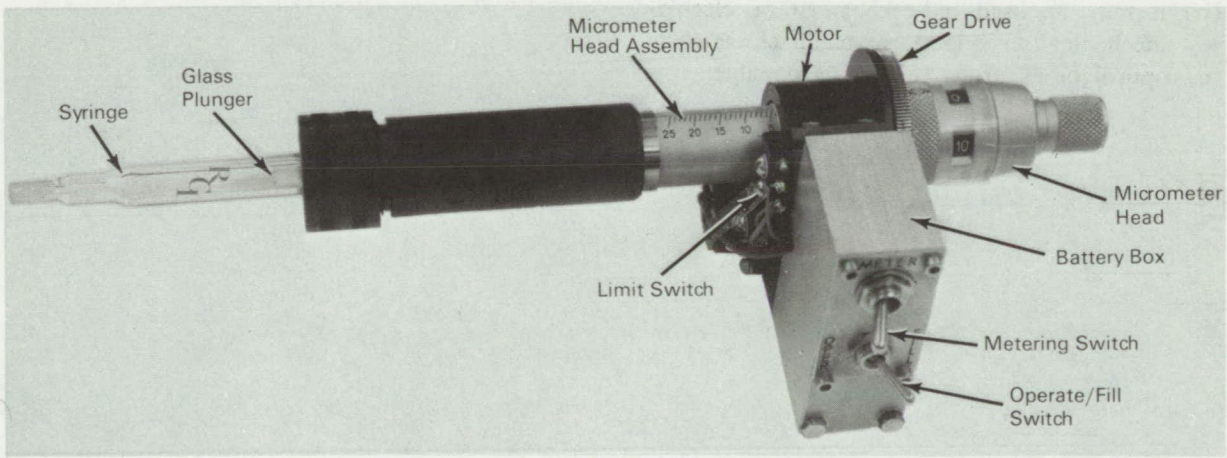
NASA TECH BRIEF

Automated Microsyringe Is Highly Accurate and Reliable



The problem:

To develop a device that will meter small (microliter) volumes of fluid. In performing chemical analysis with extremely small volumes of fluids (microchemistry) a simple, reliable and convenient metering device was needed.

The solution:

A standard syringe body and plunger that has been adapted to fit with a motor driven micrometer.

How it's done:

A miniature electric motor and selt-contained battery drive the micrometer. The contents of the syringe can be metered very precisely since there is a proportional relationship between the amount of fluid drawn into or expelled from the syringe and the relative reading of the micrometer. The micrometer is a standard depth-type micrometer that has been mechanized by the addition of gears and a motor drive.

To meter one sample of solution, the metering switch is toggled from the normally open position, and the motor is energized. The cycle proceeds automatically until one unit volume of fluid has been metered out of the syringe. At the end of the cycle, the motor drives the stop cam and, in turn, the stop switch to its normally closed position. This process may be repeated as many times as there are samples of fluid within the syringe. On the last delivery sample, the limit switch will move to the opposite position to prevent any further fluid from being delivered by the syringe through manipulation of the metering switch.

One feature of the normally closed position of the stop switch is to provide dynamic braking on the motor when the cam lifts the stop switch and de-energizes the motor. This makes a short circuit across the motor, thus providing dynamic braking which permits accurate metering of fluids.

(continued overleaf)

Notes:

1. This syringe can be used in automated wet chemical instrumentation. It is a highly adaptable device which can be used in a variety of applications where manually operated syringes are now used.
2. Commercial use of this instrument in automatic and semiautomatic chemical apparatus could be extensive. It may also find application in biomedical areas such as pathology laboratories in hospitals, or where extremely small and exact quantities of drugs or chemicals must be extracted or dispensed.
3. Simple packaging modifications would permit timed and metered medication dosage, while allowing the patient to have ambulatory freedom or outpatient status.
4. Other possibilities for this instrument are:
   (a) it can be operated by electrical signals;
   (b) it may be used in a chemical or electromechanical servo loop as a feedback element;
   (c) optical or electrical readout is possible.
5. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   NASA Pasadena Office
   4800 Oak Grove Drive
   Pasadena, California 91103
   Reference: B67-10203

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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(NPO-10142)