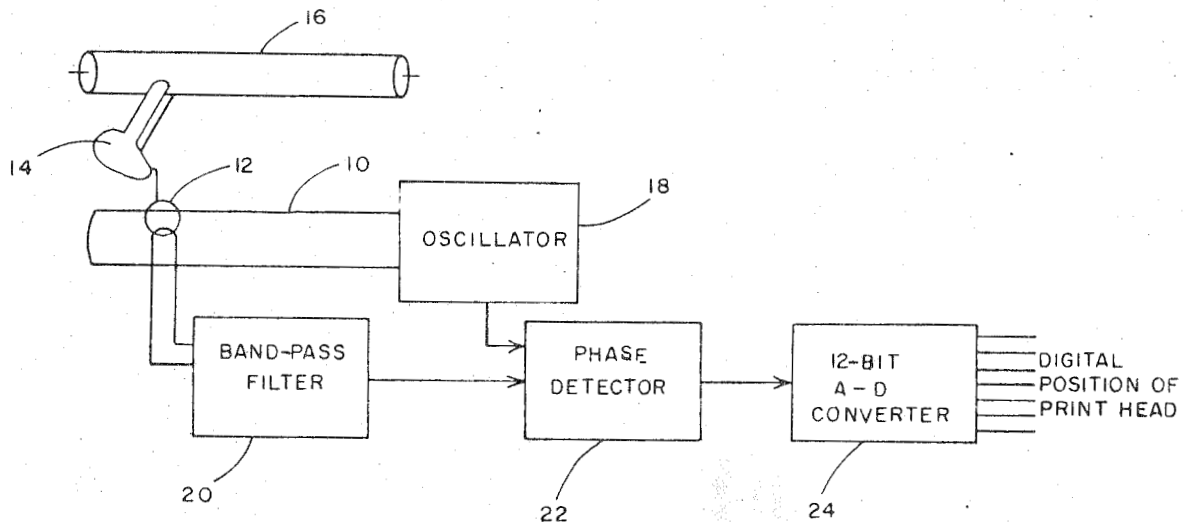


POSITION DETECTION IN PRINTERS

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Current methods of determining the position of a printhead require calibration to a known position and then receiving impulses while the printhead is moved. By keeping track of the impulses, the position can be determined.

A better way to determine printhead position utilizes a linear voltage to determine absolute position at any time. Referring to the figure, a wire 10 carrying an oscillating current is mounted in the print frame and a pickup sensor 12 is mounted on the printhead 14 capable of sensing the oscillating current in wire 10. It is thus possible to determine the printhead 14 position as it moves across platen 16 at any point in time. For instance, if a frequency of 5 MHz having a wavelength of 60 meters is used as the oscillating frequency, then anywhere along the 60-meter length it is possible to determine the position of a sensor by comparing the phase of the oscillating signal at the start of the cable to the phase of the signal at the sensed point. By using a phase comparator to produce an analog voltage proportional to the phase difference, absolute position is known. A digital-to-analog converter can then convert this phase difference to a digital signal which can be read directly by the printer controller.

In actual practice, oscillator 18 provides a signal having the frequency equal to $\frac{3 \times 10^8}{4\lambda}$ over wire 10. This frequency is required to be

measured along the fixed length object path of wire 10. The output of sensor 12 is filtered by band pass filter 20 and both the frequency signal from oscillator 18 and the output of band pass filter 20 are fed to phase detector 22. The output of phase detector 22 is an analog voltage proportional to the distance printhead 14 has moved. This voltage is converted to a digital signal by 12-bit analog-to-digital converter 24.

Noise susceptibility is greatly reduced because the amplitude of the signal does not determine the amplitude of the phase detector output signal, since only the phase difference is used. Further, because the frequency is fixed, a band-pass filter may be used to avoid extraneous signals. The 12-bit analog-to-digital converter is required to provide the resolution necessary to place the dots on the paper.

Since position detection, as described above, is more accurate than detecting discrete pulses as in the past, variable horizontal character size is possible since the fixed algorithms based on emitter impulses can be replaced by a parameter which provides the distance between dots, thereby allowing variable pitch characters.