer
KR	N 014746 -	96-704550	01-Feb-95			01-Feb-15	EFM+ channel coding
KR	N 014752 -	95-704556	14-Feb-95			14-Feb-15	Block format error interleaving
KR	N 014789 -	95-705575	21-Mar-95			21-Mar-15	DC-free channel code
KR	N 014950 -	94-37014	24-Dec-94			24-Dec-14	Mastering write strategy
KR	N 014986 -	96-702076	16-Aug-95			16-Aug-15	Multilayer with spherical abberation control
KR	N 015087 -	96-704010	08-Nov-95			08-Nov-15	Data structure indicator in sector header
KR	N 015093 -	96-703818	31-Oct-95			31-Oct-15	Disc size on disc
KR	N 015156 -	96-704513	12-Dec-95			12-Dec-15	Subtitle compression (region/subregion)
KR	N 015395 -	97-701801	12-Jul-96			12-Jul-16	Subtitle duration

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Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
KR	N 015424 -	97-701581	02-Aug-96			02-Aug-16	Path control system for multi-version
KR	N 015452 -	97-702860	26-Aug-96			26-Aug-16	DC control for EFM+
KR	N 015471 -	96-704517	06-Dec-95			06-Dec-15	Layer number info on disc
LU	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
LU	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
LU	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
LU	N 015156 -	95943556.1	12-Dec-95	0745307-A1	0745307	12-Dec-15	Subtitle compression (region/subregion)
MC	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
MC	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
MC	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
MC	N 015156 -	95943556.1	12-Dec-95	0745307-A1	0745307	12-Dec-15	Subtitle compression (region/subregion)
MX	N 014746 -	9603394	01-Feb-95		189493	01-Feb-15	EFM+ channel coding
MX	N 015087 -	962808	08-Nov-95			08-Nov-15	Data structure indicator in sector header
MX	N 015156 -	963393	12-Dec-95		199847	12-Dec-15	Subtitle compression (region/subregion)
MX	N 015395 -	972108	12-Jul-96			12-Jul-16	Subtitle duration
MX	N 015424 -	972223	02-Aug-96			02-Aug-16	Path control system for multi-version
MX	N 015452 -	UNKNOWN	26-Aug-96			26-Aug-16	DC control for EFM+
MY	B 033973 -	PI9600392	02-Feb-96				Subtitle runlength compression
MY	N 014746 -	PI9500357	14-Feb-95		112136	30-Apr-16	EFM+ channel coding
MY	N 014752 -	PI9500378	15-Feb-95				Block format error interleaving
MY	N 014986 -	PI95002480	22-Aug-95				Multilayer with spherical abberation control
MY	N 014986 A	PI20014950	22-Aug-95			22-Aug-15	Multilayer with spherical abberation control
MY	N 014986 B	PI20014949	22-Aug-95			22-Aug-15	Multilayer with spherical abberation control
MY	N 015156 -	PI9503869	14-Dec-95				Subtitle compression (region/subregion)
MY	N 015395 -	PI9602983	19-Jul-96				Subtitle duration
MY	N 015424 -	PI9603192	03-Aug-96				Path control system for multi-version
MY	N 015452 -	PI9603603	29-Aug-96				DC control for EFM+
NL	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
NL	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
NL	N 014950 -	94203621.1	14-Dec-94	0660314-A1	0660314	14-Dec-14	Mastering write strategy
NL	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
NL	N 015093 -	95934262.7	31-Oct-95	0740831-A1	0740831	31-Oct-15	Disc size on disc
NL	N 015156 -	95943556.1	12-Dec-95	0745307-A1	0745307	12-Dec-15	Subtitle compression (region/subregion)
NL	N 015395 -	96921025.1	12-Jul-96	0787404-A1	0787404	12-Jul-16	Subtitle duration
NL	N 015452 -	96926545.3	26-Aug-96	0789910-A1	0789910	26-Aug-16	DC control for EFM+

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Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
NO	N 014746 -	19963388	01-Feb-95			01-Feb-15	EFM+ channel coding
NZ	N 014746 -	278137	01-Feb-95	278137	278137	01-Feb-15	EFM+ channel coding
PL	B 033973 -	P316879	26-Jan-96			26-Jan-16	Subtitle runlength compression
PL	N 014746 -	P319407	01-Feb-95			01-Feb-15	EFM+ channel coding
PL	N 014986 -	P314789	16-Aug-95		180658	16-Aug-15	Multilayer with spherical abberation control
PL	N 014986 A	P336669	16-Aug-95			16-Aug-15	Multilayer with spherical abberation control
PL	N 014986 B	P336670	16-Aug-95		180647	16-Aug-15	Multilayer with spherical abberation control
PL	N 015093 -	P315584	31-Oct-95		180182	31-Oct-15	Disc size on disc
PL	N 015093 A	P337170	31-Oct-95		180307	31-Oct-15	Disc size on disc
PL	N 015452 -	P320006	26-Aug-96			26-Aug-16	DC control for EFM+
PT	B 033973 -	96900402.7	26-Jan-96	0754393-A1	0754393	26-Jan-16	Subtitle runlength compression
PT	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
PT	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
PT	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
PT	N 015093 -	95934262.7	31-Oct-95	0740831-A1	0740831	31-Oct-15	Disc size on disc
PT	N 015156 -	95943556.1	12-Dec-95	0745307-A1	0745307	12-Dec-15	Subtitle compression (region/subregion)
PT	N 015395 -	96921025.1	12-Jul-96	0787404-A1	0787404	12-Jul-16	Subtitle duration
PT	N 015452 -	96926545.3	26-Aug-96	0789910-A1	0789910	26-Aug-16	DC control for EFM+
RO	N 014746 -	96-001653	01-Feb-95			01-Feb-15	EFM+ channel coding
RO	N 014746 A	01-00059	01-Feb-95			01-Feb-15	EFM+ channel coding
RO	N 015093 -	96-01469	31-Oct-95		113191	31-Oct-15	Disc size on disc
RU	B 033973 -	9700011	26-Jan-96		000082	26-Jan-16	Subtitle runlength compression
RU	N 014746 -	96116250	01-Feb-95	33	2153707	01-Feb-15	EFM+ channel coding
RU	N 015093 -	96116857	31-Oct-95	96116857		31-Oct-15	Disc size on disc
RU	N 015424 -	97106830	02-Aug-96	97106830-A		02-Aug-16	Path control system for multi-version
RU	N 015452 -	97108582	26-Aug-96	15	2153200	26-Aug-16	DC control for EFM+
SE	B 033973 -	96900402.7	26-Jan-96	0754393-A1	0754393	26-Jan-16	Subtitle runlength compression
SE	N 013409 -	91201373.7	03-Jun-91	0460764-A1	0460764	03-Jun-11	Video block pointers
SE	N 014351 -	93203684.1	24-Dec-93	0605924-A3	0605924	24-Dec-13	Interlayer crosstalk for Multilayer
SE	N 014746 -	95905746.4	01-Feb-95	0745254-A1	0745254	01-Feb-15	EFM+ channel coding
SE	N 014752 -	95907127.5	14-Feb-95	0698270-A1	0698270	14-Feb-15	Block format error interleaving
SE	N 015087 -	95934799.8	08-Nov-95	0740832-A1	0740832	08-Nov-15	Data structure indicator in sector header
SE	N 015156 -	95943556.1	12-Dec-95	0745307-A1	0745307	12-Dec-15	Subtitle compression (region/subregion)
SE	N 015452 -	96926545.3	26-Aug-96	0789910-A1	0789910	26-Aug-16	DC control for EFM+
SE-EP	N 014986 -	95927046.3	16-Aug-95	0729629-A1		16-Aug-15	Multilayer with spherical abberation control

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Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
SG	B 033973 -	9611564.7	26-Jan-96		34670	26-Jan-16	Subtitle runlength compression
SG	N 014351 -	9607095.8	24-Dec-93	0048111	48111	24-Dec-13	Interlayer crosstalk for Multilayer
SG	N 014752 -	9607077.6	14-Feb-95	0050623-A	50623	14-Feb-15	Block format error interleaving
SG	N 014986 -	9700759.5	16-Aug-95		37758	16-Aug-15	Multilayer with spherical abberation control
SG	N 015087 -	9702180.2	08-Nov-95		41092	08-Nov-15	Data structure indicator in sector header
SG	N 015093 -	9703040.7	31-Oct-95		42670	31-Oct-15	Disc size on disc
SG	N 015395 -	9704506.6	12-Jul-96		45664	12-Jul-16	Subtitle duration
SG	N 015424 -	9701246.8	02-Aug-96		39073	02-Aug-16	Path control system for multi-version
SG	N 015424 A	9904246.7	02-Aug-96			02-Aug-16	Path control system for multi-version
SG	N 015452 -	9703300.5	26-Aug-96		44185	26-Aug-16	DC control for EFM+
SI	N 014746 -	95905746.4	01-Feb-95	0745254-A1	9530186	01-Feb-15	EFM+ channel coding
SK	N 014746 -	96-PV1051	01-Feb-95			01-Feb-15	EFM+ channel coding
SK	N 015093 -	96-PV920	31-Oct-95			31-Oct-15	Disc size on disc
TH	N 015424 -	032650	02-Aug-96	27257		02-Aug-16	Path control system for multi-version
TR	B 033973 -	96-00787	26-Jan-96			26-Jan-16	Subtitle runlength compression
TR	N 014746 -	95-0136	15-Feb-95			15-Feb-15	EFM+ channel coding
TR	N 014752 -	95-0143	16-Feb-95		29401	16-Feb-15	Block format error interleaving
TR	N 015093 -	95-1446	17-Nov-95		TR199501446B	17-Nov-15	Disc size on disc
TW	N 014351 -	83101489	22-Feb-94		67573	22-Feb-14	Interlayer crosstalk for Multilayer
TW	N 014746 -	84101360	15-Feb-95	294862	82864	15-Feb-15	EFM+ channel coding
TW	N 014752 -	84101856	28-Feb-95	256904	73076	28-Feb-15	Block format error interleaving
TW	N 014789 -	84101322	14-Feb-95	267279	75391	14-Feb-15	DC-free channel code
TW	N 014950 -	84100644	25-Jan-95	308686	87086	25-Jan-15	Mastering write strategy
TW	N 014986 -	84110771	13-Oct-95	292389	852158	13-Oct-15	Multilayer with spherical abberation control
TW	N 015087 -	84113943	27-Dec-95	292382	82165	27-Dec-15	Data structure indicator in sector header
TW	N 015093 -	84113944	27-Dec-95			27-Dec-15	Disc size on disc
TW	N 015395 -	84108602	17-Aug-95		82852	17-Aug-15	Subtitle duration
TW	N 015424 -	85111151	12-Sep-96	353847		12-Sep-16	Path control system for multi-version
TW	N 015452 -	85112032	02-Oct-96	394931	116382	02-Oct-16	DC control for EFM+
TW	N 015471 -	85102220	27-Feb-96			27-Feb-16	Layer number info on disc
UA	N 014746 -	96083269	01-Feb-95		42757	01-Feb-15	EFM+ channel coding
UA	N 015093 -	96072883	31-Oct-95		42015	31-Oct-15	Disc size on disc
US	B 033973 -	08/593963	30-Jan-96		6301389	30-Jan-16	Subtitle runlength compression
US	N 006493 D	06/858550	23-Apr-86		5068846	26-Nov-08	Read out of optical disc via substrate
US	N 013409 B	08/563799	28-Nov-95		5745641	28-Apr-15	Video block pointers

All corresponding patent applications, patents, divisions, continuations and reissues based upon any of the patent applications or patents of this list are considered to be included as an integral part of this list

Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
US	N 013547 V	08/299861	01-Sep-94		5677903	14-Oct-14	System for Multilayer optical disc
US	N 013547 W	08/861351	21-May-97		5841753	18-Apr-12	System for Multilayer optical disc
US	N 013547 X	08/861350	21-May-97			18-Apr-12	System for Multilayer optical disc
US	N 014351 -	08/175331	29-Dec-93		5511057	29-Dec-13	Interlayer crosstalk for Multilayer
US	N 014351 W	08/791097	23-Jan-97		5864530	29-Dec-13	Interlayer crosstalk for Multilayer
US	N 014351 Y	09/442959	18-Nov-99			29-Dec-13	Interlayer crosstalk for Multilayer
US	N 014746 -	08/385533	08-Feb-95		5696505	08-Feb-15	EFM+ channel coding
US	N 014746 A	08/900275	08-Feb-95		5920272	08-Feb-15	EFM+ channel coding
US	N 014746 R	09/899091	08-Feb-95			08-Feb-15	EFM+ channel coding
US	N 014752 -	08/389369	16-Feb-95		5838696	16-Feb-15	Block format error interleaving
US	N 014789 -	08/388865	15-Feb-95		5642113	15-Feb-15	DC-free channel code
US	N 014950 -	08/362622	22-Dec-94		5605782	22-Dec-14	Mastering write strategy
US	N 014950 A	08/755614	25-Nov-96		5790512	22-Dec-14	Mastering write strategy
US	N 015087 -	08/558515	16-Nov-95		5920874	16-Nov-15	Data structure indicator in sector header
US	N 015093 -	08/558517	16-Nov-95		6388962	16-Nov-15	Disc size on disc
US	N 015093 B					16-Nov-15	Disc size on disc
US	N 015093 C	10/134912	29-Apr-02			16-Nov-15	Disc size on disc
US	N 015156 -	08/572255	13-Dec-95			13-Dec-15	Subtitle compression (region/subregion)
US	N 015395 -	08/516836	18-Aug-95			18-Aug-15	Subtitle duration
US	N 015424 -	08/692918	31-Jul-96			31-Jul-16	Path control system for multi-version
US	N 015452 -	08/706048	30-Aug-96		5790056	30-Aug-16	DC control for EFM+
US	N 015471 -	08/573850	18-Dec-95		6370102	18-Dec-15	Layer number info on disc
US	N 015471 A	10/083330	22-Oct-01			18-Dec-15	Layer number info on disc
VE	N 015093 -	95-2032	17-Nov-95			17-Nov-15	Disc size on disc
VE	N 015452 -	96-1517	30-Aug-96			30-Aug-16	DC control for EFM+
VN	B 033973 -	S19960234	30-Sep-96		1559	30-Sep-11	Subtitle runlength compression
VN	N 014746 -	S19960099	13-Aug-96		1407	13-Aug-11	EFM+ channel coding
VN	N 014986 -	S19962028T1	23-Aug-94		947	23-Aug-09	Multilayer with spherical abberation control
VN	N 014986 A	S19962028T2	23-Aug-94		948	23-Aug-09	Multilayer with spherical abberation control
VN	N 015093 -	S19960035	15-Jul-96		1338	15-Jul-11	Disc size on disc
VN	N 015424 -	S19970878	03-May-97			03-May-17	Path control system for multi-version
VN	N 015452 -	S19970327	25-Apr-97		1598	25-Apr-17	DC control for EFM+
ZA	B 033973 -	96-0754	31-Jan-96		96-0754	31-Jan-16	Subtitle runlength compression
ZA	N 014746 -	951115	10-Feb-95		95-1115	10-Feb-15	EFM+ channel coding
ZA	N 014752 -	95-1194	14-Feb-95		95-1194	14-Feb-15	Block format error interleaving

All corresponding patent applications, patents, divisions, continuations and reissues based upon any of the patent applications or patents of this list are considered to be included as an integral part of this list

Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
ZA	N 015093 -	959489	08-Nov-95		95-9489	08-Nov-15	Disc size on disc
ZA	N 015452 -	967261	27-Aug-96		96/7261	27-Aug-16	DC control for EFM+

Exhibit I to the DVD Video Disc and DVD ROM Disc Patent License Agreement
Pioneer's patents relevant to DVD ROM disc.

