WL-TR-92-3104

RESULTS OF A ROUND ROBIN TEST PROGRAM: COMPLEX MODULUS PROPERTIES OF A POLYMERIC DAMPING MATERIAL

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May 1992

Final Report for Period October 1986 - May 1992

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FLIGHT DYNAMICS DIRECTORATE
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REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	May 1992	Final Report Oct 1986-May 1992

4. TITLE AND SUBTITLE
Results of a Round Robin Test Program: Complex Modulus Properties of a Polymeric Damping Material

5. FUNDING NUMBERS
PE-62102
PR-24010442
TA-10
WU-42

6. AUTHOR(S)
Dr. David I.G. Jones

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Wright Laboratory (WL/FIBGD)
Flight Dynamics Directorate
Air Force Systems Command
Wright-Patterson AFB, OH 45433-6553

8. PERFORMING ORGANIZATION REPORT NUMBER
WL-TR-92-3104

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Wright Laboratory (WL/FIBGD)
Flight Dynamics Directorate
Structural Dynamics Branch
Wright-Patterson AFB, OH 45433-6553

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

This report describes the results of a Round Robin test program to evaluate the complex modulus behavior of a typical polymeric damping material, as measured by several different test methods and organizations. The results are analyzed in several different ways, namely wicket plot analysis, temperature by temperature plots of moduli and loss factors versus frequency and frequency-temperature reduced variables master plots. It is determined that all the test methods used are capable of producing accurate results, but that conditions arise in each case where erroneous results are encountered. These conditions represent extreme values of the specimen stiffness (high or low), system frequencies, (usually high) or situations where small differences between large numbers occur. These conditions define natural limits for each test method and specimen configuration and dimensions. The identification of these limits, and the role of specimen dimension choices in defining the limit boundaries will be invaluable for future testing by each of the test methods and systems examined.

14. SUBJECT TERMS
Round Robin, Polymers, Damping, Test Methods, Complex Moduli, Frequency, Temperature, Accuracy

15. NUMBER OF PAGES
314

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	Unlimited

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18
298-102

FOREWORD

This research was conducted over the period from October 1986 to October 1989 at the Materials Directorate, Metals Behavior Branch, Air Force Wright Aeronautical Laboratories (AFWAL/MLLN), and from November 1989 to May 1992 at the Flight Dynamics Directorate, Structural Dynamics Branch, Wright Laboratory (WL/FIBGD). The work was begun in response to an internationally recognized need to establish the sources of error, and the corresponding magnitudes, in the measurement of complex moduli of polymeric damping materials by various test techniques and apparatus configurations. Such errors greatly inhibit the application of polymeric damping materials for vibration and noise control in military aerospace systems.

The author wishes to thank all the participants in this program for their contributions of test data and comments concerning test methods and systems. The lessons learned should be of value to all persons concerned with obtaining accurate complex modulus data for polymeric damping materials and in using these materials in engineering practice.

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NOMENCLATURE

A	Acceleration
b	Breadth of beam
f	Frequency (Hz)
f_n, f_{no}	Resonant frequencies of damped and bare beams, respectively
F, F(t)	Force
G, G_e	Shear modulus and apparent shear modulus, respectively
h	Thickness ratio (various subscripts)
H	Thickness (various subscripts)
k	Stiffness (various subscripts)
k_s, k_e	Specimen stiffness or apparent stiffness, respectively
k_o	Stiffness of test system, assumed in series with specimen
M	Mass (various subscripts)
Q	Activation energy
R	Universal Gas constant
T, T_o	Absolute temperature and reference temperature, respectively
T_A	Activation temperature (= Q/2.303R)
X	Displacement (various subscripts)
Z	Nondimensional parameter governing error magnification in beam tests
ρ	Density (various subscripts)
α(T)	Shift factor
η, η_e	Loss factor or apparent loss factor, respectively

INTRODUCTION

Polymeric viscoelastic materials have been used for vibration control by damping treatments and isolator systems for many years. The applications extend throughout the aerospace, automotive, computer, naval and many other industries, and rely on the availability of extensive bodies of data on the dynamic behavior and physical properties of a wide variety of polymeric materials.

One of the most useful descriptors of the dynamic mechanical behavior of a polymeric material is the complex modulus, which is a measure of the relationship between cyclic stress and cyclic strain at a discrete frequency, ranging from far less than a hertz to well over 10 kilohertz or even 100 kilohertz, depending on the application. The complex modulus has real and imaginary, or in-phase and out-of-phase, or direct and quadrature, components which are measures of the stiffness and energy dissipation characteristics of the material, respectively. The complex modulus of a given polymer is a unique function of frequency and temperature at low strain amplitudes, typically less than 0.1 percent peak to peak, but also depends on strain amplitude at higher amplitudes. It also depends on the state of initial stress or strain which is important for isolator systems in particular, and may change with time under exposure to severe environments or excessive temperatures. For each polymeric material, these limits must be determined by experiment and the material applied well within the stable boundaries in most long-term applications.

It is unfortunate but true that the measurement of the complex modulus properties of a sample of polymeric material, over a wide range of frequencies and temperatures, let alone a range of strain amplitudes and pre-loads if nonlinear behavior is also to be evaluated, is difficult, tedious and expensive. Many systems have been developed to conduct such measurements, including:

(1) Torsional pendulum tests
(2) Impedance or direct stiffness tests
(3) Vibrating beam tests

Early torsional pendulum test systems are described by Nielsen [1,2]. An early practical direct stiffness system is described by Fitzgerald [3], and early vibrating beam tests are described by Oberst [4,5] and Van Oort [6], to name just a few. At the present time, a large variety of commercial and special purpose test systems is available, each of which claims some advantage over other methods. The test systems usually include such features as software for automation of the testing process and plotting of the data in various formats. Each test system, when used carefully along with meticulous design and fabrication of the test specimens, can give accurate and reliable data over specific frequency and temperature ranges, but it is rarely if ever possible to obtain such data over the full frequency and temperature ranges needed for a wide variety of applications. Unfortunately, when the boundaries of the optimum frequency and/or temperature ranges are transgressed, few systems give a clear indication that the data quality is deteriorating, and investigators may encounter difficulty in deciding which data to retain and which to reject. Eventually, greatly increased scatter, unrepeatable data points, or strongly distorted signals may provide the needed clues. The result of this, often typical, state of affairs is that test system operators may become overconfident of the capabilities of their particular equipment, and controversies then often arise as to whom is "correct." Since objective tests or standards are rarely available, the result has been the publication or dissemination of much erroneous data, with no one having the means to separate the "good" data from the "bad." This situation has become progressively worse over the past several decades, and is now almost unremediable. The result is that designers cannot be sure that their basic polymeric material data are reliable, chemists cannot with confidence relate measured complex modulus data to molecular structures, and compilers of data bases often cannot provide sufficiently reliable data to meet these and other needs. No one has been happy with this situation, but there seemed to be little prospect of a remedy at the time this particular round robin project was initiated.

It is a sad fact that most round robin projects start bravely enough, but eventually progress falters through lack of sustained interest long before the final report is delivered, if it ever is. This particular round robin project has been very unusual in several respects, including:

(1) The interest has slowly grown throughout the past several years, so that the final report has been delayed because of continually increasing, rather than decreasing, interest.

(2) The test data gathered have covered a wide range of test frequencies, test temperatures and test methods for both shear and extensional deformation of the specimens.

(3) For the first time, a rational means of clearly identifying data errors has been applied, namely the "Wicket Plot" analysis. By means of this plot of log loss factor versus log modulus, it has been possible to graphically display errors in each data

set, and to explain the errors in terms of the characteristics of each test system. This has provided unusual insight as to the way each test system operates, or fails to operate, and should provide an invaluable guide to users of each type of test system.

This round robin test series began in 1986 under the auspices of an international cooperative program. The author, then at the Materials Directorate, Wright-Patterson Air Force Base, Ohio, was asked to undertake the technical and administrative aspects of the work. The resulting program timetable is outlined in Figure 1. The first task was the selection of a suitable material for evaluation. Ideally, it was presumed that a well characterized polymer such as the former National Bureau of Standards (now NIST) Polyisobutylene, used as a standard in earlier cooperative programs, would be ideal [7,8]. However, the material was no longer available, and prospects for finding a suitable replacement seemed remote at the time, although by 1990 the situation seems to have improved, through the activities of the Acoustical Society of America Accredited Standards Committee on Mechanical Shock and Vibration, Working Group S2-79 [9]. A commercial damping material was, therefore, selected instead. The final candidate was a commercial damping polymer manufactured by EAR Corporation, Indianapolis, Indiana, designated as C-1002 damping compound. Information provided by the manufacturer [10] was used to estimate the range of properties likely to be encountered. While at first sight the material chosen was a long way from the polyisobutylene standard, its use did put the Round Robin participants, identified in Table 1, to a realistic test. The test samples were all cut from a small number of sheets and bars so that major batch-to-batch variations were not expected to be a problem.

The early participants in the round robin tests, from the United States (USA) and the United Kingdom (UK), were sent samples in accordance with their specifications and were asked to perform the complex modulus measurements in practically any way they wished, subject to only a few stipulations, summarized in Table 2. The most critical of these were:

(1) Conduct the tests at specific temperatures, at 10°C intervals, and isothermally.

(2) Conduct the tests at low strain amplitudes to ensure linear behavior.

(3) Bond the specimens to the grips by means of an adhesive stiffer than the polymer at all temperatures.

In hindsight, many more stipulations might have been wise, but in the end it is probable that no stipulations could have been fully enforced in what was a voluntary test program, so the issue was moot in any case. Several sets of test data were received in 1988 and 1989, but by early 1991 the "fame" of the round robin had spread so widely that several additional participants from the USA and UK, and others from Canada and France had become involved and provided additional data which greatly enhanced the scope of the test series. While the cut-off date for receipt of data was extended several times, it was not for the usual reason of lagging interest or failure to respond, but for the more unusual reason of new participants wanting to get involved. Perhaps this is the Round Robin to end All Round Robins! Or the Mother of All Round Robins! Certainly, its success has been achieved as a result of the efforts of all the many participants who provided the test data. It is hoped that their reward will be commensurate with the effort, in terms of greater insight into the measurement process and a greater appreciation of the need, and means available, for identifying and eliminating errors, both systematic and random.

TEST METHODS

Types of Test Systems

At the present time, a wide variety of commercial systems for measuring the complex modulus properties of polymeric materials are offered for sale [11-17]. These, along with a wide variety of custom made systems, are producing large quantities of dynamic data for various applications, including the monitoring of cure cycles in polymer, plastic and composite production, measurement of linear and nonlinear stress-strain behavior of elastomers, and measurement of linear complex modulus properties of polymers over wide frequency and temperature ranges, to name just a few. Some of these applications require only a qualitative assessment of the change of specimen or sample stiffness and damping behavior with time, so no question of absolute accuracy arises. For other situations, such as the application of complex modulus data in design of damped structures and machines, the need for accuracy is much more pressing. No commercial or custom made system can measure the complex modulus properties of a polymeric sample at all arbitrary temperatures and frequencies, in part because the stiffness of the specimen may vary by 4 or more orders of magnitude and also because of changes in the static and dynamic behavior of the test system itself over sufficiently wide ranges of conditions.

Test systems for measuring complex modulus properties of polymers are generally divided into two classes, namely the "direct measurement techniques," and the "indirect measurement techniques", although in reality all measurement techniques are to some extent indirect, because stresses are applied and the resulting specimen deformations are observed over time. These stresses and deformations are never measured directly but must be inferred from other observations. The equations of motion for each type of system are derived and solved to predict the complex modulus properties of the polymeric sample from the measured response of the system. These equations are effective for some values of the parameters, but greatly magnify errors for others, so it is important to fully understand the data reduction process for each system.

Direct Stiffness Test Techniques

Typically, the direct measurement techniques involve the application of a time varying force to a polymeric material specimen, measured using a force gauge or an impedance head, observing the resulting deformation, using an accelerometer, proximity probe or optical device, and then deducing the complex shear or Young's modulus or the parameters in some other model [18,19]. Figure 2, for example, illustrates, in extremely simplified form, a direct measurement system using (1) measured driving point impedances and (2) measured transfer impedances.

Equations of Motion:

Even the simplest physical models of these systems may be quite complicated, as illustrated in Figure 3. Here, the drive system is idealized as a pure force F(t), acting on a mass M_2, which includes the effective mass of the drive system (for example the mass of the excitation coils of an electrodynamic shaker), and the push rod connecting the shaker to the force gauge (driving point impedance) or the grip (transfer impedance). The force gage is a device of finite stiffness, including the stiffness of the piezoelectric crystal (k_d) and the flanking stiffness of the case (k_f). The other end of the specimen is connected to a heavy mass M_7, which represents the connection to ground, through the grip stiffnesses k_4 and k_6. The mass M_7 is large compared to the other masses, but not infinite. It is not surprising that erroneous measurements can arise, such as those which occur when system resonances overlap the frequency range of the test, or when the specimen is very soft or very stiff, or when the forces or accelerations are too large or too small to be accurately measured.

At moderate frequencies, the model may be simplified further by neglecting many of the inertial elements, and combining the stiffness elements into a single term, as also illustrated in Figure 3. In this case, the stiffness k- of the system to the right of the specimen in Figure 3 is combined with the stiffness $k_8(1+i\eta_3)$ of the specimen, and the equation of motion of the system becomes:

$$M\ddot{x} + k_e(1+i\eta_e)x = F\exp(i\omega t) \qquad (1)$$

so that, for harmonic motion $x = X\exp(i\omega t+\phi)$

$$k_e(1+i\eta_e) = F/X + M\omega^2 \qquad (2)$$

and k_e is related to k_s and k_o by:

$$\frac{1}{k_e\,(1+i\eta_e)} = \frac{1}{k_s\,(1+i\eta_s)} + \frac{1}{k_o} \qquad (3)$$

where k_s = EA/H for a long cylindrical specimen or k_s = GA/H for a thin shear specimen. If k_o is known, k_s can be calculated from the measured k_e. Shape factors are introduced as appropriate when the specimen dimensions are not ideal [20].

Correction for finite test system stiffness:

If k_o is not very large compared with k_s, then significant errors can be encountered unless equation (1) is used to correct for finite values of k_o. These errors take the form of a systematic underestimate of the specimen stiffness k_s, which becomes ever more serious as the value of k_s equals or exceeds k_o. Read and Dean [21] have literally "written the book" on these and other sources of error in measuring the complex modulus properties of polymers. It is often difficult to apply the correction for finite values of k_o in practice, because the value may depend on the manner in which the specimen is held in the grips, and may, therefore, vary significantly from test to test.

Vibrating Beam Test Techniques

Indirect measurement techniques include the various vibrating beam systems illustrated in Figures 4 and 5 [22,23]. The boundary condition is usually the clamped-free system, with the clamped end having a massive root and placed in a massive support structure. Free-free boundary conditions are very attractive in principle, but are difficult to achieve in practice for operationally "user-friendly" systems. From time to time, however, efforts are made to achieve this goal, and it may be more readily attainable at the present time, as compared to the past, because of the much improved systems for control and measurement now available. In any case, the indirect measurement systems also have their problems. For example, great care must be taken to ensure uniformity of the test beams, the polymeric material layer thickness and the bond line onto or between the beams. Also, if the dimensions are not well chosen, excessive magnification of errors arises when the polymeric material is soft and does not influence the layered beam system strongly enough for the complex modulus properties to be accurately deduced from the observed dynamic behavior. More specifically, errors can be expected when the parameter Z^2-1, defined in equation (4) below, approaches zero [22]:

$$Z^2 = (1+\rho_2 H_2/N\,\rho_1 H_1)(f_n/f_{on})^2 \qquad (4)$$

where N=1 for the Oberst beam, 0.5 for the modified Oberst beam and 2.0 for the sandwich beam. The subscript 2 refers to the polymeric layer(s), while the subscript 1 refers to the metal beam(s). The resonant frequency of the damped system is f_n while that of each metal base beam is f_{on} . The following equations may be used to derive the complex modulus properties of the polymeric damping layer in the various beam configurations illustrated in Figure 4.

Homogeneous Beam:

The loss factor η_2 and the Young's modulus E_2 are derived from [22]:

$$\eta_2 = \frac{\Delta f_n}{f_n} \qquad (5)$$

$$E_2 = \frac{\rho b H L^4 \omega_n^2}{\xi_n^4 I} \qquad (6)$$

where f_n is the nth natural frequency, ω_n is the nth circular frequency ($2\pi f_n$), ρ is the mass density, L is the length of the beam, ξ_n is the characteristic number or eigenvalue corresponding to the nth mode, I is the second moment of area of the beam cross section and Δf_n is the half-power bandwidth. The values of ξ_n are given in Table 3.

Oberst Beam:

The loss factor η_2 and Young's modulus E_2 of the damping layer are derived from the two layer composite beam parameters from the following equations [22]:

$$\left[\frac{\omega_n}{\omega_{on}}\right]^2 (1+h_2\,\rho_r) = \frac{1+2e_2h_2(2+3h_2+2h_2^2)+e_2^2h_2^4}{1+e_2h_2} \tag{7}$$

$$\frac{\eta_n}{\eta_2} = \frac{e_2h_2(3+6h_2+4h_2^2+2e_2h_2^2+e_2^2h_2^4)}{(1+e_2h_2)(1+4e_2h_2+6e_2h_2^2+4e_2h_2^3+e_2^2h_2^4)} \tag{8}$$

where $e_2 = E_2/E_1$, E_1 is the Young's modulus of the metal beam, $h_2 = H_2/H_1$, H_2 is the thickness of the damping layer, H_1 is the thickness of the metal beam, $\rho_r = \rho_2/\rho_1$, ρ_2 is the density of the damping material and ρ_1 is the density of the metal beam, η_n is the modal loss factor of the composite beam in the n th mode, η_2 is the loss factor of the damping material, ω_{on} is the nth circular frequency of the metal beam and ω_n is the nth circular frequency of the composite beam.

Symmetric Free Layer Beam (Van Oort):

The equations for E_2 and η_2 are much simpler than for the Oberst beam [22]:

$$E_2 = \frac{E_1\,[(\omega_n/\omega_{on})^2(1+2h_2\,\rho_r) - 1]}{8h_2^3 + 12h_2^2 + 6h_2} \tag{9}$$

$$\frac{\eta_2}{\eta_n} = \frac{E_1}{(8h_2^3 + 12h_2^2 + 6h_2)E_2} + 1 \tag{10}$$

Sandwich Beam:

The equations for the shear modulus G_2 and loss factor η_2 are [22]:

$$G_2 = \frac{(A-B)-2(A-B)^2-2(A\eta_n)^2}{(1-2A+2B)^2 + 4(A\eta_n)^2} \cdot \frac{E_1 H_1 H_2 \xi_n^2}{L^2} \qquad (11)$$

$$\eta_2 = \frac{A\eta_n}{(A-B) - 2(A-B)^2 - 2(A\eta_n)^2} \qquad (12)$$

with:

$$A = (\omega_n/\omega_{on})^2 \ (2+h_2\rho_r)(B/2) \qquad (13)$$

$$B = 1/6(1+h_2)^2 \qquad (14)$$

Precautions:

It should be recalled, when using equations (11) to (14), that the Ross-Kerwin-Ungar equations from which they are derived require that the pinned-pinned boundary condition be applied, and this is only an approximation for the clamped-free beam. However, it is a good approximation for the second and higher modes, and only at extreme conditions, such as very low or very high shear moduli, are the errors noticeable. The equations for the homogeneous, Oberst and symmetric free layer beams are, of course, not subject to these errors but nevertheless the first mode data are always difficult to obtain and use. Shear deformation and rotatory inertia are neglected, and can be accounted for only through more exact analyses, such as the sixth-order theory.

Useful Ranges for Various Test Techniques

It may be claimed, without much exaggeration, that the possibilities for producing numbers representing complex modulus properties which are in error, sometimes by great amounts, far exceed the possibilities for producing accurate data, unless very great care is taken. This is the crux of the problem. Each apparatus or specific test configuration is bounded, for example, by the temperature range over which internal stresses do not interfere with measurement accuracy or the indicated temperature is close to the true specimen temperature. The useful frequency range is bounded on the low side by sensitivity of detection devices and on the high side by internal resonances which give readings having nothing to do with specimen behavior. Extremely low values of the specimen stiffness make it difficult to measure the force, while high values of the specimen stiffness interfere with measurement by interacting with the stiffnesses of the various parts of the test system, which are then of comparable magnitude. Therefore, each system or configuration usually provides accurate data over only a limited range of conditions.

Figure 6 illustrates, very broadly, the typical ranges for a number of test techniques [24]. The direct measurement techniques generally cover a frequency range from about 0.001 Hz to 1000 Hz and moduli from 10 Lb/sq in to 10000 Lb/sq in. These numbers relate to the possible range for several types of systems, no one of which covers the entire range, and measurements outside this range would typically involve unusual specimen sizes or equipment configurations, greatly increasing the cost. The beam techniques typically apply from about 10 Hz to 10000 Hz, and moduli from 10 to 100000 Lb/sq in. At any given temperature, the modulus of a polymer varies according to the curved lines A-G, H-M or N-R in Figure 6. It is seen that no one technique can be used over the whole range, but that different techniques come into play as one moves from the low modulus end to the high modulus end.

Therefore, to obtain accurate complex modulus data over the full range of moduli for a polymeric material specimen, it is usually necessary to use several test techniques and combine the data so obtained. Even when one test technique appears to cover the entire range, it is strongly recommended that other techniques also be used to verify that major systematic errors have not arisen from applying the first technique over too broad a range. Such checks can greatly increase one's own confidence in the data, as well as that of other users.

TEST SYSTEMS AND DATA

General

So far, 16 laboratories have conducted tests on the samples provided, and have furnished test data and some information on the test systems used. Tables 4 and 5 summarize the types of test systems used by each laboratory. Table 6 summarizes some of the specimen dimensions used in conjunction with various direct stiffness test systems. Figure 7 shows the frequency range covered by each laboratory, extending overall from 0.00001 Hz to 10000 Hz, over nine decades.

Because of some anomalous data encountered by several laboratories above 50°C, tests were also conducted to determine the coefficient of thermal expansion of the damping material over the temperature range from - 100°C to + 150°C, and from this calculate the density at the corresponding temperatures. Figure 8 illustrates the measured dimensional changes of three different specimens versus temperature, measured by a TA Instruments TMA 2940 system. The values of the coefficient of thermal expansion were then calculated from the dimensional changes and plotted versus temperature as in Figure 9. The density was calculated from the estimated volume changes relative to a value of 1.301 g/cu cm. measured at 20°C. A significant anomaly is noticeable at about 70°C, which reflects a major drop in the coefficient of thermal expansion, which might be the reason for some of the anomalous results above 50°C. Table 7 summarizes the thermal expansion coefficient values at the various temperatures.

Test Results for each Laboratory

Laboratory A:

This laboratory conducted several resonant beam tests, namely a steel Oberst cantilever beam and both aluminum and steel sandwich cantilever beam configurations, as illustrated in Figure 10. The beam dimensions were:

Configuration	Beam Length (mm)	Beam Thickness (mm)	Beam Density (g/cm^3)	Polymer Thickness (mm)
Free Layer Stainless Steel/Oberst beam	177.80	1.523	7.83	1.606
Stainless Steel Sandwich beam	177.80	1.498	7.83	1.606
Aluminum Sandwich	177.80	2.002	2.77	1.606

The test results for Laboratory A are summarized in Tables 8, 9 and 10 for the steel Oberst beam, the steel sandwich beam and the aluminum sandwich beam, respectively. In addition to providing the test data, Laboratory A also conducted a frequency/temperature analysis. Figure 11 shows the reduced-frequency nomogram for all the Laboratory A data, the data reduction being accomplished by appropriate computer software. These nomograms are plots of modulus and loss factor versus reduced frequency $f = f\alpha(T)$, on a log-log scale. The sloping temperature isotherms are a means to read off the modulus and loss factor values at any chosen frequency and temperature. The intersection of each isotherm with the horizontal line f = 1 Hz gives the corresponding shift factor $\alpha(T)$, which is used in later analysis. The numbers represent the modes for each data point. Figures 12, 13 and 14 show the results of the same analysis applied to test data from laboratories C, D and E, which were passed on to all participants for their evaluation at an early point in the round robin program. The same shift factor versus temperature relationship was used in each case.

Laboratory B:

This laboratory conducted tests on a material sample in extension, using a direct stiffness test system illustrated in Figure 15. Tabulated test results were not provided, but plots of Young's modulus and loss factor versus frequency, calculated from the measured force and acceleration signals, are given in Figures 16 to 22. The data at low temperatures show a large number of resonances, uncorrected for in the calculation of modulus and loss factor. The system was not sufficiently stiff, when the specimen was very stiff, to prevent spurious resonances in the frequency range of interest. As the specimen softened at higher temperatures, the spurious resonances tend to disappear, but one new resonance appears at temperatures above 30°C, corresponding to a resonance of the aluminum block/force transducer/coil mass with the specimen as the resilient element. This resonance could have been allowed for in the manner of equation (3) earlier, but apparently was not. Only a few numerical data points were readable from the graphs, in the frequency ranges indicated, and these are summarized in Table 11.

Laboratory C:

This laboratory conducted tests on a commercial direct stiffness system, namely a Polymer Laboratories DMTA system, with both single and dual cantilever specimens. Test results for Young's modulus and loss factor at several frequencies and temperatures are summarized in Table 12. Tests in shear were conducted using an in-house developed direct stiffness system called the High Frequency Shear Modulus Apparatus (HFSMA), and the results are summarized in Table 13. No analysis of the test results was performed.

