

EXHIBIT 7



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Sorrells et al.

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(54) **METHOD AND SYSTEM FOR DOWN-CONVERTING AN ELECTROMAGNETIC SIGNAL, AND TRANSFORMS FOR SAME, AND APERTURE RELATIONSHIPS**

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This patent is subject to a terminal disclaimer.

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Related U.S. Application Data

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H04L 27/00 (2006.01)

(52) **U.S. Cl.**
 USPC **455/313; 455/113**

(58) **Field of Classification Search**
 USPC 455/413, 113, 118, 130, 131, 182.1, 455/190.1, 191.1, 313, 323, 343, 350
 See application file for complete search history.

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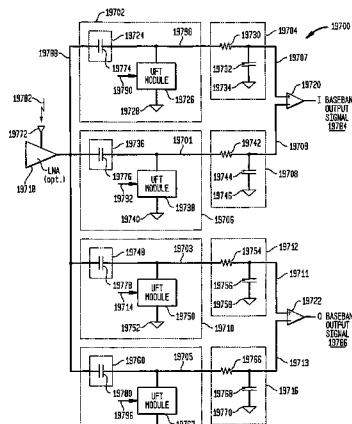
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(57) **ABSTRACT**

Methods, systems, and apparatuses, and combinations and sub-combinations thereof, for down-converting an electromagnetic (EM) signal are described herein. Briefly stated, in embodiments the invention operates by receiving an EM signal and recursively operating on approximate half cycles (1/2, 1 1/2, 2 1/2, etc) of the carrier signal. The recursive operations can be performed at a sub-harmonic rate of the carrier signal. The invention accumulates the results of the recursive operations and uses the accumulated results to form a down-converted signal. In an embodiment, the EM signal is down-converted to an intermediate frequency (IF) signal. In another embodiment, the EM signal is down-converted to a baseband information signal. In another embodiment, the EM signal is a frequency modulated (FM) signal, which is down-converted to a non-FM signal, such as a phase modulated (PM) signal or an amplitude modulated (AM) signal.

