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United States Patent [19]
Chang

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[54] **CODE-DIVISION-MULTIPLE-ACCESS-SYSTEM BASED ON M-ARY PULSE-POSITION MODULATED DIRECT-SEQUENCE**

[76] **Inventor:** **Chen-Yi Chang**, 1001 Ta Hsueh Road, Hsinchu,

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[51] **Int. Cl.⁶** **H03K 7/04; H04B 1/00**

[52] **U.S. Cl.** **375/239; 375/200**

[58] **Field of Search** **375/23, 1**

[56] **References Cited**

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Primary Examiner—Edward L. Coles, Sr.

Assistant Examiner—Allan A. Esposito

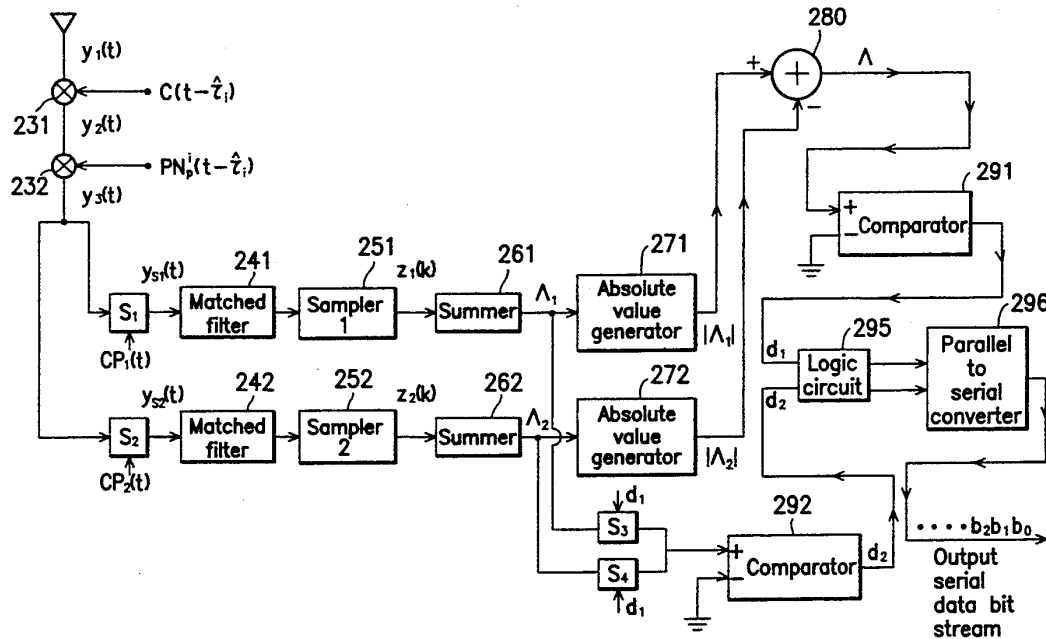
Attorney, Agent, or Firm—Ladas & Parry

[57]

ABSTRACT

A BPSK-MPP-DS-CDMA system is devised using a pulse position modulated direct sequence technique. Under the same bandwidth, same energy used for one decision, and same bit error rate conditions, if the number of users is less than the period N_{cp} of the pseudorandom sequence signal $PN_p^i(t)$ used in the BPSK-MPP-DS-CDMA system, the multiple access capacities of the binary ($M=2$), ternary ($M=3$), quaternary ($M=4$), and pentary ($M=5$) BPSK-MPP-DS-CDMA systems according to the present invention are respectively at least 2, 5.34, 13.28, and 26.4 times greater than that of the conventional BPSK-DS-CDMA systems. On the other hand, if the number of users attains N_{cp} , the multiple access capacity can not increase any more, however, the bit error rate of the system will be reduced. Furthermore, $(M-1)/M$ transmitting energy is saved.