Laboratory D:

This laboratory conducted tests on an in-house direct stiffness test system illustrated in Figure 23 for both shear and extensional configurations. The specimens were bonded to the grips by means of Loctite Prism 499 Gel high-temperature instant adhesive. Cooling was achieved by means of compressed carbon dioxide and liquid nitrogen, and heating by means of electrical heating coils. Test results for both shear and ex ension are summarized in Table 14. Temperature/frequency analysis of the Laboratory D test data was also conducted, and the results are summarized in Figures 24 and 25. The shift factors used are plotted versus temperature in Figure 26, and were curve-fitted by Laboratory D using the following equation:

$$\log[\alpha(T)] = A_0 + A_1 (T-T_0) + A_2 (T-T_0)^2 + A_3 (T-T_0)^3 \qquad (15)$$

with $A_0 = 0.09195$, $A_1 = -0.11212$, $A_2 = 7.1614E-4$, $A_3 = -2.6621E-6$. Laboratory D also conducted temperature/frequency analysis of data from laboratories A,C,D and E, and resulting nomograms are plotted in Figures 27 to 30.

Laboratory E:

This laboratory conducted tests using various vibrating beam configurations, illustrated in Figures 31 and 32, the Metravib Viscoelasticimetre, illustrated in Figure 33, and by several other techniques including a low frequency direct stiffness (impedance) system and creep. Figures 34 and 35 illustrate the frequency and temperature ranges spanned by the tests. Test results are listed in Tables 15 to 26, for both shear and extensional deformation. Some tests were conducted to establish the linearity of the dynamic response behavior of a sample of the test material, and results are illustrated in Figures 36 and 37. Laboratory E conducted frequency-temperature analysis of its data, mainly using an Arrhenius type of shift factor relationship:

$$\log \alpha(T) = \frac{T_A}{T} - \frac{T_A}{T_0} \qquad (16)$$

with T_0 the reference temperature and $T_A = Q/2.303R$ the "Activation Temperature," based on the activation energy

Q and the Universal Gas Constant R. Figure 38 shows the temperature/frequency nomogram obtained from application of T_A = 13500°R (7500°K) and T_0 = 80°F (26.6°C) to the data obtained by Laboratory E from vibrating beam tests in shear. Figure 39 shows the corresponding nomogram for impedance data and Figure 40 shows that for combined beam and impedance data. Figure 41 shows the nomogram for beam and creep data. Figures 42 and 43 show the effect of using nonoptimal values of T_A, namely T_A = 8000°R in Figure 42 and T_A = 20000°R in Figure 43. The separation of the low frequency data (creep) and the higher frequency data (beam) is evident and illustrates the need to carefully estimate T_A. Figure 44 shows a nomogram of the extensional data obtained by the homogeneous beam technique, Figure 45 that obtained by the Oberst beam technique and Figure 46 that obtained by the low frequency impedance technique. Figure 47 shows the nomogram for all extensional data from vibrating beam tests, Figure 48 from Oberst beam, homogeneous beam and impedance tests in extension and Figure 49 that for shear and extension data obtained by vibrating beam techniques only. Laboratory E also conducted frequency/temperature analysis of the data provided in shear by Laboratories A, C, D and E. Resulting nomograms are shown in Figures 45 to 53, for Laboratories A, C, D and E (shear impedance data only), respectively. The nomogram for the combined data sets is shown in Figure 54.

Laboratory F:

This laboratory conducted tests using an in-house direct stiffness test system. Test results are summarized in Table 27 for shear deformation. These data were subjected to frequency-temperature analysis, and results are plotted in Figures 55 to 62 for 1,2,7 and 12 iterations of the software. Of particular interest is the evolution of the plots of shift factor and apparent activation energy with temperature in Figures 56, 58, 60 and 62. Laboratory F also conducted frequency-temperature analysis of the data provided from Laboratories A, C and E. Resulting Master Plots and shift parameters are summarized in Figures 63 to 70.

Laboratory H:

This laboratory conducted the tests using a Polymer Laboratories DMTA system, in both shear and extension. Test results are summarized in Tables 28 and 29. Both tensile and cantilever specimens were used to measure Young's modulus at various frequencies and temperatures. No data analysis was provided.

Laboratory J:

This laboratory conducted tests using a nonresonant forced vibration system (MTS 831.50 Elastomer Test System), with tensile test specimen configurations. Test results are summarized in Tables 30 and 31. A correction was applied to the measured Young's modulus, but not apparently to the loss factor, to allow for finite stiffness of the test system. No data analysis was provided.

Laboratory L:

This laboratory conducted the tests using a Fitzgerald test system, as illustrated in Figure 71 [7]. In this figure are illustrated (A) the top view of the drive plate and (B) the front and side views of the sample clamp and drive plate. The sample clamp jaws, J, are moved in or out by graduated captive dials threaded on the screws; the force coil 1 and velocity coil 2 are shown schematically by dashed lines. Magnetic fields of permanent magnets, not shown, are indicated by paths B_1 and B_2. The drive plate is suspended by fine wires, not shown, so that it can vibrate as noted when alternating currents are passed through the force coil 1. With samples pressed against it, the measured mechanical impedance, Z_M, of the driving plate consists of a sample impedance, Z_{MS}, in series with an intrinsic driving plate. A typical calibration curve is illustrated in Figure 72 and a typical calibration data set is summarized in Table 32. Some scatter in calibration was observed, as illustrated in Figure 73. Some of the test results are summarized in Table 33. Other test results were provided but are not included because they essentially repeat the same test temperatures. No data analysis was provided.

Laboratory M:

This laboratory conducted the tests using a Metravib Viscoelasticimetre system, in both shear and extension. Test results are summarized in Tables 34 and 35. No data analysis was provided.

Laboratory N:

This laboratory measured the complex modulus properties in shear by means of an in-house direct stiffness test system. Results are summarized in Table 36. No data analysis was provided.

Laboratory O:

This laboratory conducted tests in extension, using a Rheovibron DDV-III-C system as illustrated in Figure 74, at 3.5 and 110 Hz and at various temperatures, and in shear using a Rheometrics RDA II system. Results are summarized in Tables 37 and 38. Plots of E',E" and η are plotted against temperature at 3.5 Hz in Figure 75 and at 110 Hz in Figure 76. Scatter at high temperatures is evident, especially at 3.5 Hz. No additional data analysis was provided.

Laboratory P:

This laboratory conducted the tests in shear, using a Rheometrics RDA II system. Results are summarized in Table 39. No data analysis was provided.

Laboratory Q:

This laboratory conducted the tests in flexure (extensional modulus), using a TA Instruments (DuPont) DMA 983 Analyzer. Results are summarized in Table 40. No data analysis was provided.

Laboratory R:

This laboratory conducted the tests in extension, using a DuPont DMA 983 test system and an in-house nonresonant forced vibration system, as illustrated in Figure 77. Test results are summarized in Tables 41 and 42. No data analysis was provided.

Laboratory T:

This laboratory conducted the tests in extension, using a Polymer Laboratories DMTA direct stiffness system. Test results are summarized in Table 43. A plot of loss factor versus log Young's modulus is provided in Figure 78, a master curve of log shear modulus (derived from E/3) and log loss factor versus log reduced frequency is given in Figure 79 and a plot of log shift factor versus temperature is given in Figure 80.

WICKET PLOT ANALYSIS

Qualification of Complex Modulus Data

When one has obtained a set of complex modulus data for a specific material for a sufficiently wide range of frequencies and temperatures, one often has not had the opportunity to examine all possible sources of error. The plot of log (loss factor) versus log (modulus), known as the "wicket plot," has become the Occam's Razor of test data evaluation, since potentially erroneous data often stands out extremely clearly. Figure 81 illustrates an idealized wicket plot. In this plot, the main sequence of data, if good, will tend to outline a unique relationship between loss factor and modulus. Points, or sets of points, which are well away from the main sequence are subject to question. For example, test data obtained by direct stiffness techniques often have a tendency to drop away from the main sequence for high modulus values because of the finite specimen stiffness approaching or exceeding the measuring system stiffness. Data obtained by indirect techniques, such as the resonant beams, will often tend to deviate from the main sequence at low modulus values because of error magnifications.

Analysis of the suspect points in the test data will often provide sufficient justification for rejecting those particular points. Sometimes individual points will deviate from the main sequence for no apparent reason, and must be rejected even without documented cause unless one is fortunate enough to have an extraordinarily complete record of the original tests. When such data are available, such points are often found to be due to isolated resonances superimposed on the main resonance (especially for indirect techniques), distorted signals in the measurement system, occasional errors in writing down the data when taken manually (not so common these days) etc. Unless one is extremely unfortunate, a sufficient number of points will remain to conduct frequency/temperature analysis of the data with a fair degree of confidence that the method of reduced variables will lead to satisfactory master curves in the well known manner.

Laboratory by Laboratory Analysis

Laboratory A:

Figure 82 shows the wicket plot for Laboratory A data in shear, measured by vibrating sandwich beam technique, on a mode by mode basis. There appears to be no modal basis to account for the scatter, although a few points for mode 3 and mode 4 appear to be the worst cases. Figure

83 shows the same wicket plot with points identified on the basis of the particular metal beams used in the sandwich configuration. Again, apart from one or two points, no reason for the scatter can be determined. Finally, in Figure 84, the points are identified on a temperature-by-temperature basis. The greatest scatter is evident for one point at 40°C, one at 0°C and another at 20°C, but it is difficult to account for most of the scatter. This appears to be characteristic of vibrating beam techniques: with care, scatter can be minimized but occasional points differ widely from the main sequence for no apparent reason. Figure 85 shows the wicket plot for data in extension. Scatter is minimal, but only a limited range of values of the Young's modulus is measurable. These data in shear are sufficient to characterize the material properties as a function of frequency and temperature, although the scatter is somewhat greater than desired.

Laboratory B:

The few data points available for this laboratory are plotted in Figure 86. It is seen that the wicket plot is not sufficiently complete to evaluate the quality of the data, and it is clearly not sufficient to evaluate the material properties as a function of frequency and temperature.

Laboratory C:

Figure 87 shows the wicket plot for this laboratory, in shear. The scatter is minimal, and the data appears to be very reliable. However, in comparison with Laboratory A data at high modulus values, and that for other laboratories to be examined presently, the asymptotic value of the high modulus end of the plot may be a little low. Since the technique used for measurement was a direct stiffness system, a high specimen to system stiffness ratio may be a factor. Figure 88 shows the corresponding wicket plot for extensional deformation. The scatter is low at high modulus values, but the data below 10 MPa seem to be unreliable, probably because the low stiffness values combined with long thin specimens made measurement difficult.

Laboratory D:

Figure 89 shows the wicket plot for shear deformation. The points generally appear to be satisfactory, except that at low modulus values there is some apparent systematic deviation as the temperatures increase, and the asymptotic modulus value at the high modulus end may be systematically underestimated as a result of high specimen to system stiffness ratios. The deviations at low modulus values may be related to the peculiar thermal expansion behavior noted earlier at temperatures above 40°C. Figure 90 shows the corresponding wicket plot in extension. Similar effects occur as in shear. Apart from these factors, there appears to be a sufficient data range for frequency-temperature analysis.

<u>Laboratory E:</u>

Several test techniques were employed by this laboratory, so the wicket plots are displayed in several different ways. Figure 91 shows the wicket plot for data measured in shear by the sandwich beam technique. Some scattered points are observed for mode 2 at G 100 MPa, for modes 3, 5 and 6 at $G \sim 10$ MPa and for modes 2 to 4 for $G < 1$ MPa, but it is difficult to account for these particular deviations on a modal basis. Figure 92 shows the wicket plot for shear data measured by direct stiffness and resonance techniques. Some of the resonance points appear to be in error, and some of the data measured by the Viscoelasticimetre and the High Frequency Impedance technique at values of G below 1 MPa have some scatter, which may be related to the anomalous thermal expansion behavior above 40°C. The asymptotic value of G at the high modulus end is somewhat lower than that from the resonant sandwich beam technique, probably because of high specimen to system stiffness ratios. This is more apparent in Figure 93, where data from sandwich beam and impedance techniques are combined. In this case, the creep (time domain) method also gives excessive scatter at values of G below 1 MPa. Figure 94 gives the wicket plot for all data in shear as a function of temperature, at 10°C intervals. In this case, the shifting of data sets above 40°C is more clearly seen, again suggesting that thermal expansion of the specimen is affecting the data. Figure 95 shows the wicket plot in extension, for data obtained by various techniques. The resonance data appears to have excessive scatter, along with some isolated points for the Oberst cantilever. Figure 96 gives the same data plotted as a function of temperature. The systematic shifting at temperatures above 40°C is again apparent, adding credibility to the possibility of thermal expansion affecting the test results.

<u>Laboratory F:</u>

Figure 97 shows the wicket plot for this laboratory. It is seen that some of the data at low values of G is slightly shifted at high temperatures, again possibly due to the anomalous thermal expansion behavior above

40°C. Also, no data are available above G=200 MPa, as a result of high specimen stiffness.

Laboratory H:

Figure 98 shows the wicket plot for this laboratory as a function of each particular test. A few points for test WP-1 have high scatter, and most points for test WP-11 are "displaced" to the left, for no apparent reason. Figure 99, however, shows the same data plotted as a function of test temperature, and the shift of the data at low values of G is seen to be once again associated with temperatures above 40°C, i.e., thermal expansion effects. Also seen is a very low upper bound for G, less than 100 MPa, associated with high specimen to system stiffness ratios. No correction for this systematic deviation is possible unless the system stiffness is known. Figures 100 and 101 show the wicket plots for extensional behavior. Some scatter occurs, mainly at temperatures above 40°C.

Laboratory J:

Figure 102 shows the wicket plot for extensional deformation. The upper asymptotic value of G is somewhat low, probably because of a high specimen to system stiffness ratio. At the low G end of the plot, some high temperature points are again shifted, probably because of thermal expansion effects, and the points for 20°C seem to be in error, for an unknown reason.

Laboratory L:

Figure 103 shows the wicket plot for shear deformation. The data for frequencies above 900 Hz leave the main sequence and curve back toward the left, and this is probably because of errors arising when small differences between large numbers occur in the equations used to calculate the complex modulus properties. The data for $G > 100$ MPa also seem to be unreliable, probably because of high specimen stiffness.

Laboratory M:

Figure 104 shows the wicket plot for shear deformation. These data are limited at the high G end, probably by specimen stiffness effects, and at the low G end by "shifts" of the data points to the left at temperatures above 40°C, probably as a result of thermal expansion effects. Figure 105 shows the wicket plot for extensional deformation. The same effects occur, though to a lesser degree, because of the long, thin, cylindrical specimen.

Laboratory N:

Figure 106 shows the wicket plot for extensional deformation. Again, the shifting at temperatures above 40°C is clearly seen. This is clearly associated with the anomalous thermal expansion behavior, which may or may not also be associated with chemical changes in the specimen. A low upper asymptotic value of G may also be seen.

Laboratory O:

Figure 107 shows the wicket plot for shear deformation. The data at low values of G appear to be satisfactory, except for some points at 40°C. The upper asymptote for G is low, again because of specimen stiffness effects. Figure 108 shows the wicket plot for extensional deformation. The upper asymptote for E is low compared with some previous results and the data at values of E less than 10 MPa is subject to considerable scatter, probably because the specimen is too soft for the apparatus to measure excitation forces. Figure 109, which shows the same wicket plot with points identified by temperature, shows again some shifting to the left at temperatures above 40°C.

Laboratory P:

Figure 110 shows the wicket plot for shear deformation. Some systematic deviation from the main sequence occurs at the higher test frequencies, for unknown reasons, and the upper asymptotic value of G is low, probably because of specimen stiffness effects.

Laboratory Q:

Figure 111 shows the wicket plot for extensional deformation, for two strain amplitude levels. The points agree well with data from other laboratories from about 20 MPa to over 1000 MPa, as would be expected. Major deviations occur below 20 MPa because of the extremely low stiffness of the sample, having a 10:1 length to thickness ratio.

Laboratory R:

Figure 112 shows the wicket plot for extensional deformations. The upper asymptotic value of E, as measured by the DuPont DMA 983 system, is comparable to that measured for Laboratories A and E. No data are available for $E < 6$ MPa. Some points for the forced vibration test clearly deviate from the main sequence.

Laboratory T:

Figure 113 shows the wicket plot for extensional deformations. Points above 50°C deviate from the main sequence, again probably because of thermal expansion effects. The upper asymptotic value of E is underestimated because of specimen stiffness effects.

TEMPERATURE BY TEMPERATURE ANALYSIS OF TEST DATA

Once the wicket plot analysis of all the data has been accomplished, and most erroneous data points eliminated, it is necessary to return to the variables of frequency and temperature to evaluate their effects. This is best done by plotting graphs of modulus and loss factor versus frequency, on a log-log scale, on a temperature by temperature basis. Figures 114 to 123 show plots of log shear modulus, log Young's modulus and log loss factor versus log frequency at 40°C, 20°C, 0°C, -20°C and -40°C. The agreement between laboratories, when errors identified by the wicket plots have been eliminated, is quite good. At 40°C, data for all laboratories identified were in good agreement, apart from a relatively small number of points. At 20°C, the data for Laboratory M begin to deviate from the main sequence because the specimen stiffness begins to approach that of the test system, and the loss factor values for Laboratory E (creep data) are high. At 0°C and below, the data for Laboratories M, O, H and E (Viscoelasticimetre) deviate more and more from the main sequence.

APPLICATION OF REDUCED VARIABLES

Figures 124 and 125 show manually generated master curves, for shear and extension, respectively, based on the combined data for all laboratories. The data which are erroneous on the basis of the Wicket plot analysis, as well as the temperature by temperature plots, have been culled. The corresponding shift factors are plotted against inverse absolute temperature in Figure 126, and are compared with shift factors given by several laboratories, as described earlier. Table 44 summarizes the results. A linear (Arrhenius) fit is added, for an Activation temperature T_A of about 8000°K. It is seen that this linear relationship quite adequately represents the available data for this material, and differences between the various laboratories lie well within the general scatter.

DISCUSSION

This Round Robin test program has identified several important precautions to be observed when conducting complex modulus tests. These include:

1. Round Robins take time! If this particular one had been completed at the originally scheduled time, as shown in Figure 1, only six laboratories' results would have been available. A wait of nearly 2 years yielded results from 10 more laboratories. The long timetable should be noted by those interested in conducting Round Robins! A short Round Robin program seems to be a contradiction in terms!

2. The wicket plots show that all direct stiffness test systems, commercial or otherwise, tend to yield under-estimates of the modulus values in the high modulus range for a material (i.e., low temperatures), because the specimen stiffness approaches or exceeds the stiffness (more accurately, the dynamic stiffness) of the "rigid" end of the test system to which the specimen is attached. This problem can be minimized by control of specimen dimensions, but cannot be eliminated. It can be allowed for if an accurate estimate is available of the system stiffness. or dynamic stiffness. Such corrections must be made, or the high modulus data can be interpreted in a qualitative manner only, even though the data may appear to be well behaved, with little or no scatter.

3. Test methods based on flexure of a beam-like specimen seem to give the best results for Young's modulus at low temperatures, i.e., at high modulus values. For example, the DuPont DMA 983 test results (Lab R), the homogeneous beam results (Lab. E) and the Oberst beam results (Laboratories A, E) are comparable for E   100 MPa. Sandwich beam tests (Laboratories A, E), at high moduli, give shear moduli consistent with a Poisson's ratio of about 0.35, providing a measure of confidence in the sandwich beam test for measuring shear moduli above 100 MPa.

4. At low shear moduli, the direct stiffness and sandwich beam techniques give comparable values, and appear to be quite reliable in most cases for $G < 100$ MPa. For the particular material used in this Round Robin, the data above about 40°C are subject to considerable uncertainty, as reflected in several of the wicket plots. This problem led to investigation of the

thermal expansion characteristics of the material, as described earlier. Anomalous behavior was found above 40°C. Care must be taken during testing to ensure that unusual thermal expansion effects, and/or chemical changes, do not occur within the test temperature range. It is recommended that thermal expansion characteristics be evaluated whenever complex modulus behavior exhibits any unusual features in the wicket plot.

5. For this particular material, the relationship between log shift factor and inverse absolute temperature is linear, i.e., of the Arrhenius type. Because of the scatter, it is difficult to identify any other relationship, such as the Williams-Landel-Ferry (WLF) equations.

The wicket plot has clearly become a unique and relatively newly identified tool for examining complex modulus data. It has become the Occam's Razor of data acceptance, in the sense that data which form a smooth wicket plot may or may not be valid, but data which are not smooth are certainly not valid, at least insofar as the material is thermo-rheologically simple. Invalid data so identified may be so because of thermal expansion effects (thermal stresses), chemical changes or true non-thermo- rheologically simple behavior. Identifying which of these possibilities is the reason for the invalid data is, of course, a matter for further testing whenever the problem occurs.

CONCLUSIONS

The completion of this round robin test program is quite an achievement in its own right, since round robins very frequently die on the way to completion. This report reflects the input of many individuals in the form of data and analysis, as well as the integration efforts of the author, and is the outcome of over 6 years of elapsed time from inception to completion. The lessons learned have been of value to several of the participants, and should be helpful to many readers concerned with accurate complex modulus measurements. The identification of various types of systematic error with the wicket plot patterns has been particularly helpful. It is hoped that users of the various types of equipment analyzed in this round robin program will recognize that the errors are frequently associated with choices of specimen size which are appropriate under one set of conditions but are not appropriate under other conditions which are encountered as temperature and/or frequency change. It is clear that every test system, when used under appropriate conditions and with appropriate specimens, gives accurate and repeatable results.

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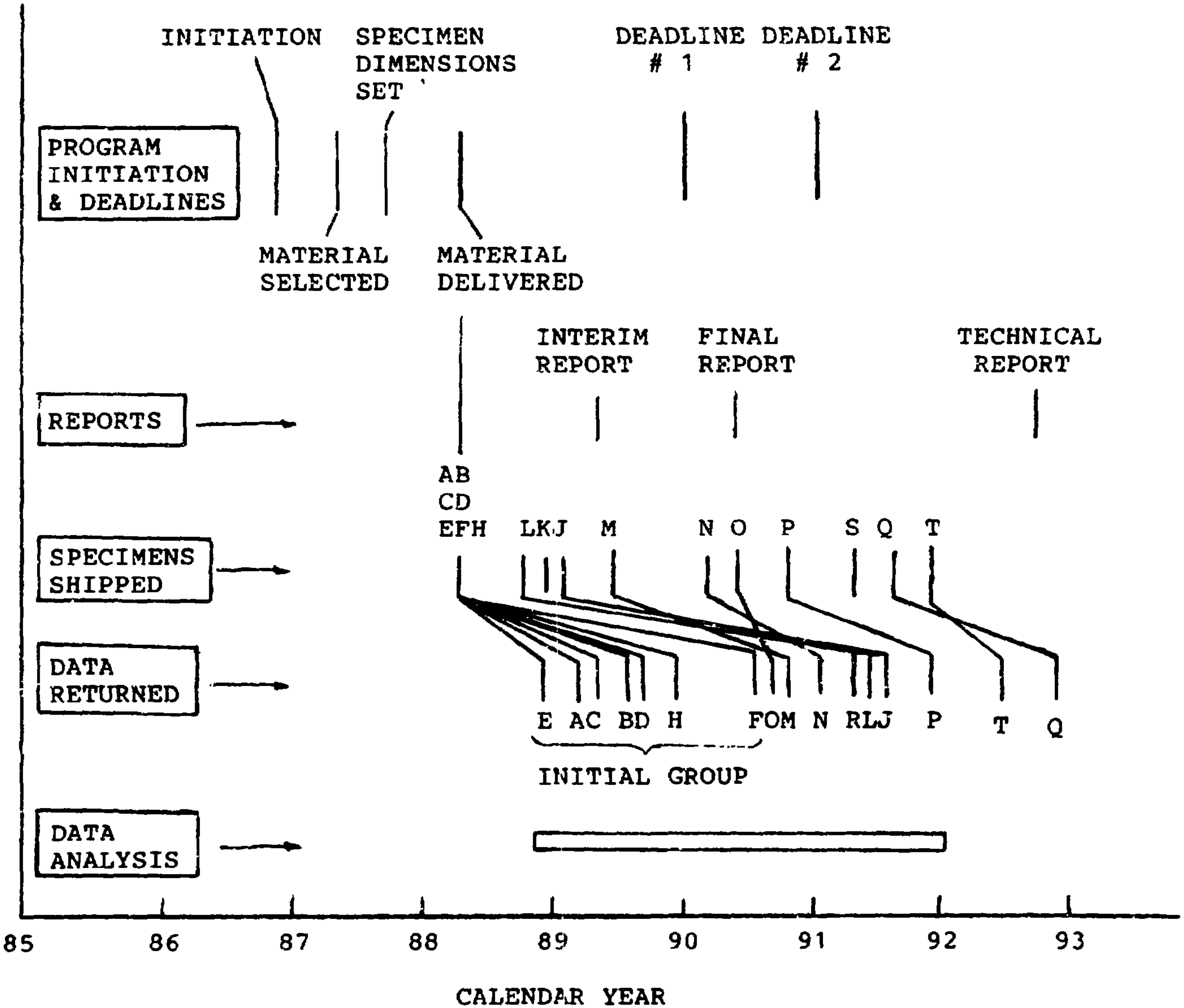
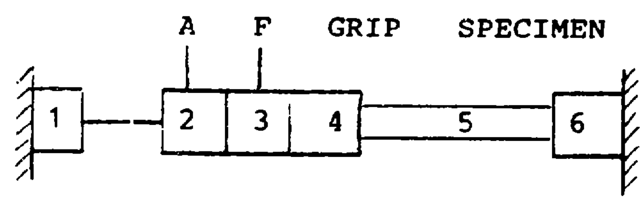


