United States Patent [19]

Baran

[11] **4,438,511**

[45] **Mar. 20, 1984**

[54] **PACKETIZED ENSEMBLE MODEM**

[75] Inventor: **Paul Baran**, Menlo Park, Calif.

[73] Assignee: **Telebit Corporation**, Cupertino, Calif.

[21] Appl. No.: **205,744**

[22] Filed: **Nov. 10, 1980**

[51] **Int. Cl.**³ **H04J 11/00**; H04J 4/00

[52] **U.S. Cl.** **370/19**; 370/60; 370/94; 370/16; 370/50

[58] **Field of Search** 370/18, 70, 13, 16, 370/17, 19, 94, 60, 50

[56] **References Cited**

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"Digital Super Modem: Why and How It Was Developed", *Data Communications*, Jun. 1980, pp. 87–95, Hick.

Product Brochure for AT&T 2096A, 9600 bps, Dataphone II.

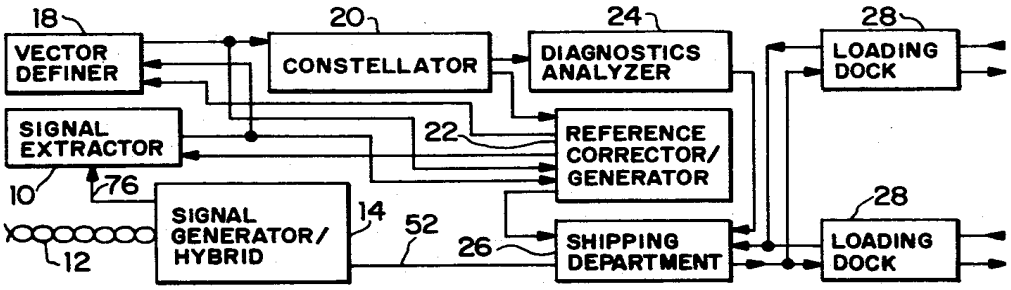
Primary Examiner—Gerald L. Brigance

Attorney, Agent, or Firm—Townsend and Townsend

[57] **ABSTRACT**

A high speed digital data modem particularly suited for use on a dial up telephone line is disclosed. For the transmit ensemble, the telephone passband is divided into sixty-four sub-bands each with a carrier located approximately in the center of each sub-band. Each carrier is amplitude and phase modulated in order to encode five (5) bits. One carrier is used as a reference signal for phase and amplitude. The modulated carriers can be changed in data content every epoch. By use of packetization of data, individual amplitude correction, and individual phase correction for each carrier, the high speed modem may achieve up to 12000 bps over a dial up line with a simultaneous 300 bps reverse channel.

10 Claims, 14 Drawing Figures



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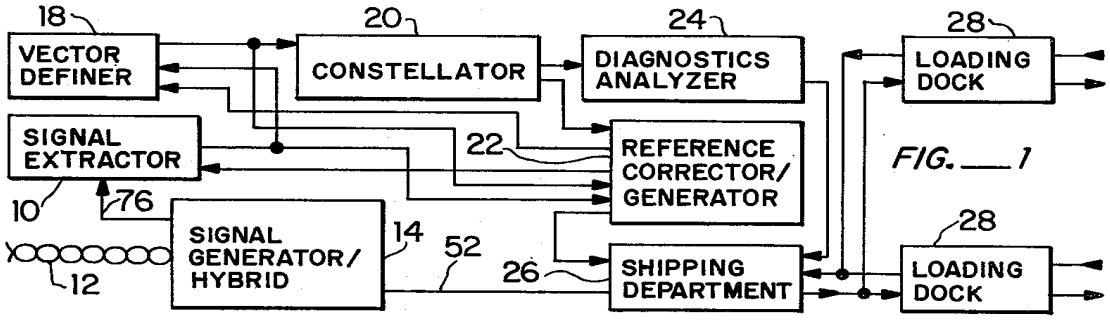