13 Claims, 19 Drawing Sheets



Liberty Mutual
Exhibit 1006

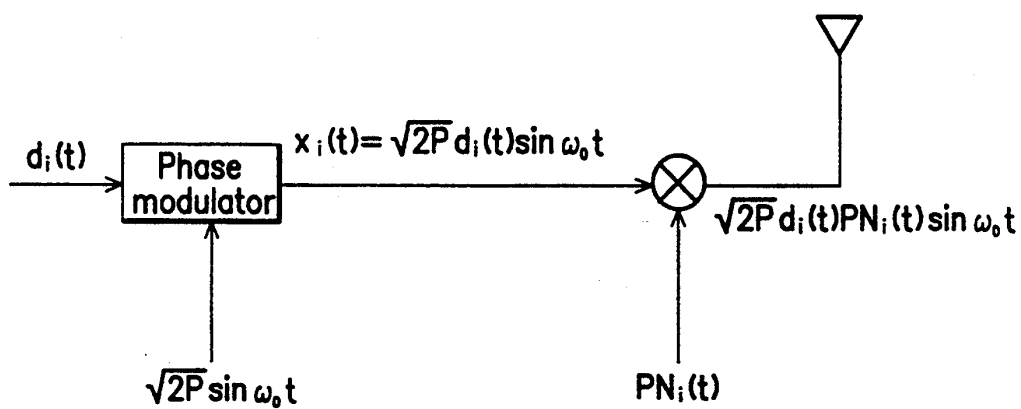


FIG. 1A(PRIOR ART)

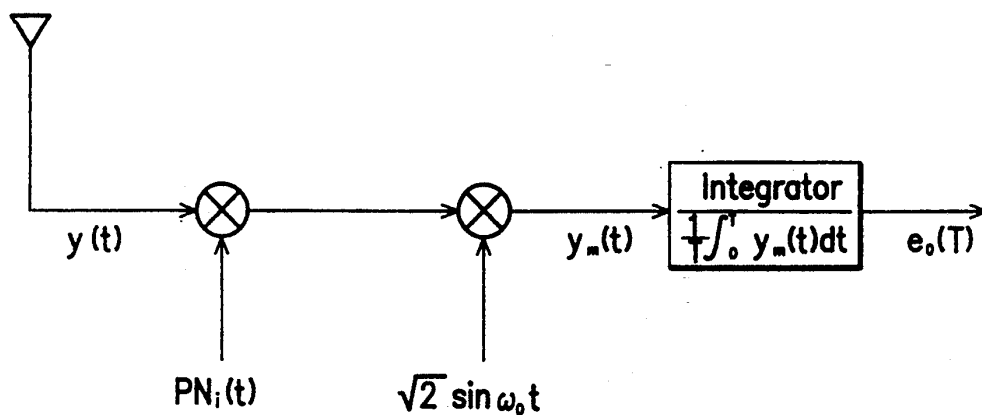


FIG. 1B(PRIOR ART)