Figure 1. Timetable of Round Robin Program Events

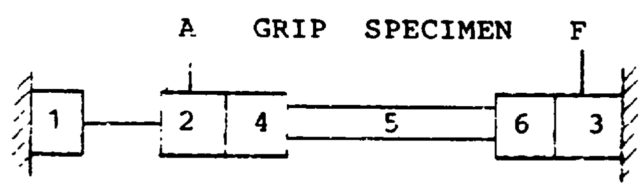


1 - Driver

2 - Accelerometer

3 - Force Gage

(1) Driving point impedance system



4,6 - Grips

5 - Specimen

(2) Transfer impedance system

Figure 2. Driving Point and Transfer Impedance Systems

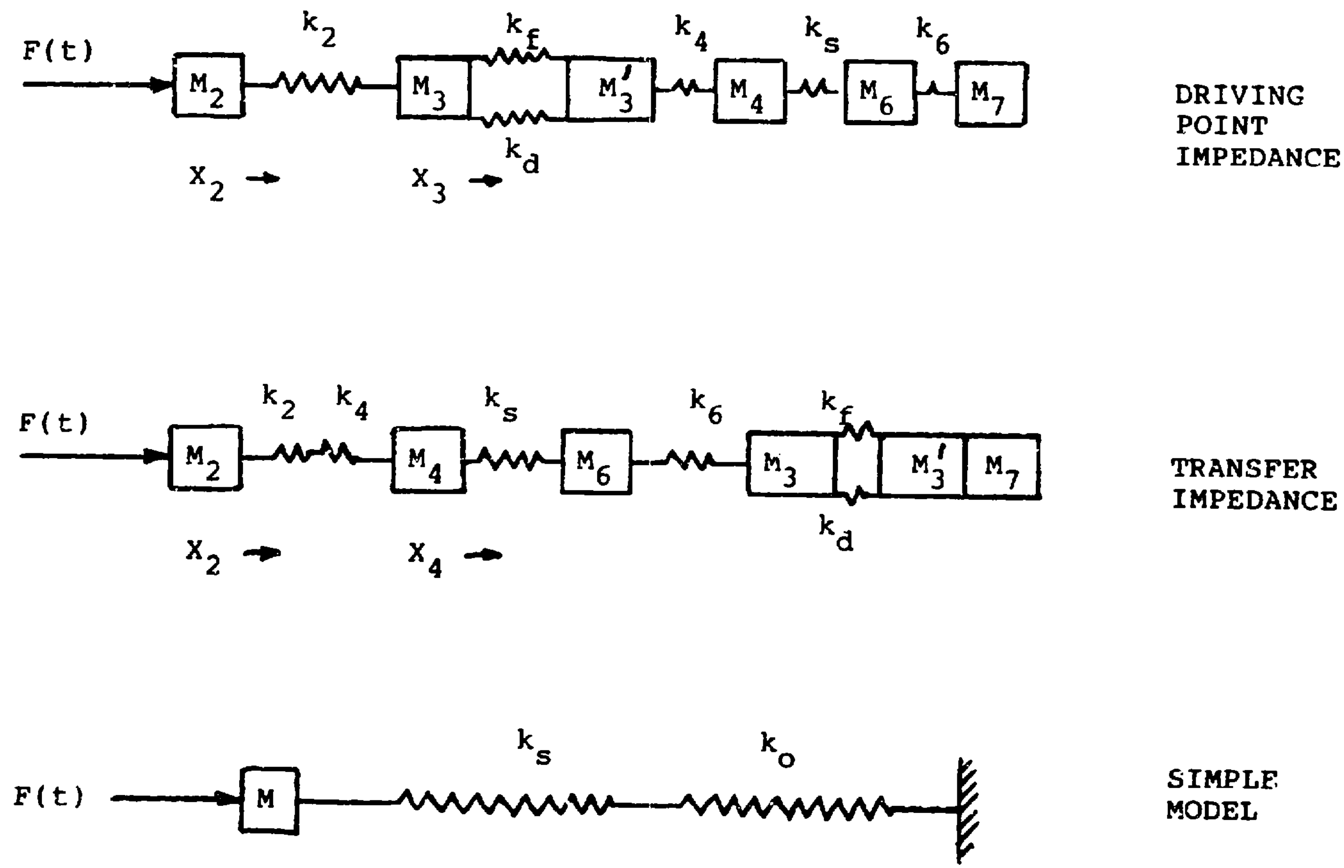


Figure 3. Models of Driving Point and Transfer Impedance Systems

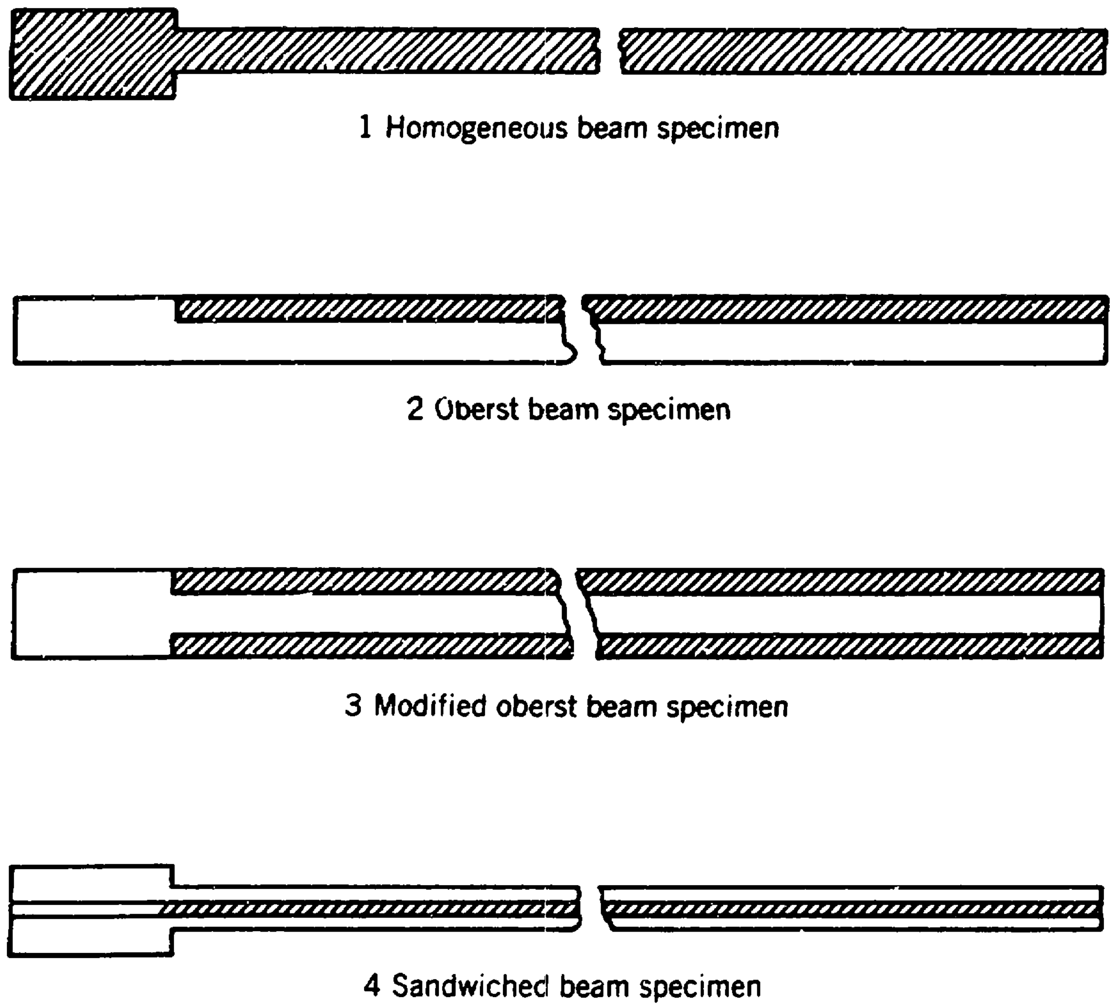


Figure 4. Vibrating Beam Test Configurations

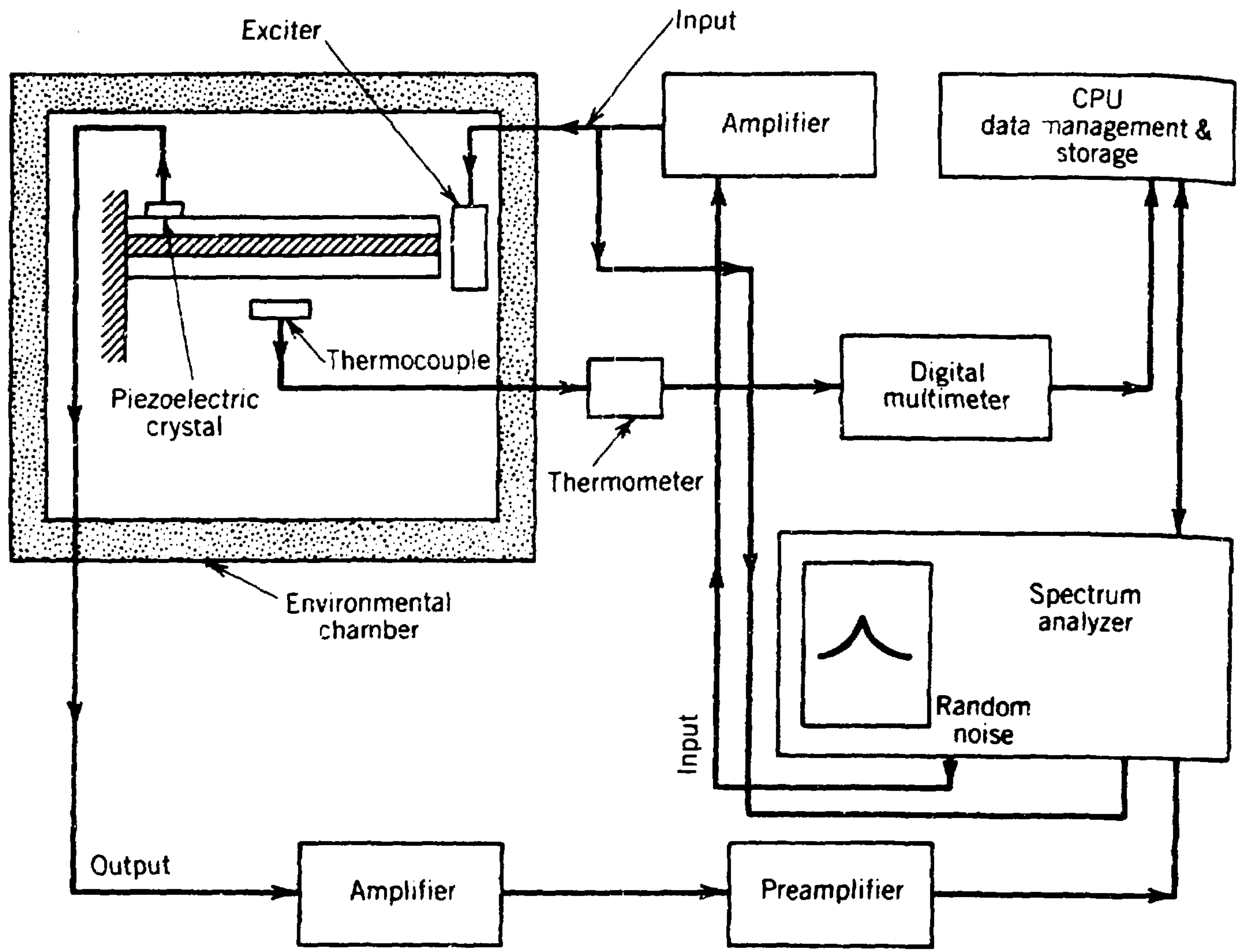


Figure 5. Block Diagram of Typical Vibrating Beam Test Setup

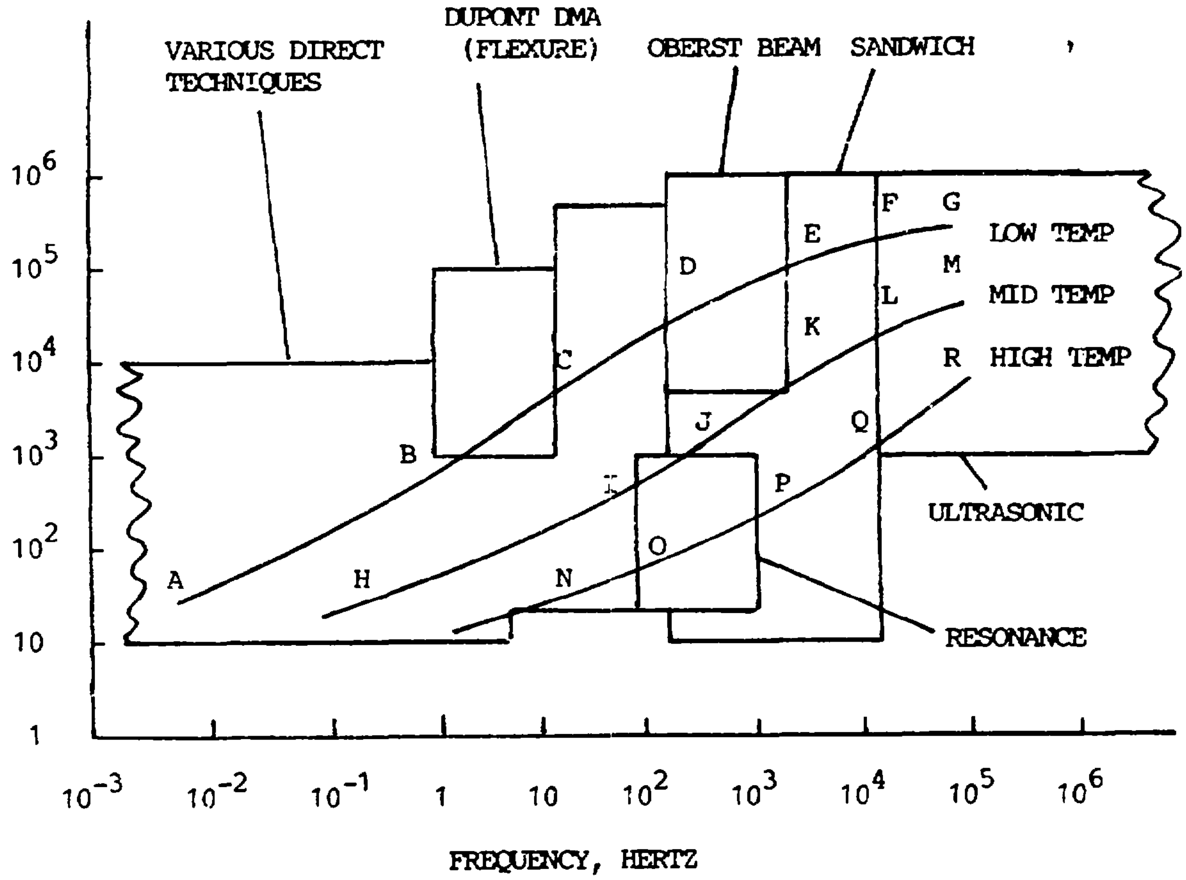


Figure 6. Zones of Applicability of Various Test Techniques

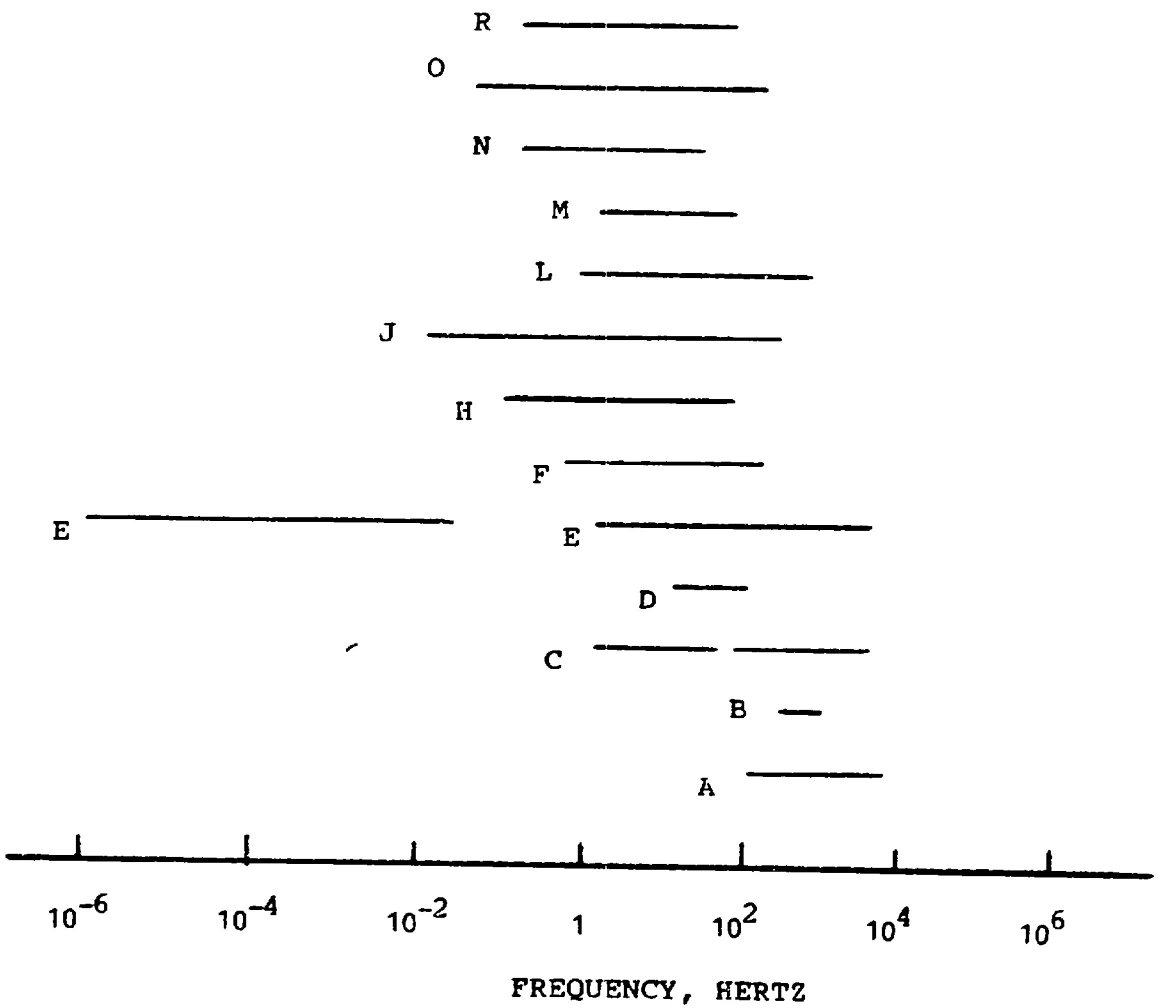


Figure 7. Frequency Ranges Evaluated by Each Laboratory

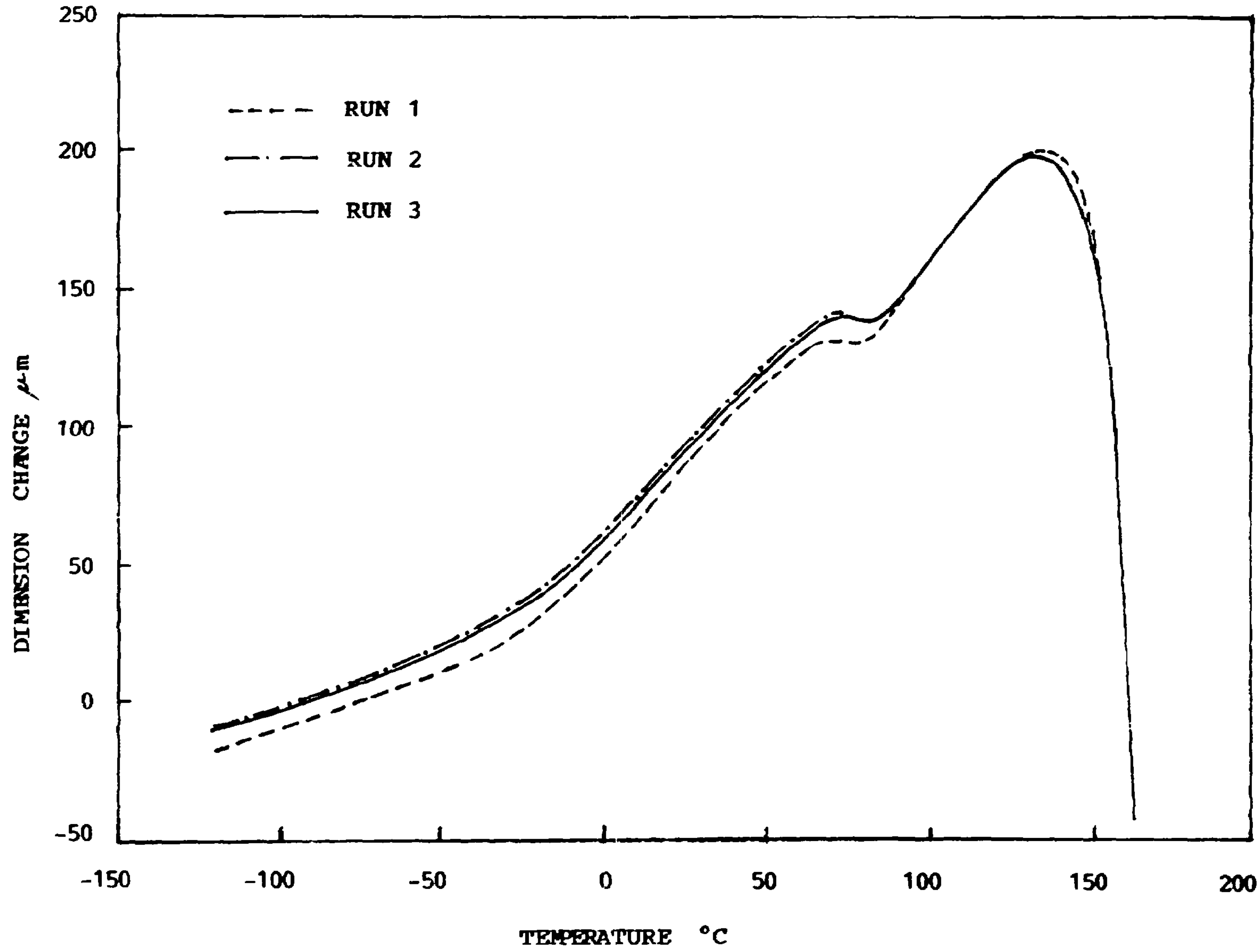


Figure 8. Measured Dimensional Change Versus Temperature

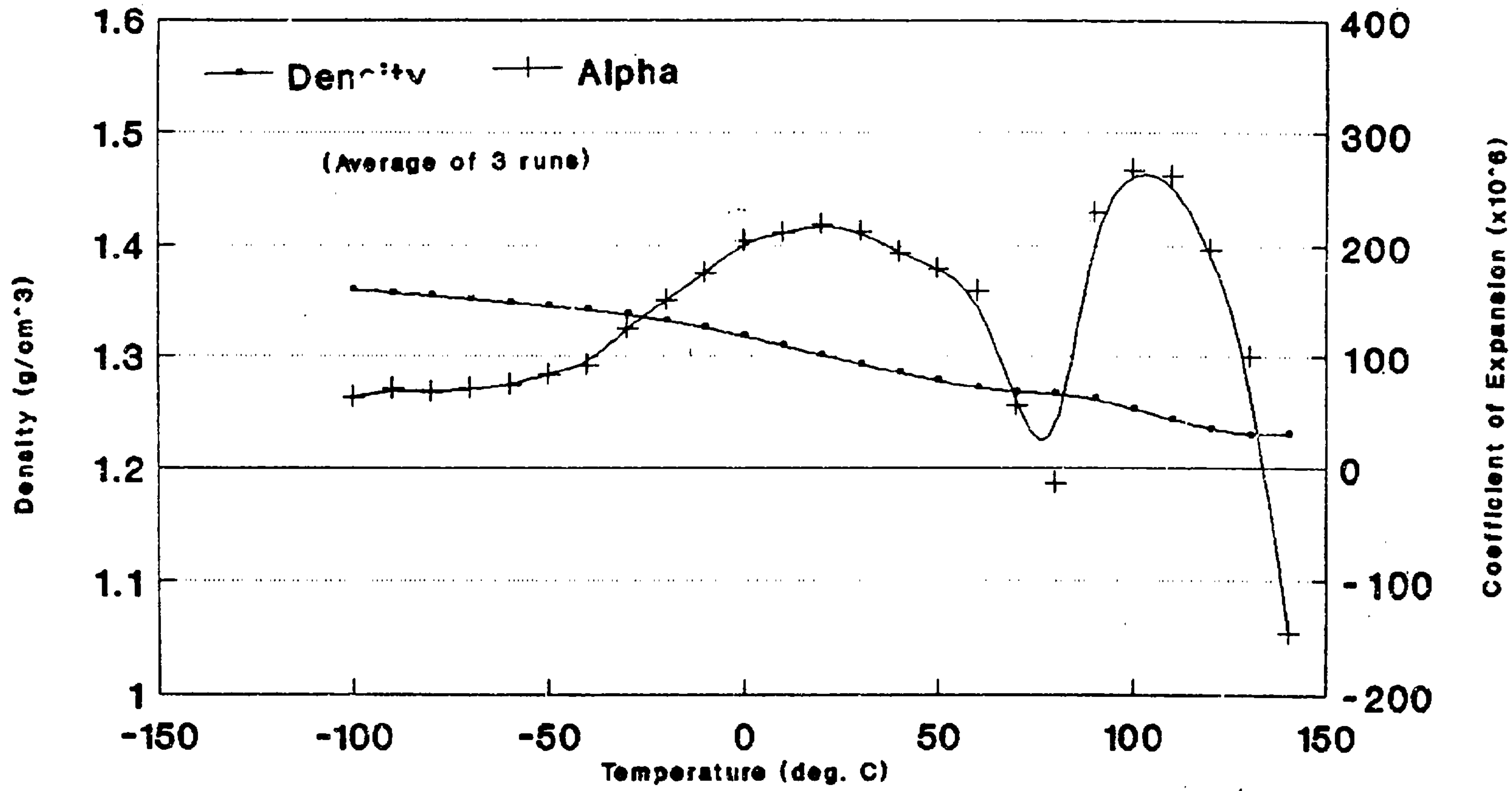


