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United States Patent [19]

Sankaranarayanan et al.

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[45] **Date of Patent: Oct. 17, 2000**

[54] **METHOD AND APPARATUS FOR ALLOCATING DATA FOR TRANSMISSION VIA DISCRETE MULTIPLE TONES**

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[73] Assignee: **AT&T Corp**, New York, N.Y.

[21] Appl. No.: **08/997,167**

[22] Filed: **Dec. 23, 1997**

[51] **Int. Cl.**[7] **H04L 27/04**

[52] **U.S. Cl.** **375/295**; 375/296; 375/260; 375/254; 704/229; 704/200

[58] **Field of Search** 375/296, 260, 375/347, 244, 254, 241, 295; 704/229, 200, 500, 205

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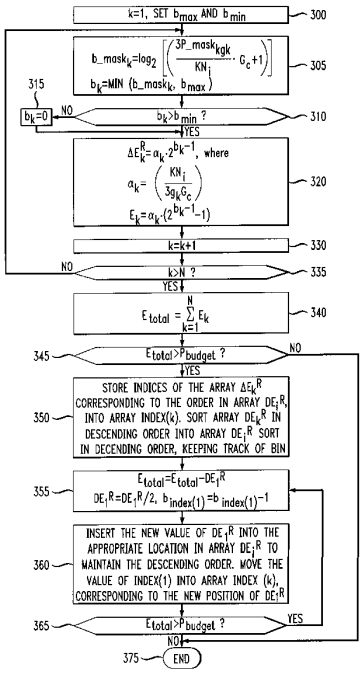
Primary Examiner—Stephen Chin

Assistant Examiner—Shuwang Liu

[57] **ABSTRACT**

A method of allocating bits to discrete frequencies in a discrete multitone modulator comprises the steps of allocating bits to frequencies on a per frequency basis such that the bits are successively allocated until a maximum power level for that frequency is exceeded. Then, a total power level for bits allocated to a plurality of transmit frequencies is calculated to see if a maximum permissible total power level is exceeded. If the maximum permissible total power level is not exceeded, then the process is complete. If the maximum total power level is exceeded, successive bits are removed until the total power level is no longer exceeded. In one bit removal method, bits are removed in order of the amount of power the bit would consume of the transmit power spectrum. The algorithm may be implemented in the combination of transmitter elements including tone ordering circuitry, gain scaling circuitry and the inverse discrete Fourier transform modulator of the discrete multitone data transmitter.

9 Claims, 5 Drawing Sheets



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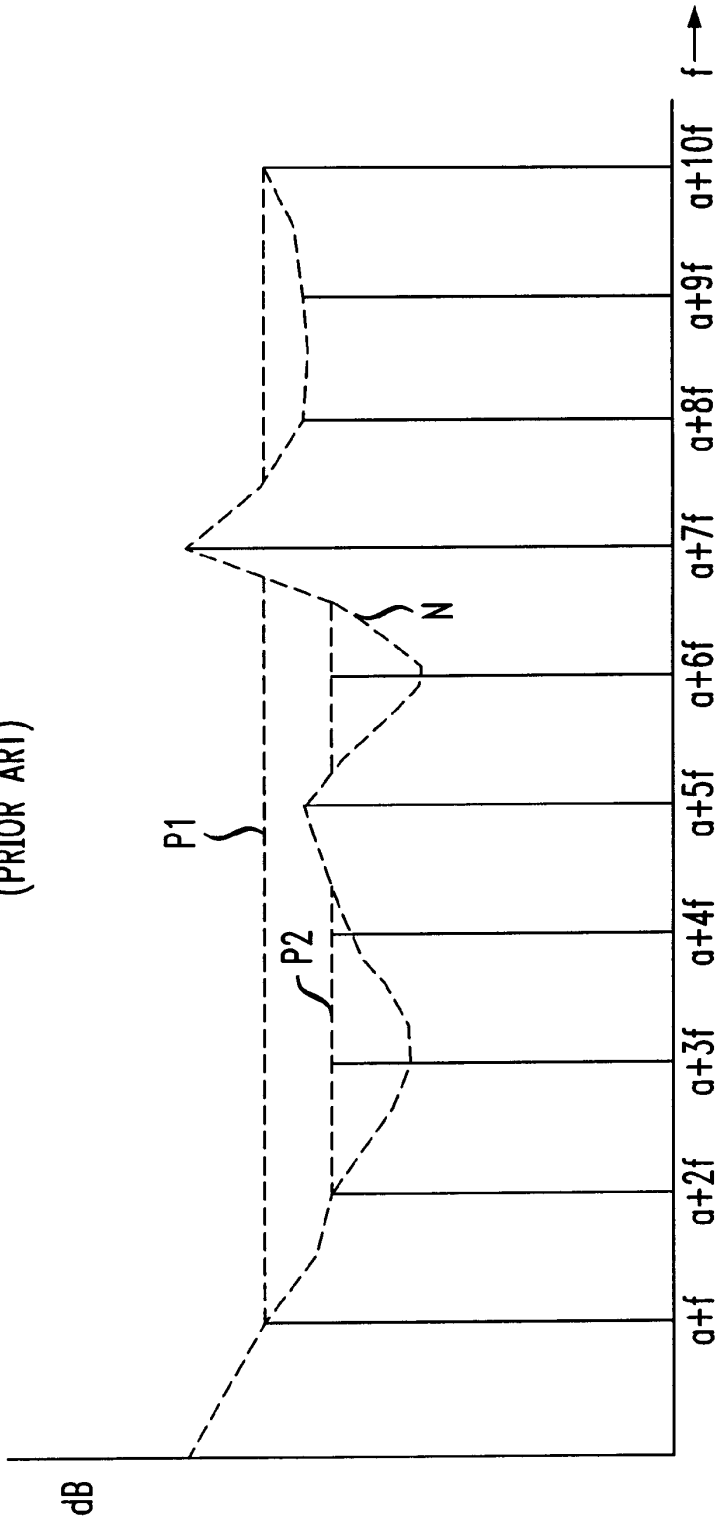