FIG. 1

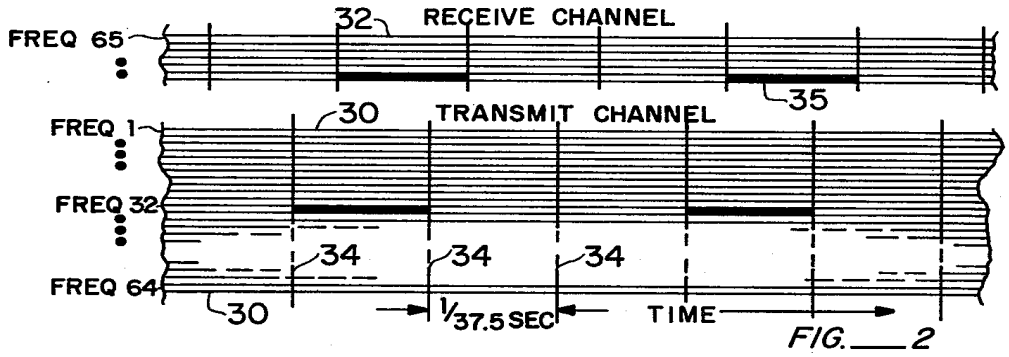

FIG. 2

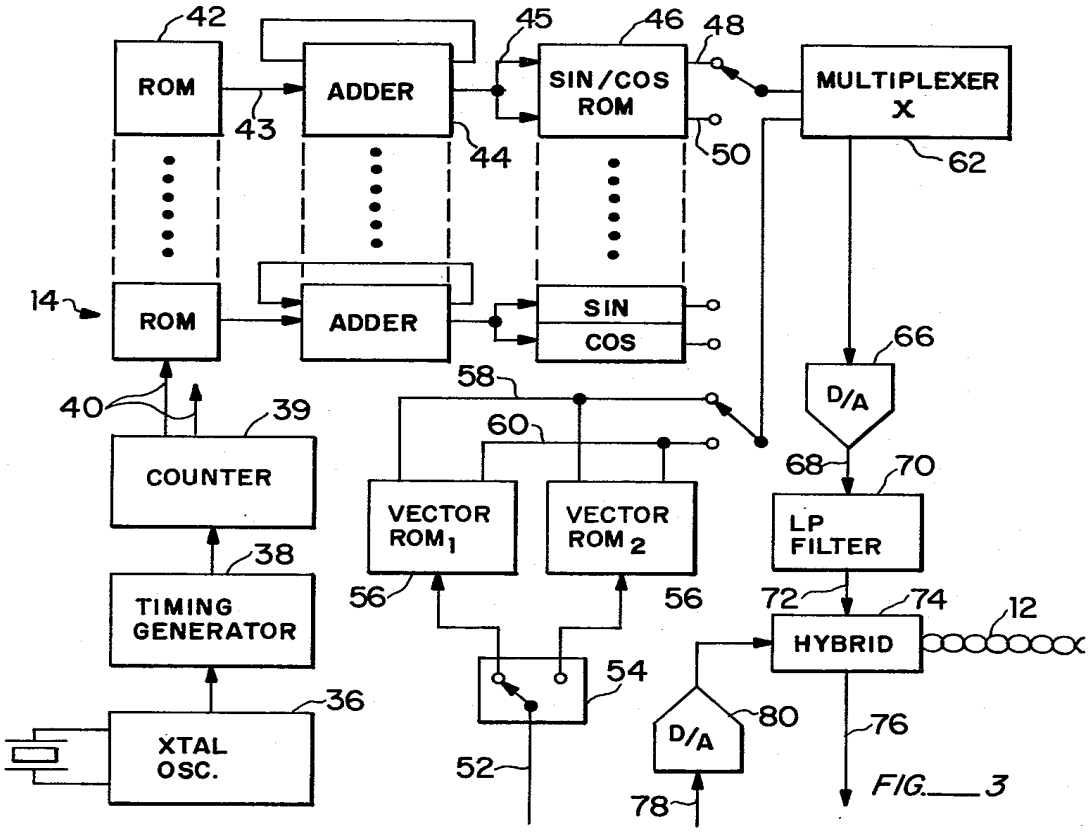

FIG. 3

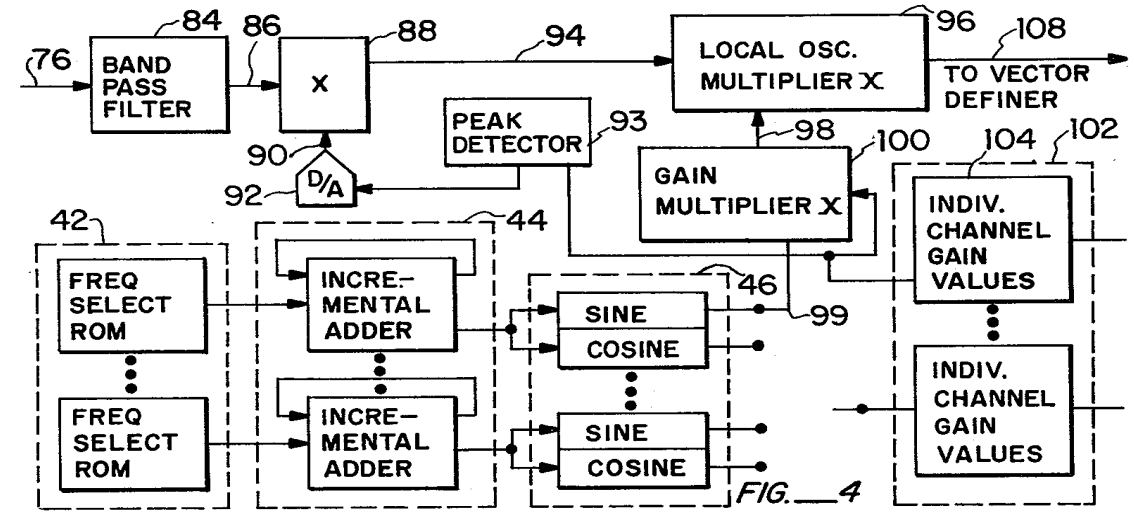

