CORRIGENDUM

Analysis of a laser-Doppler anemometer

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Notes on experimental technique and apparatus

Figure 1  Circuit diagram: RL1 and RL2 balance relays
Ericson D/DC A 049; RL3, RL4, RL5 and RL6, Varley
CAA/12H; semiconductors, DZ1 zener IS207; DZ2 and
DZ3 zener IS208; D1 and D5, 15130; T1, T2, T3 and T4,
25382

geared to the output spindle and spring-loaded to take up
backlash.

Figure 1 shows the circuit in balance. A change in photo-
transistor current puts relay RL1 off balance, and further
change puts relay RL2 off balance as well, causing the motor
to run from the 5 V or 15 V line respectively. A change in
the opposite sense produces the reverse effect.

To reduce overshoot at balance the motor is braked by
the armature shunting effect of RL3/A and RL4/A, thus
reducing the dead zone to 1% fsd. Zener diodes stabilize
the lamp supply. To facilitate cam design, the meter (figure 2)
indicates the extremities of the wiper traverse on the pro-
grammed potentiometer.

The time for full scale deflection is 7.5 s. This imposes an
upper frequency limit dependent on the accuracy and amplitude
required. Periodic adjustment is necessary to maintain the
relays in balance.

To test linearity, five runs were made using a cam (similar
to figure 2) with 20 equal steps. A plot of desired against
actual voltage gave a straight line with a standard deviation
of 0.85%, which is good considering this included errors in
plotting, cam cutting, potentiometer nonlinearity if any, and
measuring equipment.

The instrument works well and is suitable for many process
control applications.

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In the third line above equation (9) $1/\Delta \omega_2$ should be replaced
by $1/\Delta \omega_1$.

Equation (30) should read

$$
\langle |F_X|^2 \rangle = \frac{4}{\pi \Delta \gamma_\beta \Delta \gamma_\beta} \int \int \int N_1 |F(\omega)|^2 \, d\gamma_\beta \, d\omega_0
$$

(30)