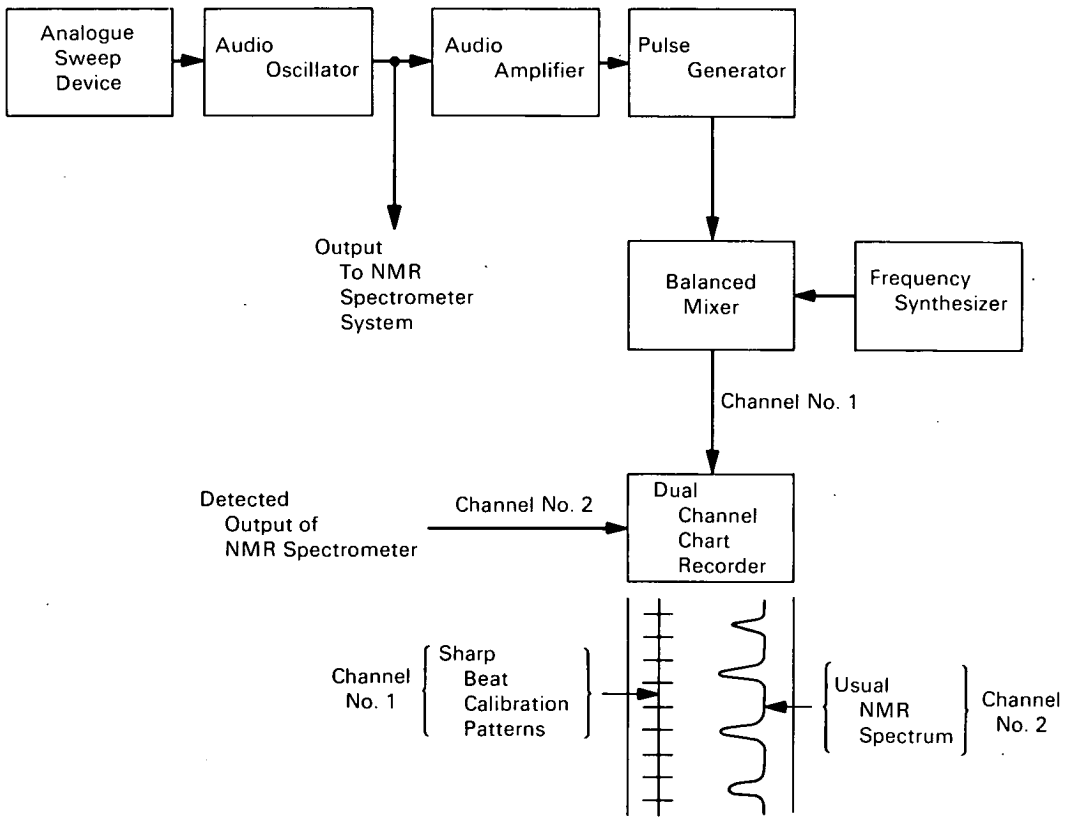
NASA TECH BRIEF

Precise Audio-Frequency Markers for Nuclear Magnetic Resonance Spectra



The problem:

To design a system for simultaneously calibrating and recording the responses of a nuclear magnetic resonance spectrometer.

The solution:

Utilize calibration markers which have the stability of a highly stable frequency source. Frequency stability must be maintained to one part in 10^5 in the frequency range of 500 to 3500 Hz, and about one part in 10^6 in the frequency range of 3500 to 10,000 Hz.

How it's done:

The method described in this Tech Brief depends on the beating of an unknown frequency (the frequency being swept) against a known, very stable frequency.

(continued overleaf)

The figure is a block diagram which shows how the system works. The audio amplifier amplifies the sweep frequency of the nuclear magnetic resonance (NMR) spectrometer. This output triggers the pulse generator at the sweep frequency. The pulses are fed to a balanced mixer which also receives pulses from the stable frequency source. The difference between the harmonic of the swept frequency and the frequency source can be displayed as a sharp beat pattern along with the NMR signal on the dual channel chart recorders. The operator, by manually stepping the frequency source, can easily exhibit per unit time, or chart division, or per unit frequency, as many sharp beat patterns as are necessary.

Notes:

1. This invention may be of interest to personnel working in laboratories which utilize nuclear magnetic resonance spectrometers, or which require high-precision-frequency-sweep calibrations (at least one part in 10^6 for swept-frequencies up to 10 KHz).
2. Requests for further documentation may be directed to:

   Technology Utilization Officer
   NASA Pasadena Office
   4800 Oak Grove Drive
   Pasadena, California 91103
   Reference: TSP70-10086

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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Caltech/Jet Propulsion Laboratory
under contract to
NASA Pasadena Office
(NPO-11147)