FIG. 4

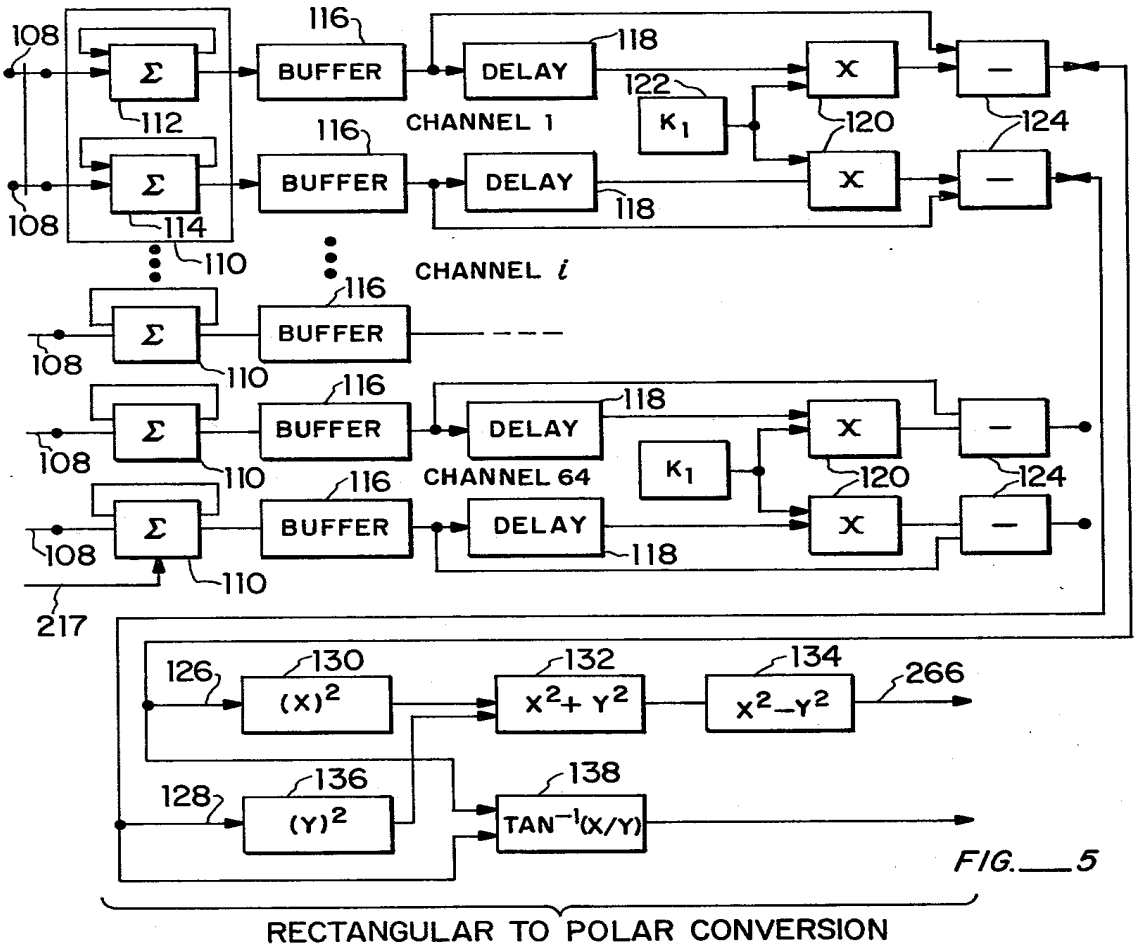

FIG. 5

RECTANGULAR TO POLAR CONVERSION

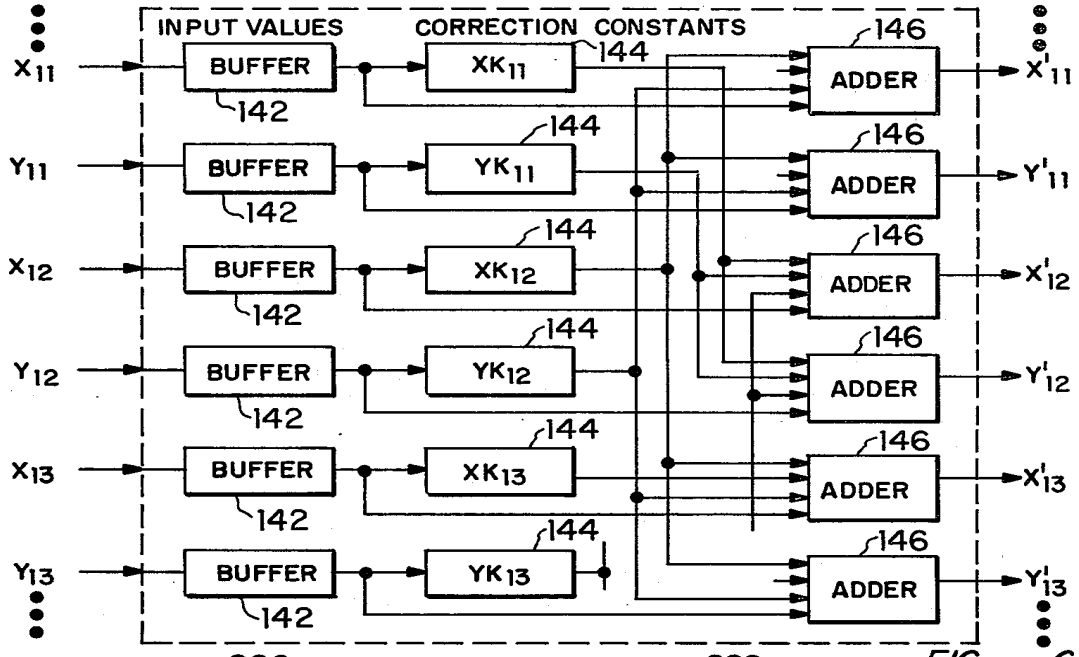

