

VLBA ACQUISITION MEMO #317

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Subject: Elastic modulus measurements for thin tapes

The elastic modulus of various tape samples has been measured by stretching small samples of the tape cut in either machine (along the tape) or transverse (across the tape) directions. Owing to the small size of samples cut in the transverse direction (that can only be a maximum of one-inch long) the measurements were made under a measuring microscope as illustrated in Figure 1. The sample strips of tape were approximately

0.1" x 1"

and were stretched in a fixture so that the stress/strain relationship are measured with a tension of from 100 - 300 grams. The results of the measurements are given in Table 1.

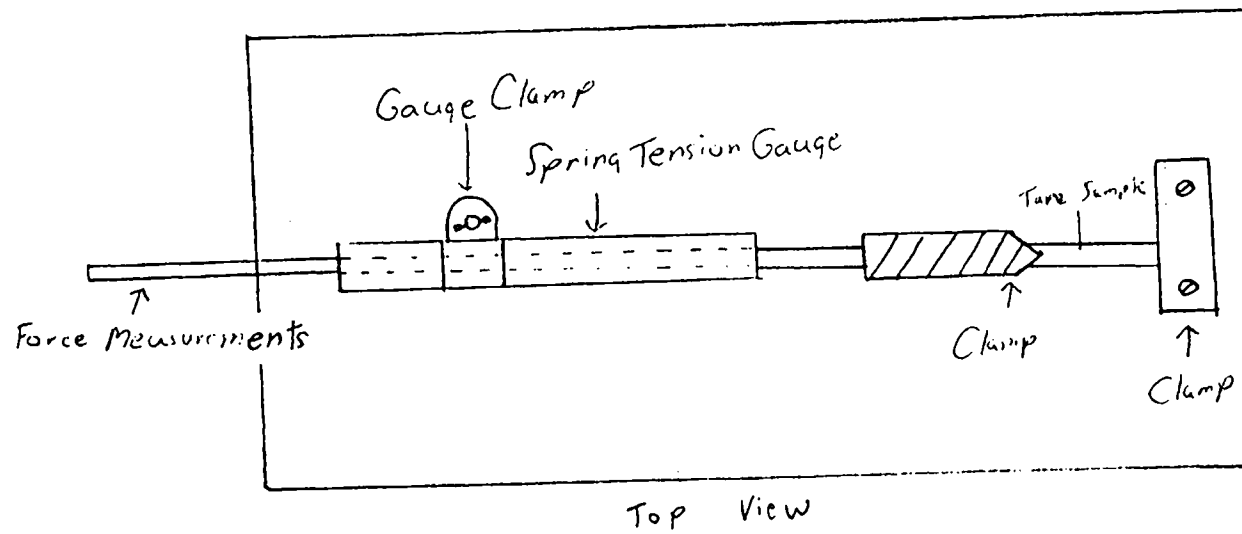
TAPE	THICKNESS μm	# SAMPLES	DIRECTION	YOUNG'S MODULUS Pa	RMS ERROR
Ampex 741	15.85	5	machine	6.00×10^9	$\pm 0.920(15.3\%)$
		5	transverse	2.85×10^9	$\pm 0.207(7.26\%)$
3M Q1C	15.24	4	machine	4.54×10^9	$\pm 0.487(10.72\%)$
		5	transverse	3.72×10^9	$\pm 0.523(14.06\%)$
Sony D1K	15.39	5	machine	7.45×10^9	$\pm 1.12(15.5\%)$
		5	transverse	2.84×10^9	$\pm 0.378(13.31\%)$

Table 1.

Notes:

1] 1 psi = 6894.76 Pa

Figure 1 Apparatus Used to Measure Tape Under Microscope



Note: Spring Tension Gauge was movable by adjusting the gauge clamp; this allowed for different tensions on the tape. The deflection of the tape was measured using a micrometer that was attached to the microscope

