United States Patent [19]

Quintus et al.

[11] **Patent Number: 4,833,418**

[45] **Date of Patent: May 23, 1989**

[54] **COMPENSATION CIRCUIT FOR NULLIFYING DIFFERENTIAL OFFSET VOLTAGE AND REGULATING COMMON MODE VOLTAGE OF DIFFERENTIAL SIGNALS**

[75] Inventors: **John J. Quintus**, Buena Park; **Michael S. Sheehan**, Santa Ana, both of Calif.

[73] Assignee: **Archive Corporation**, Costa Mesa, Calif.

[21] Appl. No.: **239,302**

[22] Filed: **Sep. 1, 1988**

[51] **Int. Cl.**[4] **H03F 3/45**

[52] **U.S. Cl.** **330/9**; 330/258; 330/259

[58] **Field of Search** 330/9, 252, 254, 258, 330/259, 148

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,845,404	10/1974	Trilling	330/258 X
4,363,977	12/1982	Tsuda et al.	330/9
4,490,682	12/1984	Poulo	330/9

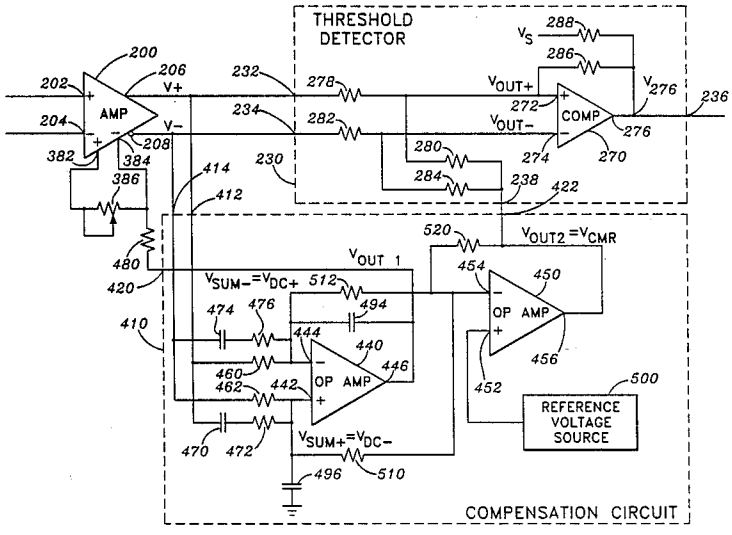
FOREIGN PATENT DOCUMENTS

0111415	7/1983	Japan	330/259

Primary Examiner—Steven Mottola

Attorney, Agent, or Firm—Knobbe, Martens, Olson & Bear

[57] **ABSTRACT**

An apparatus for nullifying the differential output offset voltage between the outputs of a differential amplifier and for setting the DC levels of the outputs to a known reference voltage includes a circuit which cross-couples the opposing AC output signals to obtain only the DC components of each signal. The apparatus further includes a first operational amplifier to generate a compensation voltage from the DC components of the outputs of the differential amplifier proportional to the amount of offset between the DC components of the outputs of the differential amplifier. The compensation voltage is fed back to the offset control inputs of the differential amplifier to reduce the differential offset voltage to substantially zero volts. The apparatus further includes a dual voltage divider network having a second operational amplifier that supplies a variable reference voltage to one terminal of each leg of the voltage divider network. The outputs of the differential amplifier each provided to a respective other terminal of the dual voltage divider network. The second operational amplifier has a reference voltage on one of its inputs. A signal responsive to the common mode output voltage from the differential amplifier is provided to the other input. The second operational amplifier provides an output voltage that is responsive to the common mode voltage output from the differential amplifier. The output voltage from the second operational amplifier provided to the terminals of the dual voltage divider network varies such that the voltage outputs from the voltage divider network have a common mode voltage substantially equal to the reference voltage.

13 Claims, 10 Drawing Sheets