APPENDIX B

STREAK CAMERA CALIBRATION

The Cordin 132 streak camera writing speed was calibrated by recording the output of a crystal-controlled oscillator displayed on the face of an oscilloscope.[61] The dynamic spatial resolution for the camera was measured by recording the image of a Ronchi ruling for different camera writing speeds. The details of the calibration experiments are given below.

B.1. Writing Speed

A schematic of the calibration setup is given in Fig. B.1. The equipment used for the calibration experiments consisted of the streak camera, the synchronizer circuit, a Hewlett-Packard 5512A electronic counter, a resistance-capacitor (RC) pulse power supply, a Tektronix 535 oscilloscope, and a General Radio 1213A oscillator. The oscillator was stable to within +4 hz out of 10^7 hz for 24 hours. The frequency scale of the oscillator was accurate to +3.4 hz out of 10^6 hz. The electronic counter was accurate to one count.

The electronic equipment was connected as shown in Fig. B.1 and the camera was focused on the face of the oscilloscope's cathode ray tube. The camera's mirror was rotated at a constant speed and then a switch on the camera controls was closed which opened the camera shutter and sent a pulse to the

synchronizer circuit. The synchronizer circuit assures that the rotating mirror is in proper position to record on the film and supplies a pulse to trigger the RC power supply. The power supply applied -80V pulse to the cathode ray tube which brightens the scope trace for a few milliseconds. A 100 Khz signal from the oscillator was continuously applied to the vertical input of the oscilloscope without sweeping the scope in time. A vertical oscillating line image of the oscillator's signal was displayed on the scope face and then recorded dynamically by the streak camera. A sinusoidal wave results on the streak camera film with accurately known peak-to-peak time intervals.

The camera writing speed is given by

$$W = F \cdot R \qquad \text{(B.1)}$$

where W is the writing speed, F is the calibration parameter, and R is the rotation speed of the camera's mirror. The results of the calibrations are given in Table B.1.

TABLE B.1.--Calibration experimental results

Experiment Number	R (rev/sec)	W (mm/μsec)	F 10^{-3} (mm)
Cal-1	250	1.0075 ± .0025	4.030 ± .001
Cal-2	250	1.0075 ± .0025	4.030 ± .001
Cal-3	1000	4.04 ± .02	4.040 ± .02