Figure 9. Thermal Expansion Coefficient and Density Versus Temperature

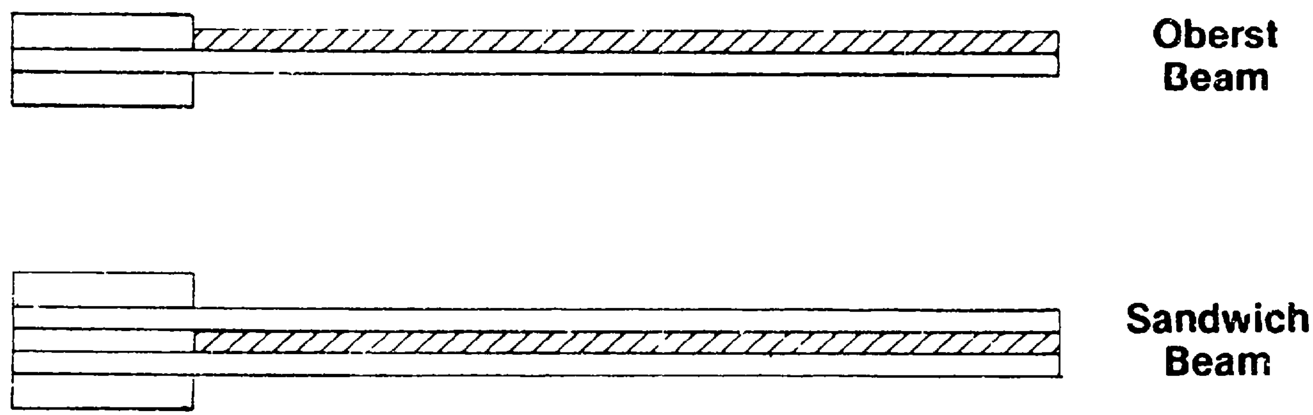


Figure 10. Beam Configurations Used by Laboratory A

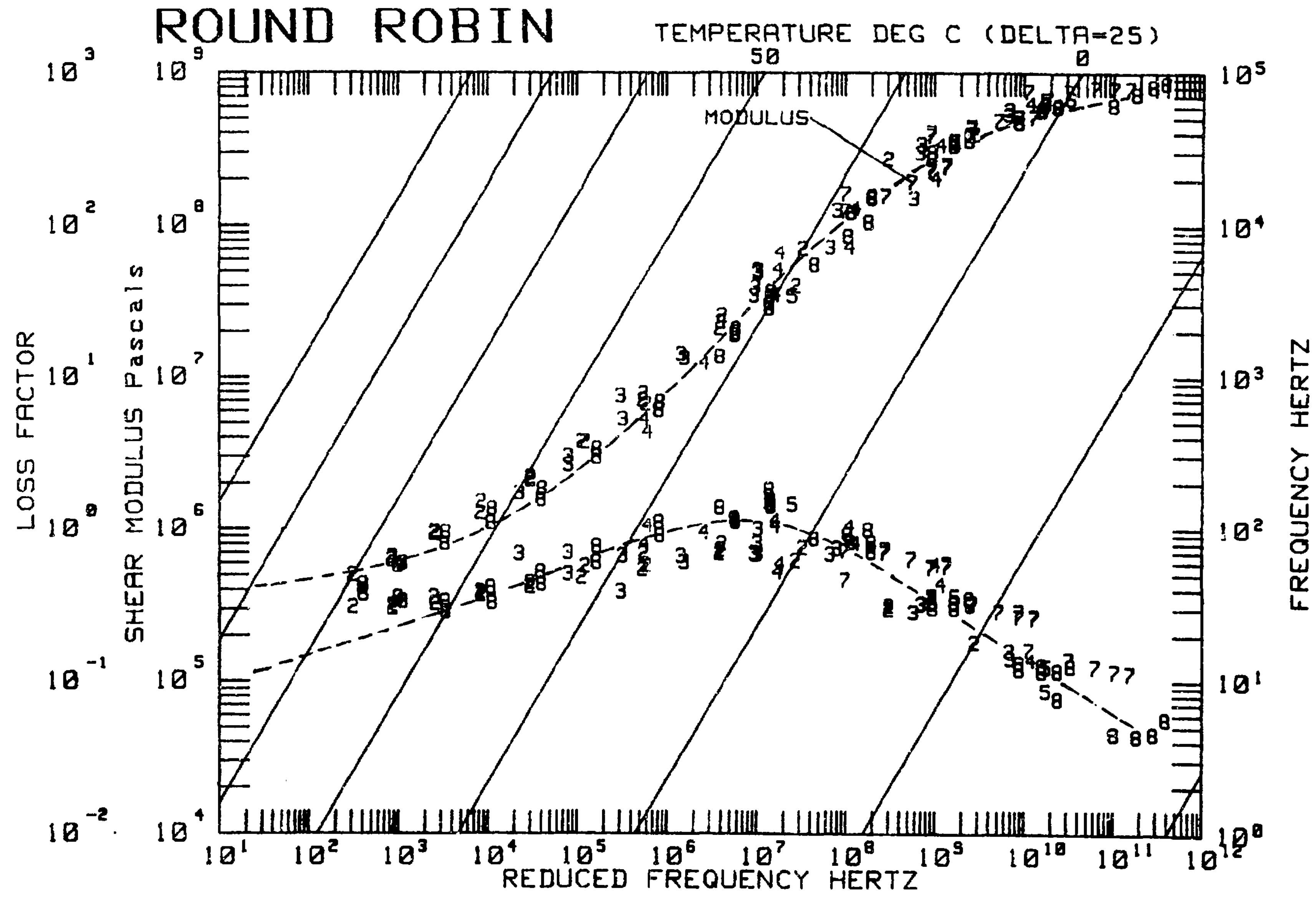


Figure 11. Frequency-Temperature Nomogram for Laboratory A Test Data as Analyzed by Laboratory A (Numbers represent modes)

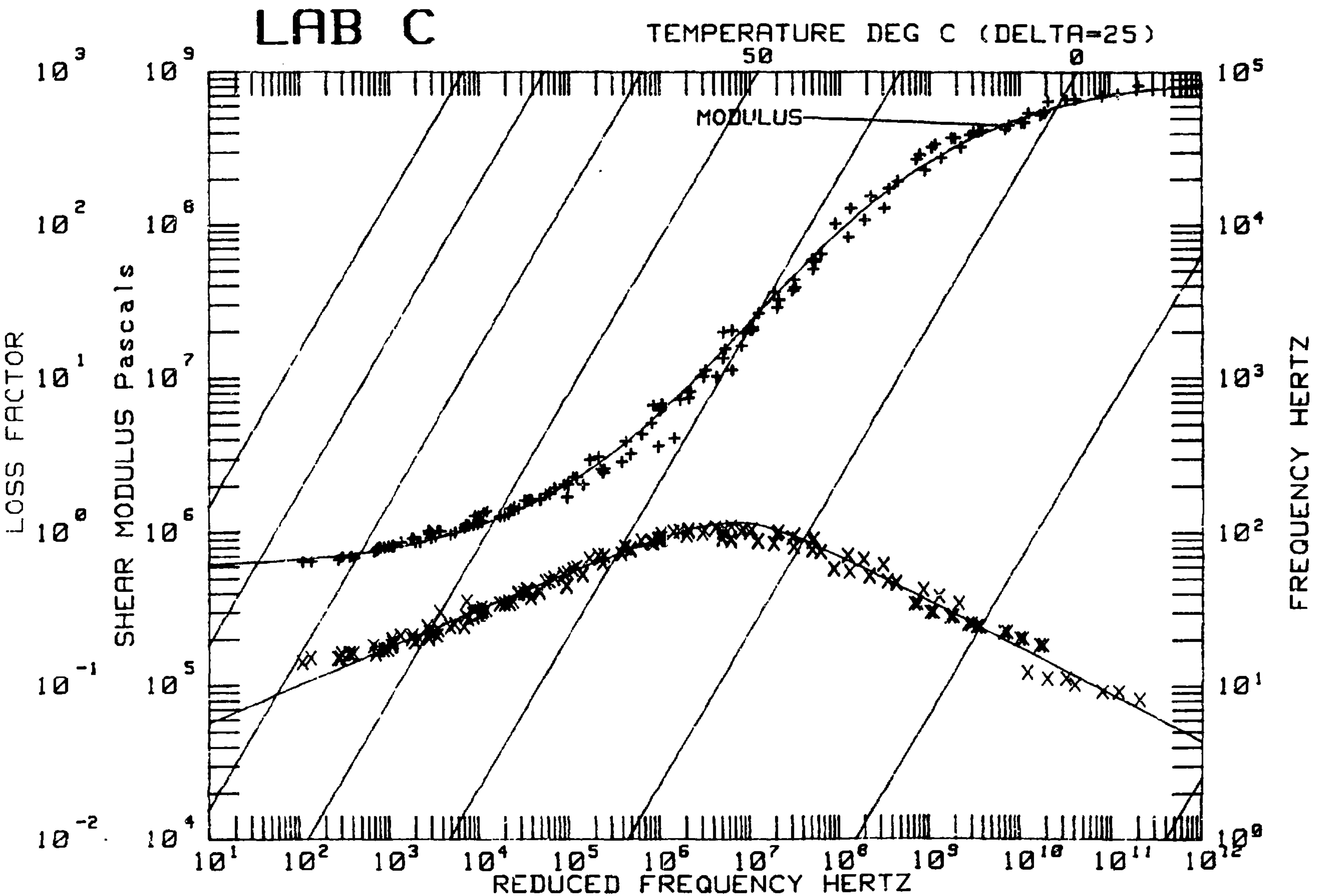


Figure 12. Frequency-Temperature Nomogram for Laboratory C Test Data as Analyzed by Laboratory A

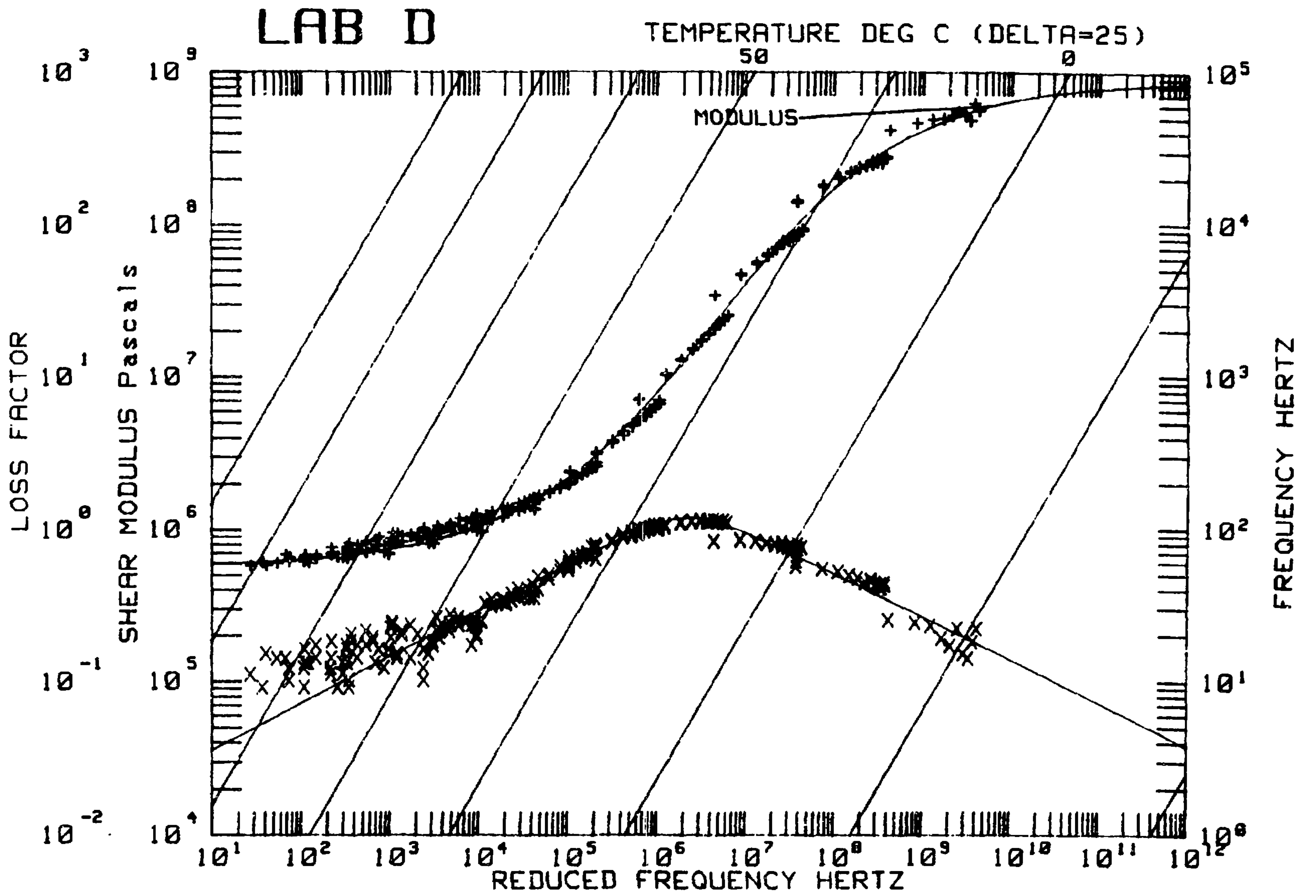


Figure 13. Frequency-Temperature Nomogram for Laboratory D Test Data as Analyzed by Laboratory A

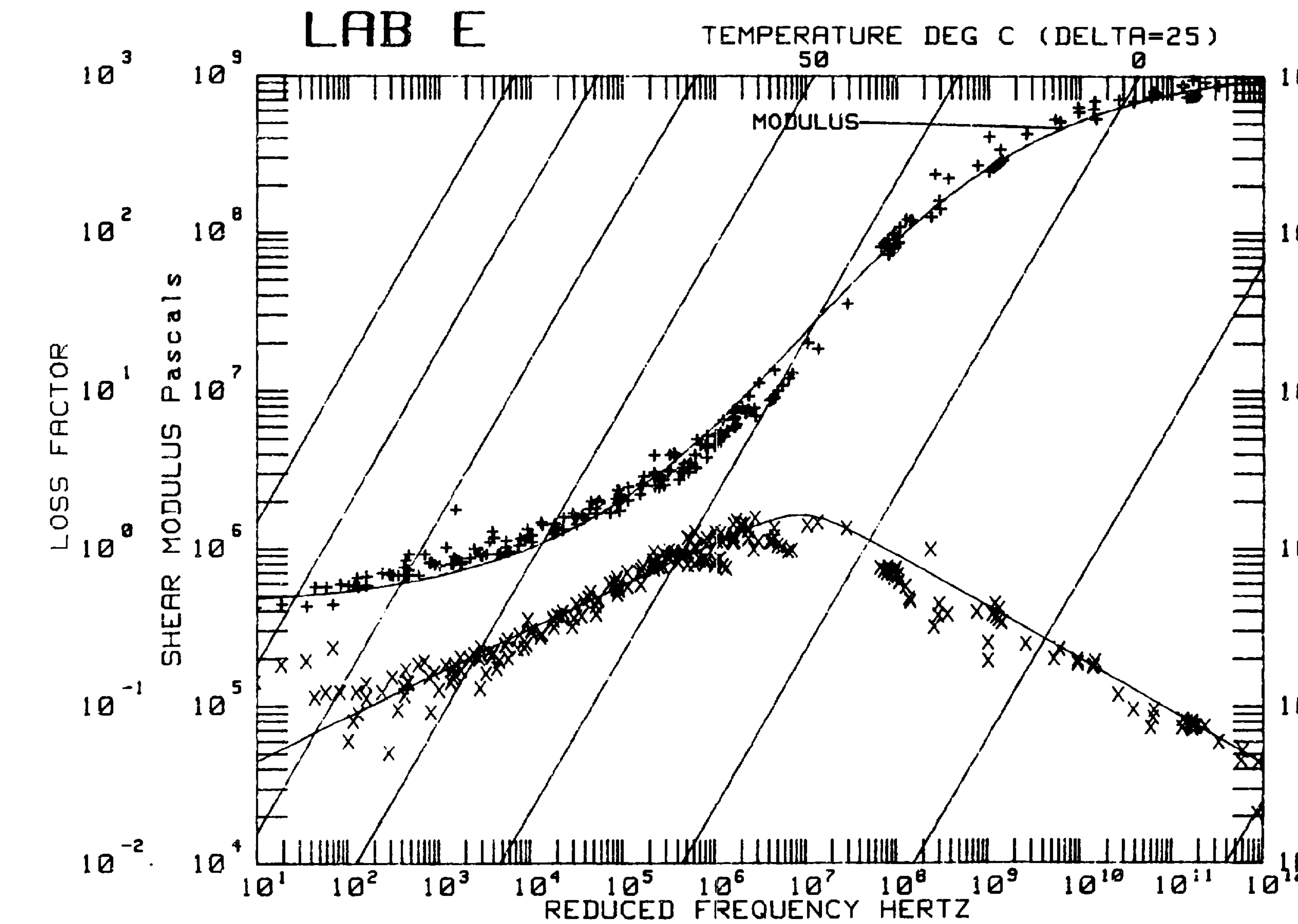


Figure 14. Frequency-Temperature Nomogram for Laboratory E Test Data as Analyzed by Laboratory A

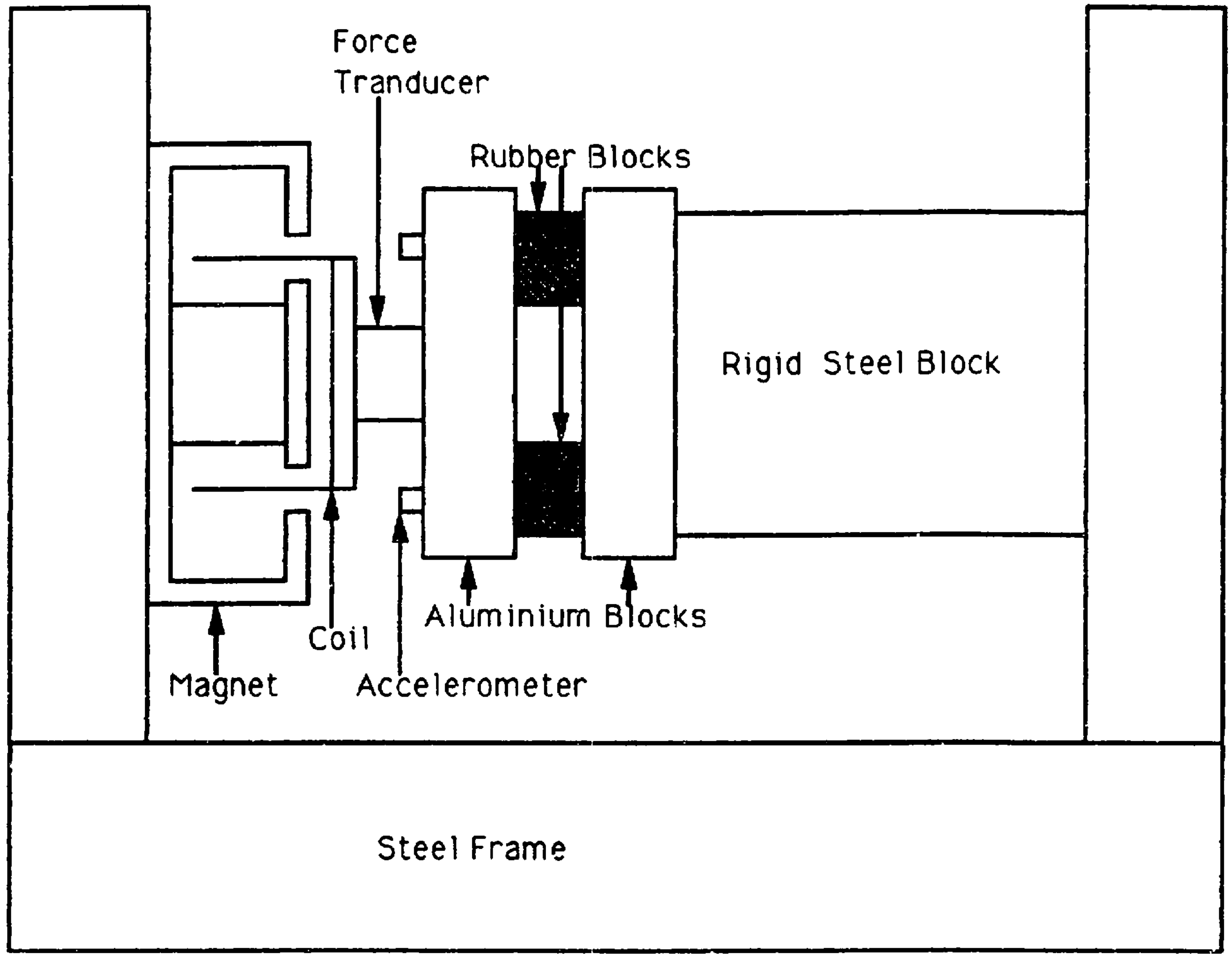


Figure 15. Test System Configuration Used by Laboratory B

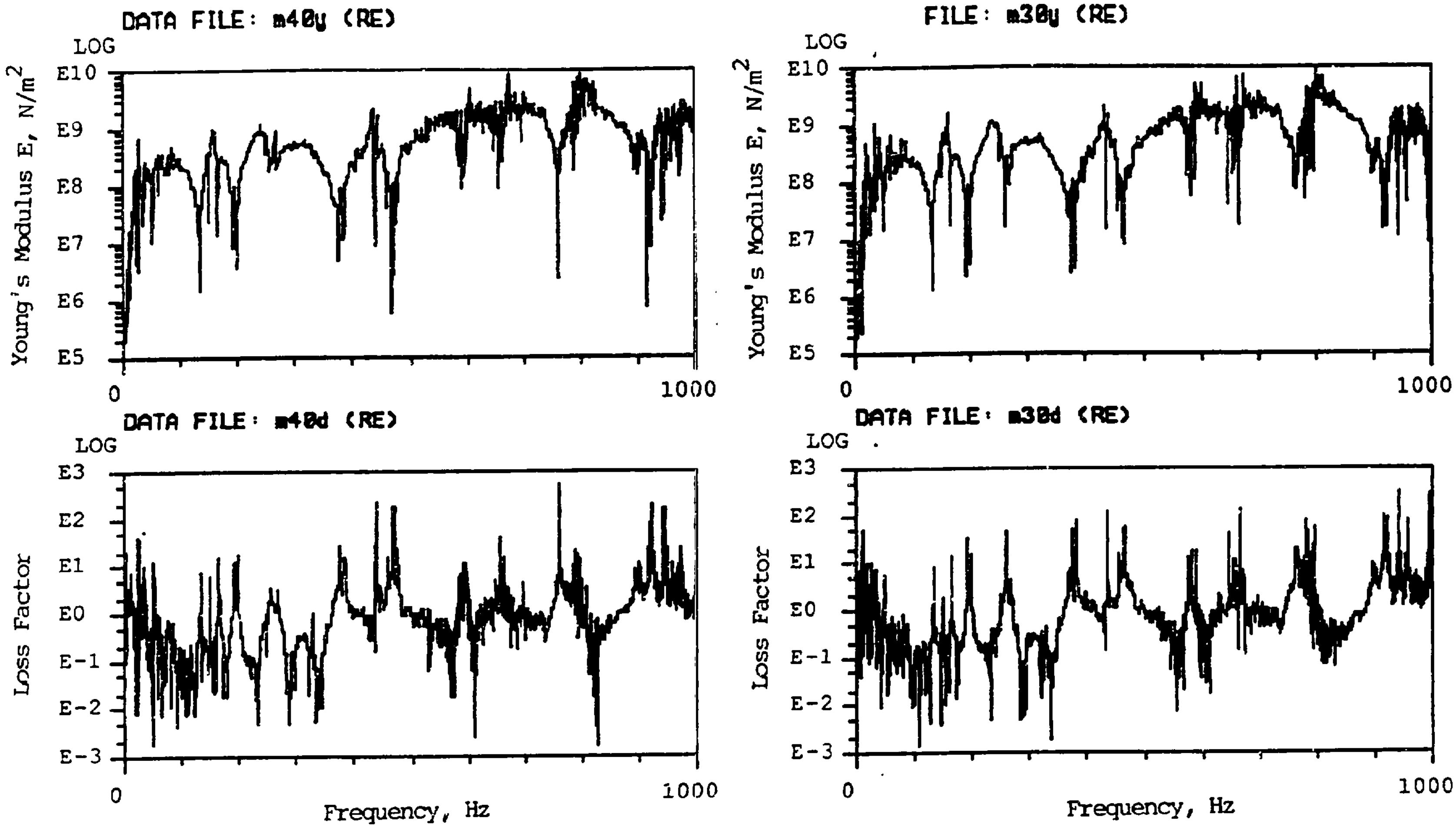


Figure 16. Plots of Young's Modulus and Loss Factor Versus Frequency for Laboratory B