FIG. 1
(PRIOR ART)

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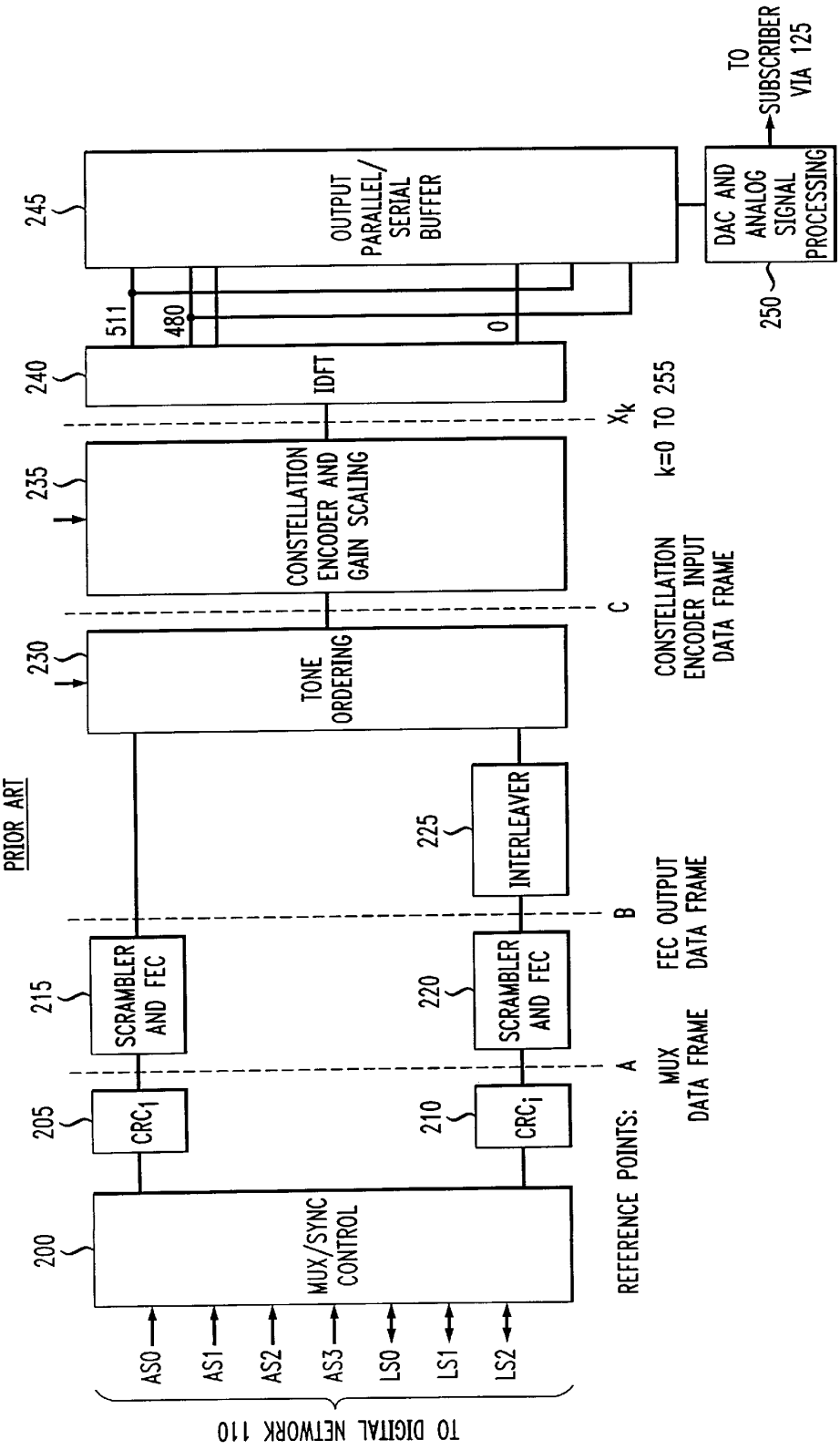