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE	
DE-EP	50P40030EP	95305172.9	25-Jul-95	0694915-A1		25-Jul-15	Multi layer	
DE-EP	50P40188EP	97301337.8	27-Feb-97	0793233-A2		27-Feb-17	Minimum readout rate	
FR-EP	50P40030EP	95305172.9	25-Jul-95	0694915-A1		25-Jul-15	Multi layer	
FR-EP	50P40188EP	97301337.8	27-Feb-97	0793233-A2		27-Feb-17	Minimum readout rate	
GB-EP	50P40030EP	95305172.9	25-Jul-95	0694915-A1		25-Jul-15	Multi layer	
GB-EP	50P40188EP	97301337.8	27-Feb-97	0793233-A2		27-Feb-17	Minimum readout rate	
JP	50P40030	95-148907	15-Jun-95	96-96406		26-Jul-14	Multi layer	
JP	50P40188	96-41943	28-Feb-96	97-231677		28-Feb-16	Minimum readout rate	
JP	51P40052	96-236411	06-Sep-96	97-120635	2849072	11-Nov-13	Structure of SYNC Codes	
US	48P40116US1	794018	07-Nov-94		5740152	07-Nov-14	Structure of SYNC Codes	
US	50P40030US	0504793	20-Jul-95		5608715	20-Jul-15	Multi layer	
US	50P40102US	759956	03-Dec-96		5987066	03-Dec-16	Digital data transmitting	*
US	50P40123US	764024	12-Dec-96		5917857	12-Dec-16	Digital modulation	*
US	50P40188US	0806458	26-Feb-97		6236804	26-Feb-17	Minimum readout rate	

** grant for Pioneer's share*

All corresponding patent applications, patents, divisions, continuations and reissues based upon any of the patent applications or patents of this list are considered to be included as an integral part of this list

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Exhibit II to the DVD Video Disc and DVD ROM Disc Patent License Agreement

Pioneer's patents relevant to DVD Video disc.

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
CN	50P40166	97110088.8	28-Feb-97	1167311A		28-Feb-12	DSI , PCI separation
CN	50P40167CN	97111626.1	15-Mar-97	1170930A		15-Mar-17	Control by NAV pack
CN	50P40179CN	97113064.7	04-Apr-97	1165620		04-Apr-17	Highlight PTS
CN	50P40180CN	97109638.4	19-Mar-97	1173698A		19-Mar-17	Seamless flag
CN	50P40184CN	97111653.9	19-Mar-97	1175055A		19-Mar-17	Attribute information
CN	50P40188CN	97111689.X	18-Mar-97	1175056A		18-Mar-17	First access unit pointer
DE	42P30229DE1	938344830.0	11-Nov-91		3844830	11-Oct-08	Selection of subtitle
DE-EP	45P40038EP1	98111640.3	24-Jun-98	0875884-A1		04-Jul-11	Presentation Data
DE-EP	48P30012EP	94303816.6	26-May-94	0626689-A2		26-May-14	Selection by classification information
DE-EP	50P40030EP	95305172.9	25-Jul-95	0694915-A1		25-Jul-15	Multi layer
DE-EP	50P40041EP	96304936.6	04-Jul-96	0752705-A2		04-Jul-16	Time map
DE-EP	50P40163EP	97302312.0	03-Apr-97	0800164-A2		03-Apr-17	User operation restriction
DE-EP	50P40164EP	97301572.0	10-Mar-97	0795869-A2		10-Mar-17	Access restriction
DE-EP	50P40165EP	97301817.9	18-Mar-97	0797201-A2		18-Mar-17	DSI Still, Cell Still
DE-EP	50P40166EP	97301340.2	27-Feb-97	0793232-A2		27-Feb-17	DSI , PCI separation
DE-EP	50P40167EP	97301536.5	07-Mar-97	0795871		07-Mar-17	Control by NAV pack
DE-EP	50P40168EP	97301915.1	21-Mar-97	0797200-A2		21-Mar-17	VOB unit search information
DE-EP	50P40169EP	97301880.7	20-Mar-97	0797206-A2		20-Mar-17	VOB unit search information
DE-EP	50P40171EP	97301652.0	12-Mar-97	0795873-A2		12-Mar-17	Parental ID
DE-EP	50P40174EP	97301613.2	11-Mar-97	0795872-A2		11-Mar-17	VOB ID, Cell ID
DE-EP	50P40175EP	97301858.3	19-Mar-97	0798723-A2		19-Mar-17	Text information
DE-EP	50P40176EP	97301756.9	17-Mar-97	0797204-A2		17-Mar-17	Time search map
DE-EP	50P40179EP	97302258.5	02-Apr-97	0800174-A2		02-Apr-17	Highlight PTS
DE-EP	50P40180EP	97301857.5	19-Mar-97	0798722-A2		19-Mar-17	Seamless flag
DE-EP	50P40181EP	97302338.5	04-Apr-97	0801392-A2		04-Apr-17	Audio frame alignment
DE-EP	50P40182EP	97301490.5	05-Mar-97	0795870-A2		05-Mar-17	Audio frame number
DE-EP	50P40184EP	97301757.7	17-Mar-97	0797205-A2		17-Mar-17	Attribute information
DE-EP	50P40186EP	97301645.4	12-Mar-97	0797203-A2		12-Mar-17	First access unit pointer
DE-EP	50P40187EP	97301820.3	18-Mar-97	0797199-A2		18-Mar-17	24 bit data alignment
DE-EP	50P40188EP	97301337.8	27-Feb-97	0793233-A2		27-Feb-17	Minimum readout rate

All corresponding patent applications, patents, divisions, continuations and reissues based upon any of the patent applications or patents of this list are considered to be included as an integral part of this list

Printdate 26 September 2001

Pioneer's patents relevant to DVD Video disc.

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
DE-EP	50P40189EP	97301489.7	05-Mar-97	0795859-A2	0795859	05-Mar-17	Audio frame
EP	50P40189EP	97301489.7	05-Mar-97	0795859-A2	0795859	05-Mar-17	Audio frame
FR-EP	45P40038EP1	98111640.3	24-Jun-98	0875884-A1		04-Jul-11	Presentation Data
FR-EP	48P30012EP	94303816.6	26-May-94	0626689-A2		26-May-14	Selection by classification information
FR-EP	50P40030EP	95305172.9	25-Jul-95	0694915-A1		25-Jul-15	Multi layer
FR-EP	50P40041EP	96304936.6	04-Jul-96	0752705-A2		04-Jul-16	Time map
FR-EP	50P40163EP	97302312.0	03-Apr-97	0800164-A2		03-Apr-17	User operation restriction
FR-EP	50P40164EP	97301572.0	10-Mar-97	0795869-A2		10-Mar-17	Access restriction
FR-EP	50P40165EP	97301817.9	18-Mar-97	0797201-A2		18-Mar-17	DSI Still, Cell Still
FR-EP	50P40166EP	97301340.2	27-Feb-97	0793232-A2		27-Feb-17	DSI , PCI separation
FR-EP	50P40167EP	97301536.5	07-Mar-97	0795871		07-Mar-17	Control by NAV pack
FR-EP	50P40168EP	97301915.1	21-Mar-97	0797200-A2		21-Mar-17	VOB unit search information
FR-EP	50P40169EP	97301880.7	20-Mar-97	0797208-A2		20-Mar-17	VOB unit search information
FR-EP	50P40171EP	97301652.0	12-Mar-97	0795873-A2		12-Mar-17	Parental ID
FR-EP	50P40174EP	97301613.2	11-Mar-97	0795872-A2		11-Mar-17	VOB ID, Cell ID
FR-EP	50P40175EP	97301858.3	19-Mar-97	0798723-A2		19-Mar-17	Text information
FR-EP	50P40176EP	97301756.9	17-Mar-97	0797204-A2		17-Mar-17	Time search map
FR-EP	50P40179EP	97302258.5	02-Apr-97	0800174-A2		02-Apr-17	Highlight PTS
FR-EP	50P40180EP	97301857.5	19-Mar-97	0798722-A2		19-Mar-17	Seamless flag
FR-EP	50P40181EP	97302338.5	04-Apr-97	0801392-A2		04-Apr-17	Audio frame alignment
FR-EP	50P40182EP	97301490.5	05-Mar-97	0795870-A2		05-Mar-17	Audio frame number
FR-EP	50P40184EP	97301757.7	17-Mar-97	0797205-A2		17-Mar-17	Attribute information
FR-EP	50P40186EP	97301645.4	12-Mar-97	0797203-A2		12-Mar-17	First access unit pointer
FR-EP	50P40187EP	97301820.3	18-Mar-97	0797199-A2		18-Mar-17	24 bit data alignment
FR-EP	50P40188EP	97301337.9	27-Feb-97	0793233-A2		27-Feb-17	Minimum readout rate
FR-EP	50P40189EP	97301489.7	05-Mar-97	0795859-A2	0795859	05-Mar-17	Audio frame
GB-EP	45P40038EP1	98111640.3	24-Jun-98	0875884-A1		04-Jul-11	Presentation Data
GB-EP	48P30012EP	94303816.6	26-May-94	0626689-A2		26-May-14	Selection by classification information
GB-EP	50P40030EP	95305172.9	25-Jul-95	0694915-A1		25-Jul-15	Multi layer
GB-EP	50P40041EP	96304936.6	04-Jul-96	0752705-A2		04-Jul-16	Time map
GB-EP	50P40163EP	97302312.0	03-Apr-97	0800164-A2		03-Apr-17	User operation restriction

All corresponding patent applications, patents, divisions, continuations and reissues based upon any of the patent applications or patents of this list are considered to be included as an integral part of this list

Pioneer's patents relevant to DVD Video disc.

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR		GRANT NR	EXPIRY DATE	TITLE
GB-EP	50P40164EP	97301672.0	10-Mar-97	0795869-A2			10-Mar-17	Access restriction
GB-EP	50P40165EP	97301817.9	18-Mar-97	0797201-A2			18-Mar-17	DSI Still, Cell Still
GB-EP	50P40166EP	97301340.2	27-Feb-97	0793232-A2			27-Feb-17	DSI , PCI separation
GB-EP	50P40167EP	97301536.5	07-Mar-97	0795871			07-Mar-17	Control by NAV pack
GB-EP	50P40168EP	97301915.1	21-Mar-97	0797200-A2			21-Mar-17	VOB unit search information
GB-EP	50P40169EP	97301880.7	20-Mar-97	0797206-A2			20-Mar-17	VOB unit search information
GB-EP	50P40171EP	97301652.0	12-Mar-97	0795873-A2			12-Mar-17	Parental ID
GB-EP	50P40174EP	97301613.2	11-Mar-97	0795872-A2			11-Mar-17	VOB ID, Cell ID
GB-EP	50P40175EP	97301858.3	19-Mar-97	0798723-A2			19-Mar-17	Text information
GB-EP	50P40176EP	97301756.9	17-Mar-97	0797204-A2			17-Mar-17	Time search map
GB-EP	50P40179EP	97302258.5	02-Apr-97	0800174-A2			02-Apr-17	Highlight PTS
GB-EP	50P40180EP	97301857.5	19-Mar-97	0798722-A2			19-Mar-17	Seamless flag
GB-EP	50P40181EP	97302338.5	04-Apr-97	0801392-A2			04-Apr-17	Audio frame alignment
GB-EP	50P40182EP	97301490.5	05-Mar-97	0795870-A2			05-Mar-17	Audio frame number
GB-EP	50P40184EP	97301757.7	17-Mar-97	0797205-A2			17-Mar-17	Attribute information
GB-EP	50P40186EP	97301845.4	12-Mar-97	0797203-A2			12-Mar-17	First access unit pointer
GB-EP	50P40187EP	97301820.3	18-Mar-97	0797199-A2			18-Mar-17	24 bit data alignment
GB-EP	50P40188EP	97301337.8	27-Feb-97	0793233-A2			27-Feb-17	Minimum readout rate
GB-EP	50P40189EP	97301489.7	05-Mar-97	0795859-A2		0795859	05-Mar-17	Audio frame
JP	42P30166	88-46604	29-Feb-88			2735557	29-Feb-08	Position of sub-picture on main picture
JP	42P30201	88-57598	22-Mar-88	89-241083		2811445	22-Mar-08	Address of sub-picture information
JP	42P30229	88-57401	11-Mar-88	89-232573	95-118799	2938077	11-Mar-08	Selection of subtitle
JP	45P40038	90-179794	06-Jul-90	92-067470			06-Jul-10	Presentation Data
JP	47P30077	92-293888	07-Oct-92	94-124540		2928610	07-Oct-12	Mixture of audio information
JP	48P30015	93-124070	26-May-93	94-332481		2951502	26-May-13	Selection of subchannel
JP	50P40030	95-148907	15-Jun-95	96-96406			26-Jul-14	Multi layer
JP	50P40040	95-166024	30-Jun-95	97-17159			30-Jun-15	Cell contents
JP	50P40041	95-170913	06-Jul-95	97-23404			06-Jul-15	Time map
JP	50P40163	96-82932	04-Apr-96	97-274776			04-Apr-16	User operation restriction
JP	50P40164	96-59838	15-Mar-96	97-251781			15-Mar-16	Access restriction
JP	50P40165	96-61471	18-Mar-96	97-261584			18-Mar-16	DSI Still, Cell Still

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Printdate 26 September 2001

Pioneer's patents relevant to DVD Video disc.

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
JP	50P40166	96-41942	28-Feb-96	97-231730		28-Feb-16	DSI , PCI seperation
JP	50P40167	96-59837	15-Mar-96	97-252450		15-Mar-16	Control by NAV pack
JP	50P40168	96-66405	22-Mar-96	97-259542		22-Mar-16	VOB unit search information
JP	50P40169	96-66403	22-Mar-96	97-259541		22-Mar-16	VOB unit search information
JP	50P40171	96-59834	15-Mar-96	97-251760		15-Mar-16	Parental ID
JP	50P40174	96-57757	14-Mar-96	97-251759		14-Mar-16	VOB ID, Cell ID
JP	50P40175	96-68730	25-Mar-96	97-265765		25-Mar-16	Text information
JP	50P40176	96-61470	18-Mar-96	97-251763		18-Mar-16	Time search map
JP	50P40179	96-83478	05-Apr-96	97-282848		05-Apr-16	Highlight PTS
JP	50P40180	96-63590	19-Mar-96	97-259573		19-Mar-16	Seamless flag
JP	50P40181	96-85608	08-Apr-96	97-282849		08-Apr-16	Audio frame allgnment
JP	50P40182	96-59836	15-Mar-96	97-252449		15-Mar-16	Audio frame number
JP	50P40184	96-63591	19-Mar-96	97-259574		19-Mar-16	Attribute information
JP	50P40185	96-66404	22-Mar-96	97-259506		22-Mar-16	Cell contents information
JP	50P40186	96-61473	18-Mar-96	97-251762		18-Mar-16	First access unit pointer
JP	50P40187	96-61472	18-Mar-96	97-251723		18-Mar-16	24 bit data alignment
JP	50P40188	96-41943	28-Feb-96	97-231677		28-Feb-16	Minimum readout rate
JP	50P40189	96-59835	15-Mar-96	97-251717		15-Mar-16	Audio frame
JP	51P40052	96-236411	06-Sep-96	97-120635	2849072	11-Nov-13	Structure of SYNC Codes
JP	51P40088	96-336054	26-Dec-96	97-190194	3124243	18-Jun-13	Selection by classification information
JP	52P40006	97-135513	26-May-97	98-108138	3025659	29-Feb-08	Position of sub-picture on main picture
JP	52P40061	97-151376	09-Jun-97	98-092161	2941745	11-Mar-08	Selection of subtitle
JP	52P40148	97-215996	25-Jul-97	98-075418	3090895	07-Jul-07	Attribute information
US	42P30201US	0248387	23-Sep-88		4853035	23-Sep-08	Address of sub-picture information
US	42P30229US	065036	24-May-93		5315400	24-May-11	Selection of subtitle
US	42P30238US	0304282	31-Jan-89		5083551	31-Jan-09	Run length limited code
US	45P40038US	0725092	02-Jul-91		5336844	09-Aug-11	Presentation Data
US	47P40013US2	525478	15-Mar-01			03-Sep-13	Aspect ratio
US	47P40013US3	638003	14-Aug-00			03-Sep-13	Aspect ratio
US	48P30012US	0249837	26-May-94		5679911	21-Oct-14	Selection by classification information
US	48P30012US1	0719486	25-Sep-96		5895876	26-May-14	Selection by classification information

All corresponding patent applications, patents, divisions, continuations and reissues based upon any of the patent applications or patents of this list are considered to be included as an integral part of this list

Pioneer's patents relevant to DVD Video disc.

