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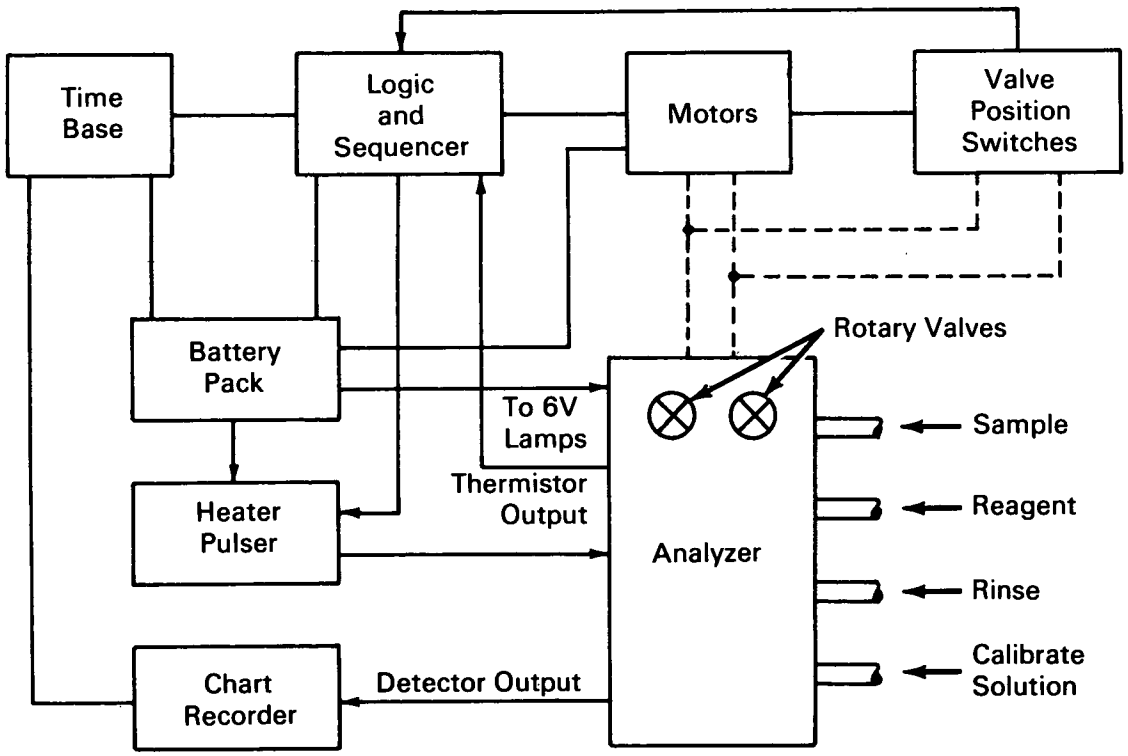
# NASA TECH BRIEF



## Apparatus Enables Automatic Microanalysis of Body Fluids




**The problem:**

To devise an apparatus that will automatically and quantitatively determine body-fluid constituents, such as calcium, creatine, and creatinine, which are amenable to analysis by fluorometry or colorimetry. The volume of the sample required for analysis should be no greater than 2 to 8 microliters, using only 60 microliters of reagent.

**The solution:**

An apparatus which only requires the services of a technician to load stock reagent solutions and sample into the analyzer chamber by connecting the appropriate flexible tubing to the puncture-diaphragm reagent bottles and sample bottle. After these connections are made, the analysis cycle is started by actuating a switch. The results of tests are displayed as percentages of full scale deflection on a strip-chart recorder.

**How it's done:**

The apparatus (shown in block diagram) is built around the analyzer in which wet chemical analysis is performed. Integral with the analyzer and made of

(continued overleaf)

the same plastic material as the analyzer are two rotary valves. These valves have internal ducts which direct the fluids to the proper test cell within the analyzer, depending upon the analysis program. Binary logic circuits control the sequence of operations (valving, pumping, mixing, and optical readout) by actuating the valve motors which rotate the valve rotors to the correct position sensed by the valve position switches. At the appropriate time, the test cell heater coils are energized by a pulse train from a pulse-width-controlled pulser. Temperature is monitored by a thermistor. The pulse width of the heater power source is altered to maintain the correct temperature by the binary logic circuits.

In the test for calcium, for example, the fluorescence detector output relative to a reference detector output is compared in a bridge circuit, the output of which is displayed on the strip chart. Similarly, in the tests for creatine and creatinine the optical density detector output relative to a reference detector is compared in a bridge and displayed on the strip chart.

The apparatus features an automatic microsyringe for volumetric metering of fluids and novel use of internally ported valves to provide simplified logic and minimum dead volume in the analyzer.

**Notes:**

1. The small size and weight of the apparatus make it attractive for portable use.
2. The apparatus can also be adapted for microanalysis of various other fluids.
3. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Jet Propulsion Laboratory
   4800 Oak Grove Drive
   Pasadena, California 91103
   Reference: B66-10515

**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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(JPL-962)