FIG. 2A
PRIOR ART

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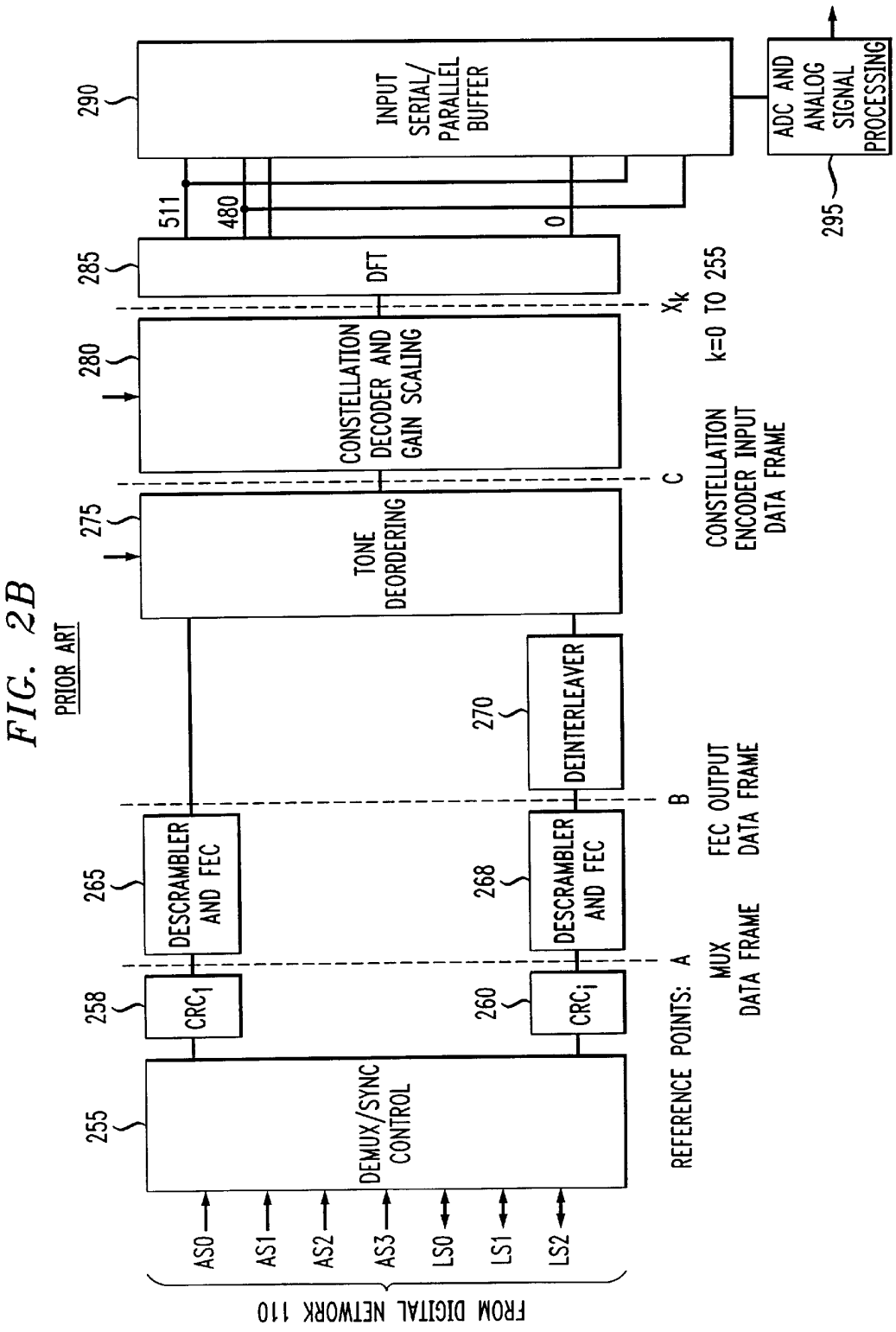