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
US	48P30015US	0249038	25-May-94		5466883	25-May-14	Selection of subchannel
US	48P40116US1	794018	07-Nov-94		5740152	07-Nov-14	Structure of SYNC Codes
US	50P40030US	0504793	20-Jul-95		5808715	20-Jul-15	Multi layer
US	50P40040US	0670533	27-Jun-96		5886965	27-Jun-16	Cell contents
US	50P40041US	0675016	03-Jul-96		5892983	03-Jul-16	Time map
US	50P40041US1	244778	05-Feb-99		6085287	03-Jul-16	Time map
US	50P40102US	759956	03-Dec-96		5987086	03-Dec-16	Digital data transmitting *
US	50P40123US	764024	12-Dec-96		5917857	12-Dec-16	Digital modulation *
US	50P40163US	0834806	03-Apr-97		6215952	03-Apr-17	User operation restriction
US	50P40164US	0818941	14-Mar-97		6085021	14-Mar-17	Access restriction
US	50P40165US	819012	17-Mar-97		6157769	17-Mar-17	DSI Still, Cell Still
US	50P40166US	0806459	26-Feb-97		6006004	26-Feb-17	DSI , PCI separation
US	50P40167US	0816688	13-Mar-97		6148138	13-Mar-17	Control by NAV pack
US	50P40168US	822457	21-Mar-97		6212330	21-Mar-17	VOB unit search information
US	50P40169US	0821424	21-Mar-97		6137954	21-Mar-17	VOB unit search information
US	50P40171US	0816889	13-Mar-97		5933569	13-Mar-17	Parental ID
US	50P40171US1	0226105	07-Jan-99		6122434	13-Mar-17	Parental ID
US	50P40174US	0815956	26-Feb-94		6031962	13-Mar-17	VOB ID, Cell ID
US	50P40175US	0825560	20-Mar-97		5889746	20-Mar-17	Text information
US	50P40176US	0822157	17-Mar-97		6091674	17-Mar-17	Time search map
US	50P40176US1	0247870	11-Feb-99		6108281	17-Mar-17	Time search map
US	50P40179US	0831716	01-Apr-97		6088506	01-Apr-17	Highlight PTS
US	50P40180US	0820256	18-Mar-97		5966352	18-Mar-17	Seamless flag
US	50P40181US	0833476	07-Apr-97		5936925	07-Apr-17	Audio frame alignment
US	50P40181US1	0263850	08-Mar-99		6034942	07-Apr-17	Audio frame alignment
US	50P40182US	0812882	06-Mar-97		6108486	06-Mar-17	Audio frame number
US	50P40184US	0820257	18-Mar-97		6104684	18-Mar-17	Attribute information
US	50P40185US	0821920	21-Mar-97		5742569	21-Mar-17	Cell contents information
US	50P40186US	0819861	17-Mar-97		5805537	17-Mar-17	First access unit pointer
US	50P40187US	0819011	17-Mar-97		6014495	17-Mar-17	24 bit data alignment
US	50P40188US	0806458	26-Feb-97		6236804	26-Feb-17	Minimum readout rate

All corresponding patent applications, patents, divisions, continuations and reissues based upon any of the patent applications or patents of this list are considered to be included as an integral part of this list

Pioneer's patents relevant to DVD Video disc.

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
US	50P40189US	0815184	11-Mar-97		5960152	11-Mar-17	Audio frame

** grant for Pioneer's share*

All corresponding patent applications, patents, divisions, continuations and reissues based upon any of the patent applications or patents of this list are considered to be included as an integral part of this list

Exhibit I to the DVD Video Disc and DVD ROM Disc Patent License Agreement

18/06/02

Sony's Patents relevant to DVD ROM disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
AT-EP	S95P0391						8/16 modulation
AT-EP	S95P0391						8/16 modulation
AU	S82P0040	80236/82	05-Feb-82		552644	05-Feb-02	DSV control word
AU	S91P0044	71860/91	30-Jan-91		631725	30-Jan-11	An optical recording medium
AU	S95P0391	28991/95	07-Jul-95		701638	07-Jul-15	8/16 modulation
AU	S95P0391	10084/99	08-Jan-99		718089	07-Jul-15	8/16 modulation
CA	S82P0040	395598	05-Feb-82		1209703	12-Aug-03	DSV control word
CA-WO	S95P0391	2171113	07-Jul-95				8/16 modulation
CN	S95P0391	121719.4	21-Jul-00				8/16 modulation
CN-WO	S95P0391	95190776.X	02-May-96	CN1134195A			8/16 modulation
DE	S82P0040	82300624.2	09-Feb-82		P3270706.1	09-Feb-02	DSV control word
DE-EP	S91P0044						An optical recording medium
DE-EP	S95P0391						8/16 modulation
DE-EP	S95P0391						8/16 modulation
EP	S82P0040	82300624.2	09-Feb-82	0058081	0058081		DSV control word
EP	S91P0044	96100707.7	18-Jan-96	0715303			An optical recording medium
EP	S95P0391	99113783.7	14-Jul-99	0971355			8/16 modulation
EP	S95P0391	01103087.1	09-Feb-01				8/16 modulation
ES-EP	S95P0391						8/16 modulation
FR	S82P0040	82300624.2	09-Feb-82		0058081	09-Feb-02	DSV control word
FR-EP	S91P0044						An optical recording medium
FR-EP	S95P0391						8/16 modulation
FR-EP	S95P0391						8/16 modulation
GB	S82P0040	82300624.2	09-Feb-82		0058081	09-Feb-02	DSV control word
GB-EP	S91P0044						An optical recording medium
GB-EP	S95P0391						8/16 modulation
GB-EP	S95P0391						8/16 modulation
ID	S95P0391	P-951292	06-Jul-95				8/16 modulation
IL	S95P0391	115541	06-Oct-95				8/16 modulation
IL	S95P0391	127149	19-Nov-98				8/16 modulation
IN	S95P0391	1267/DEL/95	07-Jul-95				8/16 modulation
IT-EP	S95P0391						8/16 modulation
IT-EP	S95P0391						8/16 modulation
JP	S82P0040	81-017734	09-Feb-81	82-132461	1547082	09-Feb-01	DSV control word
JP	S91P0044	97-033010	31-Jan-97	97-204688	3104201	31-Jan-10	An optical recording medium
JP	S91P0044	97-033012	31-Jan-97	97-204689	3104202	31-Jan-10	An optical recording medium

Printdate 18/06/01

Sony's Patents relevant to DVD ROM disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
							18/06/01
JP	S95P0391	94-157175	08-Jul-94	96-031100			8/16 modulation
JP	S95P0391	2000-217864	18-Jul-00	2001-060369			8/16 modulation
JP	S96P0575	96-121988	16-May-96	97-098381			Copy protection inserting APS, CGMS data & Ciphering with key information
JP	S96P0575	2000-140811	12-May-00	2000-358216			Copy protection inserting APS, CGMS data & Ciphering with key information
JP	S96P0575	2000-140812	12-May-00	2000-354256			Copy protection inserting APS, CGMS data & Ciphering with key information
JP	S96P0575	2000-140813	12-May-00	2001-016542			Copy protection inserting APS, CGMS data & Ciphering with key information
JP	S96P0575	2000-140814	12-May-00	2000-353362			Copy protection inserting APS, CGMS data & Ciphering with key information
KR	S91P0044	91-701176	24-Sep-91		0221826	24-Sep-11	An optical recording medium
KR	S91P0044	10-99-7003172	12-Apr-99		0233420	30-Jan-11	An optical recording medium
KR-WO	S95P0391	96-701288	07-Jul-95				8/16 modulation
MY	S95P0391	PI9503008	07-Oct-95				8/16 modulation
NL	S82P0040	82300624.2	09-Feb-82		0058081	09-Feb-02	DSV control word
NL-EP	S91P0044						An optical recording medium
NL-EP	S95P0391						8/16 modulation
NL-EP	S95P0391						8/16 modulation
PH	S95P0391	52296	09-Oct-95				8/16 modulation
PL-WO	S95P0391	P313410	07-Jul-95				8/16 modulation
SG	S95P0391	9607338-2	07-Jul-95		9607338-2	07-Jul-15	8/16 modulation
SU-WO	S95P0391	96107886	07-Jul-95				8/16 modulation
TH	S95P0391	27155	07-Jul-95				8/16 modulation
TR	S95P0391	1239	11-Oct-95				8/16 modulation
TW	S95P0391	84107701	25-Jul-95		077029	24-Jul-15	8/16 modulation
US	S82P0040	346915	08-Feb-82		4456905	08-Feb-02	DSV control word
US	S91P0044	383351	03-Feb-95		5533001	02-Jul-13	An optical recording medium
US	S91P0044	388589	14-Feb-95		5515346	07-May-13	An optical recording medium
US	S91P0044	401424	09-Mar-95		5508981	16-Apr-13	An optical recording medium
US	S91P0044	499331	07-Jul-95		5587990	30-Jan-11	An optical recording medium
US	S91P0044	683557	17-Jul-96		5610880	30-Jan-11	An optical recording medium
US	S95P0391	612952	07-Jul-95		5818367	07-Jul-15	8/16 modulation
US	S95P0391	09/166668	05-Oct-99		5969651	07-Jul-15	8/16 modulation
US	S96P0575	09/377571	19-Aug-99		6185687	19-Jul-16	Copy protection inserting APS, CGMS data & Ciphering with key information
VN	S95P0391	S-1849/96	08-May-96		884	07-Jul-15	8/16 modulation

Sony's Patents relevant to DVD ROM disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE	18/06/01
WO	S91P0044	PCT/JP91/00113	30-Jan-91	WO91/11807			An optical recording medium	
WO	S95P0391	PCT/JP95/01364	07-Jul-95				8/16 modulation	

list

Exhibit II to the DVD Video Disc and DVD ROM Disc Patent License Agreement

18/06/01

Sony's Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
AT-EP	S93P0592						Data search information entry point
AT-EP	S95P0391						8/16 modulation
AT-EP	S95P0391						8/16 modulation
AT-EP	S96P0171						Color-control of subtitle
AT-EP	S96P0249						Position-information for displaying subtitle
AT-EP	S96P0537						Top-field-flag of GOP
AT-EP	S96P0589						IP search
AT-EP	S96P0589						IP search
AT-EP	S97P0077						Interleaved unit size for seamless play
AT-EP	S97P0077						Interleaved unit size for seamless play
AT-EP	S97P0077						Interleaved unit size for seamless play
AU	S82P0040	80236/82	05-Feb-82		552644	05-Feb-02	DSV control word
AU	S91P0044	71860/91	30-Jan-91		631725	30-Jan-11	An optical recording medium
AU	S93P0592	48333/93	22-Sep-93		669563	22-Sep-13	Data search information entry point
AU	S95P0391	28991/95	07-Jul-95		701638	07-Jul-15	8/16 modulation
AU	S95P0391	10084/99	08-Jan-99		718089	07-Jul-15	8/16 modulation
AU	S96P0171	48198/96	20-Mar-96		711083	20-Mar-16	Color-control of subtitle
AU	S96P0249	50457/96	02-Apr-96		707272	02-Apr-16	Position-information for displaying subtitle
AU	S96P0249	18422/99	25-Feb-99				Position-information for displaying subtitle
AU	S96P0537	64209/96	22-Aug-96		702573	22-Aug-16	Top-field-flag of GOP
AU	S96P0589	60790/96	29-Jul-96		702962	29-Jul-16	IP search
BR	S96P0171	9601106	22-Mar-96				Color-control of subtitle
BR	S96P0249	9601263	03-Apr-96				Position-information for displaying subtitle
BR	S96P0537	9603538	23-Aug-96				Top-field-flag of GOP
BR	S96P0589	9603175	26-Jul-96				IP search
CA	S82P0040	395598	05-Feb-82		1209703	12-Aug-03	DSV control word
CA	S96P0171	2172010	18-Mar-96				Color-control of subtitle
CA	S96P0249	2173177	01-Apr-96				Position-information for displaying subtitle
CA	S96P0589	2182057	25-Jul-96				IP search
CA-WO	S95P0391	2171113	07-Jul-95				8/16 modulation
CN	S95P0391	121719.4	21-Jul-00				8/16 modulation
CN	S96P0171	96105775	23-Mar-96	CN1140311A			Color-control of subtitle
CN	S96P0249	96105771	03-Apr-96	CN1139273A			Position-information for displaying subtitle
CN	S96P0537	96113334	23-Aug-96	CN1154630A			Top-field-flag of GOP
CN	S96P0537	98118674.2	23-Aug-98	CN1215288A			Top-field-flag of GOP
CN	S96P0589	96112179	28-Jul-96	115187			IP search

Printdate 18/06/01

Sony's Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
							18/06/01
CN	S96P0589	98118675.0	24-Aug-98	CN1215289A			IP search
CN	S97P0077	97104717	09-Feb-97				Interleaved unit size for seamless play
CN	S97P0077	98118292.5	06-Oct-98	CN1218247A			Interleaved unit size for seamless play
CN-WO	S95P0391	95190776.X	02-May-96	CN1134195A			8/16 modulation
DE	S82P0040	82300624.2	09-Feb-82		P3270706.1	09-Feb-02	DSV control word
DE-EP	S91P0044						An optical recording medium
DE-EP	S93P0592						Data search information entry point
DE-EP	S95P0391						8/16 modulation
DE-EP	S95P0391						8/16 modulation
DE-EP	S96P0171						Color-control of subtitle
DE-EP	S96P0249						Position-information for displaying subtitle
DE-EP	S96P0537						Top-field-flag of GOP
DE-EP	S96P0589						IP search
DE-EP	S96P0589						IP search
DE-EP	S97P0077						Interleaved unit size for seamless play
DE-EP	S97P0077						Interleaved unit size for seamless play
DE-EP	S97P0077						Interleaved unit size for seamless play
EP	S82P0040	82300624.2	09-Feb-82	0058081	0058081		DSV control word
EP	S91P0044	96100707.7	18-Jan-96	0715303			An optical recording medium
EP	S93P0592	97201484.9	16-May-97	0794667			Data search information entry point
EP	S95P0391	99113783.7	14-Jul-99	0971355			8/16 modulation
EP	S95P0391	01103087.1	09-Feb-01				8/16 modulation
EP	S96P0171	96301947.6	21-Mar-96	0734181			Color-control of subtitle
EP	S96P0249	96302342.9	02-Apr-96	0737016			Position-information for displaying subtitle
EP	S96P0537	96306125.4	22-Aug-96	0762772			Top-field-flag of GOP
EP	S96P0589	96305533.0	29-Jul-96	0756281			IP search
EP	S96P0589	00201894.3	29-May-00	1030302			IP search
EP	S97P0077	97300629.9	30-Jan-97	0789360			Interleaved unit size for seamless play
EP	S97P0077	00203414.8	02-Oct-00				Interleaved unit size for seamless play
EP	S97P0077	00203706.7	25-Oct-00				Interleaved unit size for seamless play
ES-EP	S95P0391						8/16 modulation
ES-EP	S96P0171						Color-control of subtitle
ES-EP	S96P0249						Position-information for displaying subtitle
ES-EP	S96P0537						Top-field-flag of GOP
ES-EP	S96P0589						IP search
ES-EP	S96P0589						IP search
FR	S82P0040	82300624.2	09-Feb-82		0058081	09-Feb-02	DSV control word
FR-EP	S91P0044						An optical recording medium