FIG. 6

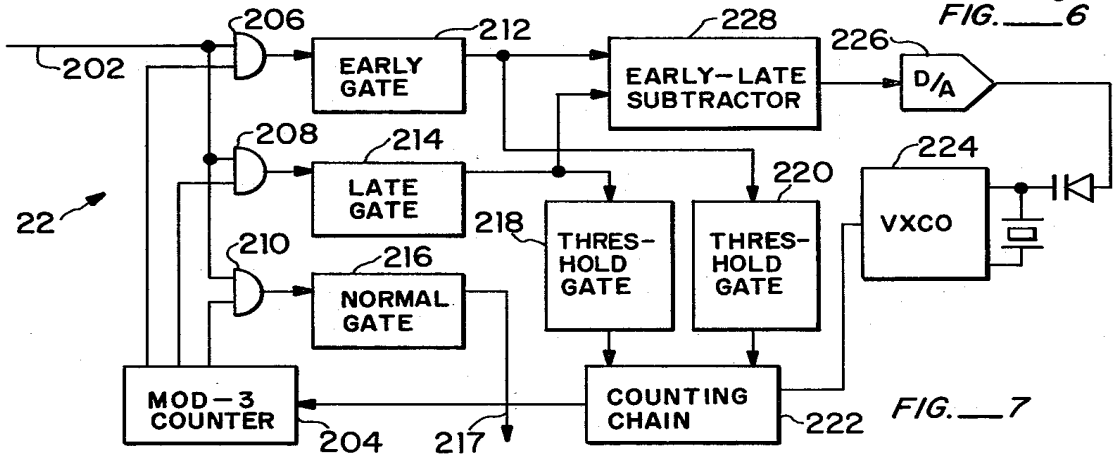

FIG. 7

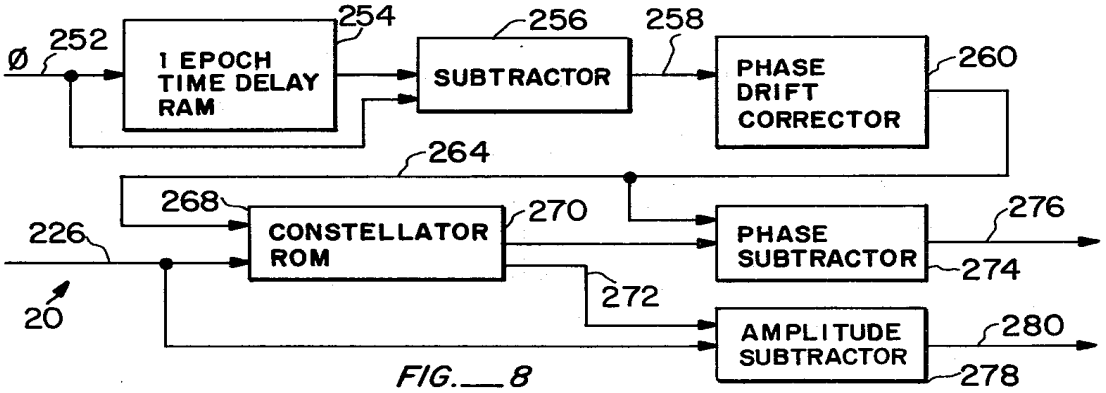

FIG. 8

