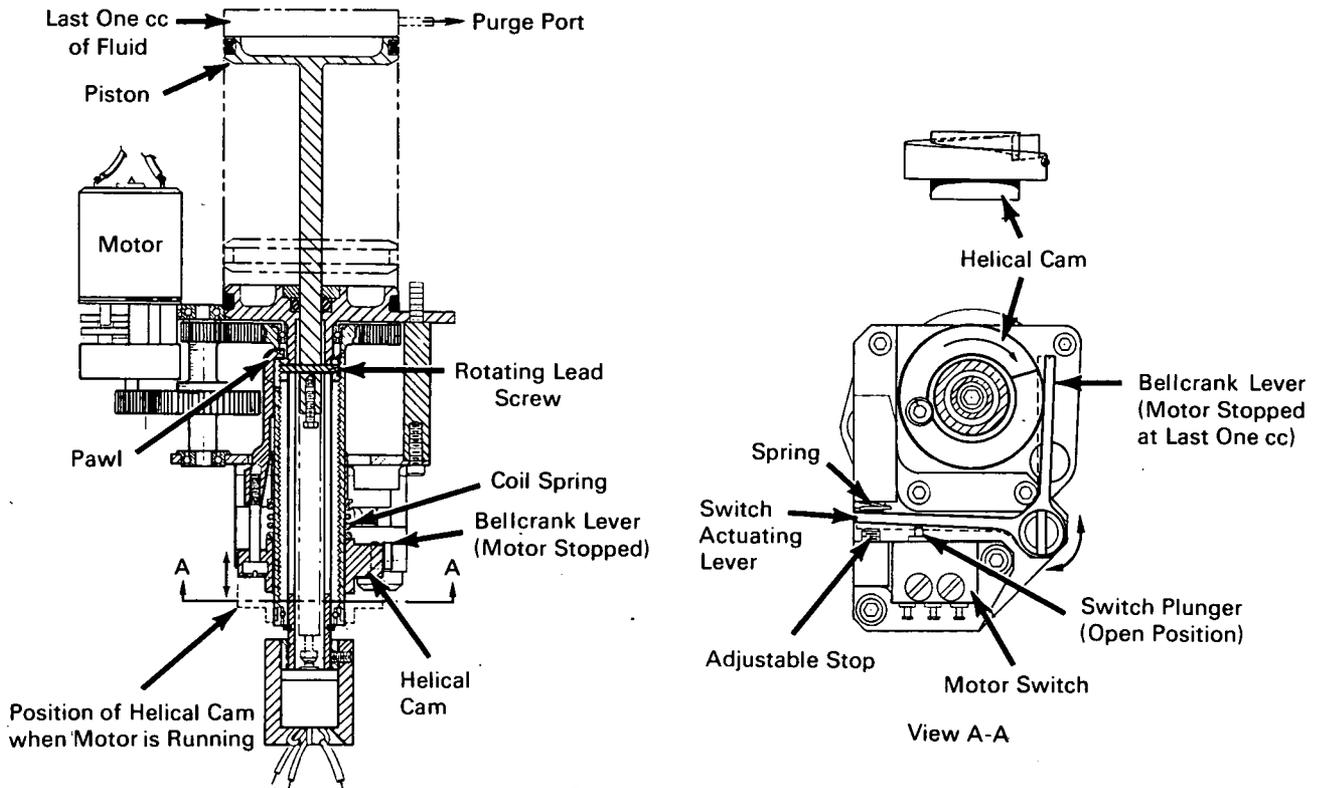


# NASA TECH BRIEF



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Division, NASA, Code UT, Washington, D.C. 20546.

## A Long-Lived Precision Switch Actuator for Controlling Pump-Piston Action



Switch Actuator

### The problem:

During the development of an automated wet-chemical analysis system, it was found desirable to retain a sample of the collected fluid for a subsequent step in the analysis sequence. A switching mechanism, compatible with the existing pump mechanism, was required to control the pump piston action in order to acquire the fluid sample. The mechanical con-

straints imposed by the pump precluded the use of available switch actuating mechanisms.

### The solution:

A switch mechanism, shown in the illustration, was designed which limited the stroke of the piston by stopping the piston motor drive. A cam and lead-screw mechanism actuated a "micro" snap switch at the proper travel. The fluid sample remaining in the

(continued overleaf)

reservoir was then pumped into the sample chamber of the analysis system.

**How it's done:**

The operation of an electrical switch to open the motor circuit for precise limiting of the pump piston is effected by a rotating lead-screw mechanism which produces a translatory movement of the pump piston, and a cam which rotates with the screw mechanism but which also moves along the screw axis for a limited portion of the piston translation. Rotation of the screw mechanism imparts limited translatory movement to the pawl which engages the cam at a pre-selected point of the piston translation. The pawl shifts the cam into a position so that further rotation of the cam causes a bellcrank lever to actuate the switch. The switch actuating arm of the bellcrank lever is long enough to depress the switch plunger in a straight-line action which minimizes plunger wear. The plunger is normally held depressed by action of an external spring bearing on the actuating arm to effect closure of the normally open switch contacts. Movement of the actuating arm to depress the switch plunger is restricted by an adjustable stop which prevents excessive overtravel of the plunger; this could damage the internal operating mechanism of the switch. Cam engagement with the other bellcrank arm

offsets the pressure exerted by the external spring and allows the switch plunger to be raised by action of the internal spring arrangement of the switch to open the switch contacts.

**Note:**

Requests for further information may be directed to:  
Technology Utilization Officer  
NASA Pasadena Office  
4800 Oak Grove Drive  
Pasadena, California 91103  
Reference: B70-10279

**Patent status:**

This invention is owned by NASA, and a patent application has been filed. Royalty-free, nonexclusive licenses for its commercial use will be granted by NASA. Inquiries concerning license rights should be made to NASA, Code GP, Washington, D.C. 20546.

Source: Robert R. Davis of  
Caltech/JPL  
-under contract to  
NASA Pasadena Office  
(NPO-10757)