Sony's Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
FR-EP	S93P0592						Data search information entry point
FR-EP	S95P0391						8/16 modulation
FR-EP	S95P0391						8/16 modulation
FR-EP	S96P0171						Color-control of subtitle
FR-EP	S96P0249						Position-information for displaying subtitle
FR-EP	S96P0537						Top-field-flag of GOP
FR-EP	S96P0589						IP search
FR-EP	S96P0589						IP search
FR-EP	S97P0077						Interleaved unit size for seamless play
FR-EP	S97P0077						Interleaved unit size for seamless play
FR-EP	S97P0077						Interleaved unit size for seamless play
GB	S82P0040	82300624.2	09-Feb-82		0058081	09-Feb-02	DSV control word
GB-EP	S91P0044						An optical recording medium
GB-EP	S93P0592						Data search information entry point
GB-EP	S95P0391						8/16 modulation
GB-EP	S95P0391						8/16 modulation
GB-EP	S96P0171						Color-control of subtitle
GB-EP	S96P0249						Position-information for displaying subtitle
GB-EP	S96P0537						Top-field-flag of GOP
GB-EP	S96P0589						IP search
GB-EP	S96P0589						IP search
GB-EP	S97P0077						Interleaved unit size for seamless play
GB-EP	S97P0077						Interleaved unit size for seamless play
GB-EP	S97P0077						Interleaved unit size for seamless play
HK	S96P0589	0110178.2	14-Feb-01				IP search
HK	S97P0077						Interleaved unit size for seamless play
HK	S97P0077						Interleaved unit size for seamless play
ID	S95P0391	P-951292	06-Jul-95				8/16 modulation
ID	S96P0537	P-962393	22-Aug-96		ID0005191	22-Aug-16	Top-field-flag of GOP
IL	S95P0391	115541	06-Oct-95				8/16 modulation
IL	S95P0391	127149	19-Nov-98				8/16 modulation
IN	S95P0391	1267/DEL/95	07-Jul-95				8/16 modulation
IN	S96P0537	1868/DEL/96	21-Aug-96				Top-field-flag of GOP
IT-EP	S93P0592						Data search information entry point
IT-EP	S95P0391						8/16 modulation
IT-EP	S95P0391						8/16 modulation
IT-EP	S96P0171						Color-control of subtitle
IT-EP	S96P0249						Position-information for displaying subtitle

Sony's Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
							Top-field-flag of GOP
IT-EP	S96P0537						IP search
IT-EP	S96P0589						IP search
IT-EP	S96P0589						DSV control word
JP	S82P0040	81-017734	09-Feb-81	82-132461	1547082	09-Feb-01	An optical recording medium
JP	S91P0044	97-033010	31-Jan-97	97-204688	3104201	31-Jan-10	An optical recording medium
JP	S91P0044	97-033012	31-Jan-97	97-204689	3104202	31-Jan-10	Data search information entry point
JP	S93P0592	92-350577	04-Dec-92	94-325553	2785220	04-Dec-12	Data search information entry point
JP	S93P0592	92-355558	18-Dec-92	94-164522			8/16 modulation
JP	S95P0391	94-157175	08-Jul-94	96-031100			8/16 modulation
JP	S95P0391	2000-217864	18-Jul-00	2001-060369			Color-control of subtitle
JP	S96P0171	95-088607	23-Mar-95	96-265661			Position-information for displaying subtitle
JP	S96P0249	95-099436	03-Apr-95	96-275205			Top-field-flag of GOP
JP	S96P0537	95-214675	23-Aug-95				Copy protection inserting APS, CGMS data & Ciphering with key information
JP	S96P0575	96-121988	16-May-96	97-098381			Copy protection inserting APS, CGMS data & Ciphering with key information
JP	S96P0575	2000-140811	12-May-00	2000-358216			Copy protection inserting APS, CGMS data & Ciphering with key information
JP	S96P0575	2000-140812	12-May-00	2000-354256			Copy protection inserting APS, CGMS data & Ciphering with key information
JP	S96P0575	2000-140813	12-May-00	2001-016542			Copy protection inserting APS, CGMS data & Ciphering with key information
JP	S96P0589	95-211420	28-Jul-95	97-046712			IP search
JP	S97P0077	97-026238	10-Feb-97	97-274769			Interleaved unit size for seamless play
KR	S91P0044	91-701176	24-Sep-91		0221826	24-Sep-11	An optical recording medium
KR	S91P0044	10-99-7003172	12-Apr-99		0233420	30-Jan-11	An optical recording medium
KR	S93P0592	93-019642	22-Sep-93	94-08275			Data search information entry point
KR	S93P0592	10-00-0050060	28-Aug-00				Data search information entry point
KR	S96P0171	96-07804	22-Mar-96	96-35585			Color-control of subtitle
KR	S96P0249	96-10570	03-Apr-96	96-40008			Position-information for displaying subtitle
KR	S96P0537	96-35963	23-Aug-96	97-14362			Top-field-flag of GOP
KR	S96P0589	96-30906	29-Jul-96	97-08058			IP search
KR	S96P0589	10-00-0064311	31-Oct-00				IP search
KR	S97P0077	97-04241	10-Feb-97	97-63196			Interleaved unit size for seamless play
KR-WO	S95P0391	96-701288	07-Jul-95				8/16 modulation
MX	S96P0171	961049	20-Mar-96		192158	20-Mar-16	Color-control of subtitle
MX	S96P0249	961267	02-Apr-96				Position-information for displaying subtitle

Printdate 18/06/01

Sony's Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
MX	S96P0537	963578	22-Aug-96				Top-field-flag of GOP
MX	S96P0589	963031	26-Jul-96				IP search
MX	S97P0077	970855	03-Feb-97				Interleaved unit size for seamless play
MY	S95P0391	PI9503008	07-Oct-95				8/16 modulation
MY	S96P0171	PI9600988	18-Mar-96				Color-control of subtitle
MY	S96P0249	PI9601238	03-Apr-96				Position-information for displaying subtitle
MY	S96P0537	PI9603428	20-Aug-96				Top-field-flag of GOP
MY	S96P0589	PI9603104	27-Jul-96				IP search
MY	S97P0077	PI9700368	30-Jan-97				Interleaved unit size for seamless play
NL	S82P0040	82300624.2	09-Feb-82		0058081	09-Feb-02	DSV control word
NL-EP	S91P0044						An optical recording medium
NL-EP	S93P0592						Data search information entry point
NL-EP	S95P0391						8/16 modulation
NL-EP	S95P0391						8/16 modulation
NL-EP	S96P0171						Color-control of subtitle
NL-EP	S96P0249						Position-information for displaying subtitle
NL-EP	S96P0537						Top-field-flag of GOP
NL-EP	S96P0589						IP search
NL-EP	S96P0589						IP search
NL-EP	S97P0077						Interleaved unit size for seamless play
NL-EP	S97P0077						Interleaved unit size for seamless play
NL-EP	S97P0077						Interleaved unit size for seamless play
PH	S95P0391	52296	09-Oct-95				8/16 modulation
PH	S96P0537	53965	22-Aug-96				Top-field-flag of GOP
PL	S96P0537	P-315802					Top-field-flag of GOP
PL	S96P0537	P343992	10-Nov-00				Top-field-flag of GOP
PL	S96P0537	P343991	10-Nov-00				Top-field-flag of GOP
PL-WO	S95P0391	P313410	07-Jul-95				8/16 modulation
RU	S96P0537	96116330	22-Aug-96				Top-field-flag of GOP
SE	S93P0592						Data search information entry point
SG	S95P0391	9607338-2	07-Jul-95		9607338-2	07-Jul-15	8/16 modulation
SG	S96P0537	9610493	20-Aug-96		74566	20-Aug-16	Top-field-flag of GOP
SU-WO	S93P0592	94026951	22-Sep-93				Data search information entry point
SU-WO	S95P0391	96107886	07-Jul-95				8/16 modulation
TH	S95P0391	27155	07-Jul-95				8/16 modulation
TH	S96P0171	030549	21-Mar-96	023191			Color-control of subtitle
TH	S96P0249	030725	02-Apr-96	28578			Position-information for displaying subtitle
TH	S96P0537	32895	21-Aug-96	26166			Top-field-flag of GOP

Sony's Patents relevant to DVD Video disc

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
TH	S96P0589	032561	26-Jul-96				IP search
TR	S95P0391	1239	11-Oct-95				8/16 modulation
TR	S96P0537	45980	23-Aug-96				Top-field-flag of GOP
TW	S95P0391	84107701	25-Jul-95		077029	24-Jul-15	8/16 modulation
TW	S96P0171	85103217	18-Mar-96		086923	17-Mar-16	Color-control of subtitle
TW	S96P0249	85103855	02-Apr-96		083710	01-Apr-16	Position-information for displaying subtitle
TW	S96P0537	85110202	21-Aug-96		088619	20-Aug-16	Top-field-flag of GOP
TW	S96P0589	85109176	27-Jul-96		085499	26-Jul-16	IP search
TW	S97P0077	86100843	25-Jan-97		095017	24-Jan-17	Interleaved unit size for seamless play
US	S82P0040	346915	08-Feb-82		4456905	08-Feb-02	DSV control word
US	S91P0044	383351	03-Feb-95		5533001	02-Jul-13	An optical recording medium
US	S91P0044	388589	14-Feb-95		5515346	07-May-13	An optical recording medium
US	S91P0044	401424	09-Mar-95		5508981	16-Apr-13	An optical recording medium
US	S91P0044	499331	07-Jul-95		5587990	30-Jan-11	An optical recording medium
US	S91P0044	683557	17-Jul-96		5610880	30-Jan-11	An optical recording medium
US	S93P0592	125573	22-Sep-93		5455684	22-Sep-13	Data search information entry point
US	S95P0391	612952	07-Jul-95		5818367	07-Jul-15	8/16 modulation
US	S95P0391	09/166668	05-Oct-99		5969651	07-Jul-15	8/16 modulation
US	S96P0171	619001	21-Mar-96		5748256	21-Mar-16	Color-control of subtitle
US	S96P0249	627742	02-Apr-96		5889564	02-Apr-16	Position-information for displaying subtitle
US	S96P0537	701754	22-Aug-96		5771357	22-Aug-16	Top-field-flag of GOP
US	S96P0575	09/377571	19-Aug-99		6185687	19-Jul-16	Copy protection inserting APS, CGMS data & Ciphering with key information
US	S96P0589	688819	26-Jul-96		6009229	26-Jul-16	IP search
US	S97P0077	791231	30-Jan-97		5721591	30-Jan-17	Interleaved unit size for seamless play
VN	S95P0391	S-1849/96	08-May-96		884	07-Jul-15	8/16 modulation
VN	S96P0537	SC0140/96	23-Aug-96		1428	23-Aug-11	Top-field-flag of GOP
WO	S91P0044	PCT/JP91/00113	30-Jan-91	WO91/11807			An optical recording medium
WO	S93P0592	PCT/JP93/01362	22-Sep-93	WO94/07332			Data search information entry point
WO	S95P0391	PCT/JP95/01364	07-Jul-95				8/16 modulation

Printdate 18/06/01

Audit Guidelines DVD Disc Patent License Agreement

These audit guidelines are designed to lay down basic elements for the audits to be performed by Licensee's auditors.

1. Auditor's qualifications

Licensee's auditor who issues the auditor's opinion on the royalty statement (refer to 2) shall be the same as the auditor who issues an auditors' opinion on the financial statements of Licensee.

- the auditor shall be a certified public accountant in the country concerned, and a member of a well-respected firm, preferably one of the big 5 internationally operating auditing firms.

- the auditor shall be a member of the CPA association in the country concerned, or a member of the auditors' association in the Netherlands, UK or USA.

2. Opinion

The auditor's opinion on the royalty statement and manufacturing equipment list, as described below, shall read as follows:

Independent Auditor's Report

The Board of Directors
<XYZ Corporation>

We have audited the accompanying royalty statements and the manufacturing equipment list, duly initialed by us, applicable to the DVD-Disc production of <XYZ Corporation> for the year ending December 31, 200x, under the terms of a license agreement dated Month xx, 20XX, between <Philips Company> and <XYZ Corporation>. These schedules are the responsibility of <XYZ Corporation's> management. Our responsibility is to express an opinion on these schedules based on our audit.

We have conducted our audit in accordance with generally accepted international auditing standards and the Audit Guidelines for the DVD Disc Patent License Agreement. These standards and guidelines require that we plan and perform the audit in order to obtain reasonable assurance as to whether the schedules are free of material misstatements. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the schedules. An audit also includes assessing the accounting principles used and significant estimates made by the management as well as evaluating the overall schedule presentation. We believe that our audit provides a reasonable basis for our opinion.

In our opinion, the royalty statements referred to above present fairly, in all material respects, the number of DVD-Discs produced by <XYZ Corporation> during the year ending December 31, XXXX and the amount of royalties applicable thereto, under the license agreement referred to above.

In our opinion the manufacturing equipment list referred to above presents fairly, in all material respects, an overview of all machines used by <XYZ> Corporation in the manufacture of DVD-Discs during the year ending December 31, XXXX under the license agreement referred to above.

This report is intended solely for use by the boards of directors and management of <XYZ Corporation> and <Philips Company>.

(signed) audit firm

city, Month xx, 20xx

Enclosures: Royalty statements (xx pages)

Manufacturing Equipment List (xx pages)

Manufacturing Equipment List

The manufacturing equipment list shall contain information in accordance with the table as given in Exhibit C2.

3. Work papers

General

- The auditor of Licensee shall comply with the auditor's independence rules as promulgated by the SEC.
- The auditor appointed by Philips shall be given full access, without limitation, to the work papers.
- The work papers shall include a clear overview of the legal and organizational structure of Licensee's company and the group of companies of which Licensee is part together with an overview of Licensee's manufacturing locations.

Royalty statements

The work papers with respect to royalty statements shall include:

- a copy of the royalty statements under review.
- a copy of the DVD Disc Patent License Agreement including, relevant related correspondence.
- the maximum manufacturing capacity of DVD-Discs of Licensee (including the manufacturing equipment list) and reconciliation hereof with the property, plant and equipment accounts in the financial statements.
- The reconciliation of the maximum manufacturing capacity with the actual output and the royalty statements.
- copies of the internal manufacturing output recording system per month and key performance indicators such as: manufacturing running time, rejections, daily output, machine service hours, idle hours and reconciliation with the royalty statements.
- an analysis of the average use of polycarbonate per DVD-Disc and the reconciliation hereof with the volume of polycarbonate purchased, manufacturing output, purchase recording systems, suppliers overview and the financial statements.
- an analysis of the volume of silver/aluminum used per month and a reconciliation with the manufacturing output, purchase ledgers per supplier and the financial statements.
- an analysis regarding the cut-off procedures applied for the period.

- the reconciliation of the volume of DVD-Discs manufactured with sales and purchases in the period under review (goods movement schedule).

- a planning document assessing the risk areas in the audit, a working program, an audit memorandum including salient features.

Manufacturing Equipment Identification System

The work papers shall include:

- a copy of the manufacturing equipment list referred to above

- a reconciliation of the manufacturing equipment list with the financial statement, general ledger and work paper specifications.

- an overview of work performed on the manufacturing equipment list, which shall include a physical inventory taken, including identification of the specifics per machine (see Exhibit C2).

- purchase orders/invoices for machines as listed in the manufacturing equipment list (see Exhibit C2).

4. Work paper review

The work paper review will be performed at the offices of Licensee's auditor. The auditors appointed by Philips shall be granted unlimited access to all work papers of Licensee's auditor. The auditor appointed by Philips shall be allowed to make copies of the work papers where considered necessary by him/her. The auditor appointed by Philips will report his findings to Philips in a report or letter format.

EXHIBIT C2

Manufacturing Equipment List DVD Video Disc/DVD ROM Disc

Name Licensee: CREST NATIONAL

Reporting period: Q4-2002

Initial for identification purposes only:

This Manufacturing Equipment List contains 3 pages specifying:

The number of production systems: 3

The number of moulds: 6

I hereby represent that the information provided in this Manufacturing Equipment List is true, complete and accurate in every respect.