28 Claims, 284 Drawing Sheets



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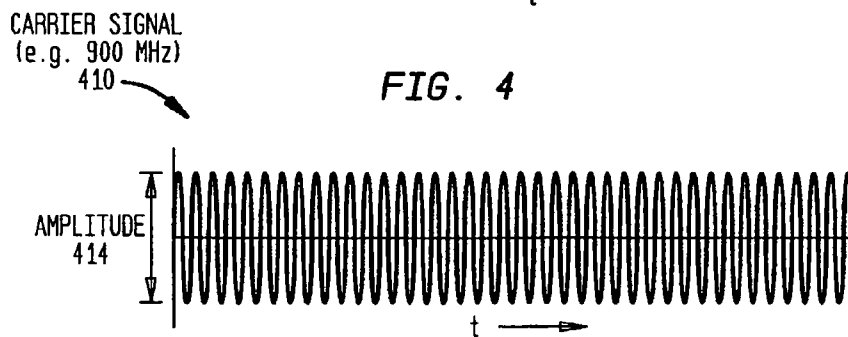
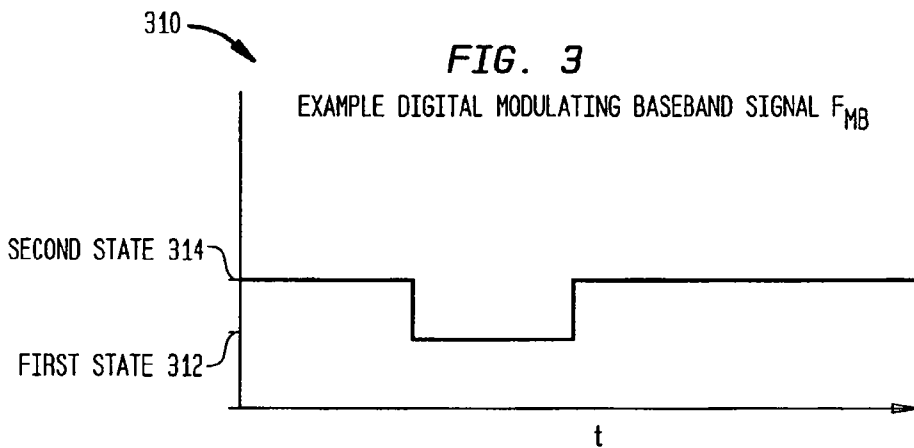
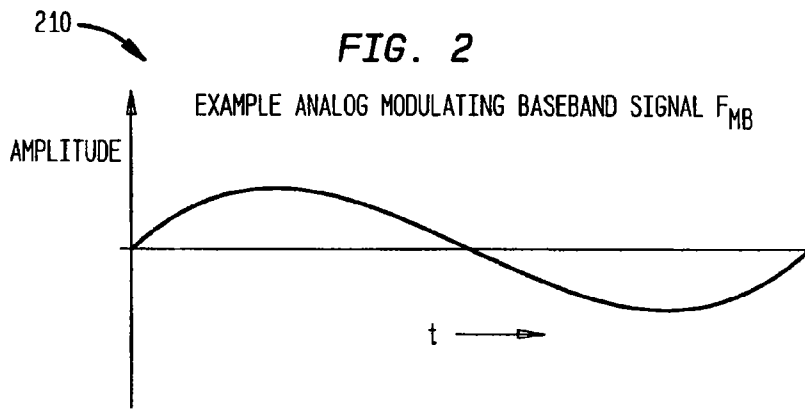
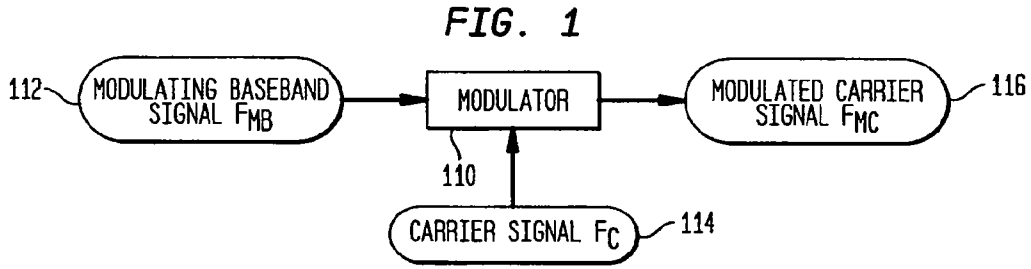
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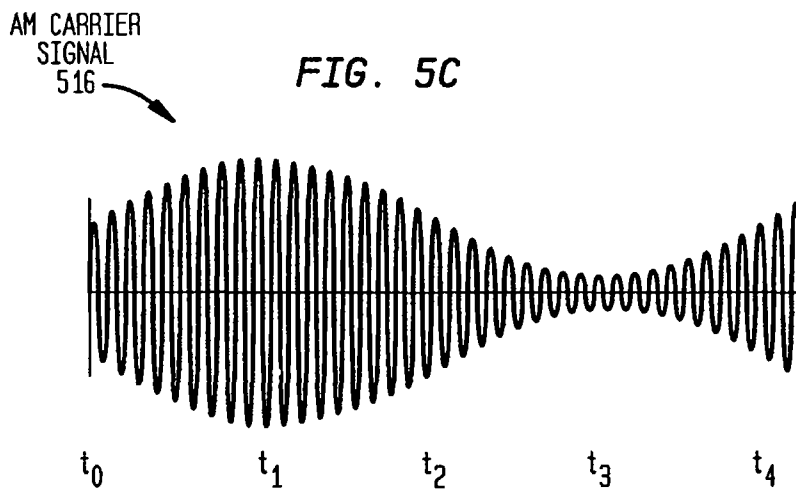
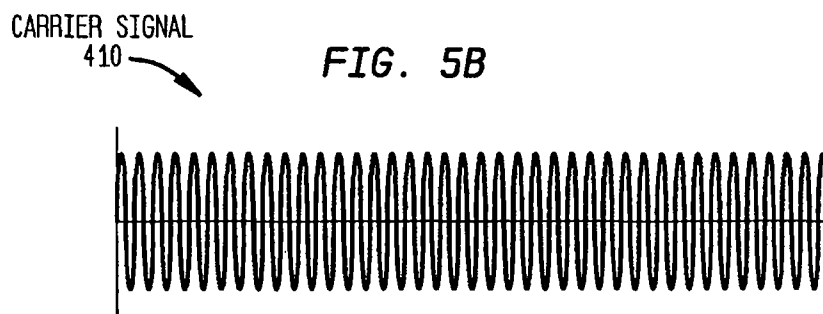
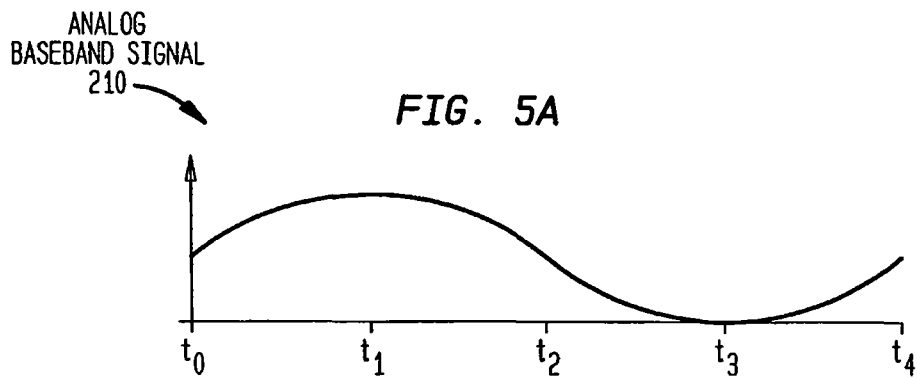
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