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RESEARCH NOTE

A USEFUL MONOCHROMATOR DRIVE SYSTEM FOR SPECTRAL SCANNING

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HALLDAL[1] describes the use of an interference-wedge filter as a simple monochromator for recording different types of spectra. His use of the cam and screen to obtain equal quanta is particularly clever. We have used interference-wedge filters in a similar way for the purpose of recording fluorescence emission spectra[2, 3]. It is frequently useful and efficient to be able to change the scanning speed of a monochromator during a run so that it is slow in spectral regions where the property being measured changes rapidly with wavelength and conversely. However, to achieve satisfactory results, the recording speed must be changed simultaneously with the monochromator scan speed. This can be done easily in Halldal's instrument (or with any other monochromator) with a relatively simple modification[3].

The modification consists of using a stepping motor and multispeed chart drive unit (Heath # EU-20-26) for a Heath servo chart recorder in place of the multispeed synchronous motor (# 5 in Halldal's Fig. 1) to drive the interference wedge or monochromator and recording on a Heath recorder equipped with the multispeed attachment. The stepping motor used to drive the wedge can be either unidirectional (A. W. Haydon series 45100) or bidirectional (Haydon series 44100), although the motor drive unit may need some slight modifications to accommodate the bidirectional motor. The wedge motor drive unit is then driven by the output signal from the recorder chart drive unit, rather than its own internal 60 cycle signal (or conversely, depending on which motor requires the higher frequency of stepping pulses). This results in a constant speed ratio between the two motors. The actual ratio is determined by the speed setting on the slave unit. The absolute scan speed of both together can then be varied, while maintaining the constant ratio between them, by varying the speed setting of the master drive unit.

Using a more complex programming between the wedge and recorder drive units, it may be possible to correct for the nonlinearity of wavelength with distance along the wedge which occurs in these interference wedges; we have not attempted to do this. It should also be noted that when studying physiological processes which require corrections for instrumental or physiological drifts in time, such as the action spectra described by Halldal[1], it may be necessary to keep the scanning rate constant over the entire range of measurement to be able to make the corrections.

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