

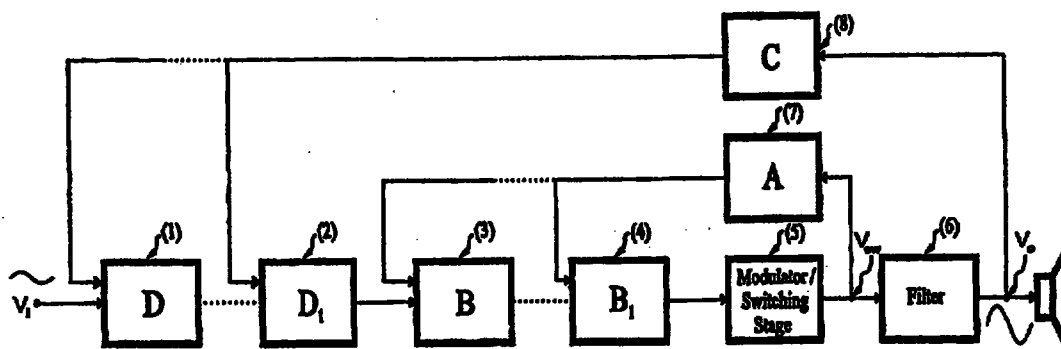
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(54) Title: PULSE MODULATION POWER AMPLIFIER WITH ENHANCED CASCADE CONTROL METHOD



(57) Abstract

A digital switching power amplifier with Multivariable Enhanced Cascade Controlled (MECC) includes a modulator, a switching power stage and a low pass filter. In the first preferred embodiment an enhanced cascade control structure local to the switching power stage is added, characterised by having a single local feedback path A (7) with a lowpass characteristic and local forward blocks B₁ or B (3, 4). This leads to a much improved system with a very low sensitivity to errors in the switching power stage. In the second preferred embodiment of the invention the control structure is extended with a global structure composed of a single feed-back path C (8) and forward paths blocks D₁ or D (1, 2). This provides further improvements and a very low sensitivity to load variations and filter errors. Both MECC embodiments are characterised by being simple in implementation, stable and extendible by adding/removing simple local (3) or global (1) forward path blocks. A third embodiment of the invention is a controlled self-oscillating pulse modulator, characterised by first a non-hysteresis comparator as modulator and second by a higher order oscillating loop realised in both forward path B₁ and feedback path A to determine stable self-oscillating conditions. An implemented 250W example MECC digital power amplifier has proven superior performance in terms of audio performance (0.005 % distortion, 115 dB dynamic range) and efficiency (92 %).