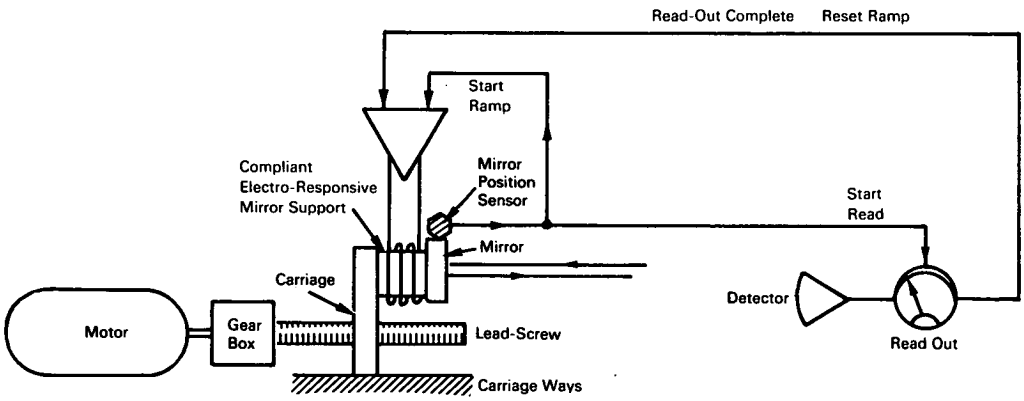
December 1966 Brief 66-10695

NASA TECH BRIEF

Motion Drive System is Accurately Controlled in the 1-Micron Range



The problem:

To develop a motion-drive system for use with interferometers where accurate control of minuscule distance in the 1-micron range is of prime importance. The new drive system must also be adaptable for use with other precision devices.

The solution:

A motion drive system in which incremental motion is obtainable in varying increments of from several inches to a fraction of a micron.

How it's done:

The drive system can be implemented as a functional addition to a simple, continuous-motion, lead-screw to produce a controlled incremental motion of the driven element. Since the motion imparted to the driven element is the resultant sum of continuous motion and transducer movement, it is possible to hold the driven element motionless or move it at speeds in excess of that of the continuous motion system. By alternating these two conditions, through appropriate electrical input to a transducer, incremental motion of the driven element is realized.

In the drive system, an electromechanical transducer (electromagnetic, electrostatic, piezoelectric or magnetostrictive) is interposed between the point of continuous motion and the element to be incrementally driven. The electrical signal to the transducer produces motion within the transducer equal and opposite to that of the continuous motion within the total drive system. For the duration of the electrical signal, and within the physical limitations of the transducer, there is no motion at the output of the drive system. Repeated occurrence of this effect produces the desired incremental driving action. The electrical signal to the transducer can be produced either by a suitable generator or from a sensor associated with the mechanical action of the drive system, resulting in a servo-type operation.

(continued overleaf)

Notes:

1. The drive system is applicable to any device that requires extremely accurate positioning control. The system is generally applicable to those classes of instruments in which a movable element is used to alter the instrument's characteristics in such a fashion as to result in significant variations of an observable effect. Although described in terms of linear motion, the same technique is applicable to angular motion. Therefore, interferometers, refractometers, diffractometers, and scanning-type instruments can be utilized with the drive system.
2. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Jet Propulsion Laboratory
   4800 Oak Grove Drive
   Pasadena, California 91103
   Reference; B66-10695

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: J. H. Morecroft
(JPL-864)