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# United States Patent [19]

Shenoi

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[54] **DSP IMPLEMENTATION OF A CELLULAR BASE STATION RECEIVER**

[75] Inventor: **Kishan Shenoi**, Saratoga, Calif.

[73] Assignee: **SymmetriCom, Inc.**, San Jose, Calif.

[21] Appl. No.: **664,705**

[22] Filed: **Jun. 17, 1996**

[51] Int. Cl.<sup>6</sup> ..... **H04L 27/14; H03D 3/00**

[52] U.S. Cl. .... **375/324; 375/326; 329/327**

[58] Field of Search ..... **375/229, 260, 375/271, 316, 322, 324, 326; 329/315, 327; 455/205**

[56] **References Cited**

**U.S. PATENT DOCUMENTS**

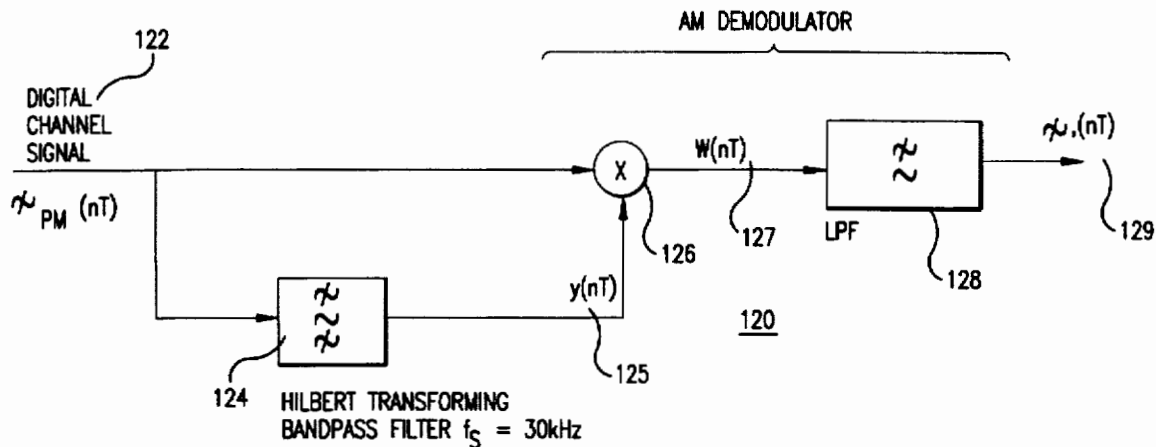
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|-----------|--------|---------------|---------|
| 3,634,773 | 1/1972 | Kobayashi     | 329/311 |
| 4,803,739 | 2/1989 | Daikoku       | 455/47  |
| 5,177,611 | 1/1993 | Gibson et al. | 348/611 |
| 5,434,577 | 7/1995 | Baghdady      | 342/380 |

Primary Examiner—Chi H. Pham  
Assistant Examiner—Emmanuel Bayard  
Attorney, Agent, or Firm—Wilson Sonsini Goodrich & Rosati

[57] **ABSTRACT**

Demodulating FM signals using digital signal processing extracts a carrier signal from digitized channel signals, multiplies the digital channel signal with this extracted carrier signal, and further filters out the carrier signal to produce the demodulated signal. The DSP technique first down converts a group of channels to baseband which are then processed through an A/D converter to produce a digitized composite signal. A bank of bandpass filters, typically based on FFT processors, applied to the composite signal produce (a group of) digitized channel signal(s). The digitized channel signal is then demodulated by recovering a carrier signal by digitally filtering, for example, using a Hilbert bandpass filter, the channel signal and digitally filtering the product of the carrier signal and the channel signal to recover the modulating voice signals.

