TABLE III

Elastic Moduli of Quartz*

Modulus	Value (10^{11} dyne/cm^2)	Reference
2nd-order		
c_{11}**	8.757	(39)
c_{12}	0.704	"
c_{13}	1.191	"
c_{14}	-1.804	"
c_{33}	10.575	"
3rd-order		
c_{111}	-21.0	(40)
c_{112}	-34.5	"
c_{113}	1.2	"
c_{114}	-16.3	"
c_{133}	-31.2	"
c_{333}	-81.5	"
4th-order		
c_{1111}	1705	Present Work
c_{3333}	1849	"

*The second-order constants are isentropic, the third-order are mixed isothermal, isentropic constants, and the fourth-order are Hugoniot constants, (see text).

**The c_{11} constant used is appropriate for open circuit compression, i.e., at constant electric displacement, D.

thus produced are negligible.

The differences between the purely isentropic third-order moduli and the mixed moduli given in Table III can be calculated from Eq. (2.19)

The temperature coefficients of expansion, as given by MASON (47) are:

$$\alpha_3 = 7.8 \times 10^{-6}, \ \alpha_1 = \alpha_2 = 14.3 \times 10^{-6}$$

and the expression, due to Westrum, reported by McSKIMIN (39) for the specific heat is:

$$C_p\ (T) = C_p\ (T_c) + (T - T_c)C_1 + (T + T_c)^2 C_2 + (T - T_c)^3 C_3\ \alpha \ldots$$

$$(77.4°K < T < 298°K)$$

where

$$T_c = 190°K$$

$$C_p\ (T_c) = 5.189 \times 10^6 \text{ erg/g°K}$$

$$C_1 = 2.444 \times 10^4 \text{ erg/g°K}$$

$$C_2 = -4.126 \times 10^1 \text{ erg/g°K}$$

$$C_3 = 5.327 \times 10^{-2} \text{ erg/g°K}$$

taking

$$T = 25°C, \ \rho_o = 2.6485 \text{ g/cm}^3, \ C_p = 7.42 \times 10^6 \text{ erg/g°K},$$

and estimating $(\frac{\partial C^S_{33}}{\partial T})$ from McSkimin's data taken at 25°C and -195.8°C to be of the order of -1×10^8 dyne/cm^2 °K we find the difference given by Eq. (2.19) for the c_{333} constant, for example, to be of the order of 5×10^3 dyne/cm^2.