Signed for and on behalf of

NATIONAL FILM LABORATORIES, INC. d/b/a/ CREST INTERNATIONAL

Name: ROBERT FREEDMAN

Title: SVP

Manufacturing Equipment List DVD Video Disc/DVD ROM Disc

Name Licensee: Crest National

Reporting period: Q4 - 2002

System number: 5	Type: Spaceline
Date of installation/commissioning:	Supplier: Singulus
	Serial number: 38600019

This production system is suitable for (*Please tick as appropriate (multiple selections possible)*)
- ☑ DVD 5
- ☑ DVD 9 / DVD 10
- ☐ DVD14 / DVD 18

Injection moulding equipment

	Serial number	Supplier	additional information
1.	0164	Sumitomo	SD30 Layer 0
2.	0163	Sumitomo	SD30 Layer 1
3.			

Moulds

	Serial number	SID code	Supplier	additional information
1.	4395 H	9F43	Seikoh Giken	Layer 0
2.	4396 H	—	Seikoh Giken	Layer 1
3				

Sputtering and lacquering equipment

	Type of equipment	Serial number	Supplier
1.	Singulus Smart Cathode	38600019	Singulus
2.	Singulus Smart Cathode	38600019	Singulus
3	Singulus lacquering	38600019	Singulus
4			
5			
6			

Initial

Manufacturing Equipment List DVD Video Disc/DVD ROM Disc

Name Licensee: Crest National

Reporting period: Q4-2002

System number: 6	Type: Spaceline
Date of installation/commissioning:	Supplier: Singulus
	Serial number: 38600180

This production system is suitable for (*Please tick as appropriate (multiple selections possible)*)
- ☑ DVD 5
- ☑ DVD 9 / DVD 10
- ☐ DVD14 / DVD 18

Injection moulding equipment

	Serial number	Supplier	additional information
1.	1733	Sumitomo	SD30 Layer 0
2.	1734	Sumitomo	SD30 Layer 1
3.			

Moulds

	Serial number	SID code	Supplier	additional information
1.	4401 H	9F42	Seikoh Giken	Layer 0
2.	4402 H	/	Seikoh Giken	Layer 1
3				

Sputtering and lacquering equipment

	Type of equipment	Serial number	Supplier
1.	Singulus Smart Cathode	38600180	Singulus
2.	Singulus Smart cathode	38600180	Singulus
3	Singulus lacquering	38600180	Singulus
4			
5			
6			

Manufacturing Equipment List DVD Video Disc/DVD ROM Disc

Name Licensee: Crest NATIONAL

Reporting period: Q4-2002

System number: 7	Type: Spaceline
Date of installation/commissioning:	Supplier: Singulus
	Serial number: 38600181

This production system is suitable for (*Please tick as appropriate (multiple selections possible)*)
- ☑ DVD 5
- ☑ DVD 9 / DVD 10
- ☐ DVD14 / DVD 18

Injection moulding equipment

	Serial number	Supplier	additional information	
1.	1738	Sumitomo	SD30	Layer 0
2.	1737	Sumitomo	SD30	Layer 1
3.				

Moulds

	Serial number	SID code	Supplier	additional information
1.	AXX.1987	9F24	Axxicon	S mould Layer 0
2.	AXX.1988		Axxicon	S mould Layer 1
3				

Sputtering and lacquering equipment

	Type of equipment	Serial number	Supplier
1.	Singulus SmartCathode	38600181	Singulus
2.	Singulus SmartCathode	38600181	Singulus
3	Singulus Lacquering	38600181	Singulus
4			
5			
6			

Initial

EXHIBIT C

38880

PATENT LICENSE AGREEMENT FOR THE USE OF AC-3 TECHNOLOGY IN THE MANUFACTURE OF DVD-VIDEO DISCS

This Agreement is entered into this 1st day of July, 2002 by and between

KONINKLIJKE PHILIPS ELECTRONICS N.V., having its registered offices in Eindhoven, The Netherlands, (hereinafter referred to as "Philips")

and

NATIONAL FILM LABORATORIES, INC. d/b/a CREST NATIONAL, having its registered office in 6721 Romaine Street, Hollywood, CA 90038 (hereinafter referred to as "Licensee")

WHEREAS, Licensee is engaged in the manufacture of DVD-Video Discs and, in the process of such manufacture, is making use of the technology developed by Dolby Laboratories Inc. and known as AC-3;

WHEREAS, Philips, Institut für Rundfunk Technik G.m.b.H. of München, Germany, (IRT) and France Télécom R&D of Issy Les Moulineaux, France (France Télécom) own certain patents relating to the AC-3 technology, these patents (hereinafter referred to as "Licensed Patents") are listed in Exhibit I hereto;

WHEREAS, Philips has been authorized by IRT and France Télécom to grant licenses for the use of the Licensed Patents in connection with the manufacture of DVD-Video Discs making use of the AC-3 technology, while IRT and France Télécom each retain the right also to license their respective patents relating to the AC-3 technology separately so that interested manufacturers may opt to take out individual licenses under the relevant patents of Philips, IRT and France Télécom instead of a combined license;

WHEREAS, Licensee has requested from Philips a license under the Licensed Patents in connection with the manufacture of DVD-Video Discs making use of AC-3 and Philips is willing to grant such license on the conditions set forth herein;

IT IS HEREBY AGREED AS FOLLOWS:

Article 1 - Definitions

1.01 "**Disc**" shall mean a non-recordable reflective disc-shaped information carrier comprising any kind of information including, but not limited to, audio, video, text and/or data related information, which is irreversibly stored in one or more layers during and as an integral part of the manufacturing process of the disc in a form which is optically readable by playback devices using a laser-beam.

1.02 **"Player"** shall mean a playback device for optically reading information stored on a Disc and converting such information into electrical signals for reproduction purposes.

1.03 **"DVD-Video Disc"** shall mean a replicated Disc comprising any kind of information including, but not limited to, audio, video, text, and/or data related information, encoded in digital form, which is optically readable by a DVD-Video Player (as hereinafter defined).

1.04 **"DVD-Video Player"** shall mean a Player capable of reproducing information stored on a DVD-Video Disc and converting such information into electrical signals, in accordance with the DVD-Video and DVD-ROM Standard Specifications (as hereinafter defined), which electrical signals are directly capable and intended to be used for visual reproduction through standard television receivers and/or video monitors.

1.05 **"DVD-Video and DVD-ROM Standard Specifications"** shall mean the specifications for the DVD Systems, as specified in the document "DVD Specifications for Read-Only Disc, version 1.0 (parts 1, 2 and 3)" of August 1996, or any updated version thereof, as issued by the DVD Format/Logo Licensing Corporation.

1.06 **"Licensed Product(s)"** shall mean DVD-Video Discs incorporating the AC-3 technology, manufactured and/or sold in accordance with the provisions hereof, which have been duly reported and on which the royalties due hereunder are paid in accordance with the provisions of this Agreement.

1.07 **"Licensed Patents"** shall mean the patents as listed in Exhibit I hereto.

The term **"essential"** as used in relation to patents in this Agreement shall refer to patents, the use of which is necessary (either directly or as a practical matter) for the use of the AC-3 technology in connection with the Licensed Products.

Philips will commission an independent patent expert to review the European, Japanese and US patents listed as essential in Exhibit I in order to confirm the essentiality of such patents. In the event that said independent expert would find that any of the patents would not qualify as essential as defined in this Agreement, Philips shall delete such patent (as well as the equivalent national patents) from the relevant Exhibit and such patent will be put on the relevant Exhibit of non-essential patents. Any such finding and deletion however, shall not affect the obligation of Licensee to pay the royalty on each Licensed Product as specified in Article 3.01, provided that, in the event that none of the Licensed Patents would be infringed by the manufacture of Licensed Products within the Territory, Licensee shall have no obligation to pay royalties in respect of Licensed Products manufactured within the Territory and which are directly sold for final use within the Territory or directly exported for final use to a country in which no Licensed Patents subsist. Notwithstanding such deletion, Licensee shall retain the right to continue the use of such deleted patent(s) in accordance with this Agreement, without any additional payment, unless Licensee explicitly notifies Philips in writing of its decision to waive such right.

In the event that Philips or IRT or France Télécom (or any of their Associated Companies, as hereinafter defined) would have additional patents (other than patents acquired from third

parties after the date of January 1, 1997) in its patent portfolio which are essential to the manufacture, sale or other disposal of Licensed Products and which have a filing date or are entitled to a so-called priority date prior to January 1, 1997, but which have not been listed as essential patents in the Exhibit hereto, Philips will notify Licensee accordingly and such additional patents will be added to the Licensed Patents. Any patents as may be added as essential patents to the Exhibit, will similarly be subject to the review by the independent patent expert in accordance with the preceding paragraph.

The patent lists provided to Licensee upon execution of the Agreement are subject to change in accordance with the provisions of this Agreement. With regard to the rights granted to Licensee hereunder, the patent lists published by Philips on its website (www.licensing.philips.com) or otherwise communicated by Philips to Licensee after the date of execution hereof shall prevail over the lists provided to Licensee upon execution of this Agreement.

1.08 **"Associated Company"** shall mean any one or more business entities (1) owned or controlled by Philips, IRT, France Télécom or Licensee, (2) owning or controlling Philips, IRT, France Télécom or Licensee, or (3) owned or controlled by the business entity owning or controlling Philips, IRT, France Télécom or Licensee at the material time. For the purposes of this definition a business entity shall be deemed to own and/or to control another business entity if more than 50% (fifty per cent) of the voting stock of the latter business entity, ordinarily entitled to vote in the election of directors, (or, if there is no such stock, more than 50% (fifty per cent) of the ownership of or control in the latter business entity) is held by the owning and/or controlling business entity.

1.09 **"Territory"** shall mean the geographic area known as the United States of America, its territories and possessions.

Article 2 – Grant of rights

2.01 For the term of this Agreement, Philips hereby grants to Licensee a non-exclusive, non-transferable license under the Licensed Patents to use the AC-3 technology in the manufacture of Licensed Products within the Territory and to sell or otherwise dispose of Licensed Products so manufactured in all countries of the world.

2.02 In consideration of the undertakings set forth in Articles 2.01, 202 and 2.04 and similar undertakings by third party licensees of Philips and without prejudice of the provisions of Article 5, for a period of ten years from the Effective Date (as hereinafter defined) Licensee agrees to grant to Philips, IRT, France Télécom and their respective Associated Companies in respect of the use of the AC-3 technology in the manufacture of DVD-Video Discs, non-exclusive, non-transferable licenses, on reasonable, non-discriminatory conditions comparable to those set forth herein, to use the AC-3 technology in the manufacture of DVD-Video Discs and to sell or otherwise dispose of DVD-Video Discs, under any and all present and future patents, for which Licensee or its Associated Companies have or may hereafter acquire the right to grant licenses and which are essential to the use of AC-3 technology in the manufacture of DVD-Video Discs and the subsequent sale or other disposal thereof, and

which patents were first filed in any country of the world prior to the date of termination of this Agreement.

2.03 Philips undertakes that it will offer, at the request of any of Licensee's Associated Companies, which has concluded a DVD Video Disc and DVD ROM Disc Patent License Agreement, to any such Associated Company, a non-exclusive and non-transferable license under the Licensed Patents to use the AC-3 technology in the manufacture of DVD-Video Discs on reasonable and non-discriminatory conditions comparable to those set forth herein, to manufacture, sell or otherwise dispose of DVD-Video Discs incorporating the AC-3 technology.

In consideration of Philips' undertaking as set out in the preceding paragraph, Licensee undertakes that all of its Associated Companies which have or may hereafter acquire patents essential to the manufacture, sale or other disposal of DVD-Video Discs incorporating the AC-3 technology and which patents were first filed in any country of the world prior to the date of termination of this Agreement, shall make available licenses under such patents, on reasonable, non-discriminatory conditions comparable to those set forth herein to Philips, any of Philips' Associated Companies and to other third parties who have entered or will enter into a license agreement with Philips or an Associated Company of Philips in respect of DVD-Video Discs incorporating the AC-3 technology.

Article 3 - Royalties, Reports and Payments

3.01 In consideration of the rights granted hereunder by Philips to Licensee, Licensee agrees to pay to Philips a royalty of US$ 0.003 (three tenths of a US dollar cent) on each Licensed Product sold by Licensee, in which any one or more of the Licensed Patent(s) is (are) used, irrespective of whether such Licensed Patent(s) is (are) used in the country of manufacture, sale or other disposal.

A Licensed Product shall be considered sold when invoiced or, if not invoiced, when delivered to a party other than Licensee.

For the avoidance of doubt, in the event the manufacture by Licensee of Licensed Products within the Territory would not infringe any of the Licensed Patents, Licensee shall have no obligation to pay the royalties due on the basis of this Agreement in respect of Licensed Products manufactured within the Territory and which are directly sold for final use within the Territory or directly exported for final use to a country in which no Licensed Patents subsist.

3.02 Within 30 days following 31 March, 30 June, 30 September and 31 December of each year during the term of this Agreement, Licensee shall submit to Philips (even in the event that no sales have been made) a written statement, signed by a duly authorized officer on behalf of Licensee, setting forth with respect to the preceding quarterly period:

(1) the quantities of DVD-Video Discs incorporating the AC-3 technology manufactured by Licensee;

(2) a computation of the royalties due under this Agreement.

Licensee shall pay the royalties due to Philips within 30 days after the end of each quarterly period, in US Dollars.

Licensee shall submit to Philips, once per calendar year, an audit statement by its external auditors, who shall be public certified auditors, confirming that the quarterly royalty statements as submitted by Licensee to Philips for the last four quarterly periods, are true, complete and accurate in every respect. Such statement shall be submitted within 90 days following the end of Licensee's financial year.

3.03 Within 30 days following the expiration or termination of this Agreement, Licensee shall submit to Philips a certified report on the number of Licensed Products in stock at the time of expiration or termination of this Agreement. Royalties, calculated in accordance with Article 3.01, shall be due and payable on all Licensed Products manufactured prior to, but remaining in stock with Licensee on the date of expiration or termination of this Agreement. For the avoidance of doubt, this Article 3.03 shall be without prejudice to the provisions of Article 5.06.

3.04 Any payment under this Agreement which is not made on the date(s) specified herein, shall accrue interest at the rate of 2% (two per cent) per month (or part thereof) or the maximum amount permitted by law, whichever is lower.

3.05 All payments to Philips under this Agreement shall be made by transfer in such currency, convertible in the sense of Articles VIII and XIX of the Articles of Agreement of the International Monetary Fund, as designated by Philips. The rate of exchange for converting the currency of the Territory shall be the telegraphic transfer selling rate of the designated currency as officially quoted in the Territory by the officially authorized foreign exchange bank for payment of currency transactions on the day that the amount is due and payable.

3.06 All costs, stamp duties, taxes and other similar levies arising from or in connection with the conclusion of this Agreement shall be borne by Licensee. However, in the event that the government of a country imposes any income taxes on payments made by Licensee to Philips hereunder and requires Licensee to withhold such tax from such payments, Licensee may deduct such tax from such payments. In such event, Licensee shall promptly provide Philips with tax receipts issued by the relevant tax authorities so as to enable Philips to support a claim for credit against income taxes which may be payable by Philips and/or its Associated Companies in The Netherlands and to enable Philips to document, if necessary, its compliance with tax obligations in any jurisdiction outside The Netherlands.

3.07 In order that the royalty statements provided for in this Article 3 may be verified, Licensee shall keep complete and accurate books and records and shall keep the books and records available for a period of 5 years following the manufacture, sale or other disposal of each Licensed Product.

In order to verify the correctness of the aforementioned royalty statements, Philips shall have

the right to inspect the books and records of Licensee from time to time. Any such inspection shall take place no more than once per calendar year and shall be conducted by a public certified auditor appointed by Philips. Philips shall give Licensee written notice of such inspection at least 7 days prior to the inspection. Licensee shall willingly co-operate and provide all such assistance in connection with such inspection as Philips and/or the auditor may require. The inspection shall be conducted at Philips' own expense, provided that in the event that Licensee has failed to submit royalty statements and/or yearly written statement(s) by its external auditors, as provided for in Article 3.02, in respect of the period to which the inspection relates or in the event that any discrepancy or error exceeding 3% (three per cent) of the monies actually due is established, the cost of the inspection shall be borne by Licensee, without prejudice to any other claim or remedy as Philips may have under this Agreement or under applicable law.

