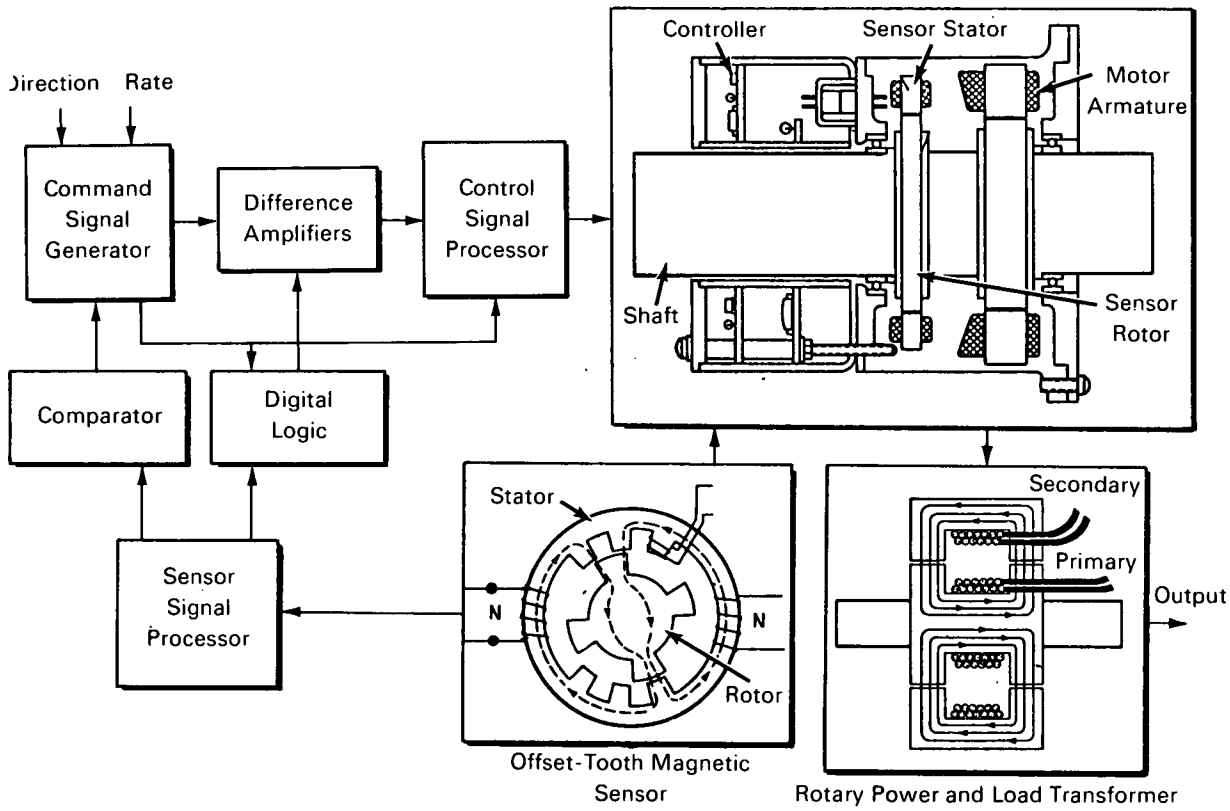
Electronically Controlled Motor Drive System Has Ultra-high Reliability and Long Lifetime



A direct drive electromechanical system shown in the figure has the exceptional performance features of ultra-high reliability and long lifetime. No gears or sliding contact elements are used and only low speed bearings are required. The mechanical components of the system include a brushless dc torque motor which replaces the conventional brush-type motor, an offset-tooth magnetic sensor that derives position and rate information directly from the output shaft, and a rotary power transformer that transfers electrical power (without the use of brushes) from an external source to the proper load. Digital and linear integrated circuits process the shaft position and rate signals and generate the logic functions which control the shaft rotation.

The design properties of high servo loop stiffness, minimum power consumption, and the capability of operating indefinitely at low angular rates enable

(continued overleaf)

the system to be utilized in a wide variety of industrial applications which require precise part location, such as graphic plotters and automated machine tools. Manufacturers and designers of process control systems which employ servo positioners would have special interest in this synchronous and dc drive system.

Technical performance highlights of the electromechanical components include a stall torque of 90 in. -oz. developed by the motor which weighs only 4.3 lb. The rotary power transformer, weighing only 2.3 lb handles 500 watts of power (at about 97% efficiency) and operates at 10 kHz. Development work is in progress to increase the stability, maximize the servo loop stiffness and reduce the overall system complexity.

Note:

Requests for further information may be directed to:
Technology Utilization Officer
Goddard Space Flight Center
Code 207.1
Greenbelt, Maryland 20771
Reference: TSP70-10346

Patent status:

No patent action is contemplated by NASA.

Source: L. J. Veillette
Goddard Space Flight Center
(GSC-10065)