

- [54] **DIGITALLY SYNTHESIZED AUDIO FREQUENCY VOLTAGE SOURCE**
- [75] **Inventor:** Nile M. Oldham, Ijamsville, Md.
- [73] **Assignee:** The United States of America as represented by the Secretary of Commerce, Washington, D.C.
- [21] **Appl. No.:** 414,213
- [22] **Filed:** Sep. 28, 1989
- [51] **Int. Cl.⁵** H03K 5/00; H03B 19/00
- [52] **U.S. Cl.** 307/261; 307/271; 307/227; 328/14; 328/27; 328/186
- [58] **Field of Search** 328/14, 13, 27, 151, 328/186; 307/227, 261, 271, 260

- [56] **References Cited**
- U.S. PATENT DOCUMENTS**
- | | | | |
|-----------|---------|--------------------|---------|
| 3,772,681 | 11/1973 | Skingle | 328/27 |
| 3,845,395 | 10/1974 | Murphree | 328/27 |
| 4,039,806 | 8/1977 | Fredriksson et al. | 328/14 |
| 4,306,190 | 12/1981 | Beckwith et al. | 328/14 |
| 4,814,637 | 3/1989 | Roessler et al. | 307/227 |

- FOREIGN PATENT DOCUMENTS**
- | | | | |
|---------|--------|--------------------|---------|
| 0135437 | 3/1985 | European Pat. Off. | 307/227 |
|---------|--------|--------------------|---------|

OTHER PUBLICATIONS

N. M. Oldham & P. S. Hetrick, "A Calculable, Trans-

portable Audio-Frequency AC Reference Standard", IEEE Conf., 6/88.

Primary Examiner—Timothy P. Callahan
Attorney, Agent, or Firm—Alvin Englert

[57] **ABSTRACT**

A method and apparatus for accurately generating a digitally synthesized sinusoidal voltage is started by storing digital values for sine waveforms in a read only memory. A first and second digital to analog converters are connected to the read only memory through latches. The outputs of the first and second digital to analog converters are alternatively switched between the inverting input and the non-inverting input of an operational amplifier such that one of the first and second digital to analog converter is connected to the inverting input while the other is connected to the non-inverting input. The output of the operational amplifier is connected to the inverting input through a variable capacitance, the feedback being determined by the one of the first and second digital to analog converter connected to the inverting input. A clock is used to control the connection of the first and second digital to analog converter to the inverting input and to control the determination of the feedback.

7 Claims, 3 Drawing Sheets

