

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

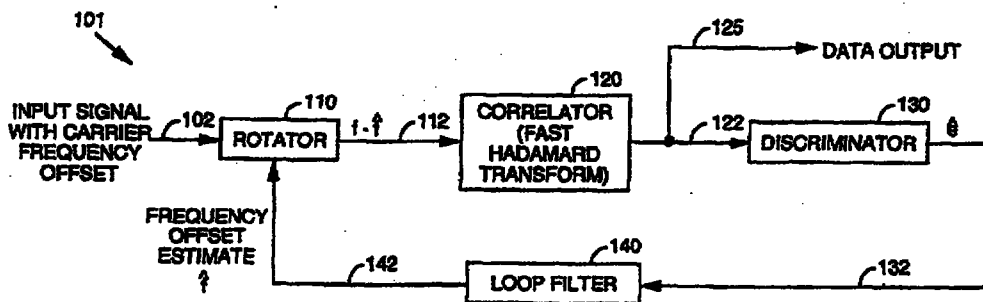
(51) International Patent Classification 6 : H04B 1/707		A1	(11) International Publication Number: WO 97/37437
			(43) International Publication Date: 9 October 1997 (09.10.97)
(21) International Application Number: PCT/US97/06379			(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).
(22) International Filing Date: 26 March 1997 (26.03.97)			
(30) Priority Data: 625,481 29 March 1996 (29.03.96) US			
(71) Applicant: QUALCOMM INCORPORATED [US/US]; 6455 Lusk Boulevard, San Diego, CA 92121 (US).			
(72) Inventors: AGRAWAL, Avneesh; Apartment 37, 10623 Dabney Drive, San Diego, CA 92126 (US). VIJAYAN, Rajiv; Apartment 6203, 3550 Lebon Drive, San Diego, CA 92122 (US).			
(74) Agents: MILLER, Russell, B. et al.; Qualcomm Incorporated, 6455 Lusk Boulevard, San Diego, CA 92121 (US).			

Published

With international search report.

Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: FREQUENCY TRACKING FOR COMMUNICATION SIGNALS USING M-ARY ORTHOGONAL WALSH MODULATION



(57) Abstract

A frequency tracking loop for a communication system using orthogonal Walsh modulation is provided. The frequency tracking loop includes a correlator (120) such as a fast Hadamard transformation device, and a discriminator (130). The correlator (120) produces a correlation vector (122) representing the result of correlating the input signal with each of a set of Walsh functions, with corresponding index values. The discriminator (130) produces a frequency error signal (ϵ) based on the correlator (120) output with the highest energy level and other correlator outputs whose indices are related to the index of highest energy correlator output by powers of two. The frequency error signal (ϵ) is generated by producing a cross product between the highest energy output and one or more of the other related correlator outputs. In further aspects, a filter (140) can be used to further shape the resulting error signal (ϵ) and form a frequency offset estimate signal ($\hat{\epsilon}$).