Philips' right of inspection as set out in this Article 3.07 shall survive termination or expiration of this Agreement.

3.08 Without prejudice to the provisions of Article 3.07, Licensee shall provide all relevant additional information as Philips may reasonably request from time to time, so as to enable Philips to ascertain which products manufactured, sold or otherwise disposed of by Licensee are subject to the payment of royalties to Philips hereunder, the patents which have been used in connection with such products, and the amount of royalties payable.

3.09 As a condition precedent to the entry into force of this Agreement, Licensee shall submit to Philips a royalty statement in respect of DVD-Video Discs incorporating the AC-3 technology manufactured and sold or otherwise disposed of by Licensee before the Effective Date of this Agreement in accordance with the provisions of Article 3.02. Within 7 days following the execution of this Agreement, Licensee shall pay to Philips the royalties on such DVD-Video Discs incorporating the AC-3 technology, calculated by applying the royalty rate of US$ 0.003 for each such DVD-Video Disc incorporating the AC-3 technology. The royalty statement shall similarly be subject to Philips' right of audit as set out in Article 3.07. Within 45 days following the execution of this Agreement, Licensee shall submit to Philips an audit statement by its external auditors, who shall be public certified auditors, confirming that this royalty statement is true, complete and accurate in every respect.

Article 4 – No Warranty and Indemnification

4.01 It is acknowledged by Licensee that third parties may own industrial and/or intellectual property rights in the field of the AC-3 technology. Licensee acknowledges and agrees that Philips, IRT and France Télécom and their respective Associated Companies make no warranty whatsoever that the use of the AC-3 technology or the manufacture, sale or other disposal of any Licensed Product does not infringe or will not cause infringement of any industrial and/or intellectual property rights other than the Licensed Patents.

Article 5 - Term and Termination

5.01 This Agreement shall enter into force on the "Effective Date", being the date first written above. In the event that validation of this Agreement is required by the competent governmental authorities, the Effective Date shall be the date of such validation. This Agreement shall remain in force for a period of 10 years from the Effective Date, unless terminated earlier in accordance with the provisions of this Article 5.

5.02 Without prejudice to the provisions of Article 5.03 through 5.06, each party may terminate this Agreement at any time by means of written notice to the other party in the event that the other party fails to perform any obligation under this Agreement and such failure is not remedied within 30 days after receipt of a notice specifying the nature of such failure and requiring it to be remedied. Such right of termination shall not be exclusive of any other remedies or means of redress to which the non-defaulting party may be lawfully entitled and all such remedies shall be cumulative. Any such termination shall not affect any royalties or other payment obligations under this Agreement accrued prior to such termination.

5.03 Philips may terminate this Agreement forthwith by means of notice in writing to Licensee in the event that a creditor or other claimant takes possession of, or a receiver, administrator or similar officer is appointed over any of the assets of Licensee or in the event that Licensee makes any voluntary arrangement with its creditors or becomes subject to any court or administration order pursuant to any bankruptcy or insolvency law.

5.04 Additionally, insofar as legally permitted, Philips may terminate this Agreement at any time by means of written notice to Licensee in case Licensee or an Associated Company of Licensee has been found liable by a competent court or administrative authority to have committed a serious act of piracy with respect to copyrights of third parties.

5.05 Philips shall have the right to terminate this Agreement forthwith or to revoke the license granted under any of Philips', IRT's or France Télécom's respective patents in the event that Licensee or any of its Associated Companies brings a claim for infringement of any of its patents essential for the use of the AC-3 technology in the manufacture of DVD-Video Discs and/or the sale or other disposal thereof against Philips, IRT or France Télécom and/or any of their respective Associated Companies and Licensee refuses to license such patents on fair and reasonable conditions to Philips, IRT and France Télécom respectively.

5.06 Upon the termination of this Agreement by Philips for any reason pursuant to Article 5.02 through 5.05, Licensee shall immediately cease the manufacture, sale or other disposal of DVD-Video Discs incorporating the AC-3 technology in which any one or more of the Licensed Patents are used. Further, upon such termination, any and all amounts outstanding hereunder shall become immediately due and payable.

5.07 All provisions of this Agreement which are intended to survive (whether express or implied) the expiry or termination of this Agreement, shall so survive.

Article 6 - Miscellaneous

6.01 Any notice required under this Agreement to be sent by either party shall be given in writing by means of a letter or facsimile directed:

in respect of Licensee, to:

National Film Laboratories, Inc. d/b/a Crest National
6721 Romaine Street
Hollywood, CA 90038

in respect of Philips, to:

Koninklijke Philips Electronics N.V.
c/o Philips International B.V.
Intellectual Property & Standards - Legal Department
P.O. Box 80002, Building SFF-8
5600 JB Eindhoven
The Netherlands
Fax. +31 40 2734131
with a copy to:

U.S. Philips Corporation
580 White Plains Road
Tarrytown, New York 10591

or to such other address as may have been previously specified in writing by either party to the other.

6.02 This Agreement sets forth the entire understanding and agreement between the parties as to the subject matter hereof and supersedes and replaces all prior arrangements, discussions and understandings between the parties relating thereto. Neither party shall be bound by any obligation, warranty, waiver, release or representation, except as expressly provided herein, or as may subsequently be agreed in writing between the parties.

6.03 Nothing contained in this Agreement shall be construed:

(a) as imposing on either party any obligation to instigate any suit or action for infringement of any of the patents licensed hereunder or to defend any suit or action brought by a third party which challenges or relates to the validity of any of such patents. Licensee shall have no right to instigate any such suit or action for infringement of any of the patents licensed by Philips hereunder, nor the right to defend any such suit or action which challenges or relates to the validity of any such patent licensed by Philips hereunder;

(b) as imposing any obligation to file any patent application or to secure any patent or to maintain any patent in force;

(c) as conferring any license or right to copy or imitate the appearance and/or design of any product of Philips, IRT, France Télécom or any of their Associated Companies;

(d) as conferring any license to manufacture, use, sell or otherwise dispose of any product or device other than a Licensed Product.

6.04 Neither the failure nor the delay of either party to enforce any provisions of this Agreement shall constitute a waiver of such provision or of the right of either party to enforce each and every provision of this Agreement.

6.05 Should any provision of this Agreement be finally determined void or unenforceable in any judicial proceeding, such determination shall not affect the operation of the remaining provisions hereof, provided that, in such event, Philips shall have the right to terminate this Agreement by written notice to Licensee.

6.06 This Agreement shall be governed by and construed in accordance with the laws of The State of New York.

Any dispute between the parties hereto in connection with this Agreement (including any question regarding its existence, validity or termination) shall be submitted to any state or federal courts in The State of New York, provided always that, in case Philips is the plaintiff, Philips may at its sole discretion submit any such dispute to either the state or federal courts in the venue of Licensee's registered office, or to any of the state or federal courts in the Territory having jurisdiction. Licensee hereby irrevocably waives any objection to the jurisdiction, process and venue of any such court and to the effectiveness, execution and enforcement of any order or judgment (including, but not limited to, a default judgment) of any such court in relation to this Agreement, to the maximum extent permitted by the law of any jurisdiction, the laws of which might be claimed to be applicable regarding the effectiveness, enforcement or execution of such order or judgment.

AS WITNESS, the parties hereto have caused this Agreement to be signed on the date first written above.

KONINKLIJKE PHILIPS ELECTRONICS N.V.

Name: H. Sakkers

Title: by proxy

Date: _____

NATIONAL FILM LABORATORIES, INC. d/b/a CREST NATIONAL

Name: _____

Title: SVP

Date: 10/23/02

Exhibit I to the Patent License Agreement for the use of AC-3 technology in the manufacture of DVD-Video discs

Patents relevant to DVD Video disc - AC-3 audio

COUNTRY	REFERENCE	FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
AR	N 013241 -	317015	04-Jun-90		250211	11-Oct-11	Universal subband coder format
AT	IRT-PCT -	WO 87-00723	20-Nov-87	WO 88.04117	66.553	20-Nov-07	Subband coded audio signals transmission
AT	N 013241 -	90201356.4	29-May-90	0402973-A1	E114862	29-May-10	Universal subband coder format
AT	N 013241 A	94200239.5	29-May-90	0599824-A3	E211329	29-May-10	Universal subband coder format
AT	N 013241 B	94200240.3	29-May-90	0599825-A3	E206253	29-May-10	Universal subband coder format
AT	N 013241 D	96200046.9	29-May-90	0708533-A3	E206254	29-May-10	Universal subband coder format
AT-EP	N 013241 E	96201857.8	29-May-90	0751520-A3		29-May-10	Universal subband coder format
AU	N 013241 -	90-56159	31-May-90	90-56159 641654	641654	31-May-10	Universal subband coder format
BA	N 013241 -	BAP97269A	03-Nov-97			03-Nov-17	Universal subband coder format
BE	N 013241 -	90201356.4	29-May-90	0402973-A1	0402973	29-May-10	Universal subband coder format
BE	N 013241 A	94200239.5	29-May-90	0599824-A3	0599824	29-May-10	Universal subband coder format
BE	N 013241 B	94200240.3	29-May-90	0599825-A3	0599825	29-May-10	Universal subband coder format
BE	N 013241 D	96200046.9	29-May-90	0708533-A3	0708533	29-May-10	Universal subband coder format
BE-EP	N 013241 E	96201857.8	29-May-90	0751520-A3		29-May-10	Universal subband coder format
BR	N 013241 -	PI9002617.9	01-Jun-90	PI9002617	PI9002617	01-Jun-10	Universal subband coder format
CA	N 013241 -	2017935	30-May-90			30-May-10	Universal subband coder format
CA	N 013241 A	2363045	30-May-90			30-May-10	Universal subband coder format
CH	IRT-PCT -	WO 87-00723	20-Nov-87	WO 88.04117	0.290.581	20-Nov-07	Subband coded audio signals transmission
CH	N 013241 -	90201356.4	29-May-90	0402973-A1	0402973	29-May-10	Universal subband coder format
CH	N 013241 A	94200239.5	29-May-90	0599824-A3	0599824	29-May-10	Universal subband coder format
CH	N 013241 B	94200240.3	29-May-90	0599825-A3	0599825	29-May-10	Universal subband coder format
CH	N 013241 D	96200046.9	29-May-90	0708533-A3	0708533	29-May-10	Universal subband coder format
CH-EP	N 013241 E	96201857.8	29-May-90	0751520-A3		29-May-10	Universal subband coder format
CN	N 013241 -	90103226.3	30-May-90	1048473-A	1031090	30-May-10	Universal subband coder format
CN	N 013241 A	94103143.8	30-May-90	1096619-A		30-May-10	Universal subband coder format
CN	N 013241 B	94103142.X	30-May-90	1096618-A		30-May-10	Universal subband coder format
CZ	N 013241 -	90-PV2678	30-May-90		283598	30-May-10	Universal subband coder format
DE	IRT-3 -	DE 34.40.613	07-Nov-84		34.40.613	07-Nov-04	Digital transfer of compressed signals
DE	IRT-PCT -	WO 87-00723	20-Nov-87	WO 88.04117	37.72.381	20-Nov-07	Subband coded audio signals using scale factors
DE	IRT-PCT -	DE 36.39.753	21-Nov-86	36.39.753	36.39.753	20-Nov-07	Subband coded audio signals transmission
DE	N 013241 -	90201356.4	29-May-90	0402973-A1	69014422.9	29-May-10	Universal subband coder format
DE	N 013241 A	94200239.5	29-May-90	0599824-A3	69033882.1	29-May-10	Universal subband coder format
DE	N 013241 B	94200240.3	29-May-90	0599825-A3	69033811.2	29-May-10	Universal subband coder format

All corresponding patent applications, patents, divisions, continuations and reissues based upon any of the patent applications or patents of this list are considered to be included as an integral part of this list

Printdate Friday, June 07, 2002

Patents relevant to DVD Video disc - AC-3 audio

COUNTRY	REFERENCE		FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
DE	N 013241	D	96200046.9	29-May-90	0708533-A3	69033813.9	29-May-10	Universal subband coder format
DE-EP	N 013241	E	96201857.8	29-May-90	0751520-A3		29-May-10	Universal subband coder format
DK	IRT-PCT	-	WO 87-00723	20-Nov-87	DK 4050/88	172.621	20-Nov-07	Subband coded audio signals transmission
DK	N 013241	-	90201356.4	29-May-90	0402973-A1	0402973	29-May-10	Universal subband coder format
DK	N 013241	A	94200239.5	29-May-90	0599824-A3	0599824	29-May-10	Universal subband coder format
DK	N 013241	B	94200240.3	29-May-90	0599825-A3	0599825	29-May-10	Universal subband coder format
DK	N 013241	D	96200046.9	29-May-90	0708533-A3	0708533	29-May-10	Universal subband coder format
DK-EP	N 013241	E	96201857.8	29-May-90	0751520-A3		29-May-10	Universal subband coder format
ES	N 013241	-	90201356.4	29-May-90	0402973-A1	0402973	29-May-10	Universal subband coder format
ES	N 013241	A	94200239.5	29-May-90	0599824-A3	0599824	29-May-10	Universal subband coder format
ES	N 013241	B	94200240.3	29-May-90	0599825-A3	0599825	29-May-10	Universal subband coder format
ES	N 013241	D	96200046.9	29-May-90	0708533-A3	0708533	29-May-10	Universal subband coder format
ES-EP	N 013241	E	96201857.8	29-May-90	0751520-A3		29-May-10	Universal subband coder format
FI	IRT-PCT	-	WO 87-00723	20-Nov-87	FI 88.3446	84.538	20-Nov-07	Subband coded audio signals transmission
FR	IRT-PCT	-	WO 87-00723	20-Nov-87	WO 88.04117	0.290.581	20-Nov-07	Subband coded audio signals transmission
FR	N 013241	-	90201356.4	29-May-90	0402973-A1	0402973	29-May-10	Universal subband coder format
FR	N 013241	A	94200239.5	29-May-90	0599824-A3	0599824	29-May-10	Universal subband coder format
FR	N 013241	B	94200240.3	29-May-90	0599825-A3	0599825	29-May-10	Universal subband coder format
FR	N 013241	D	96200046.9	29-May-90	0708533-A3	0708533	29-May-10	Universal subband coder format
FR-EP	N 013241	E	96201857.8	29-May-90	0751520-A3		29-May-10	Universal subband coder format
GB	IRT-PCT	-	WO 87-00723	20-Nov-87	WO 88.04117	0.290.581	20-Nov-07	Subband coded audio signals transmission
GB	N 013241	-	90201356.4	29-May-90	0402973-A1	0402973	29-May-10	Universal subband coder format
GB	N 013241	A	94200239.5	29-May-90	0599824-A3	0599824	29-May-10	Universal subband coder format
GB	N 013241	B	94200240.3	29-May-90	0599825-A3	0599825	29-May-10	Universal subband coder format
GB	N 013241	D	96200046.9	29-May-90	0708533-A3	0708533	29-May-10	Universal subband coder format
GB-EP	N 013241	E	96201857.8	29-May-90	0751520-A3		29-May-10	Universal subband coder format
GR	N 013241	-	90201356.4	29-May-90	0402973-A1	0402973	29-May-10	Universal subband coder format
GR	N 013241	A	94200239.5	29-May-90	0599824-A3	0599824	29-May-10	Universal subband coder format
GR	N 013241	B	94200240.3	29-May-90	0599825-A3	0599825	29-May-10	Universal subband coder format
GR-EP	N 013241	E	96201857.8	29-May-90	0751520-A3		29-May-10	Universal subband coder format
HK	N 013241	-	NOT GIVEN	29-May-90		0960416	29-May-10	Universal subband coder format
HK	N 013241	A	98113036.2	29-May-90	1012112-A 1012112-A		29-May-10	Universal subband coder format
HK	N 013241	B	98113037.1	29-May-90	1012113-A 1012113-B		29-May-10	Universal subband coder format
HK	N 013241	C	98114929.0	29-May-90	1013743-A 1013743-A	HK1013743	29-May-10	Universal subband coder format
HK	N 013241	D	98114934.3	29-May-90	1013744-A 1013744-B		29-May-10	Universal subband coder format