**15 Claims, 8 Drawing Sheets**



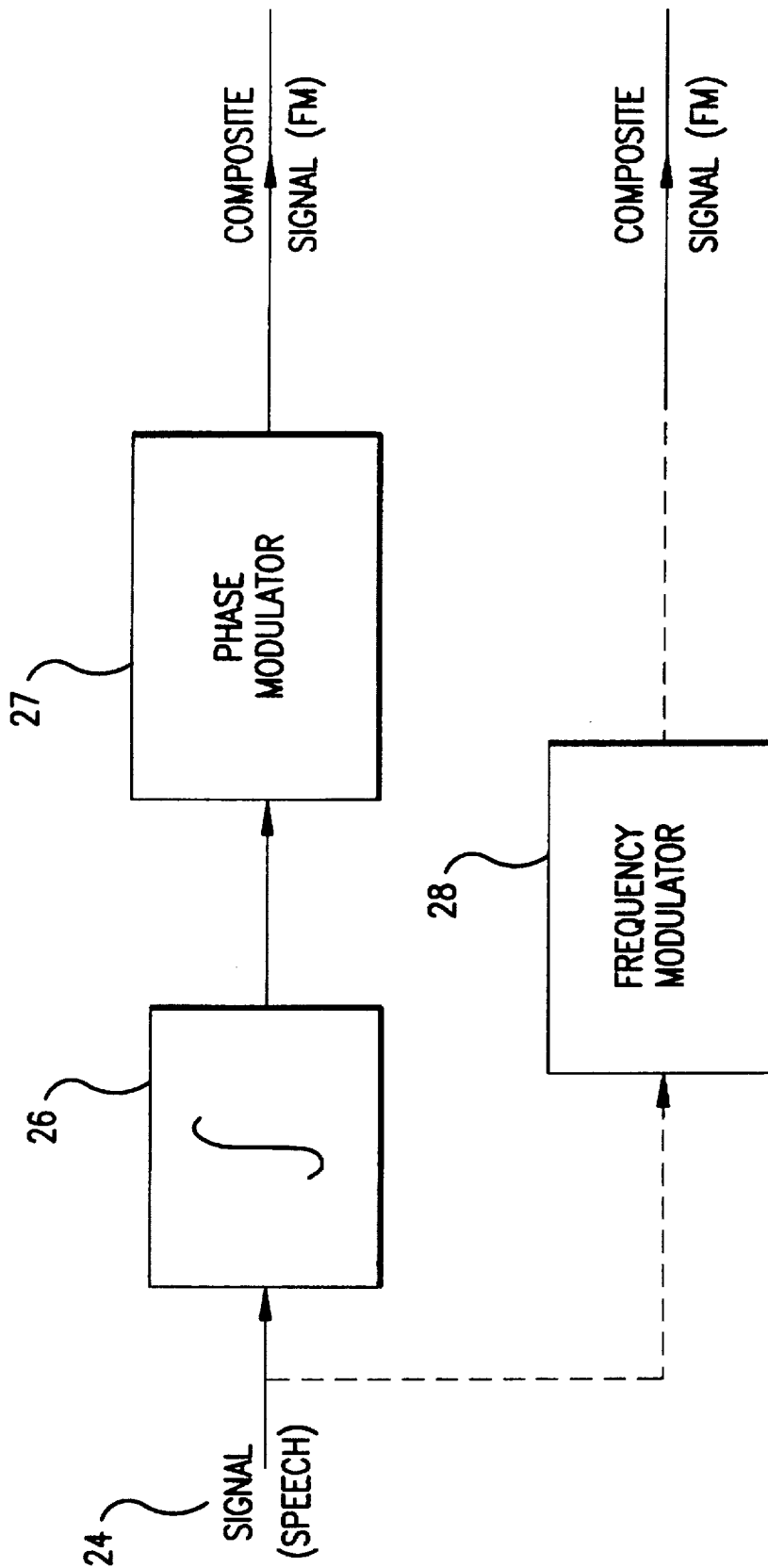
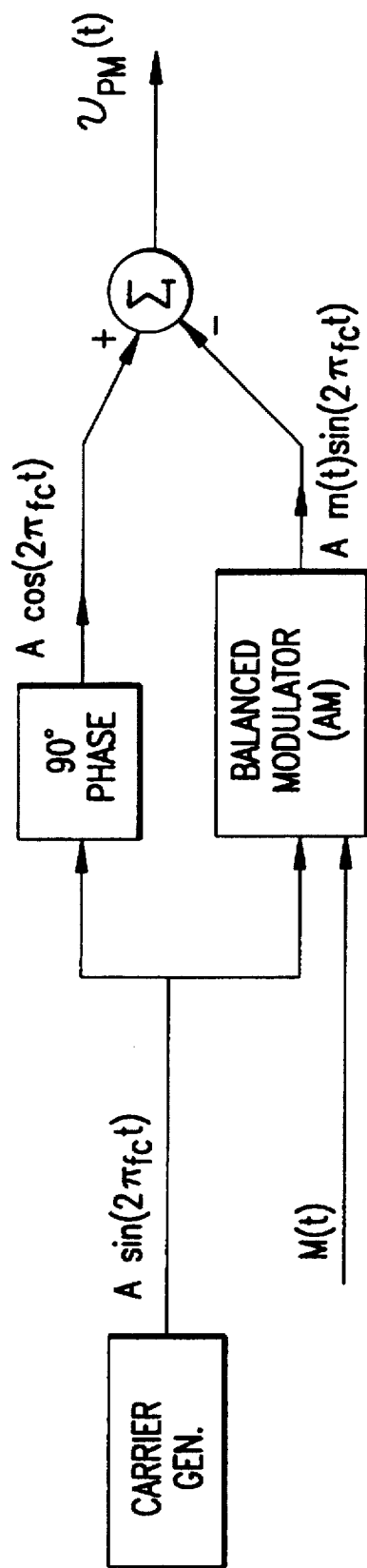


