

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
25 November 2004 (25.11.2004)

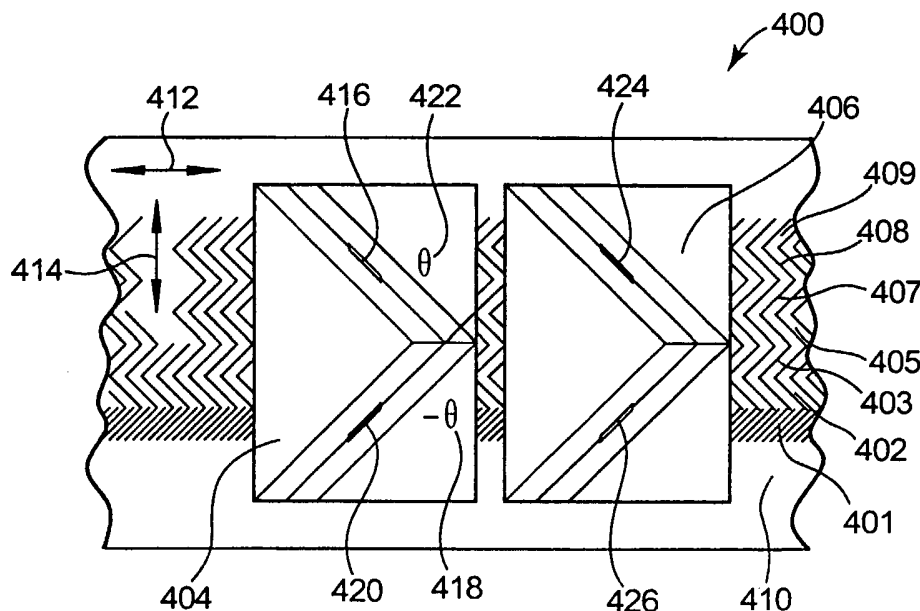
PCT

(10) International Publication Number  
**WO 2004/102463 A3**

- (51) International Patent Classification: <sup>7</sup> **G11B 5/09**, 21/02, 20/20
- (21) International Application Number: PCT/US2004/013326
- (22) International Filing Date: 29 April 2004 (29.04.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
60/469,518 9 May 2003 (09.05.2003) US  
60/469,521 9 May 2003 (09.05.2003) US  
10/793,502 4 March 2004 (04.03.2004) US
- (71) Applicant (for all designated States except US): **ADVANCED RESEARCH CORPORATION** [US/US]; 815 14th Avenue S.E., Minneapolis, MN 55414 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **SCHWARZ, Theodore, A.** [US/US]; 1462 Tamberwood Trail, St. Paul, MN 55125 (US). **DUGAS, Matthew, P.** [US/US]; 2324 Valentine Avenue, St. Paul, MN 55108 (US).
- (74) Agents: **BINDER, Mark, W.** et al.; Kagan Binder, PLLC, 200 Maple Island Building, 221 Main Street North, Stillwater, MN 55082 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— with international search report

[Continued on next page]

(54) Title: LARGE ANGLE AZIMUTH RECORDING AND HEAD CONFIGURATIONS



(57) Abstract: Large angle azimuth recording methods and devices. In one aspect of the invention methods of recording one or data tracks having data transitions oriented at a large azimuth angle are provided. In another aspect of the invention methods of reading a data track having data transitions oriented at a large azimuth angle are provided. Such methods include steps of suppressing a side track signal. In other aspects of the invention, head modules and devices for writing and/or reading large azimuth angle data tracks are provided.



---

**(88) Date of publication of the international search report:**  
20 April 2006

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/13326

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(7) : G11B 5/09, 21/02, 20/20 US CL : 360/121,76,77,13,21,75,76,69,70,48,71,77.12 According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) U.S. : 360/121,76,77,13,21,75,76,69,70,48,71,77.12 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EAST		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---	US 4,539,615 A (ARAI ET AL) 03 September 1985, see col 5, lines 49-51.	1-2,5-15,18-23,26-29,32 and 36
Y		3-4,16-17,24-25,30-31 and 33-35
Y	JP 58146011 A (FUTATSUMACHI) 31 August 1983, see entire document.	3-4,16-17,24-25,30-31 and 33-35
A	US 5,371,638 A (SALIBA) 06 December 1994.	1-36
A	US 6,088,184 A (HU) 11 July 1998.	1-36
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents:		
"A" document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"B" earlier application or patent published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"Z"	document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search	Date of mailing of the international search report	
06 October 2004 (06.10.2004)	03 NOV 2004	
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703)305-3230	Authorized officer KEN WIEDER Telephone No. 703-305-4800	