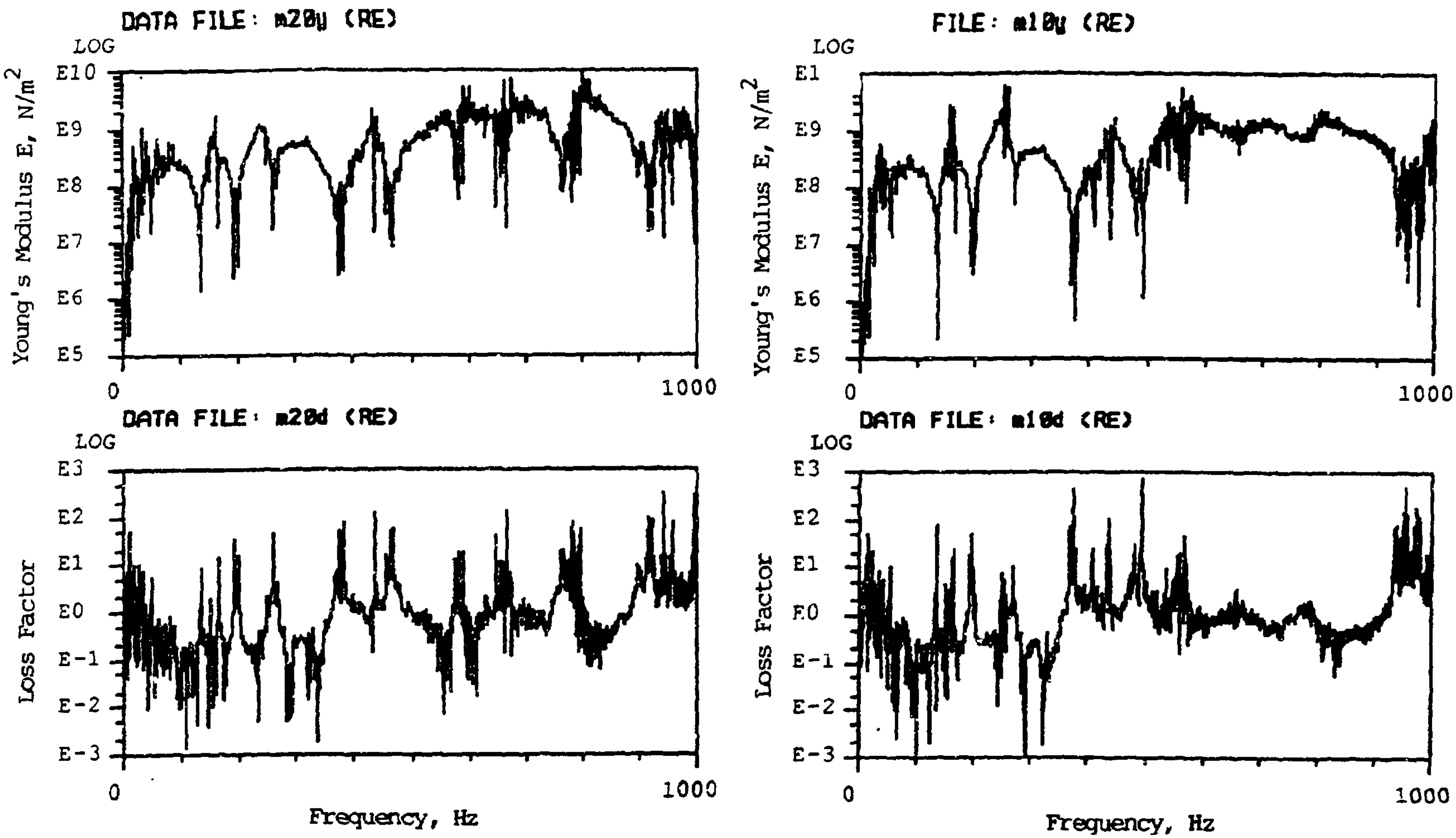


Figure 17. Plots of Young's Modulus and Loss Factor Versus Frequency for Laboratory B

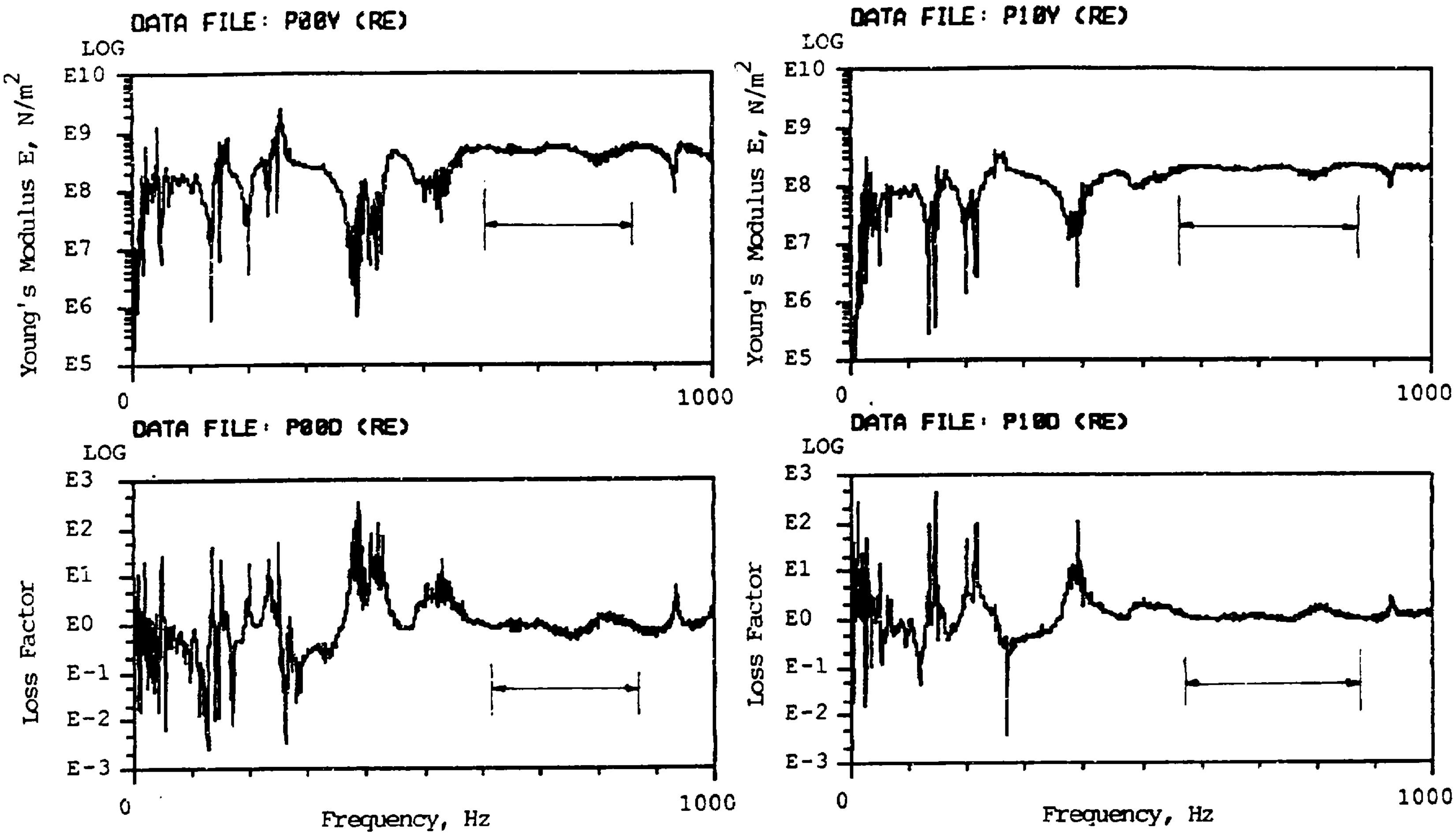
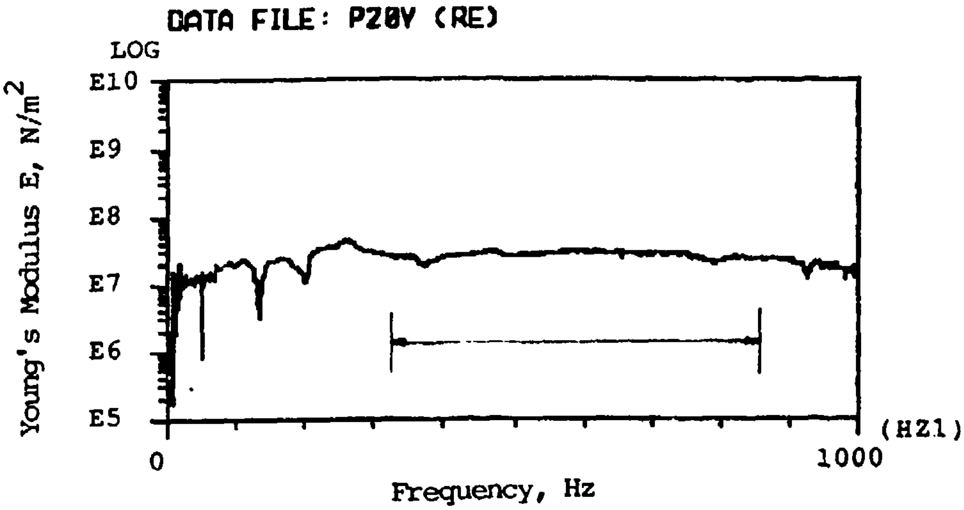


Figure 18. Plots of Young's Modulus and Loss Factor Versus Frequency for Laboratory B



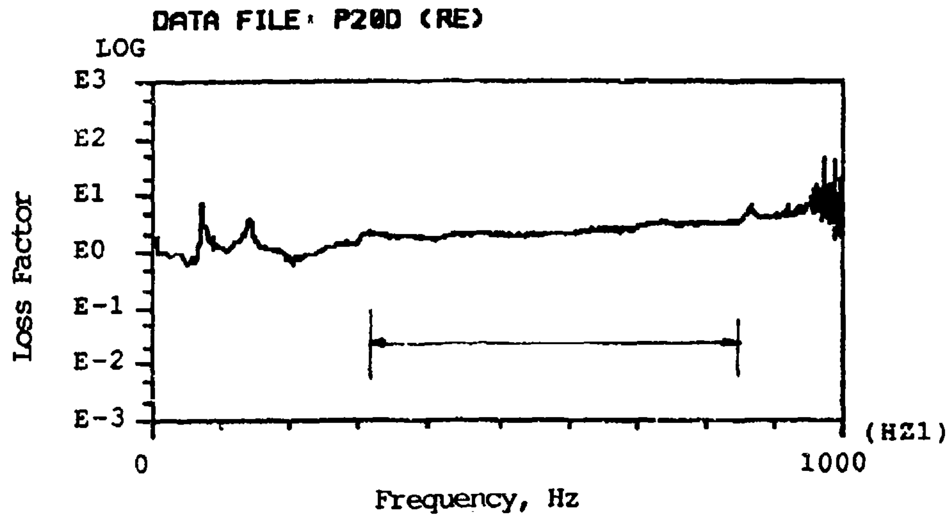


Figure 19. Plots of Young's Modulus and Loss Factor Versus Frequency for Laboratory B

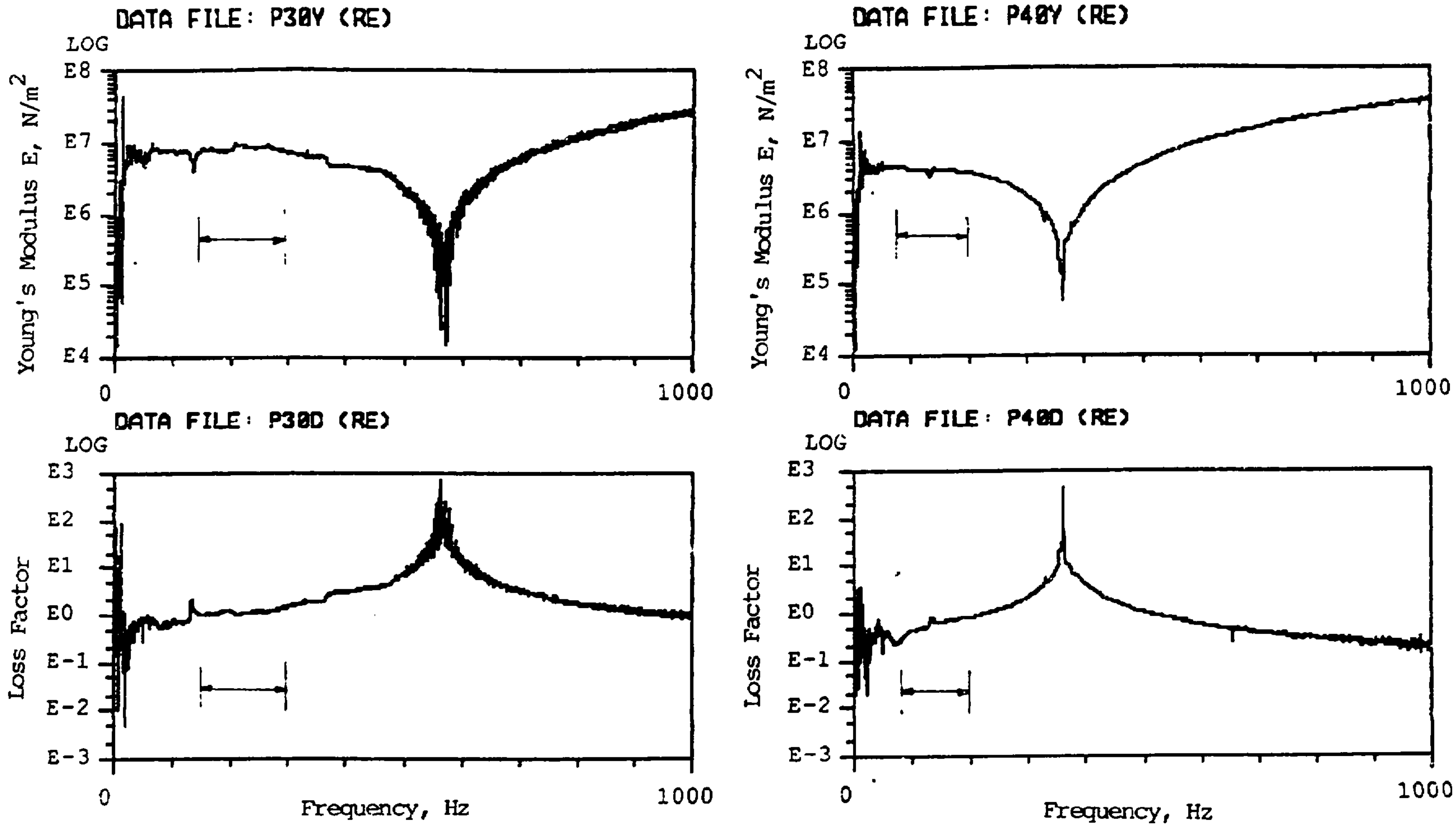


Figure 20. Plots of Young's Modulus and Loss Factor Versus Frequency for Laboratory B

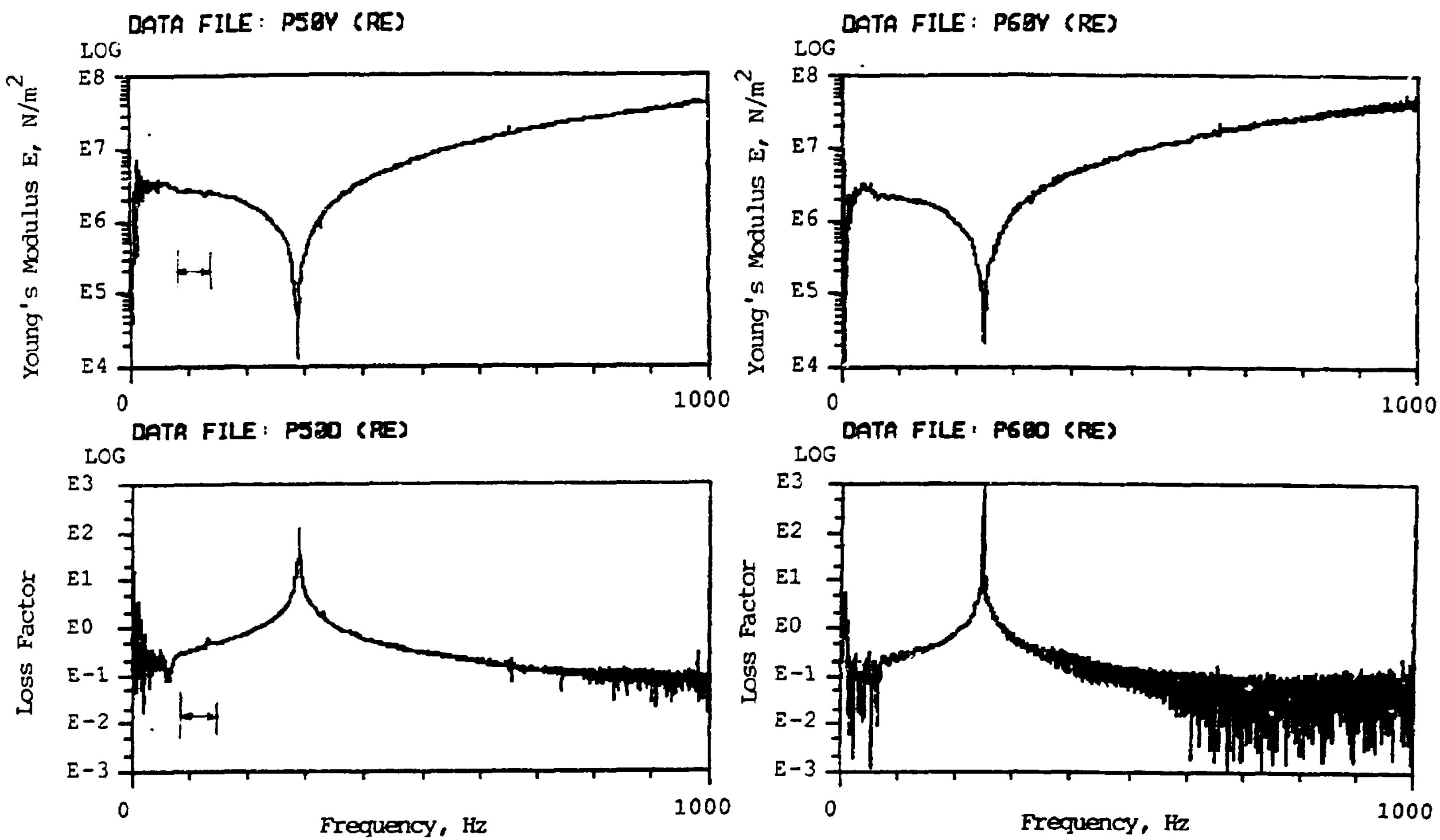


Figure 21. Plots of Young's Modulus and Loss Factor Versus Frequency for Laboratory B

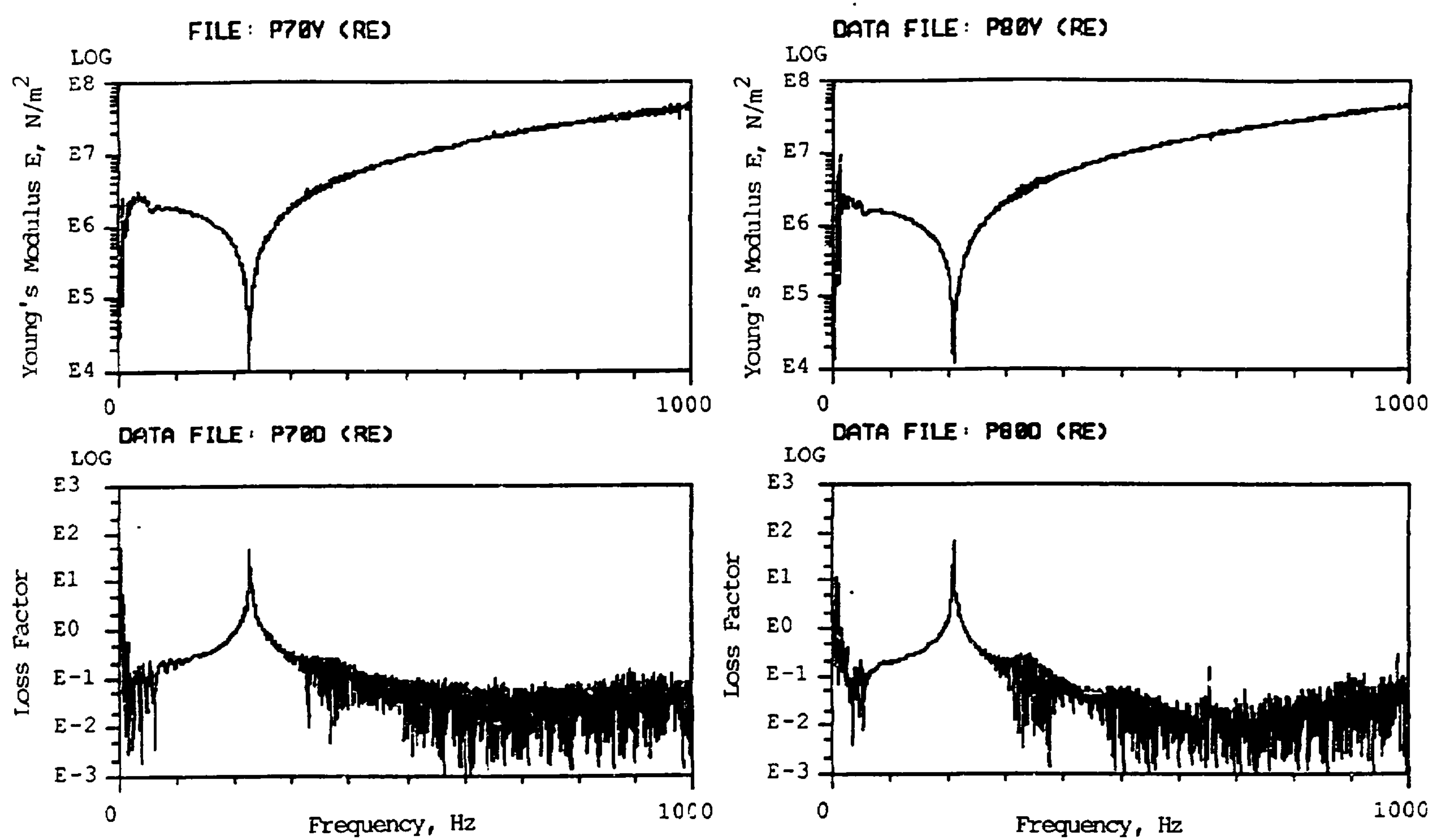
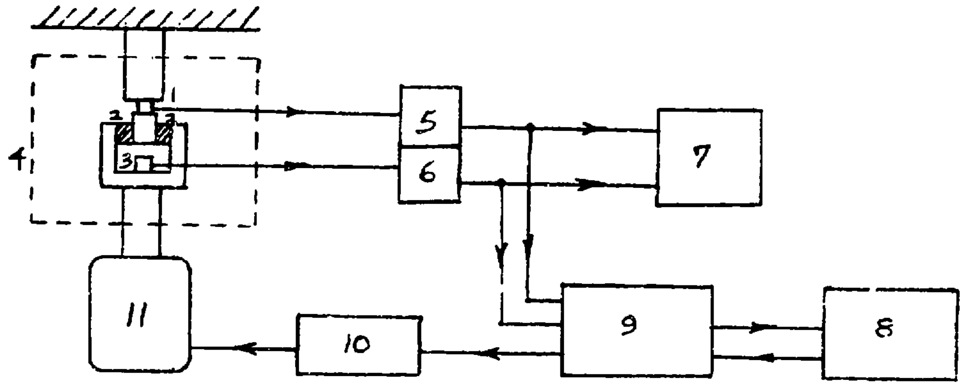


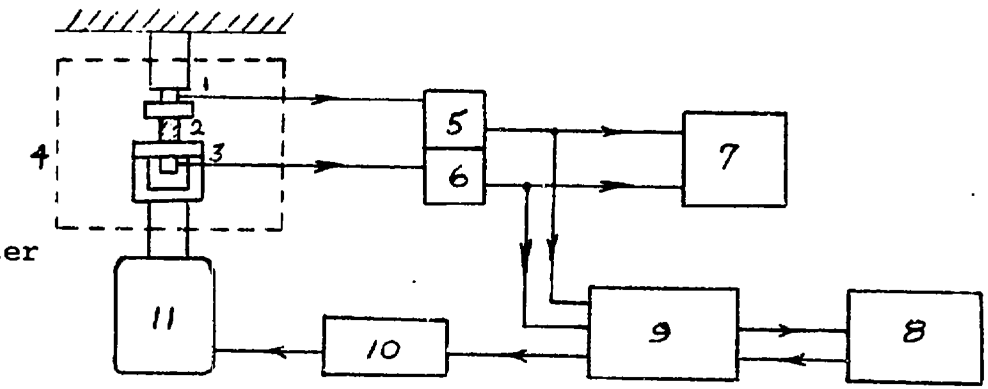
Figure 22. Plots of Young's Modulus and Loss Factor Versus Frequency for Laboratory B

