APPENDIX I.

COMPUTER PROGRAMS AND SAMPLE RESULTS

As indicated earlier, the equations (45), (48), (50), (53), and (57) represent five independent equations for the determination of the three displacement coefficients, a_1, a_2, a_3, the mid-meridian constraining pressure, P_c, and the wafer centerline deflection, Δ . A knowledge of these parameters allows for the determination of the normal and shearing stress distributions from equations (38), (39), (40), and (41), respectively. The applied compressive force can likewise be determined from (43).

If, at a given load, or what is equivalent, a given radius ratio R_c/R_o, values of a_2 and Δ are assumed, then a_3 can be found from equation (50). Using this, a_1 and P_c are found from (45) and (48), respectively. Equations (53) and (57) are utilized to check the validity of the assumed values of a_2 and Δ . A reasonably close approximation can be found for Δ by assuming that the wafer maintains its cylindrical shape at all loads. Since the wafer expands more at the mid-meridian plane, the coefficient a_2, which is a measure of this curature, will be some initially small negative quantity.

The computer program shown in Figure 21, written in FORTRAN language, starts with an assumed value of -0.010 for a_2, and then calculates an approximate value of Δ from