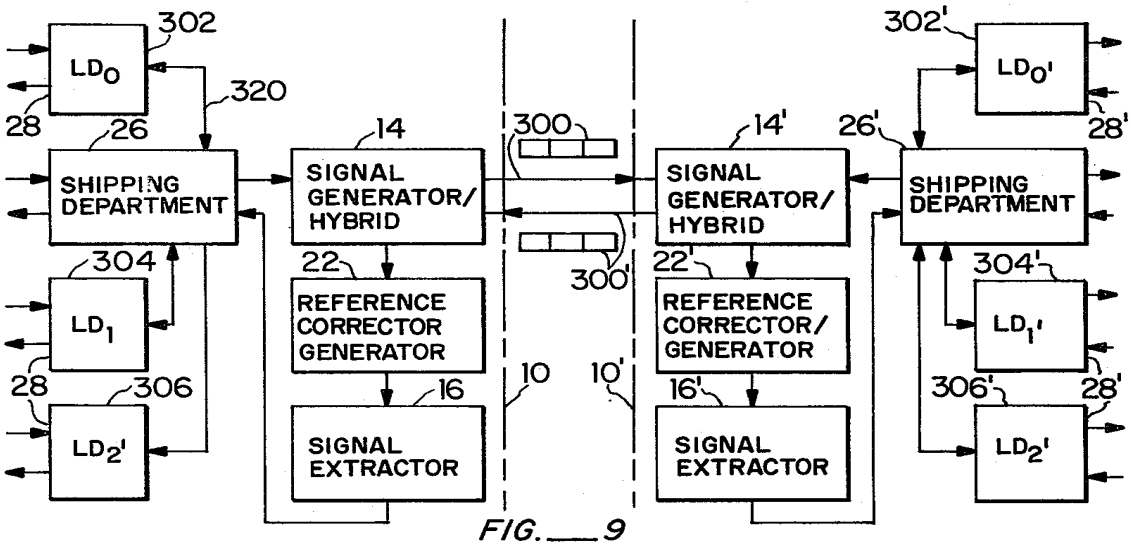

FIG. 9

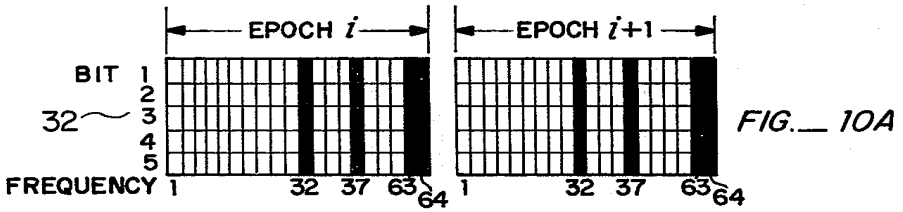

FIG. 10A

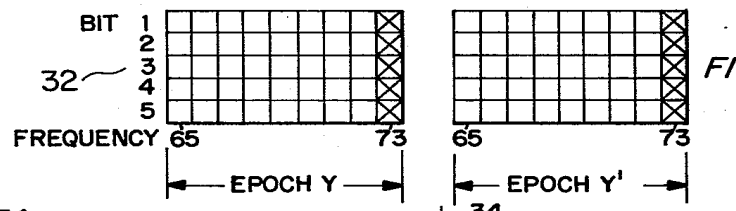