LEGEND

1 - Force Transducer
2 - Sample
3 - Accelerometer
4 - Thermal Enclosure
5 - Charge Amplifier
6 - Charge Amplifier
7 - Oscilloscope
8 - Computer
9 - Frequency Response Analyzer
10 - Power Amplifier
11 - Electrodynamic Exciter



(a) Shear Configuration



(b) Extensional Configuration

Figure 23. Test System Configurations for Laboratory D

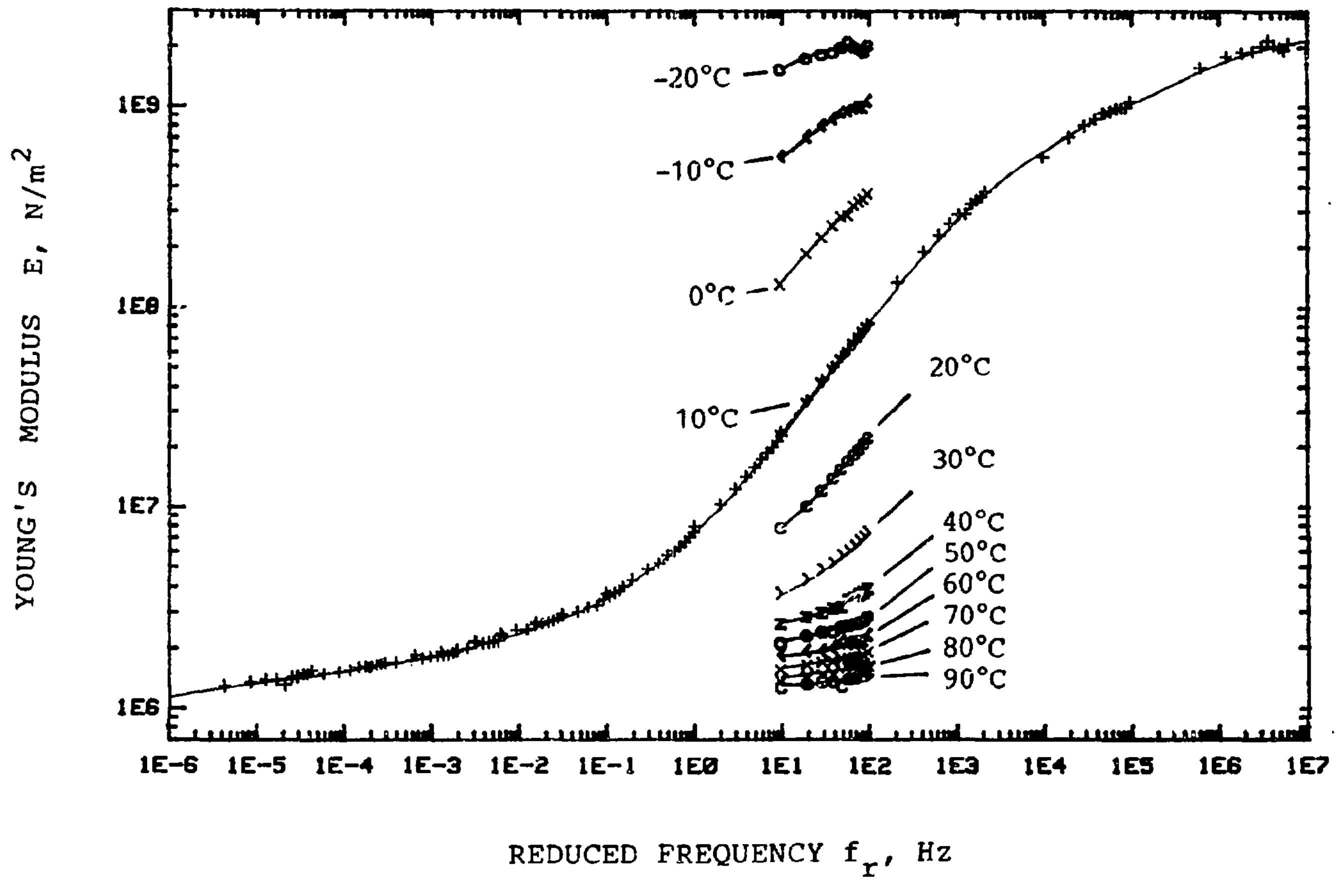


Figure 24. Frequency-Temperature Master Plot of Laboratory D Test Data as Analyzed by Laboratory D (Modulus)

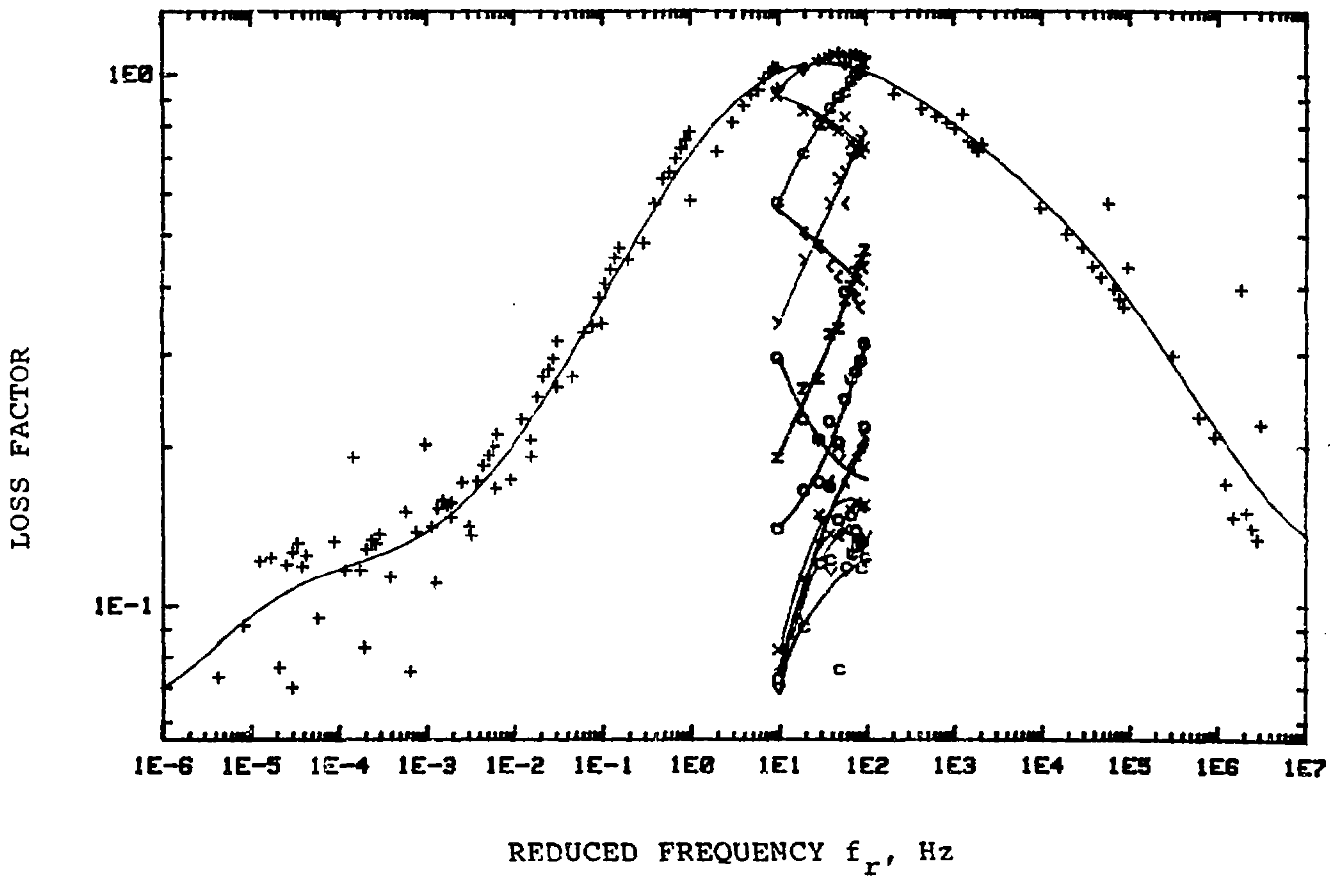


Figure 25. Frequency-Temperature Master Plot of Laboratory D Test Data as Analyzed by Laboratory D (Loss Factor)

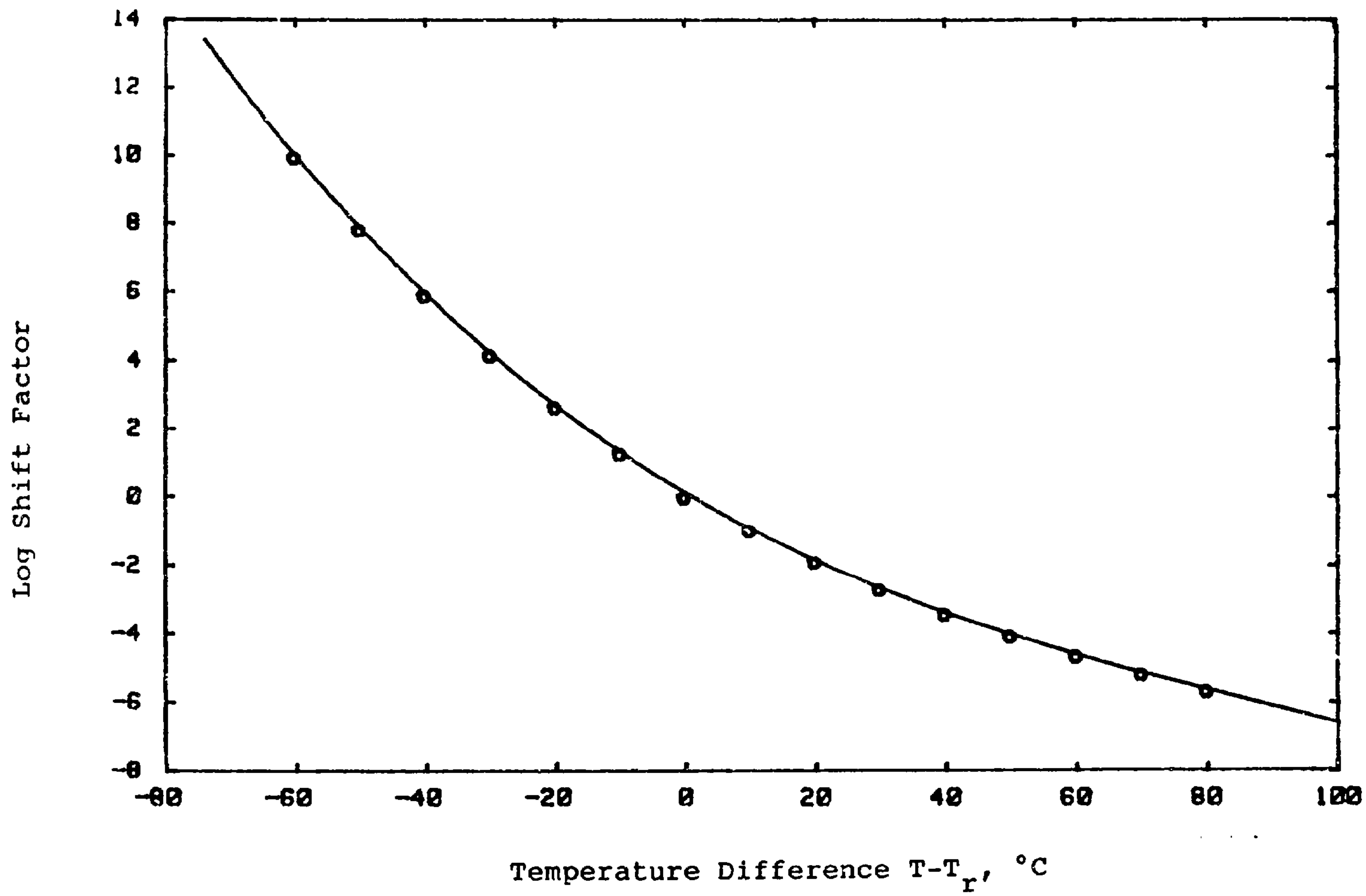


Figure 26. Plot of Log Shift Factor Versus Temperature Difference for Laboratory D

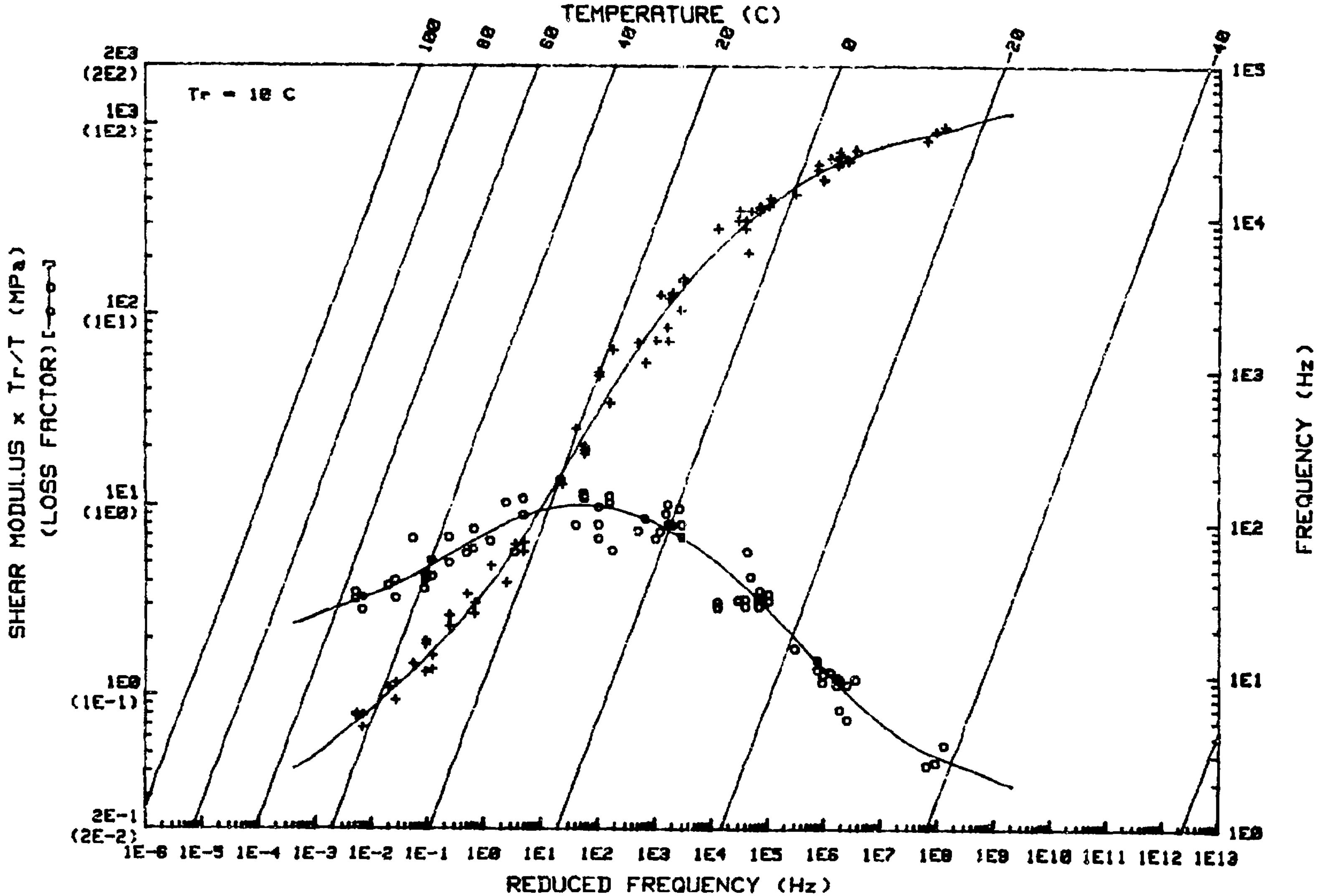


Figure 27. Frequency-Temperature Nomogram for Laboratory A Data as Analyzed by Laboratory D

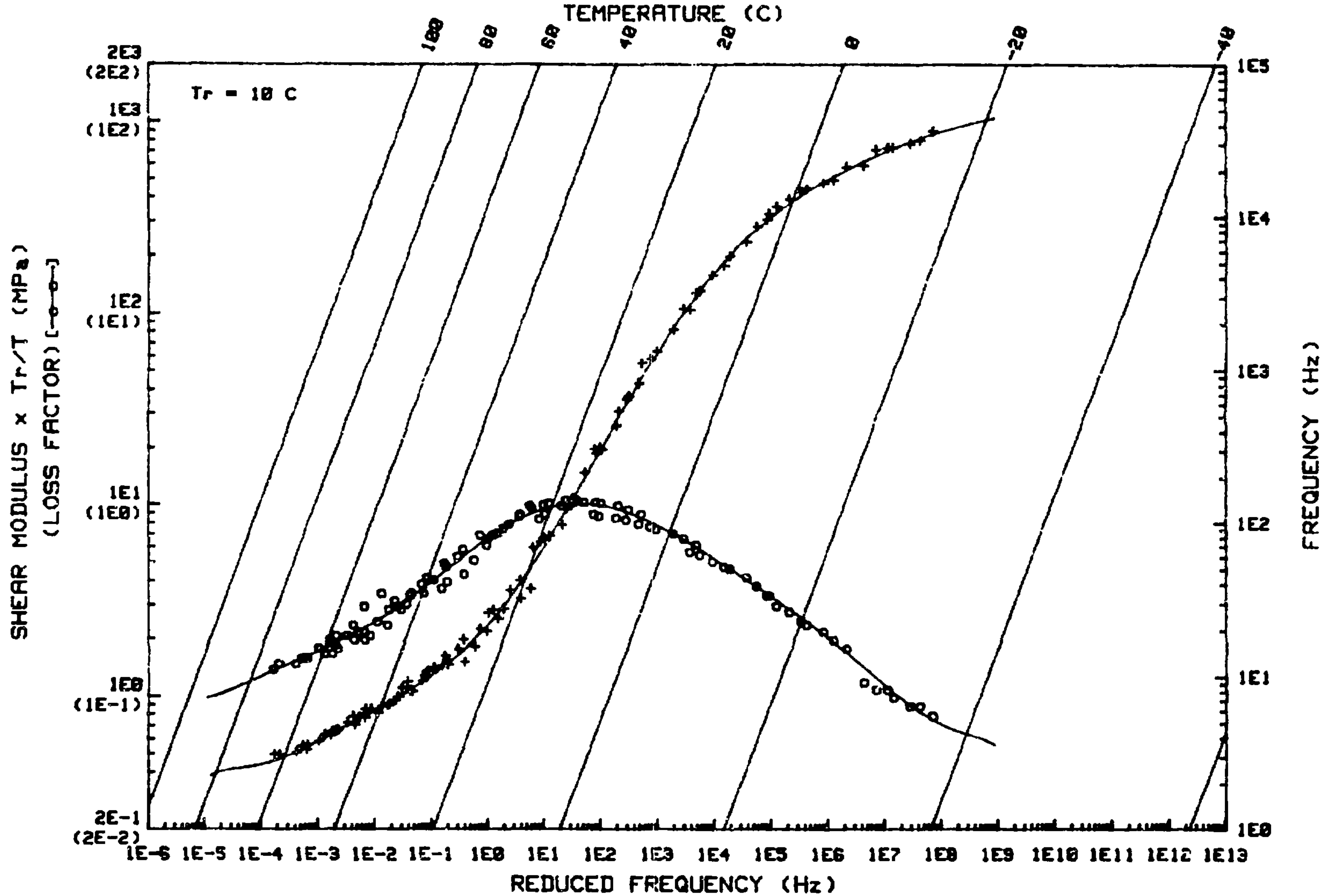


Figure 28. Frequency-Temperature Nomogram for Laboratory C Data as Analyzed by Laboratory D

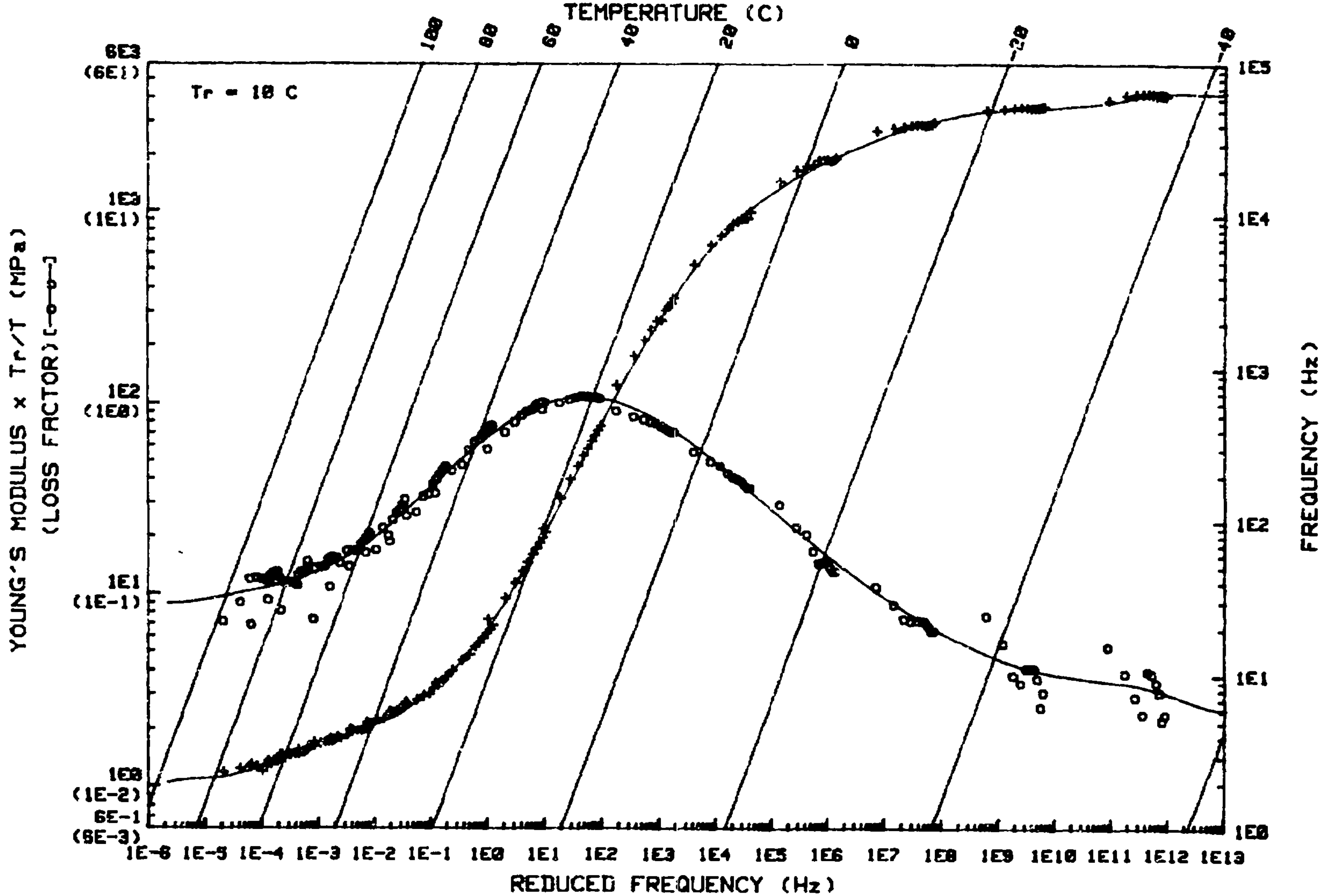


Figure 29. Frequency-Temperature Nomogram for Laboratory D Data as Analyzed by Laboratory D

