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# NASA TECH BRIEF

*NASA Pasadena Office*

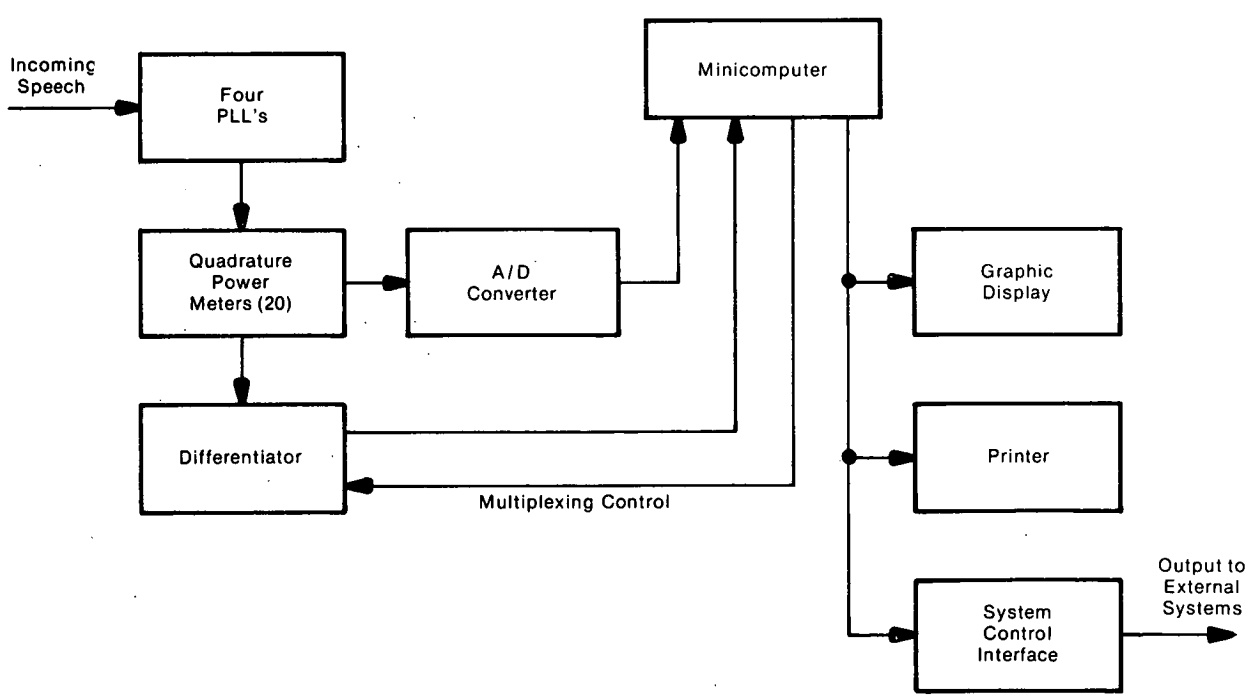


## Real-Time Speech Analyzer

Conventionally, the harmonic analysis of voiced speech requires that the voice be recorded. The measurements are then extracted from the recording with filters. However, spectrum analysis of speech shows that the fundamental and harmonics are distinct enough to lock a phase-locked loop (PLL). Thus, a system has been designed to use PLL's to give real-time information on the speech spectrum by tracking the fundamental and its first 19 harmonics.

When a PLL tracks more than one harmonic, it must operate at the least common multiple of the harmonic numbers times the fundamental frequency. To give workable PLL operating frequencies, the first 19 harmonics are separated into four groups, and each group is tracked by a separate PLL. The power level of the fundamental and each harmonic is measured by a separate quadrature power meter which compares the incoming voice frequency with the output of the PLL voltage-controlled oscillator.

The illustration shows the system block diagram. The four PLL's (IC) with their 20 associated quadrature power meters are sampled (multiplexed) and differentiated under the control of a minicomputer (microprocessor). After quantization, the power spectrum can be compared with digitally recorded patterns in the memory and/or can be read out on a graphic display or a printout. Alternatively, the speech recognition system can be used to control external systems such as other computers or their peripherals.

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(continued overleaf)

**Note:**

Requests for further information may be directed to:

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Pasadena, California 91103
Reference: TSP75-10205

**Patent status:**

This invention is owned by NASA, and a patent application has been filed. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to:

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