All corresponding patent applications, patents, divisions, continuations and reissues based upon any of the patent applications or patents of this list are considered to be included as an integral part of this list

Printdate Friday, June 07, 2002

Patents relevant to DVD Video disc - AC-3 audio

COUNTRY	REFERENCE		FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
HU	N 013241	-	90-3284	31-May-90		210644	31-May-10	Universal subband coder format
IN	N 013241	-	90-438	28-May-90	175971	175971	28-May-04	Universal subband coder format
IN	N 013241	A	95-217	28-May-90			28-May-04	Universal subband coder format
IN	N 013241	B	95-218	28-May-90			28-May-04	Universal subband coder format
IN	N 013241	C	98-296	28-May-90			28-May-04	Universal subband coder format
IN	N 013241	D	98-309	28-May-90			28-May-04	Universal subband coder format
IN	N 013241	E					28-May-04	Universal subband coder format
IT	IRT-PCT	-	WO 87-00723	20-Nov-87	WO 88.04117	0.290.581	20-Nov-07	Subband coded audio signals transmission
IT	N 013241	-	90201356.4	29-May-90	0402973-A1	0402973	29-May-10	Universal subband coder format
IT	N 013241	A	94200239.5	29-May-90	0599824-A3	0599824	29-May-10	Universal subband coder format
IT	N 013241	B	94200240.3	29-May-90	0599825-A3	0599825	29-May-10	Universal subband coder format
IT	N 013241	D	96200046.9	29-May-90	0708533-A3	0708533	29-May-10	Universal subband coder format
IT-EP	N 013241	E	96201857.8	29-May-90	0751520-A3		29-May-10	Universal subband coder format
JP	IRT-PCT	-	WO 87-00723	20-Nov-87	JP 1501435 ,	2.599.624	20-Nov-07	Subband coded audio signals transmission
JP	N 013241	-	90-141693	01-Jun-90	91-24834	3012849	01-Jun-10	Universal subband coder format
KR	IRT-PCT	-	WO 87-00723	20-Nov-87	WO 88.04117	9.514.066	20-Nov-07	Subband coded audio signals transmission
KR	N 013241	-	90-8138	02-Jun-90		149862	10-Jun-13	Universal subband coder format
LU	N 013241	-	90201356.4	29-May-90	0402973-A1	0402973	29-May-10	Universal subband coder format
LU	N 013241	A	94200239.5	29-May-90	0599824-A3	0599824	29-May-10	Universal subband coder format
LU	N 013241	B	94200240.3	29-May-90	0599825-A3	0599825	29-May-10	Universal subband coder format
LU	N 013241	D	96200046.9	29-May-90	0708533-A3	0708533	29-May-10	Universal subband coder format
LU-EP	N 013241	E	96201857.8	29-May-90	0751520-A3		29-May-10	Universal subband coder format
MX	N 013241	-	20972	01-Jun-90		172513	01-Jun-10	Universal subband coder format
MY	N 013241	-	PI9000923	02-Jun-90		105780	30-Jan-10	Universal subband coder format
NL	IRT-PCT	-	WO 87-00723	20-Nov-87	WO 88.04117	0.290.581	20-Nov-07	Subband coded audio signals transmission
NL	N 013241	-	90201356.4	29-May-90	0402973-A1	0402973	29-May-10	Universal subband coder format
NL	N 013241	A	94200239.5	29-May-90	0599824-A3	0599824	29-May-10	Universal subband coder format
NL	N 013241	B	94200240.3	29-May-90	0599825-A3	0599825	29-May-10	Universal subband coder format
NL	N 013241	D	96200046.9	29-May-90	0708533-A3	0708533	29-May-10	Universal subband coder format
NL-EP	N 013241	E	96201857.8	29-May-90	0751520-A3		29-May-10	Universal subband coder format
PL	N 013241	-	P285437	01-Jun-90	285437	167271	01-Jun-10	Universal subband coder format
RU	N 013241	-	4830112	29-May-90			29-May-10	Universal subband coder format
SE	IRT-PCT	-	WO 87-00723	20-Nov-87	WO 88.04117	0.290.581	20-Nov-07	Subband coded audio signals transmission
SE	N 013241	-	90201356.4	29-May-90	0402973-A1	0402973	29-May-10	Universal subband coder format
SE	N 013241	A	94200239.5	29-May-90	0599824-A3	0599824	29-May-10	Universal subband coder format

All corresponding patent applications, patents, divisions, continuations and reissues based upon any of the patent applications or patents of this list are considered to be included as an integral part of this list

Printdate Friday, June 07, 2002

Patents relevant to DVD Video disc - AC-3 audio

COUNTRY	REFERENCE		FILING NR	FILING DATE	PUBLICATION NR	GRANT NR	EXPIRY DATE	TITLE
SE	N 013241	B	94200240.3	29-May-90	0599825-A3	0599825	29-May-10	Universal subband coder format
SE	N 013241	D	96200046.9	29-May-90	0708533-A3	0708533	29-May-10	Universal subband coder format
SE-EP	N 013241	E	96201857.8	29-May-90	0751520-A3		29-May-10	Universal subband coder format
SG	N 013241	-	9690189.7	29-May-90		28659	29-May-10	Universal subband coder format
SG	N 013241	A	9607808.4	29-May-90		44803	29-May-10	Universal subband coder format
SG	N 013241	B	9604520.8	29-May-90	0046416		29-May-10	Universal subband coder format
SI	N 013241	-	9011071	21-Feb-94		9011071	31-May-10	Universal subband coder format
SK	N 013241	-	90-PV2678	30-May-90		280559	30-May-10	Universal subband coder format
TW	N 013241	-	79104265	25-May-90		45033	25-May-10	Universal subband coder format
UA	N 013241	-	93004526	17-Sep-93			17-Sep-13	Universal subband coder format
US	IRT-PCT	-	WO 87-00723	20-Nov-87	WO 88.04117	4.972.484	20-Nov-07	Subband coded audio signals transmission
US	N 013241	A	07/997158	21-Dec-92		5323396	01-Jun-10	Universal subband coder format
US	N 013241	B	08/173850	27-Dec-93		5606618	01-Jun-10	Universal subband coder format
US	N 013241	E	08/488318	07-Jun-95		5539829	01-Jun-10	Universal subband coder format
US	N 013241	G	08/483009	06-Jun-95		5530655	01-Jun-10	Universal subband coder format
US	N 013241	H	09/521052	08-Mar-00		6289308	01-Jun-10	Universal subband coder format
US	N 013241	I	09/908932	17-Jul-01	2001-0044713-A1		01-Jun-10	Universal subband coder format
US	Q 093002	W	08/427646	24-Apr-95		5481643	18-Mar-13	Matrixing of bitrate reduced signals
YU	N 013241	-	90-P1071	31-May-90	90-P1071	48202	31-May-10	Universal subband coder format

All corresponding patent applications, patents, divisions, continuations and reissues based upon any of the patent applications or patents of this list are considered to be included as an integral part of this list

Printdate Friday, June 07, 2002

EXHIBIT D

PHILIPS

Koninklijke Philips Electronics N.V.

P.O. Box 218
5600 MD Eindhoven
The Netherlands

National Film Laboratories, Inc.
d/b/a Crest Digital
3845 E. Coronado Street
Anaheim, CA 92807
USA

Ref: LP3-A6K-100
Date: November 17, 2011

Subject: Notice of Termination under the DVD Video Disc and DVD ROM Disc Patent License Agreement; the Patent License Agreement for the Use of AC-3 Technologies in the Manufacture of DVD-Video Discs; and MPEG Audio Patent License Agreement

Dear Sirs,

Reference is made to (1) the DVD Video Disc and DVD ROM Disc Patent License Agreement ("DVD Agreement"); (2) the Patent License Agreement for the Use of AC-3 Technology in the Manufacture of DVD Video Discs ("AC-3 Agreement") and (3) the MPEG Audio Patent License Agreement ("MPEG Agreement"), each made effective July 1, 2002 (collectively "the DVD Agreements") between Koninklijke Philips Electronics N.V. ("Philips") and National Film Laboratories, Inc. d/b/a Crest National (currently d/b/a Crest Digital) ("Crest").

We refer to the Notice of Default dated July 14th 2010. As your company has failed to remedy the defaults stated within the 30-day period referred to in said letter we hereby terminate the DVD Agreements. We further note that in addition to the defaults noted in our July 14, 2010 letter, Crest has continued to default by not paying the royalties due in full under the DVD Agreements through the third calendar quarter of 2011.

We demand that Crest National immediately cease the manufacture and sale of DVD Discs using any one or more of Philips' patents.

PHILIPS

We hereby confirm that the Agreements are terminated with immediate effect, subject to the reservation of all our rights, including but not limited to the right to claim royalties together with interest up to the date of actual payment of all due amounts, as well as any damages with respect to any infringement of Philips' patents following termination of the Agreements.

Yours sincerely,

Koninklijke Philips Electronics N.V.

H.B. Sakkers
Legal Department
Philips Intellectual Property & Standards

EXHIBIT E

PROSKAUER ROSE LLP

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April 21, 2006

Via E-Mail & Facsimile

Philips Intellectual Property & Standards
P.O Box 220
5600 AE Eindhoven
The Netherlands

Re: DVD Patent Licensing Program
Our Reference No.: 58363-012

Dear :

We provide herewith our April 2006 Cumulative Report of Philips U.S. Patents Essential for DVD-ROM and DVD-Video Discs and our April 2006 Cumulative Report of Philips U.S. Patents Essential for DVD-ROM and DVD-Video Playback. These reports list all Philips U.S. patents that we, as of this date, have found essential for implementing either or both of the following two DVD standards:

> DVD Specifications for Read-Only Disc, Part 1, PHYSICAL SPECIFICATIONS Version 1.0, May 2004 ("DVD-ROM Standard");
>
> DVD Specifications for Read-Only Disc, Part 3, VIDEO SPECIFICATIONS Version 1.1, August 2001 ("DVD-Video Standard");

Our evaluations are based on:

1. Our review of the patent specification, certain claims of the patent, and the prosecution history of the patent;

2. Claims analyses for certain patents presented to us by you;

3. Our review of the above-noted DVD standards; and

4. Responses to questions regarding certain patents including written responses and face-to-face meetings.

A patent that is found to be essential may be either "technically essential" or "essential as a practical matter."

A patent is "technically essential" if making, using, or selling a disc, player, or recorder, in compliance with a portion of the relevant DVD standard, directly infringes at least one claim of that patent under 35 U.S.C. §271(a). Our reports indicate which patents are essential for each of the disc category, the playback category, and the recording category (where appropriate) of the respective DVD standard.

Consistent with our past practice, we have found essential for the disc category certain patents that cover apparatuses used for making a disc, e.g., patents that cover apparatuses for encoding or recording information on a DVD-Video disc.

As we are evaluating U.S. patents, we consider all of the grounds for infringement defined in Title 35 U.S.C. § 271, including, for example, inducement of infringement under 35 U.S.C. § 271(b), contributory infringement under 35 U.S.C. § 271(c) and product made by a patented process infringement under 35 U.S.C. § 271(g). On a case-by-case basis, we have found a limited number of method and apparatus claims essential for the disc category using one or more of the foregoing bases.

If we are unable to conclude that a patent is "technically essential," we may still be able to find the patent "essential as a practical matter" for the respective DVD licensing program. To be "essential as a practical matter," a patent must be shown to have at least one claim having no commercially realistic alternative for implementing a portion of a particular DVD standard. See Letter from Joel I. Klein to Garrard R. Beeney, Esq., DVD Business Review Letter #1 (December 16, 1998)("3C DOJ letter"). However, for a patent to be found essential on this basis, evidence must be submitted that demonstrates such essentiality. Absent the submission of evidence, we cannot find a patent to be essential as a practical matter.

Such evidence may come in various forms. For example, in the past, evidence we have found persuasive included:

(a) an identification of substantially all of the relevant products in the marketplace that comply with the relevant DVD standard (for example, products whose individual market shares add up to 90% or more of the total market); and

(b) a showing that the invention claimed in the patent submitted for evaluation is being used by substantially all of the identified products.

We will also take into consideration any other evidence submitted indicating that a patent is essential as a practical matter.

In other words, if, as determined on a case-by-case basis, there is significant evidence of a commercially realistic alternative to the patent, the patent cannot be found to be essential as a practical matter.

Pursuant to U.S. law, we use a two-step process to review patent claims for essentiality: first, we interpret the patent claims; second, we compare the interpreted claims to the pertinent DVD standard. A patent claim is interpreted based on the claim language, the patent's specification, and the patent's file history.

Claims that include "means-plus-function" limitations warrant special mention. An analysis of a claim containing means-plus-function limitations involves the same two-step process described above: claim interpretation and a comparison of the interpreted claims with the pertinent DVD standard. Under U.S. law, a means-plus-function limitation is interpreted to cover the structure, material, or acts described in the patent's specification, and any equivalents thereof, that perform the claimed function. Thus, interpreting a means-plus-function limitation requires identifying the claimed function and determining the corresponding structure, material, or acts disclosed in the patent's specification that perform the claimed function. After interpreting a claim limitation written in means-plus-function format, the pertinent DVD standard is evaluated to determine whether it requires performance of the claimed function using the same structure, material, or acts found in the patent's specification, or using an equivalent of such structure, material, or acts.

We have concluded that the patents listed on the attached reports are essential for implementing one or more of the above-noted DVD Standards. The reasons for our findings are set out in the attached reports.

The reports are organized as follows:

April 2006 Cumulative Report of Philips U.S Patents
Essential for DVD-ROM and DVD-Video Discs

Appendix A1:	Philips Patents Essential for DVD-ROM Single Layer Discs
Appendix A2:	Philips Patents Essential for DVD-ROM Dual Layer Discs
Appendix A3:	Philips Patents Essential for DVD-Video Single Layer Discs
Appendix A4:	Philips Patents Essential for DVD-Video Dual Layer Discs
Appendix AC-3:	Philips Patents Essential for DVD-Video Discs with AC-3 Audio
Appendix MPEG:	Philips Patents Essential for DVD-Video Discs with MPEG Audio
Appendix DTS:	Philips Patents Essential for DVD-Video Discs with DTS Audio

April 2006 Cumulative Report of Philips U.S Patents
Essential for DVD-ROM and DVD-Video Playback

Appendix A1:	Philips Patents Essential for DVD-ROM Playback
Appendix A2:	Philips Patents Essential for DVD-Video Playback
Appendix AC-3:	Philips Patents Essential for Playback of DVD-Video Discs with AC-3 Audio
Appendix MPEG:	Philips Patents Essential for Playback of DVD-Video Discs with MPEG Audio
Appendix DTS:	Philips Patents Essential for Playback of DVD-Video Discs with DTS Audio

PROSKAUER ROSE LLP

Please contact us if you require further assistance.

