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Erskine

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[54] **MULTICHANNEL HETERODYNING FOR WIDEBAND INTERFEROMETRY, CORRELATION AND SIGNAL PROCESSING**

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Related U.S. Application Data

[63] Continuation-in-part of application No. 08/720,343, Sep. 27, 1996, Pat. No. 5,872,628.

[51] **Int. Cl.⁶** **G01B 9/02**

[52] **U.S. Cl.** **356/349; 356/345**

[58] **Field of Search** **356/349, 345, 356/346**

[56] **References Cited**
U.S. PATENT DOCUMENTS

5,642,194 6/1997 Erskine 356/345

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[57] **ABSTRACT**

A method of signal processing a high bandwidth signal by coherently subdividing it into many narrow bandwidth channels which are individually processed at lower frequencies in a parallel manner. Autocorrelation and correlations can be performed using reference frequencies which may drift slowly with time, reducing cost of device. Coordinated adjustment of channel phases alters temporal and spectral behavior of net signal process more precisely than a channel used individually. This is a method of implementing precision long coherent delays, interferometers, and filters for high bandwidth optical or microwave signals using low bandwidth electronics. High bandwidth signals can be recorded, mathematically manipulated, and synthesized.

28 Claims, 31 Drawing Sheets

