

Shunt comparator stabilizes high-speed digital servo

by B. Vojnovic

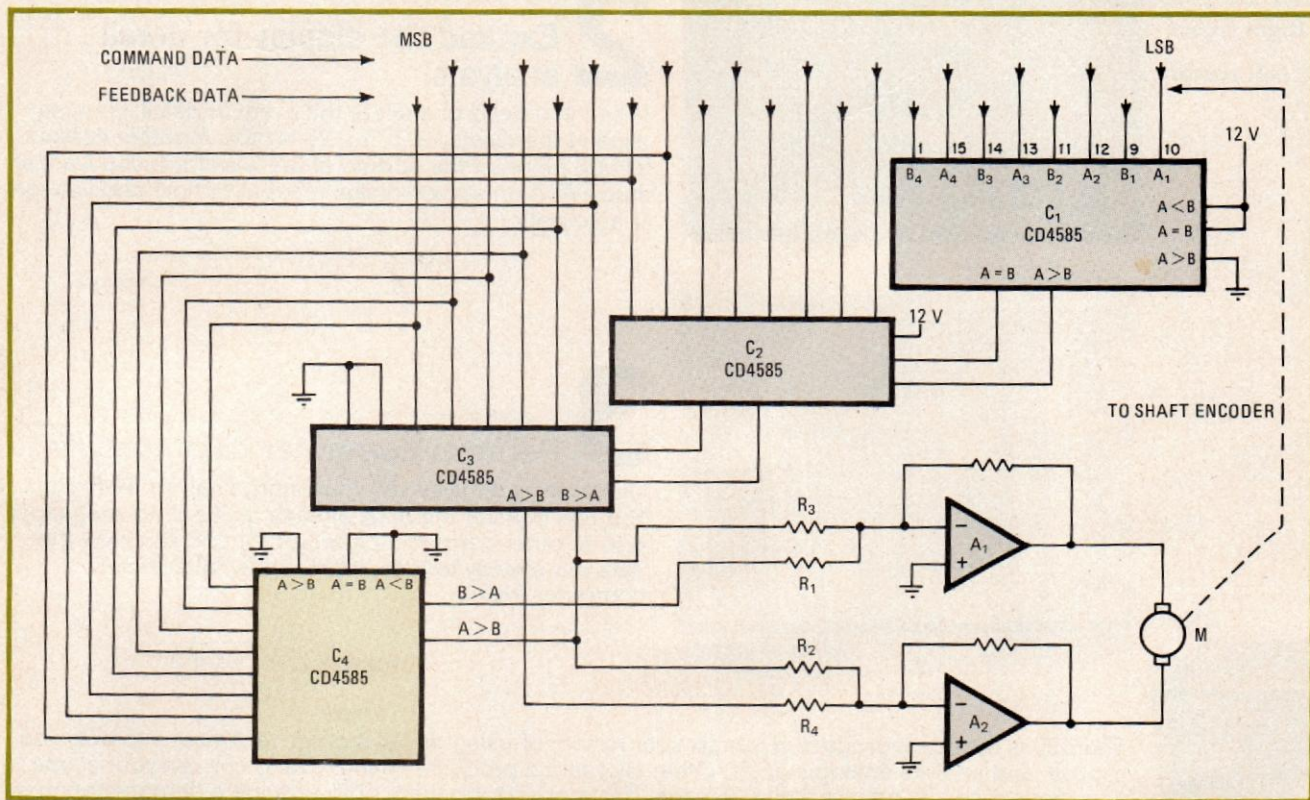
Gray Laboratory, Mount Vernon Hospital, Northwood, Middlesex, England

In high-speed applications requiring great positional accuracy, a digital servo system is usually preferred to an analog one because of its higher apparent accuracy. But its stability at high speeds is no greater. However, the digital servo system is easier to modify so that its

overshoot and position-hunting problems are minimized.

The modifications are made to the kind of digital servo system shown in the figure—one in which the set and feedback values are compared digitally by three comparators, C_1 , C_2 , and C_3 . They derive an error signal from the comparison of binary-command data with positional-feedback data generated by the motor, M , and an 11-bit digital encoder driven through a suitable gearbox. A balanced motor drive arrangement should be used to ensure low-noise pickup in cases where the controller is remote from the motor-drive circuit. It is also advantageous when good braking characteristics are desired.

Connecting comparator C_4 essentially in shunt with C_3 , as shown reduces the likelihood of overshooting because



Stabilizing force. Addition of C_4 to circuit minimizes oscillations in high-speed digital servo. C_4 forces immediate coarse comparison of most significant bits (response time controlled by R_1 - R_2), before fine comparison is made (response time controlled by R_3 - R_4).