displacement rate arising from the viscous strain rate $\dot{\gamma}$ just matches the crosshead speed in a conventional tensile or compression test (i.e. the elastic strain-rate is zero and the load to produce this viscous strain-rate corresponds to the observed value of maximum load).

In addition to the parameters ΔE, v, T_g, C_1, C_2 and η_g required by the conventional Robertson treatment, the model includes the additional parameter Ω. An approximate relationship between Ω and v may be obtained from the results of Rabinowitz *et al*, [14]. As we have seen their results show that for PMMA the shear yield stress, at constant shear strain rate, is an approximately linear increasing function of hydrostatic pressure. Reference to equation 6 indicates that over the range of shear stresses observed by Rabinowitz *et al* at constant $\dot{\gamma}$ (0.5 kilobar $< \tau <$ 1.1 kilobar) θ_1 must be approximately independent of pressure. Examination of equation 4 indicates that if $\tau v - p\Omega =$ constant then this condition is satisfied. We therefore suggest that $\Omega/v \doteqdot (d\tau/dp)\dot{\gamma}$ and from fig. 3 take $(d\tau/dp)\dot{\gamma} = 0.2$.

The data obtained from tension and compression at various strain-rates and temperatures and the data of Rabinowitz *et al* were analysed according to this modified Robertson treatment.

For the tensile and compression tests τ and ρ were taken to be $\sigma/2$ and $\pm\,\sigma/3$ respectively, where σ is the axial yield stress $\dot{\gamma}$ is assumed to be equal to half the applied axial strain-rate. The maximum shear stress on the specimen and applied hydrostatic pressure were used for τ and ρ in the torsion tests. The values for ΔE, v, C_1, C_2, η_g, T_g suggested by Robertson, together with $\Omega = 0.2v$ do not give an acceptable fit to the data. Therefore these values were used as starting points and all the coefficients were adjusted independently by computer to give a "least squares fit" using a procedure developed by Murgatroyd [17]. In the spirit of the Robertson treatment the shear and hydrostatic components of stress and temperature were treated as independent variables, which minimised the deviations between the predicted and actual shear strain-rates for the tension, compression and torsion tests, by adjusting the constants in the equation independently. The following table (table I) shows the final values obtained for the coefficients and those predicted by Robertson for PMMA. These calculated coefficients were used to generate the full curves in figs. 1 and 3.

TABLE I Table of coefficients for PMMA

	Optimised values	Values suggested by Robertson
C_1	11.1° C	17.44° C
C_2	55.9° C	51.6° C
ΔE	0.88 kcal/mole	1.44 kcal/mole
T_g	105° C	105° C
η_g	10^{12} poise	$10^{13} - 10^{14.6}$ poise
v	109 Å^3	140 Å^3
Ω/v	0.175	0

No such direct data to determine a value for $d\tau/dp$ exists for amorphous PET owing to the difficulty of making tubular specimens from thin sheet material, and so we are forced to estimate a value from several sources. Rabinowitz *et al* [14] and Bowden and Jukes [2] observed that the yield stress of PMMA can be described by

$$\tau = \tau_0 + kP$$

where $k = 0.204$ from Rabinowitz (data from torsion under hydrostatic pressure) and $k = 0.175$ from Bowden and Jukes (data from plane strain compression). The latter technique produced a value of 0.172 for isotropic amorphous PET (private communication), whereas the former yielded $k = 0.075$ for isotropic crystalline PET. We therefore choose rather arbitrarily $\Omega/v = 0.1$ for this amorphous PET sheet. Treating the other six coefficients as independent variables the curves shown in fig. 2 were obtained. A list of coefficients for PET is shown in table II. No attempt was made to fit the data in the region of rapidly changing stress at 60° C where crazes were observed to precede yield. With regard to the values of the coefficients obtained the following observations seem relevant; C_1 and C_2 lie well within the range of values obtained from dynamic-mechanical experiments for both PMMA & and PET (see for example [19, 20]). The values for v, T_g and η_g also compare favourably with published data. However the values of ΔE for

TABLE II Table of coefficients for PET

	Optimised values	Values suggested by Robertson
C_1	15.1° C	17.44° C
C_2	75.7° C	51.6° C
ΔE	1.91 kcals/mole	1.38 kcals/mole
T_g	90° C	70° C
v	234 Å^3	215 Å^3
Ω/v	0.10	0
η_g	$10^{14.1}$ poise	$10^{13} - 10^{14.6}$ poise