FIG.1



110

FIG.2

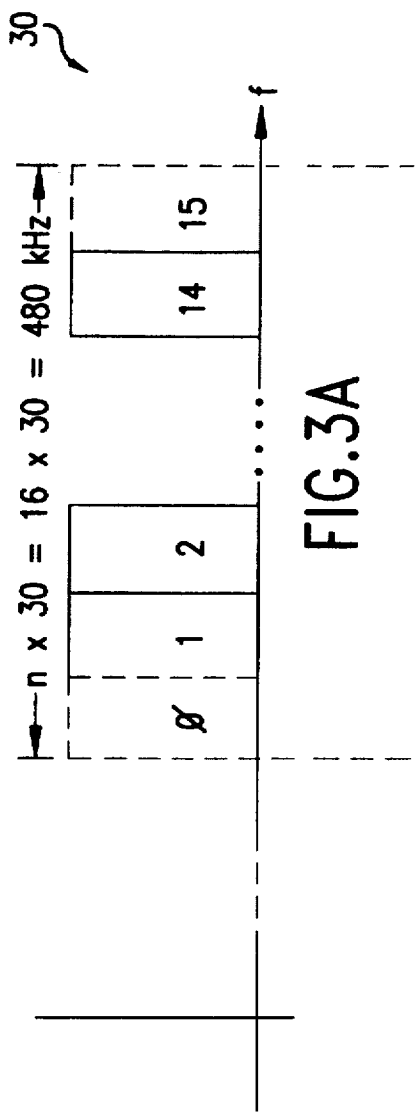
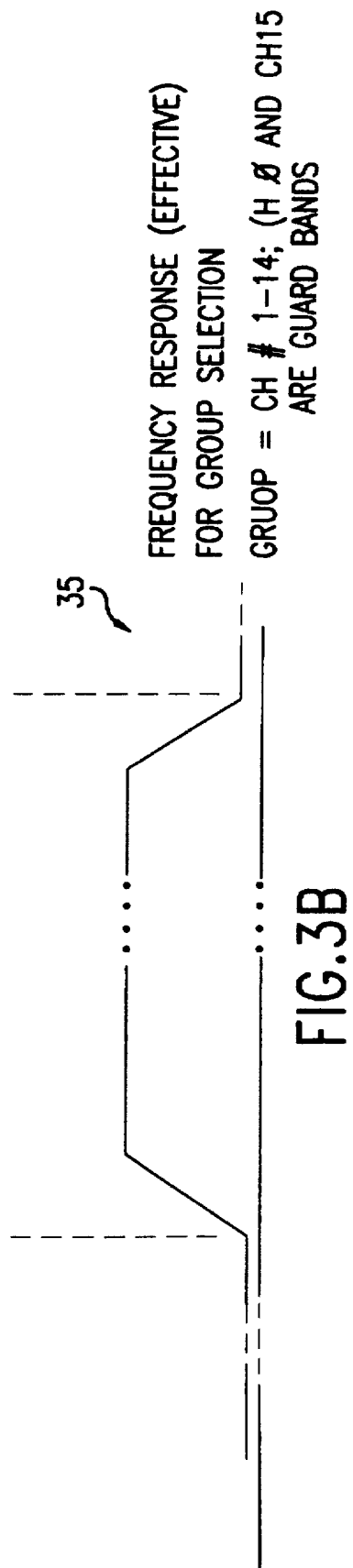


