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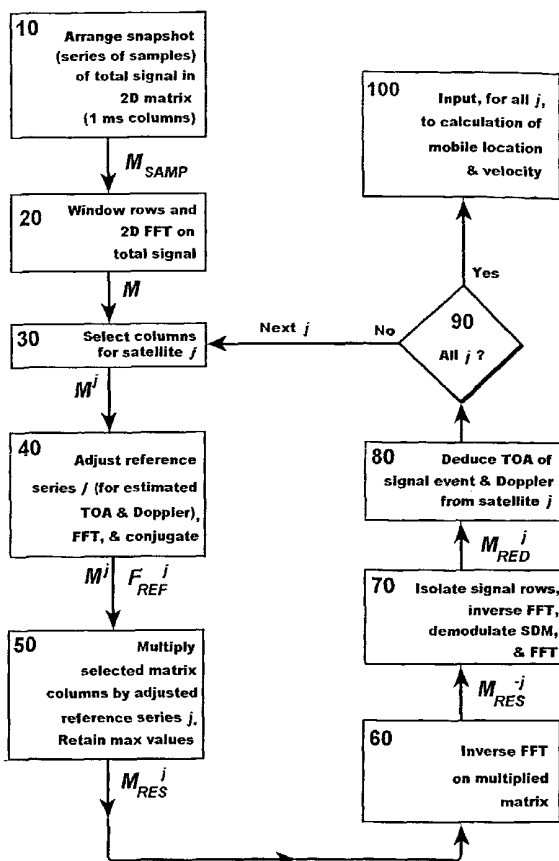
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(54) Title: EFFICIENT ALGORITHM FOR PROCESSING GPS SIGNALS



(57) Abstract: A disclosed algorithm enables fast and efficient location of a mobile unit by obtaining and processing a snapshot of signals from all satellites in view of a constellation such as the Global Positioning System. The method is capable of dealing with weak signals and requires minimal use of processing time and use of communications resources. Each satellite transmits a signal that consists of a series of frames of a pseudo-noise sequence whereupon is superimposed a satellite data message. The total signal received from the satellite network by the mobile unit is arranged as columns of a matrix and is processed coherently to provide estimated pseudo-ranges and estimated rates of change of pseudo-ranges for in-view satellites. The coherent processing includes performing an initial orthogonal transform on the rows of the matrix and, uses prior knowledge to select that portion of the matrix containing a particular satellite signal for further processing. A reference vector, containing the respective pseudo-noise sequence, is prepared for each satellite in view by cyclically transposing the elements thereof to match the phase of the same sequence in the received signal from the satellite and multiplying the elements of the vector by Doppler compensation factors. Then, for each satellite in view, the columns of the selected matrix portion are convolved with the prepared reference vector for that satellite. Prior knowledge is again used to refine the selection and the satellite data message is demodulated to enable precise location of the start of a pseudo-noise sequence frame and the Doppler shift of the received signal. The process is repeated for at least four satellites in view to determine location and velocity of the receiving station by methods well known in the art.

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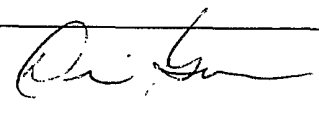
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A. CLASSIFICATION OF SUBJECT MATTER																						
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According to International Patent Classification (IPC) or to both national classification and IPC																						
B. FIELDS SEARCHED																						
Minimum documentation searched (classification system followed by classification symbols) U.S. : 342/357.12, 357.15, 357.06: 701/213																						
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched																						
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) USPAT, EPO, DERWENT, JPO : (GPS or GLONASS or SATPS) and FFT, and (coherent adj integration)																						
C. DOCUMENTS CONSIDERED TO BE RELEVANT																						
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																				
X	US 4,998,111 A (MA et al) 05 March 1991 (5.03.1991) see entire document, spec. Fig. 1.	1-37																				
Y	US 4,578,678 A (HURD) 25 March 1986 (25.03.1986), see Fig. 3	1-37																				
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.																						
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