FIG. 2B
PRIOR ART

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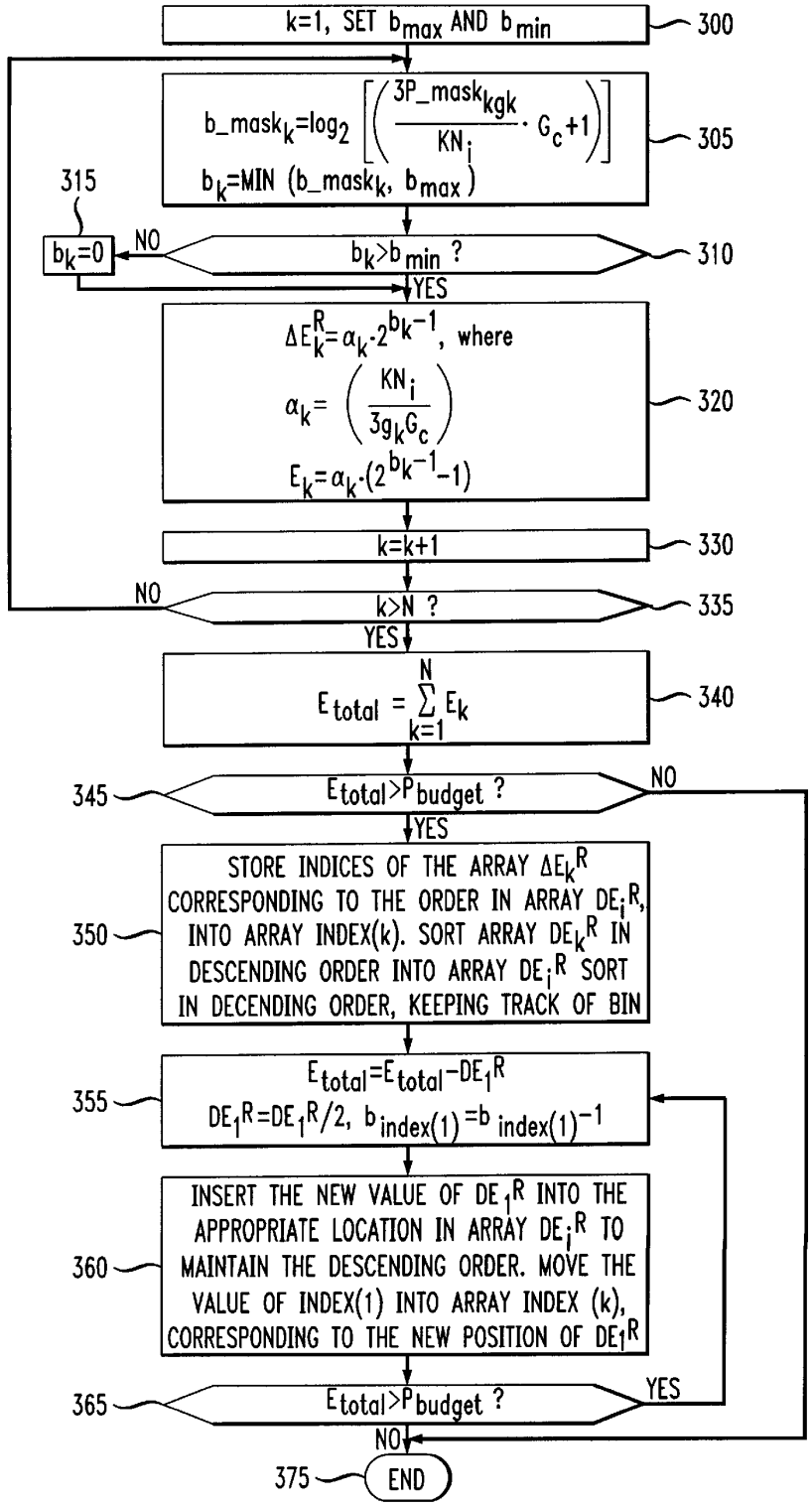
FIG. 3



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