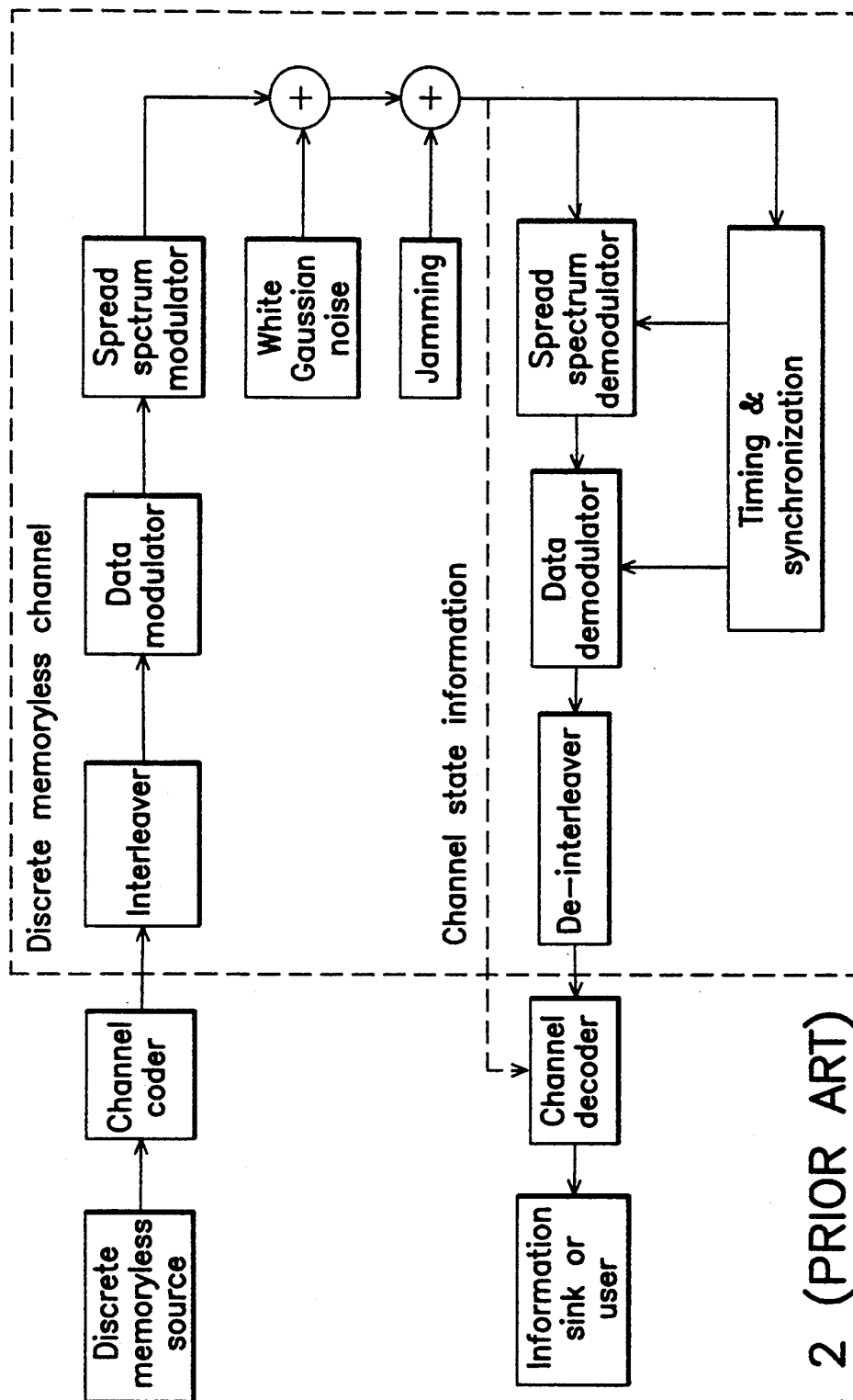


FIG. 2 (PRIOR ART)