FIG. 3A



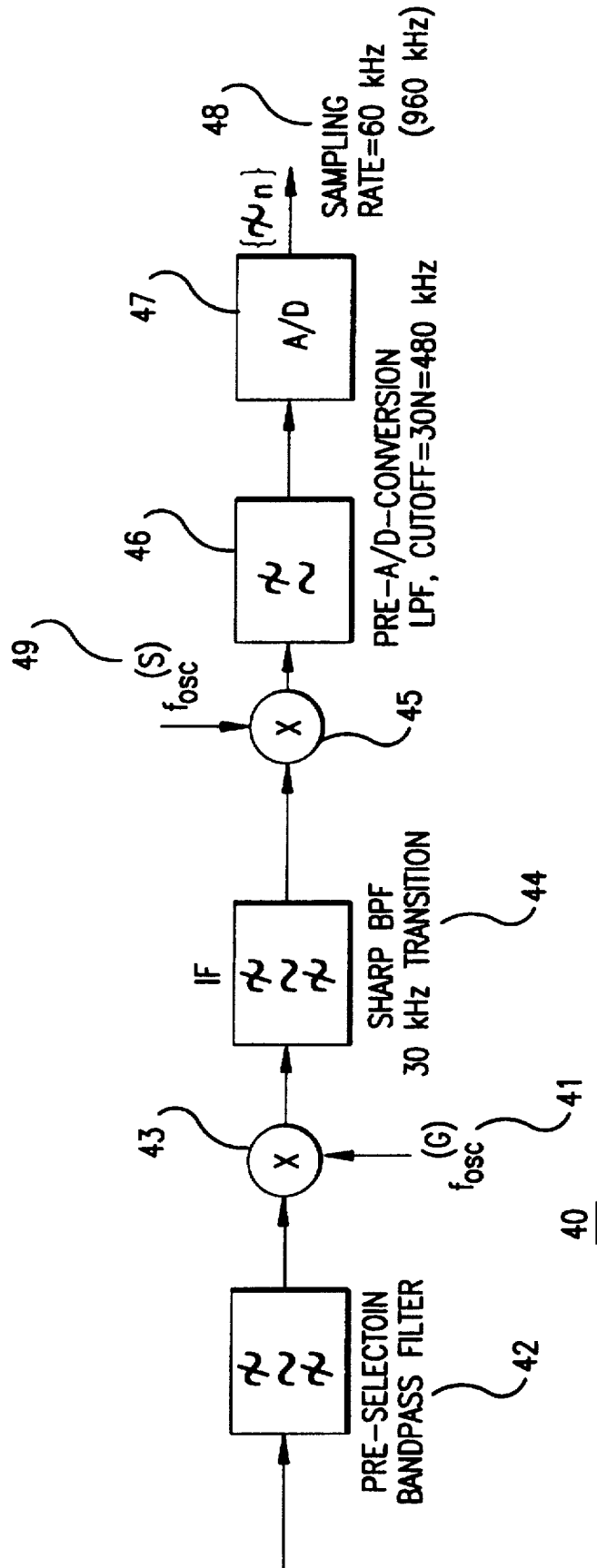


FIG.3C

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