## VISCOSITY AT HIGH PRESSURES conjunction with the crystal dimensions in eqn (5) to give $K_1$ . These two sources of $K_1$

are compared for a range of liquids at 30°C in table 1 and the agreement averages 0.2 % with a range of -0.2 to +0.7 %. Density and viscosity data were taken from Timmermans <sup>4</sup>

> GOLD ELECTRODE (VACUUM-DEPOSITED ON QUARTZ) OOB IN TINNED COPPER LEADS SOLDER SPOT

FIG. 1.-Configuration of electrodes for the torsional crystal.

except for iso- and n-pentane for which A.P.I. viscosity values 5 have been used. Table 1 also shows that the value of the constant  $K_1$  is slightly dependent on the kinematic viscosity of the fluid. Harrison and Lamb<sup>3</sup> have shown that the variation of  $K_1$  and  $K_2$  with kinematic viscosity is due to irregularity in the crystal surface and that this effect which is larger for  $K_2$  is readily removed by careful polishing. According to eqn (2), the attenuation of the viscous wave is inversely proportional to the exponential of the square root of the kinematic viscosity. Therefore, if the kinematic viscosity is sufficiently small, the attenuation length and irregularities in the crystal surface may become comparable, resulting in an increase in the electromechanical constants. For fluids of kinematic viscosity greater than

## TABLE 1.—VALUES OF THE CONSTANT $K_1$ for a 39.5 kHz polished crystal in various LIQUIDS AT 30°C AND ATMOSPHERIC PRESSURE

$K_1/\Omega$ cm <sup>2</sup> s g <sup>-1</sup>		
from eqn (5)		
5290		
5285		
5085		
5080		
5075		
5030		
5010		

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