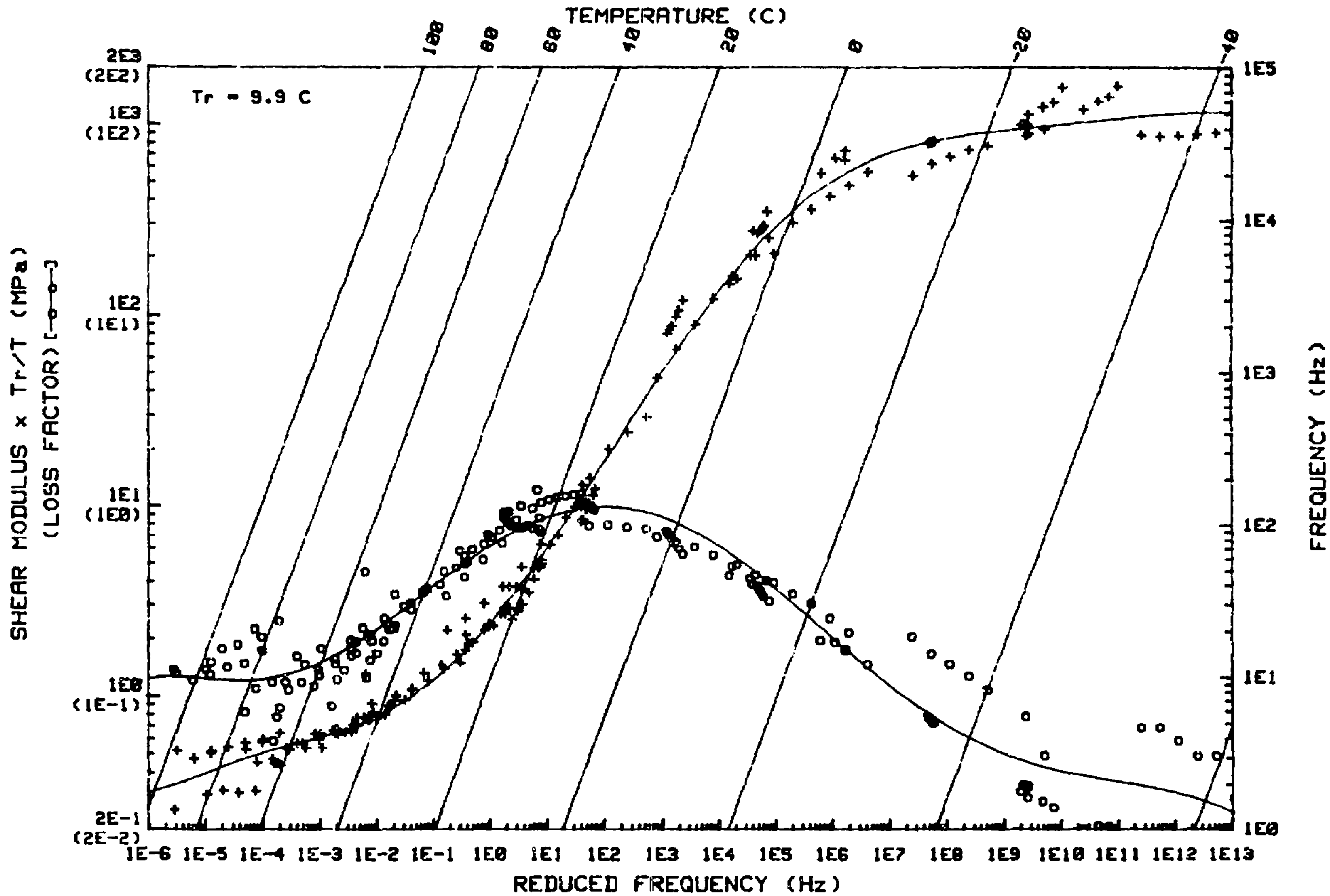


Figure 30. Frequency-Temperature Nomogram for Laboratory E Data as Analyzed by Laboratory D

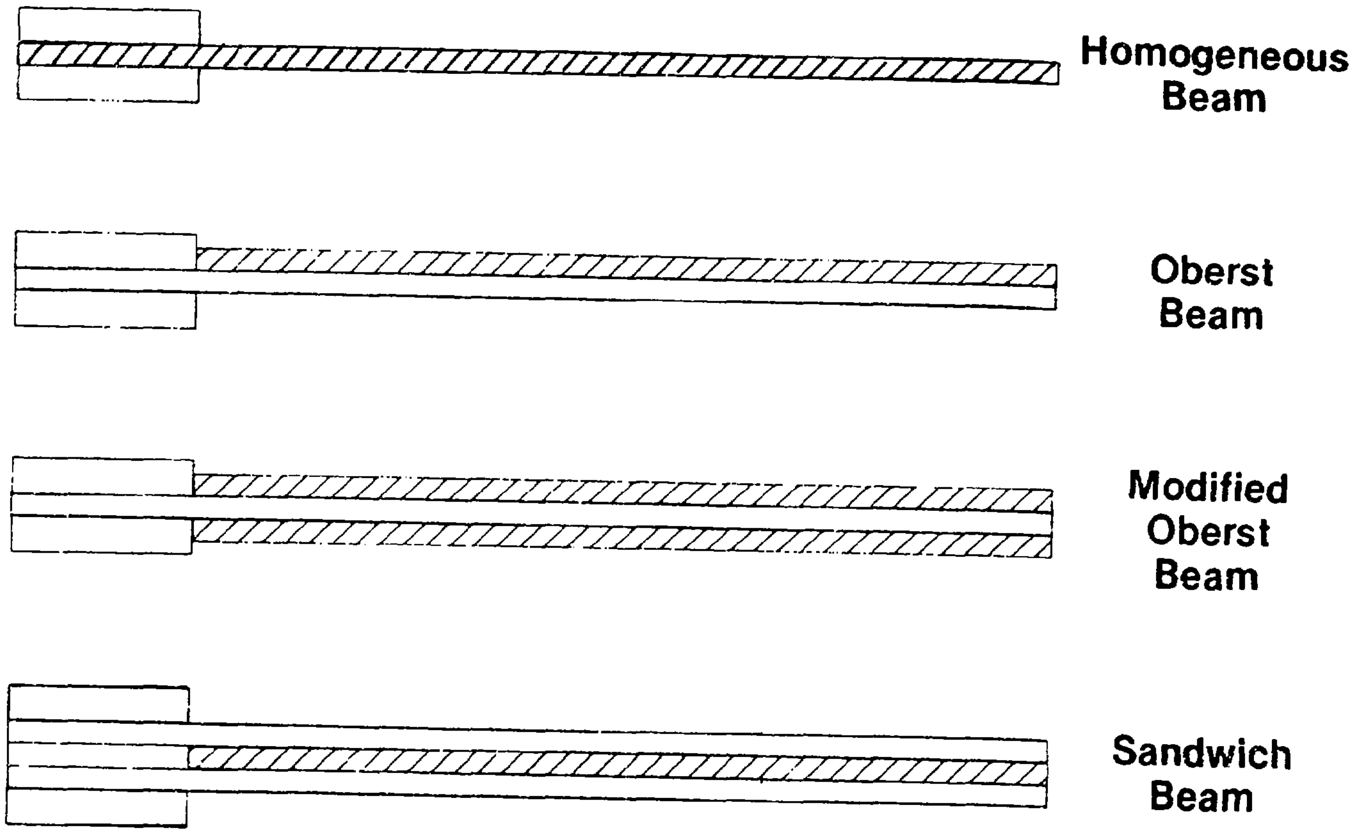


Figure 31. Beam Configurations Tested by Laboratory E

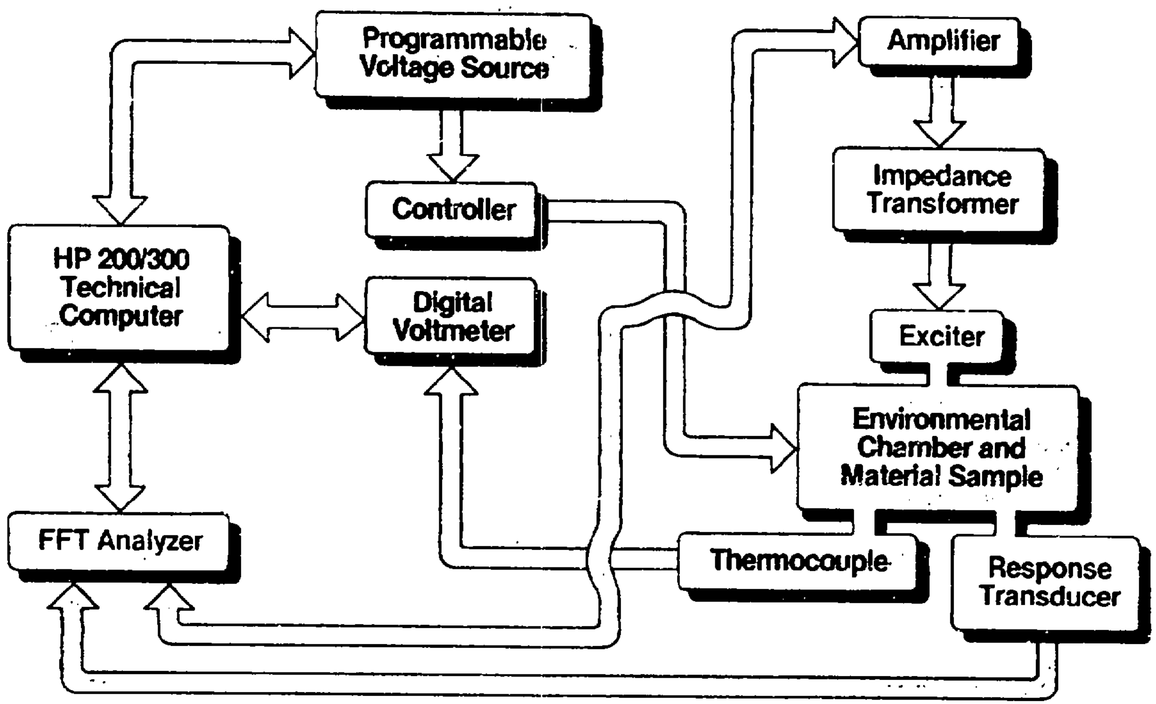


Figure 32. Vibrating Beam Test Setup used by Laboratory E

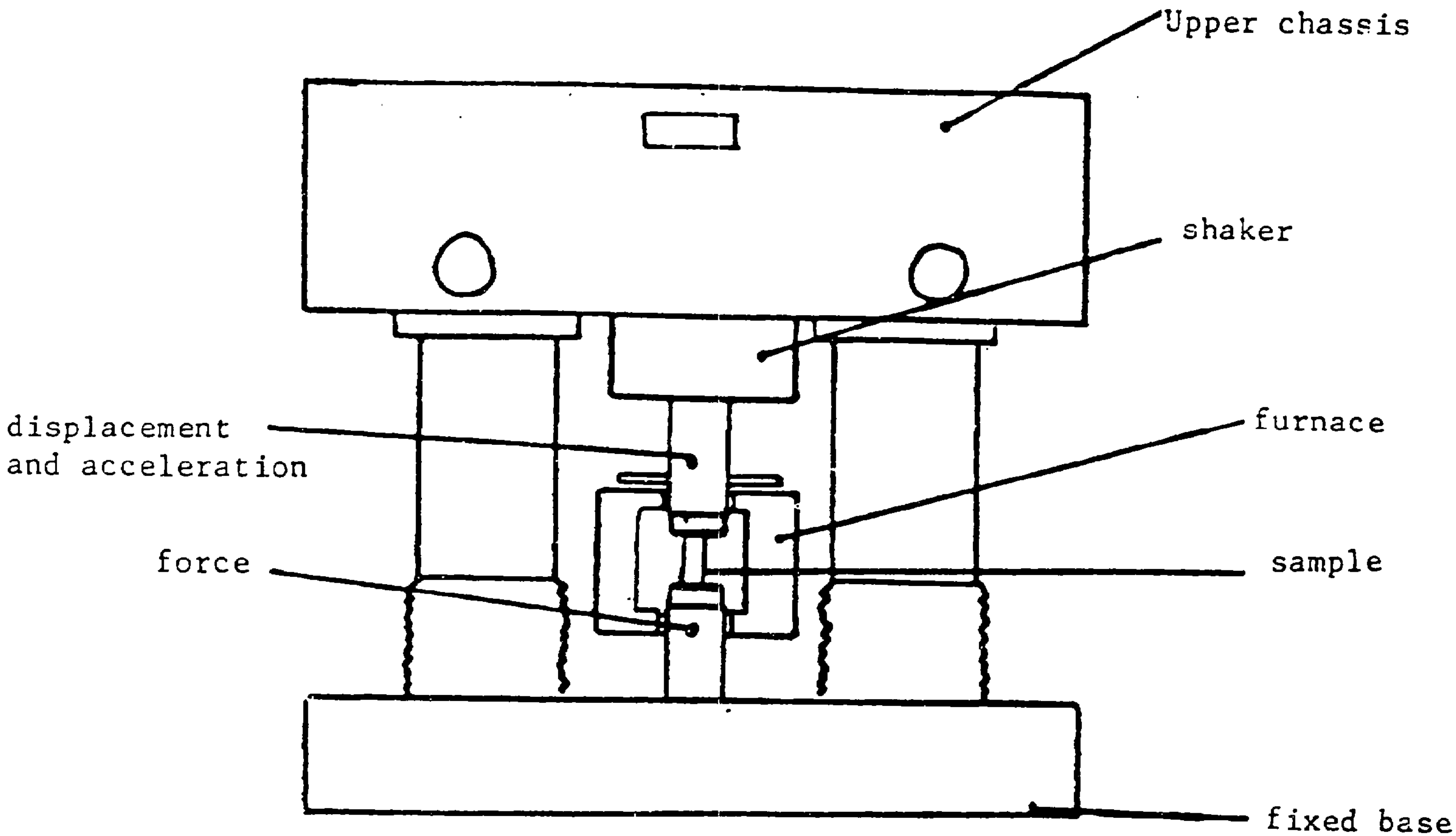
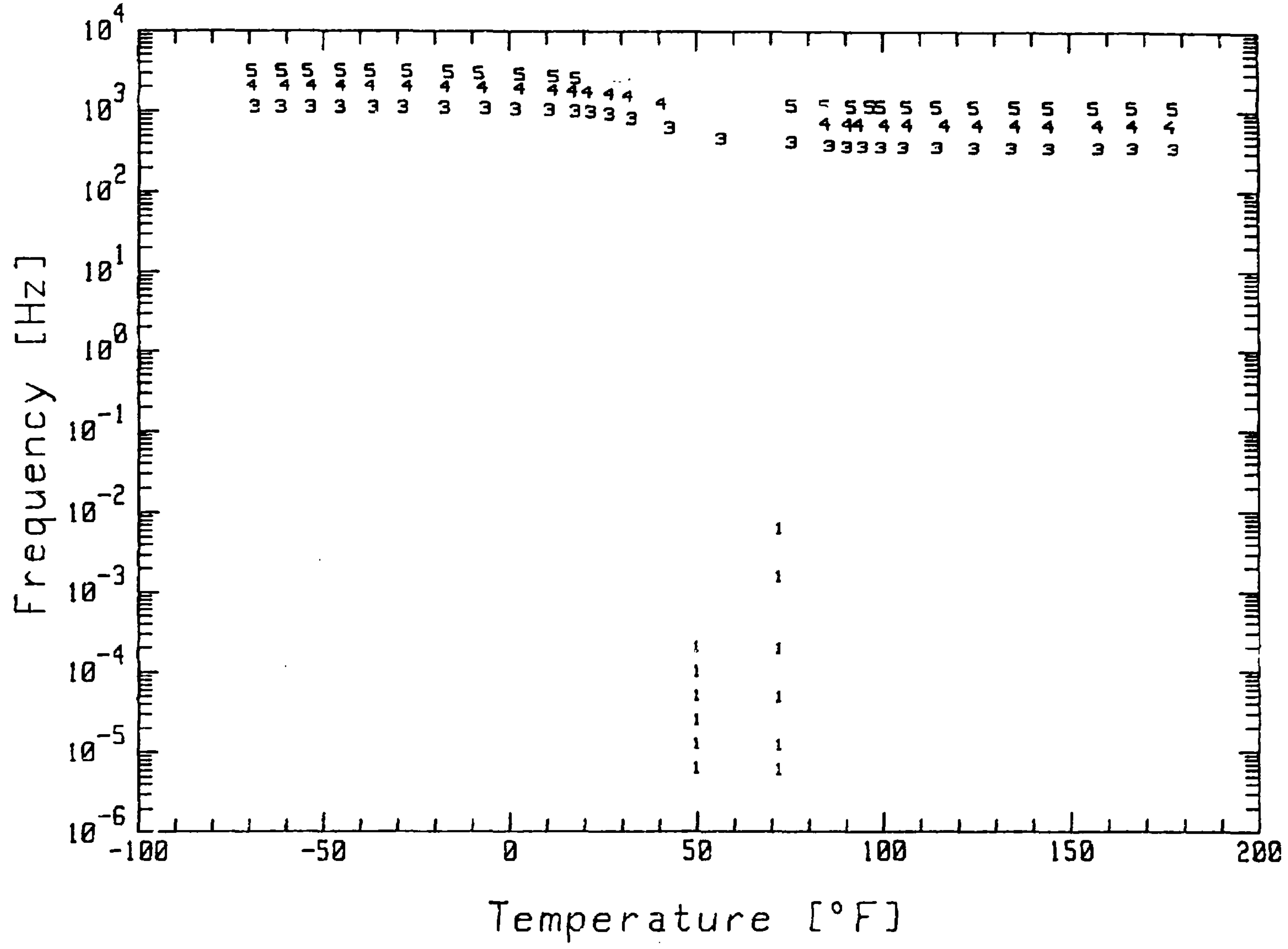


Figure 33. Viscoelasticimetre Configuration



Fi. Figure 34. Frequency and Temperature Locations of Measured Data by Vibrating Beam and Creep Techniques (Shear)

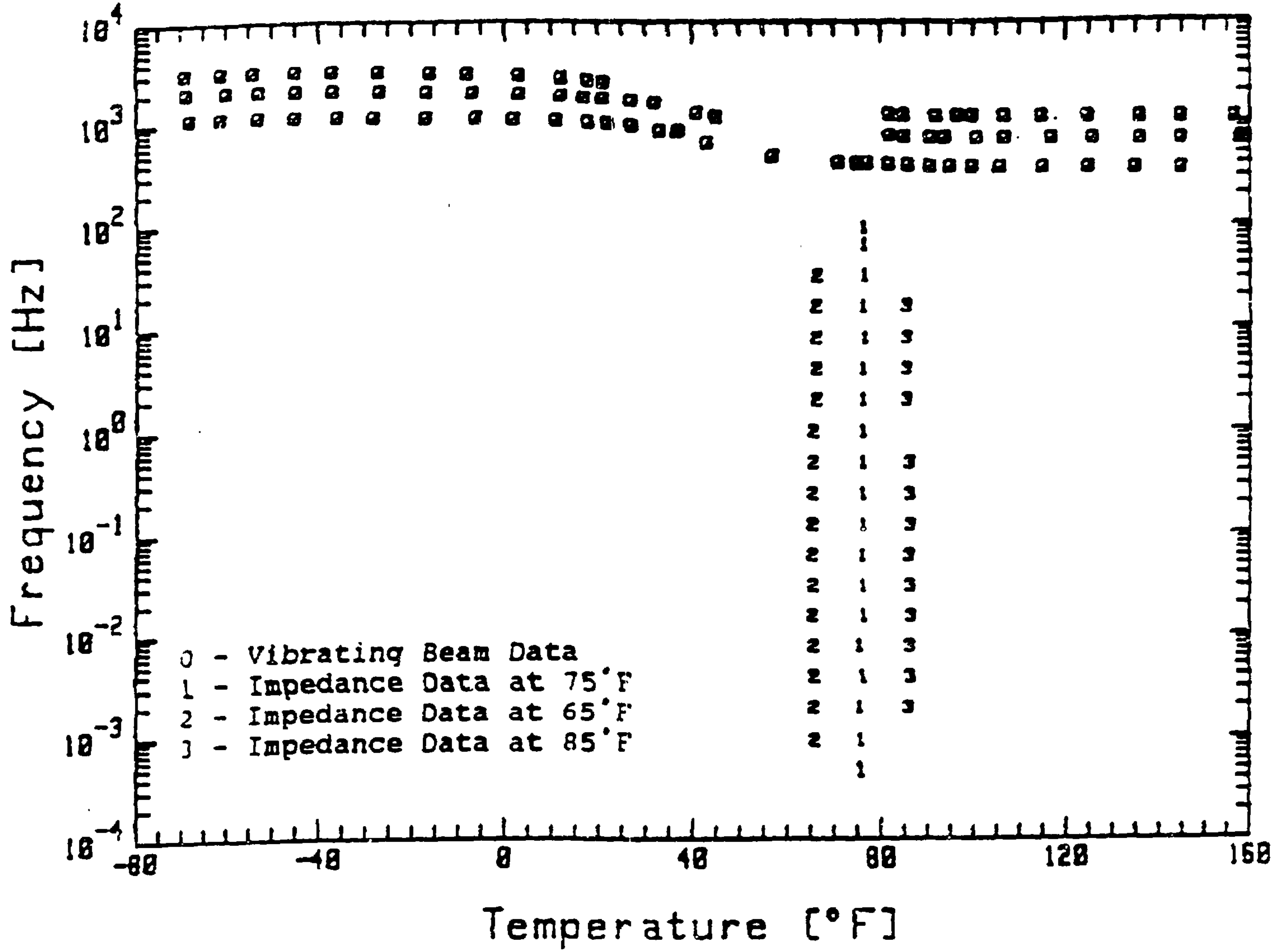


Figure 35. Range of Test Frequencies and Temperatures for Beam and Impedance Techniques (Lab E)

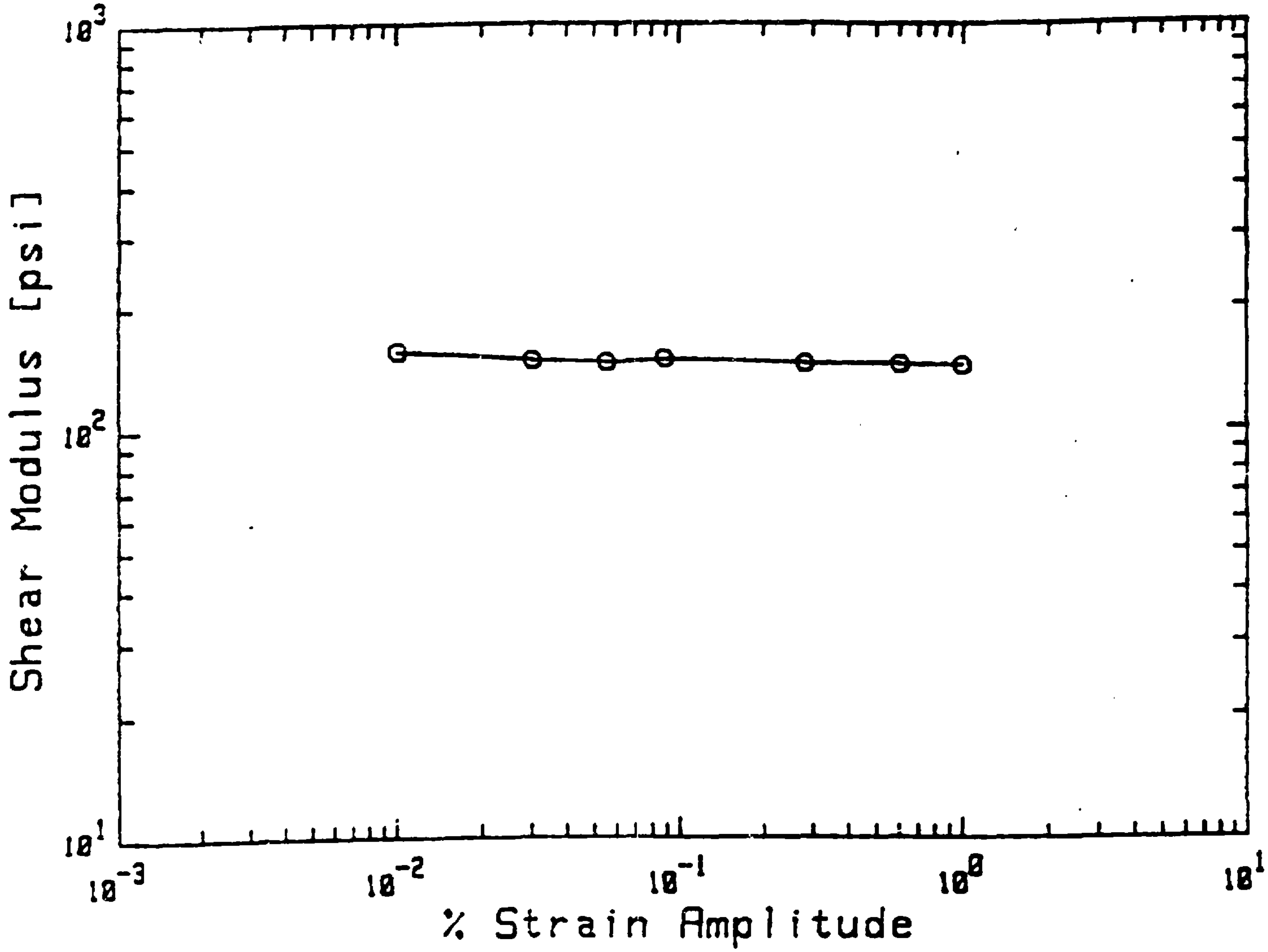


Figure 36. Effect of Dynamic Strain Amplitude on Shear Modulus (Laboratory E)

