UNIVERSITY OF ADELAIDE

PHYSICS DEPARTMENT

A STUDY OF PHOTOGRAPHIC IMAGES
USING FOURIER TECHNIQUES

by

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STATEMENT

I herewith state that this thesis does not contain
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CHAPTER IV

STUDY OF PHOTOGRAPHIC IMAGES USING FOURIER TECHNIQUES

SUMMARY

An optical Fourier analyser for analysing transparency functions has been constructed and found to give accurate results. A detailed description of the instrument, an adaption of a Michelson interferometer, including the mechanical units and electronic circuits used, is given.

An attempt to establish the amount of harmonics present when recording sine wave objects on the straight portion of the H & D curve of the photographic emulsion has been made. There are limitations to the validity of this treatment but for low contrast objects a good estimation of the harmonic content can be made. Working in terms of transmitted intensity it is shown that a simple theory, similar to that used in the design of audio power amplifiers, can be used to calculate the harmonic content of sine wave images. The results obtained from this theory are compared with those predicted from the straight part of the H & D curve and the values measured with the apparatus.

A method for calculating the frequency response of photographic emulsions is established and the response of four Ilford emulsions is measured.

Some applications of the instrument are suggested and discussed.