FIG. 10B

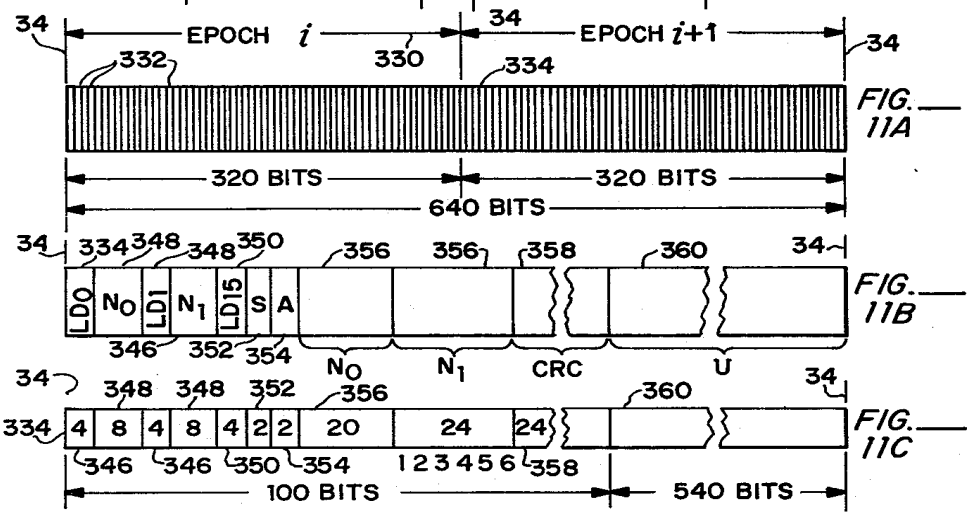

FIG. 11A

FIG. 11B

FIG. 11C

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