Very truly yours,
PROSKAUER ROSE LLP

By: Kenneth Rubenstein
Kenneth Rubenstein

Enclosures

cc:

April 2006 Cumulative Report of Philips U.S. Patents Essential for DVD-ROM and DVD-Video DISCS

Appendix A1
Philips Patents Essential for DVD-ROM Single Layer Discs

US Patent	Representative Claim	DVD-ROM (Part 1) Specification (unless otherwise noted)
4,961,077	1	*Secs.*: K.1, K.3, K.9.2 *Pages*: PHX-16, 21
5,068,846	1	*Sec.*: 2.1 *Page*: PH-9
5,642,113	20	*Secs.*: 3.3, 3.3.3 *Table*: 3.3-1 *Pages*: PH-52-1, 54, 55 to 60
5,696,505	25	*Secs.*: 3.3, 3.3.3 *Table*: 3.3-1 *Pages*: PH-52-1, 54, 55 to 60
5,790,056	12	*Secs.*: 3.3, 3.3.1, 3.3.2, 3.3.3 *Fig.*: 3.3-2 *Tables*: 3.3-1, 3.3-2 *Pages*: PH-52-1 to 62
5,790,512	1	*Secs.*: 2.6.3, 2.7.1.a *Annex*: H *Pages*: PH-25, 29, PHX-10-2
5,838,696	4	*Secs.*: 1.6, 3.2, 3.2.1, 3.2.2, 3.2.7, 3.2.8 *Fig.*: 3.2.1-1 *Pages*: PH-7, 40 to 41, 47 to 48, 49

April 2006 Cumulative Report of Philips U.S. Patents Essential for DVD-ROM and DVD-Video DISCS

Appendix A1 Philips Patents Essential for DVD-ROM Single Layer Discs		
US Patent	**Representative Claim**	**DVD-ROM (Part 1) Specification (unless otherwise noted)**
5,920,272	1	*Secs.:* 3.3, 3.3.3 *Fig.:* 3.3-2 *Tables:* 3.3-1, 3.3-2 *Pages:* PH-52-1, 52-2, 54, 55 to 62
6,388,962	4	*Secs.:* 1.1, 2.1, 2.4.2, 3.4.1.3.1 *Figs.:* 2.1-1, 3.4.1.3-1 *Table:* 3.4.1.3.1-1 *Pages:* PH-1, 9, 19, 66, 67
6,526,005	1	*Secs.:* 1.1, 2.1, 2.4.2, 3, 3.1.1, 3.1.4, 3.4.1.3.1 *Figs.:* 2.1-1, 3.4.1.3-1 *Table:* 3.4.1.3.1-1 *Pages:* PH-1, 9, 19, 37, 66, 67

ORIGINAL

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

KONINKLIJKE PHILIPS ELECTRONICS N.V.; and U.S. PHILIPS CORPORATION

PLAINTIFF(S)

v.

NATIONAL FILM LABORATORIES, INC. d/b/a CREST NATIONAL GROUP, INC.; BEACHBODY, LLC f/k/a PRODUCT PARTNERS, LLC, RONALD STEIN, STEPHEN STEIN, ELAINE STEIN, MARTIN ROSS, and LORRAINE ROSS,

DEFENDANT(S).

CASE NUMBER

CV12-04576 PSWL(FFMx)

SUMMONS

TO: DEFENDANT(S):

A lawsuit has been filed against you.

Within 21 days after service of this summons on you (not counting the day you received it), you must serve on the plaintiff an answer to the attached ☑ complaint ☐ _____ amended complaint ☐ counterclaim ☐ cross-claim or a motion under Rule 12 of the Federal Rules of Civil Procedure. The answer or motion must be served on the plaintiff's attorney, _____, whose address is _____. If you fail to do so, judgment by default will be entered against you for the relief demanded in the complaint. You also must file your answer or motion with the court.

Clerk, U.S. District Court

Dated: MAY 25 2012

By: _____
Deputy Clerk

(Seal of the Court)

[Use 60 days if the defendant is the United States or a United States agency, or is an officer or employee of the United States. Allowed 60 days by Rule 12(a)(3)].

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

KONINKLIJKE PHILIPS ELECTRONICS N.V.; and U.S. PHILIPS CORPORATION

PLAINTIFF(S)

v.

NATIONAL FILM LABORATORIES, INC. d/b/a CREST NATIONAL GROUP, INC.; BEACHBODY, LLC f/k/a PRODUCT PARTNERS, LLC, RONALD STEIN, STEPHEN STEIN, ELAINE STEIN, MARTIN ROSS, and LORRAINE ROSS,

DEFENDANT(S).

CASE NUMBER

CV12-04576 RSWL (FFMx)

SUMMONS

TO: DEFENDANT(S):

A lawsuit has been filed against you.

Within 21 days after service of this summons on you (not counting the day you received it), you must serve on the plaintiff an answer to the attached ☑ complaint ☐ _____ amended complaint ☐ counterclaim ☐ cross-claim or a motion under Rule 12 of the Federal Rules of Civil Procedure. The answer or motion must be served on the plaintiff's attorney, _____, whose address is _____. If you fail to do so, judgment by default will be entered against you for the relief demanded in the complaint. You also must file your answer or motion with the court.

Clerk, U.S. District Court

Dated: MAY 25 2012

By: JULIE PRADO
Deputy Clerk

SEAL

(Seal of the Court)

[Use 60 days if the defendant is the United States or a United States agency, or is an officer or employee of the United States. Allowed 60 days by Rule 12(a)(3)].

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

NOTICE OF ASSIGNMENT TO UNITED STATES MAGISTRATE JUDGE FOR DISCOVERY

This case has been assigned to District Judge Ronald S. W. Lew and the assigned discovery Magistrate Judge is Frederick F. Mumm.

The case number on all documents filed with the Court should read as follows:

CV12- 4576 RSWL (FFMx)

Pursuant to General Order 05-07 of the United States District Court for the Central District of California, the Magistrate Judge has been designated to hear discovery related motions.

All discovery related motions should be noticed on the calendar of the Magistrate Judge

---

NOTICE TO COUNSEL

A copy of this notice must be served with the summons and complaint on all defendants (if a removal action is filed, a copy of this notice must be served on all plaintiffs).

Subsequent documents must be filed at the following location:

[X] **Western Division**
312 N. Spring St., Rm. G-8
Los Angeles, CA 90012

[ ] **Southern Division**
411 West Fourth St., Rm. 1-053
Santa Ana, CA 92701-4516

[ ] **Eastern Division**
3470 Twelfth St., Rm. 134
Riverside, CA 92501

Failure to file at the proper location will result in your documents being returned to you.

UNITED STATES DISTRICT COURT, CENTRAL DISTRICT OF CALIFORNIA
CIVIL COVER SHEET

I (a) PLAINTIFFS (Check box if you are representing yourself ☐)
KONINKLIJKE PHILIPS ELECTRONICS N.V.; and U.S. PHILIPS CORPORATION

DEFENDANTS
NATIONAL FILM LABORATORIES, INC.; BEACHBODY, LLC; RONALD STEIN; STEPHEN STEIN; ELAINE STEIN; MARTIN ROSS; and LORRAINE ROSS

(b) Attorneys (Firm Name, Address and Telephone Number. If you are representing yourself, provide same.)
MAYER BROWN LLP
Two Palo Alto Square, Suite 300
3000 El Camino Real
Palo Alto, CA 94306
Tel: (650) 331-2000

Attorneys (If Known)

II. BASIS OF JURISDICTION (Place an X in one box only.)
☐ 1 U.S. Government Plaintiff
☑ 3 Federal Question (U.S. Government Not a Party)
☐ 2 U.S. Government Defendant
☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES - For Diversity Cases Only (Place an X in one box for plaintiff and one for defendant.)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated or Principal Place of Business in this State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated and Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. ORIGIN (Place an X in one box only.)
☑ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from Appellate Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify): ☐ 6 Multi-District Litigation ☐ 7 Appeal to District Judge from Magistrate Judge

V. REQUESTED IN COMPLAINT: **JURY DEMAND:** ☑ Yes ☐ No (Check 'Yes' only if demanded in complaint.)
CLASS ACTION under F.R.C.P. 23: ☐ Yes ☑ No
☑ **MONEY DEMANDED IN COMPLAINT:** $ Not Yet Determined

VI. CAUSE OF ACTION (Cite the U.S. Civil Statute under which you are filing and write a brief statement of cause. Do not cite jurisdictional statutes unless diversity.)
Patent Infringement under 35 U.S.C. § 271; Breach of Contract

VII. NATURE OF SUIT (Place an X in one box only.)

OTHER STATUTES
☐ 400 State Reapportionment
☐ 410 Antitrust
☐ 430 Banks and Banking
☐ 450 Commerce/ICC Rates/etc.
☐ 460 Deportation
☐ 470 Racketeer Influenced and Corrupt Organizations
☐ 480 Consumer Credit
☐ 490 Cable/Sat TV
☐ 810 Selective Service
☐ 850 Securities/Commodities/ Exchange
☐ 875 Customer Challenge 12 USC 3410
☐ 890 Other Statutory Actions
☐ 891 Agricultural Act
☐ 892 Economic Stabilization Act
☐ 893 Environmental Matters
☐ 894 Energy Allocation Act
☐ 895 Freedom of Info. Act
☐ 900 Appeal of Fee Determination Under Equal Access to Justice
☐ 950 Constitutionality of State Statutes

CONTRACT
☐ 110 Insurance
☐ 120 Marine
☐ 130 Miller Act
☐ 140 Negotiable Instrument
☐ 150 Recovery of Overpayment & Enforcement of Judgment
☐ 151 Medicare Act
☐ 152 Recovery of Defaulted Student Loan (Excl. Veterans)
☐ 153 Recovery of Overpayment of Veteran's Benefits
☐ 160 Stockholders' Suits
☐ 190 Other Contract
☐ 195 Contract Product Liability
☐ 196 Franchise

REAL PROPERTY
☐ 210 Land Condemnation
☐ 220 Foreclosure
☐ 230 Rent Lease & Ejectment
☐ 240 Torts to Land
☐ 245 Tort Product Liability
☐ 290 All Other Real Property

TORTS
PERSONAL INJURY
☐ 310 Airplane
☐ 315 Airplane Product Liability
☐ 320 Assault, Libel & Slander
☐ 330 Fed. Employers' Liability
☐ 340 Marine
☐ 345 Marine Product Liability
☐ 350 Motor Vehicle
☐ 355 Motor Vehicle Product Liability
☐ 360 Other Personal Injury
☐ 362 Personal Injury-Med Malpractice
☐ 365 Personal Injury-Product Liability
☐ 368 Asbestos Personal Injury Product Liability

IMMIGRATION
☐ 462 Naturalization Application
☐ 463 Habeas Corpus-Alien Detainee
☐ 465 Other Immigration Actions

TORTS
PERSONAL PROPERTY
☐ 370 Other Fraud
☐ 371 Truth in Lending
☐ 380 Other Personal Property Damage
☐ 385 Property Damage Product Liability

BANKRUPTCY
☐ 422 Appeal 28 USC 158
☐ 423 Withdrawal 28 USC 157

CIVIL RIGHTS
☐ 441 Voting
☐ 442 Employment
☐ 443 Housing/Accommodations
☐ 444 Welfare
☐ 445 American with Disabilities - Employment
☐ 446 American with Disabilities - Other
☐ 440 Other Civil Rights

PRISONER PETITIONS
☐ 510 Motions to Vacate Sentence Habeas Corpus
☐ 530 General
☐ 535 Death Penalty
☐ 540 Mandamus/ Other
☐ 550 Civil Rights
☐ 555 Prison Condition

FORFEITURE/ PENALTY
☐ 610 Agriculture
☐ 620 Other Food & Drug
☐ 625 Drug Related Seizure of Property 21 USC 881
☐ 630 Liquor Laws
☐ 640 R.R. & Truck
☐ 650 Airline Regs
☐ 660 Occupational Safety /Health
☐ 690 Other

LABOR
☐ 710 Fair Labor Standards Act
☐ 720 Labor/Mgmt. Relations
☐ 730 Labor/Mgmt. Reporting & Disclosure Act
☐ 740 Railway Labor Act
☐ 790 Other Labor Litigation
☐ 791 Empl. Ret. Inc. Security Act

PROPERTY RIGHTS
☐ 820 Copyrights
☑ 830 Patent
☐ 840 Trademark

SOCIAL SECURITY
☐ 861 HIA (1395ff)
☐ 862 Black Lung (923)
☐ 863 DIWC/DIWW (405(g))
☐ 864 SSID Title XVI
☐ 865 RSI (405(g))

FEDERAL TAX SUITS
☐ 870 Taxes (U.S. Plaintiff or Defendant)
☐ 871 IRS-Third Party 26 USC 7609

CV12-04576

FOR OFFICE USE ONLY: Case Number: _____

AFTER COMPLETING THE FRONT SIDE OF FORM CV-71, COMPLETE THE INFORMATION REQUESTED BELOW.

UNITED STATES DISTRICT COURT, CENTRAL DISTRICT OF CALIFORNIA
CIVIL COVER SHEET

VIII(a). IDENTICAL CASES: Has this action been previously filed in this court and dismissed, remanded or closed? ☑ No ☐ Yes
If yes, list case number(s): _____

VIII(b). RELATED CASES: Have any cases been previously filed in this court that are related to the present case? ☑ No ☐ Yes
If yes, list case number(s): _____

Civil cases are deemed related if a previously filed case and the present case:
(Check all boxes that apply) ☐ A. Arise from the same or closely related transactions, happenings, or events; or
☐ B. Call for determination of the same or substantially related or similar questions of law and fact; or
☐ C. For other reasons would entail substantial duplication of labor if heard by different judges; or
☐ D. Involve the same patent, trademark or copyright, and one of the factors identified above in a, b or c also is present.

IX. VENUE: (When completing the following information, use an additional sheet if necessary.)

(a) List the County in this District; California County outside of this District; State if other than California; or Foreign Country, in which **EACH** named plaintiff resides.
☐ Check here if the government, its agencies or employees is a named plaintiff. If this box is checked, go to item (b).

County in this District:*	California County outside of this District; State, if other than California; or Foreign Country
	Koninklijke Philips Electronics N.V. -- The Netherlands U.S. Philips Corporation -- Delaware

(b) List the County in this District; California County outside of this District; State if other than California; or Foreign Country, in which **EACH** named defendant resides.
☐ Check here if the government, its agencies or employees is a named defendant. If this box is checked, go to item (c).

County in this District:*	California County outside of this District; State, if other than California; or Foreign Country
National Film Laboratories, Inc.: Orange County. Beachbody, LLC; Ronald Stein; Elaine Stein; Martin Ross, Lorraine Ross: Los Angeles County	Stephen Stein -- Indiana

(c) List the County in this District; California County outside of this District; State if other than California; or Foreign Country, in which **EACH** claim arose.
Note: In land condemnation cases, use the location of the tract of land involved.

County in this District:*	California County outside of this District; State, if other than California; or Foreign Country
Orange County -- All Claims	

*** Los Angeles, Orange, San Bernardino, Riverside, Ventura, Santa Barbara, or San Luis Obispo Counties**
Note: In land condemnation cases, use the location of the tract of land involved

X. SIGNATURE OF ATTORNEY (OR PRO PER): _____ Date 5/24/2012

Notice to Counsel/Parties: The CV-71 (JS-44) Civil Cover Sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law. This form, approved by the Judicial Conference of the United States in September 1974, is required pursuant to Local Rule 3-1 is not filed but is used by the Clerk of the Court for the purpose of statistics, venue and initiating the civil docket sheet. (For more detailed instructions, see separate instructions sheet.)

Key to Statistical codes relating to Social Security Cases:

Nature of Suit Code	Abbreviation	Substantive Statement of Cause of Action
861	HIA	All claims for health insurance benefits (Medicare) under Title 18, Part A, of the Social Security Act, as amended. Also, include claims by hospitals, skilled nursing facilities, etc., for certification as providers of services under the program. (42 U.S.C. 1935FF(b))
862	BL	All claims for "Black Lung" benefits under Title 4, Part B, of the Federal Coal Mine Health and Safety Act of 1969. (30 U.S.C. 923)
863	DIWC	All claims filed by insured workers for disability insurance benefits under Title 2 of the Social Security Act, as amended; plus all claims filed for child's insurance benefits based on disability. (42 U.S.C. 405(g))
863	DIWW	All claims filed for widows or widowers insurance benefits based on disability under Title 2 of the Social Security Act, as amended. (42 U.S.C. 405(g))
864	SSID	All claims for supplemental security income payments based upon disability filed under Title 16 of the Social Security Act, as amended.
865	RSI	All claims for retirement (old age) and survivors benefits under Title 2 of the Social Security Act, as amended. (42 U.S.C. (g))