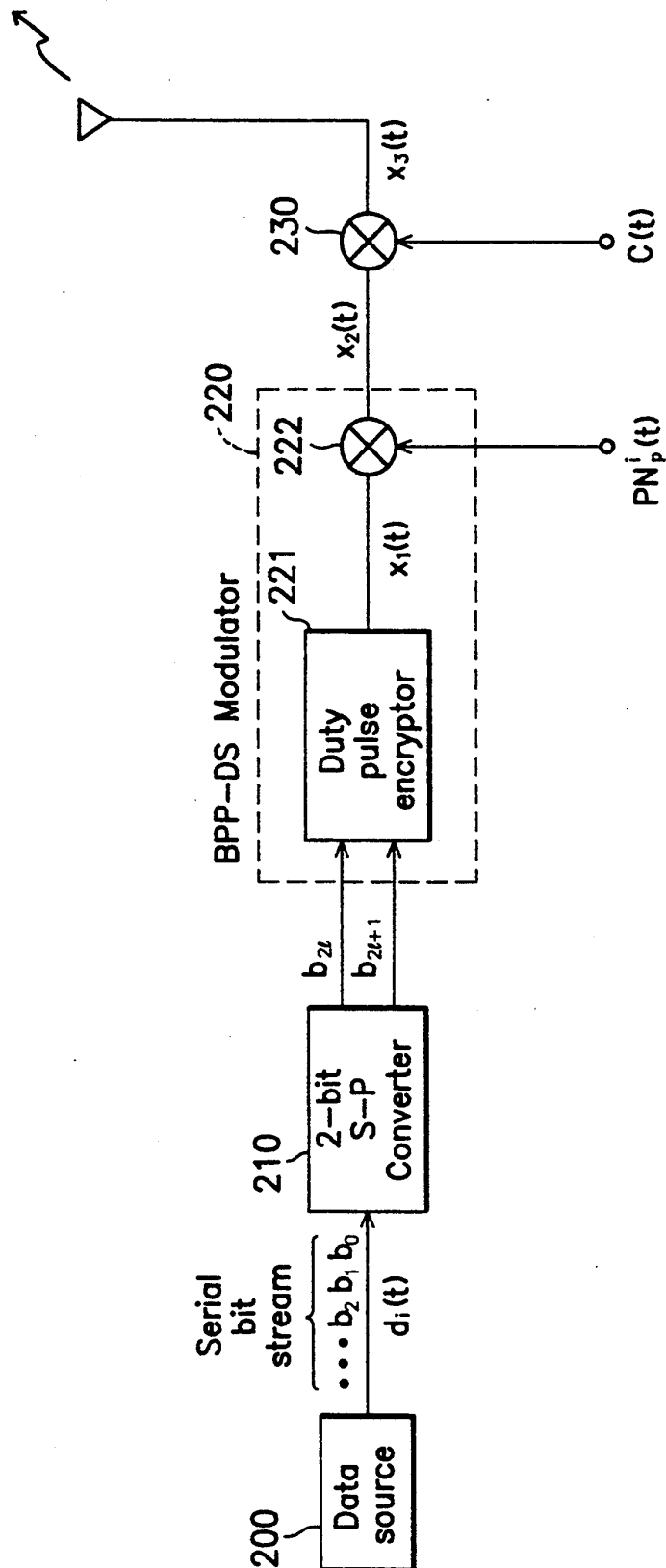


FIG. 3A

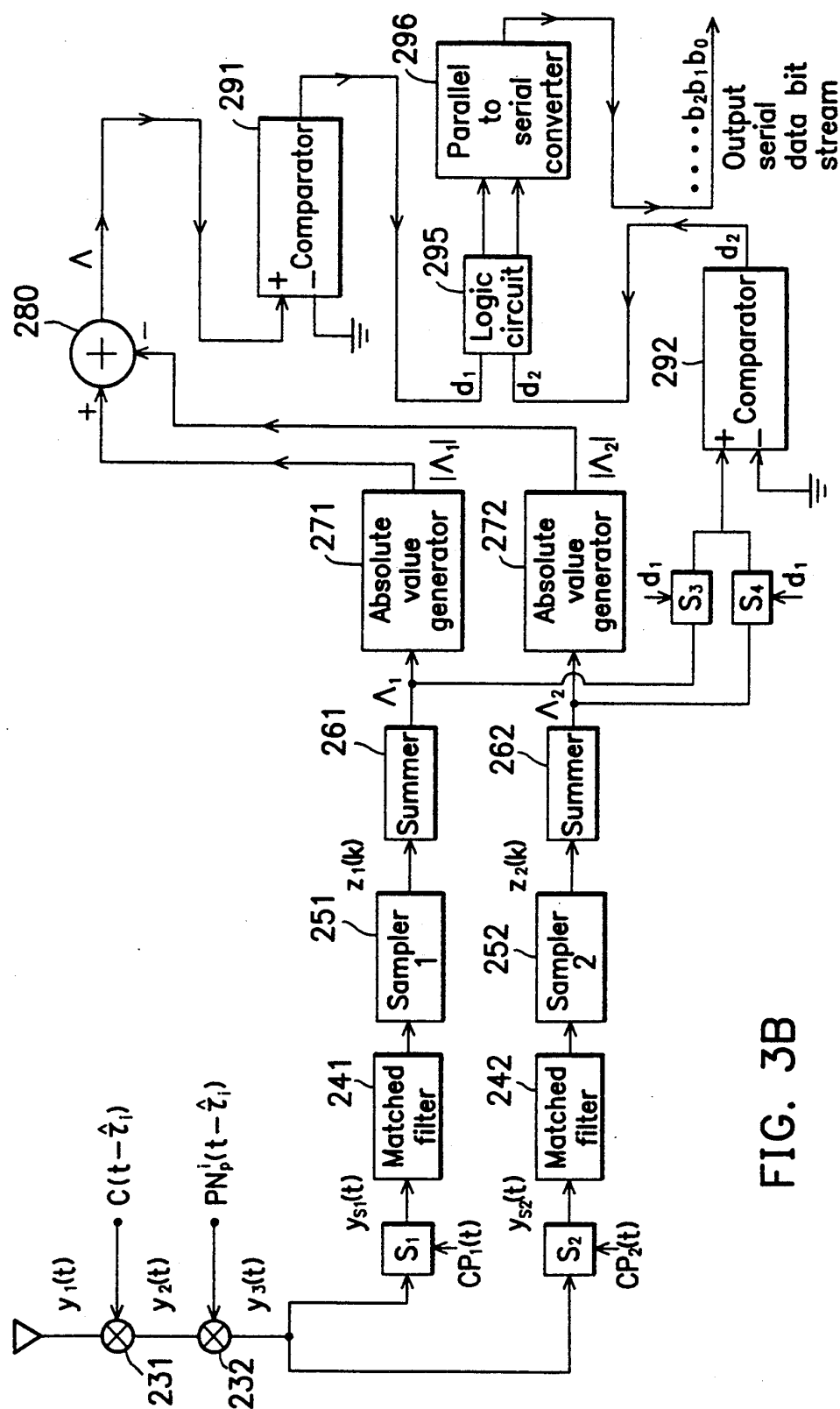


FIG. 3B

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