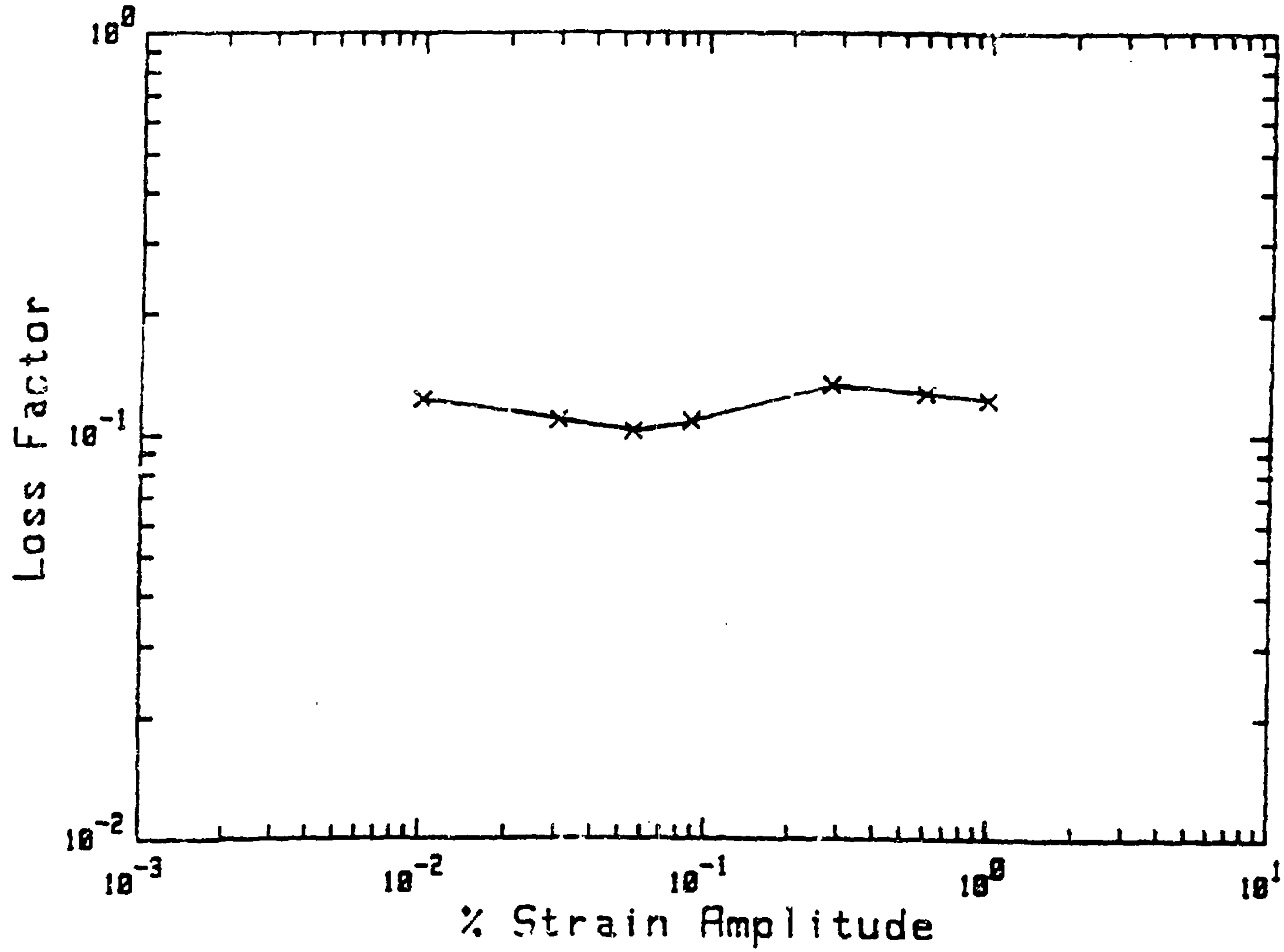


Figure 37. Effect of Dynamic Strain Amplitude on Loss Factor (Laboratory E)

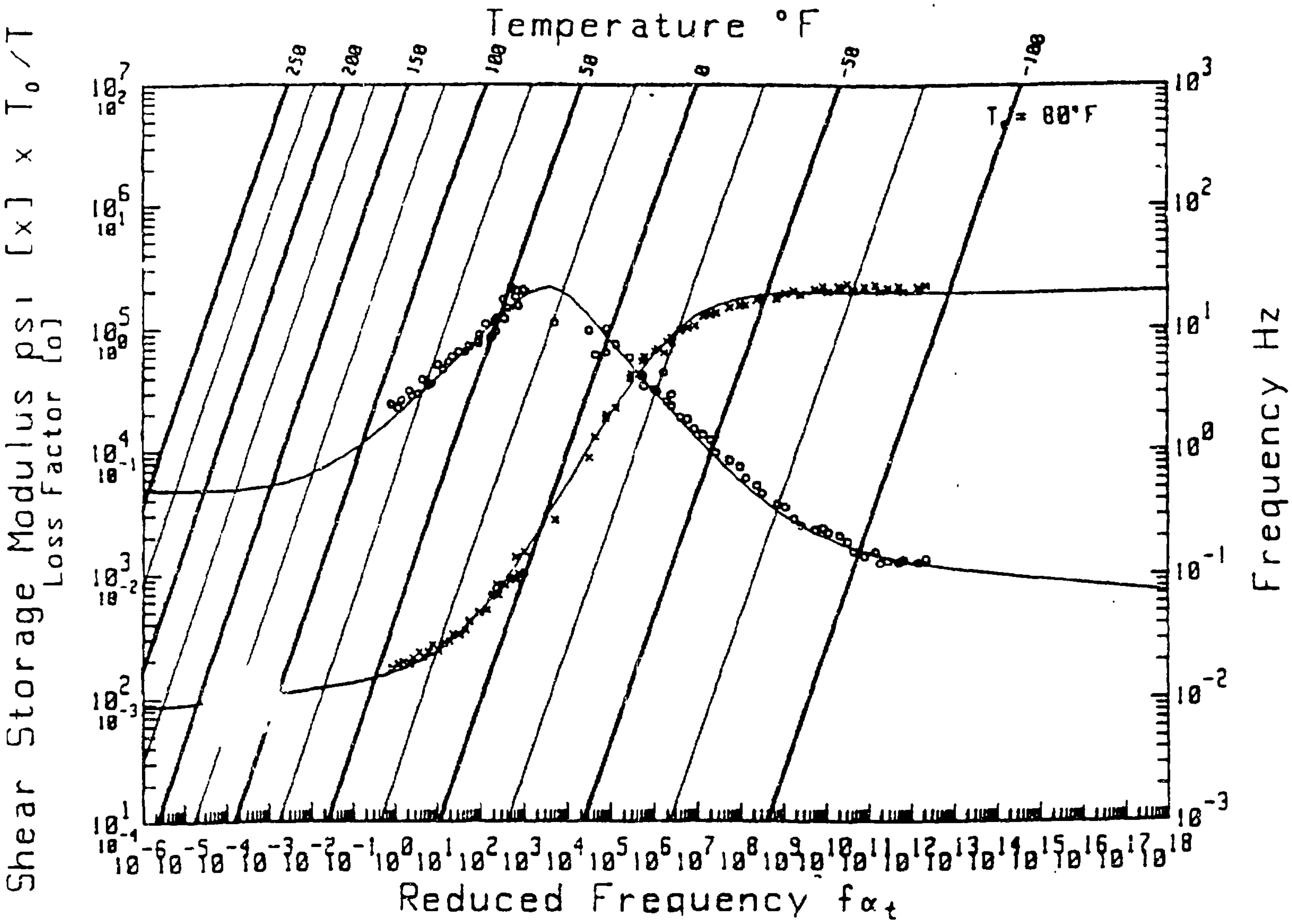


Figure 38. Nomogram for Beam Data in Shear for Laboratory E

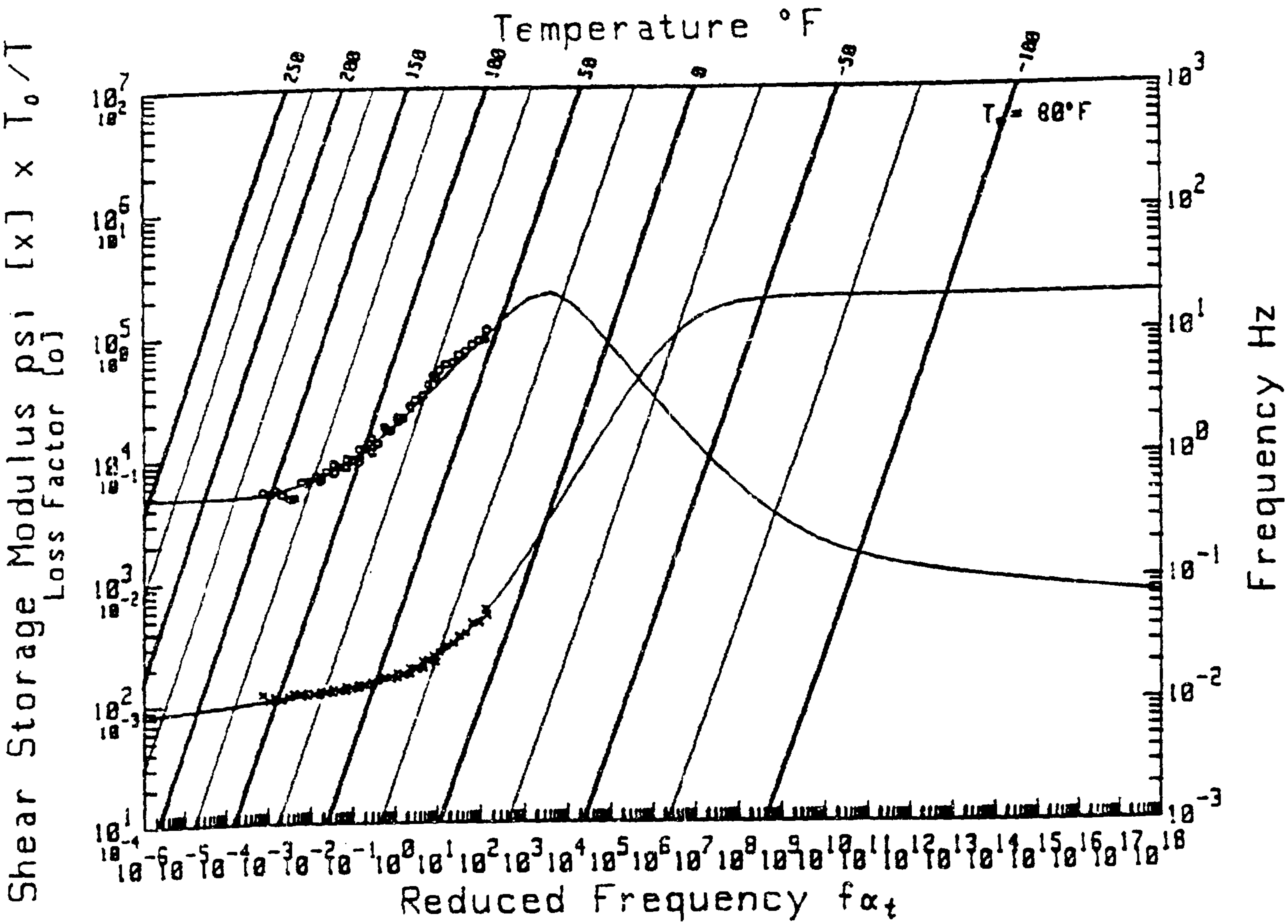


Figure 39. Nomogram for Impedance Data in Shear for Laboratory E

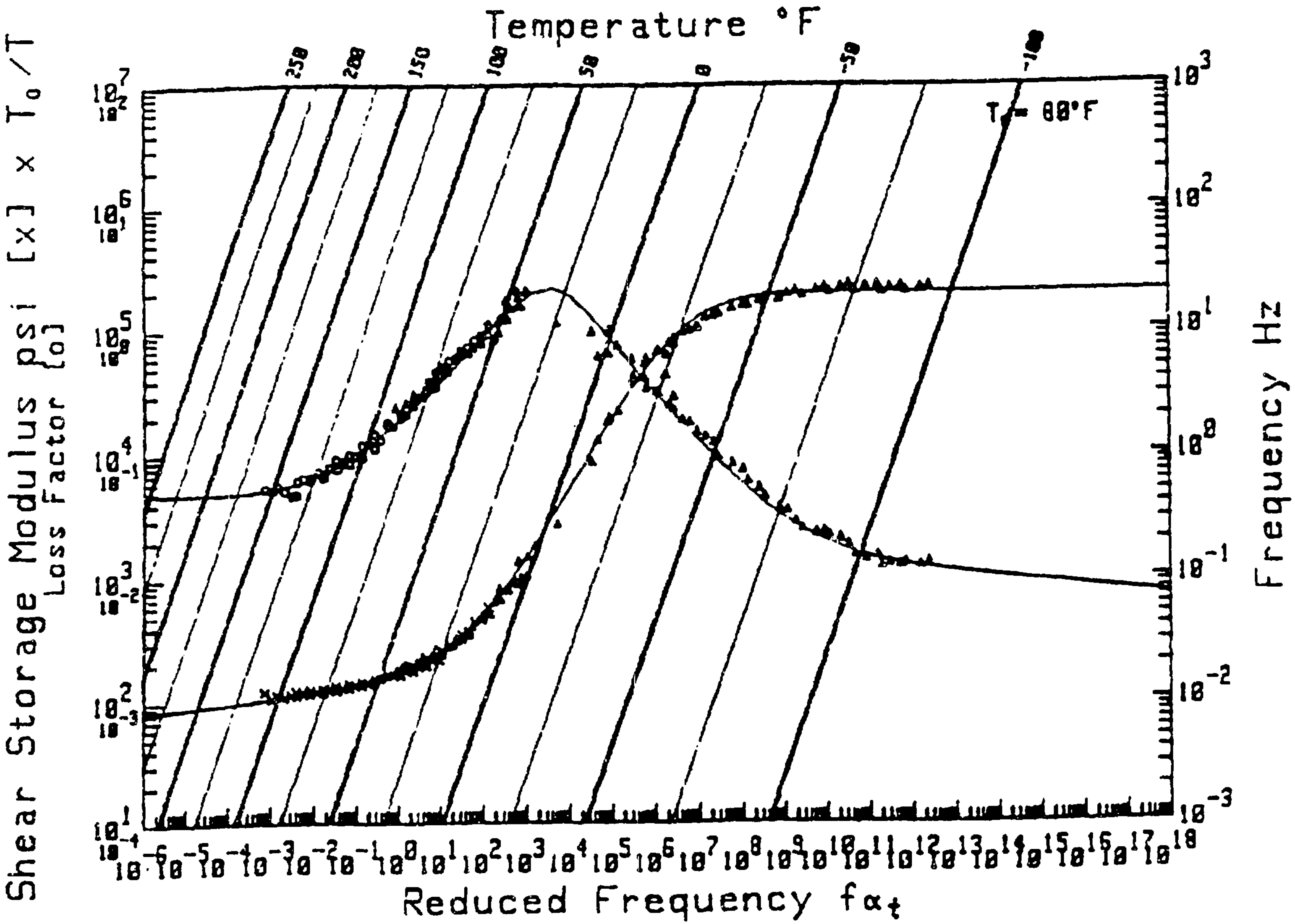


Figure 40. Nomogram for Beam and Impedance Data in Shear for Laboratory E

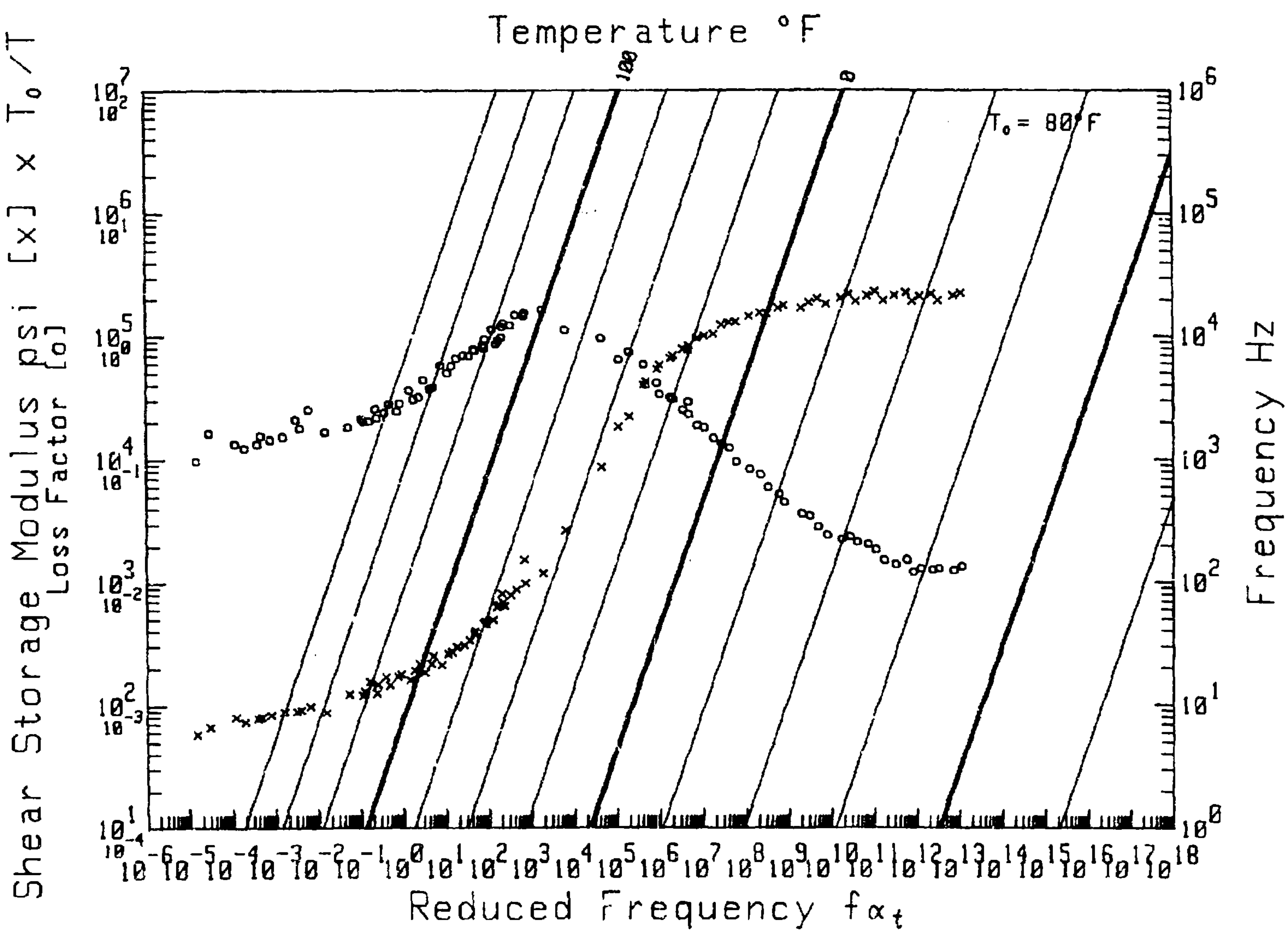


Figure 41. Nomogram of Measured Data by Vibrating Beam and Creep Techniques in Shear; Slope (T_A) = 13500°R

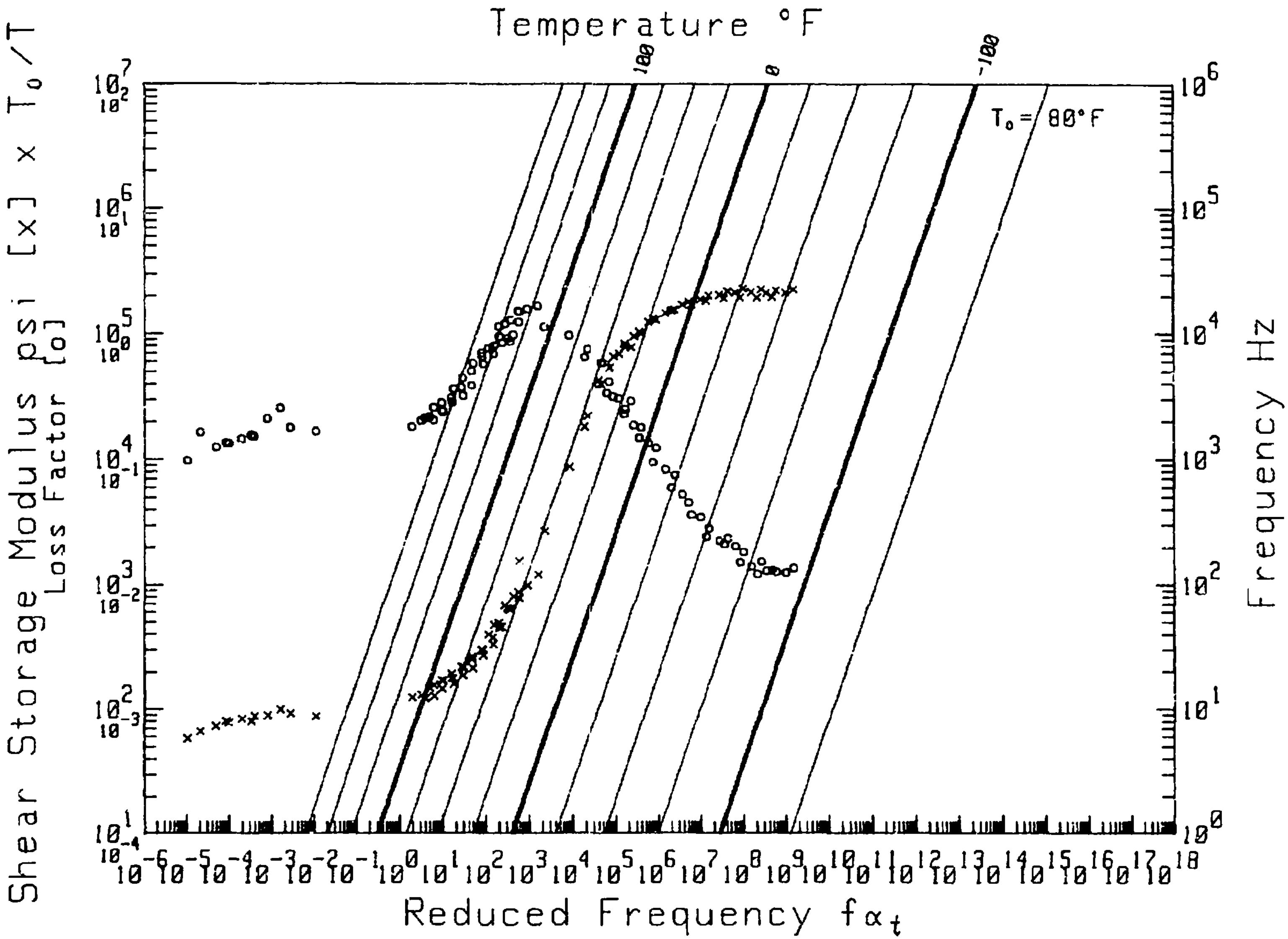


Figure 42. Nomogram of Measured Data by Vibrating Beam and Creep Techniques in Shear; Slope (T_A) = 8000°R

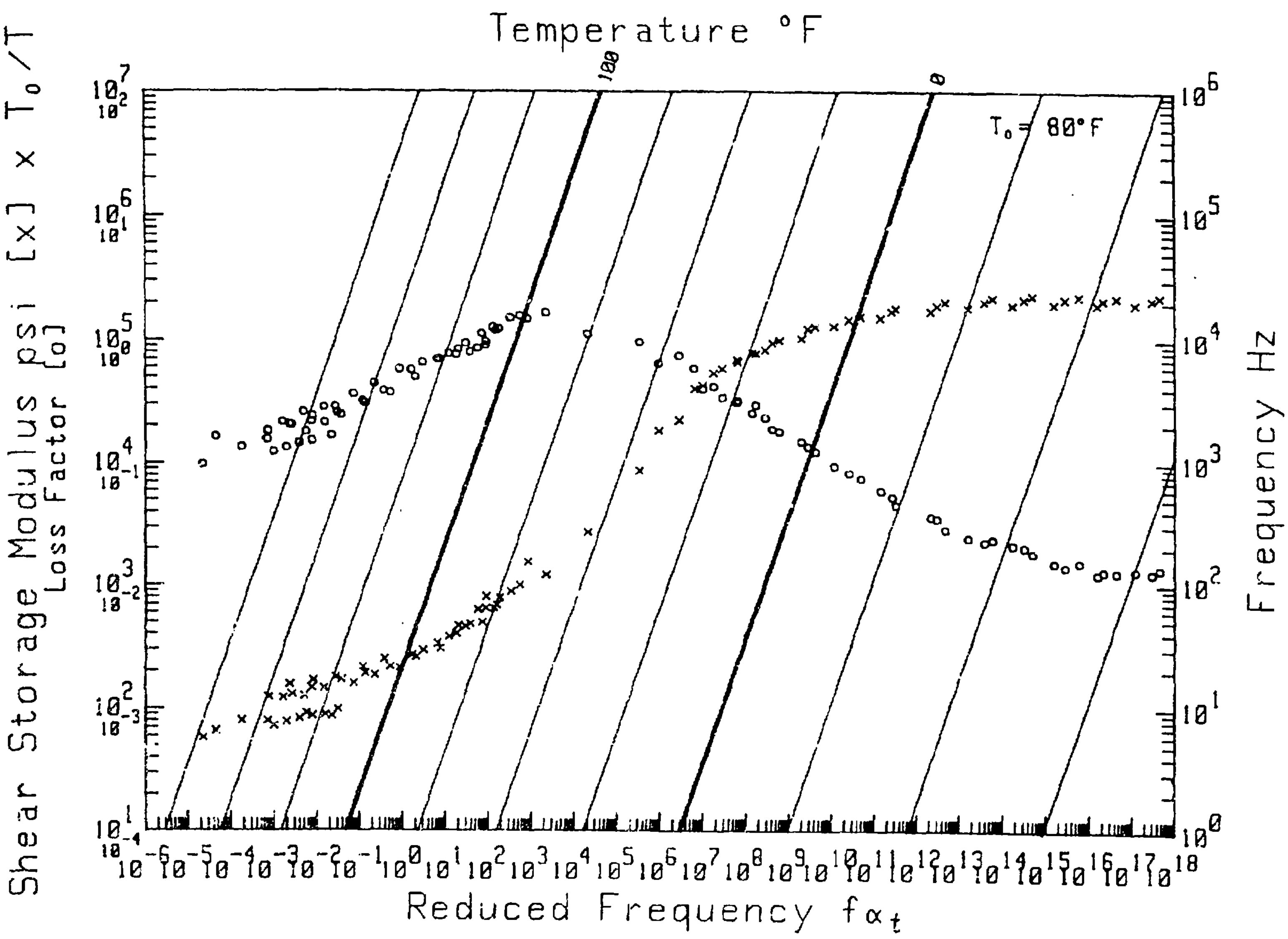


Figure 43. Nomogram of Measured Data by Vibrating Beam and Creep Techniques in Shear; Slope (T_A) = 20000°R

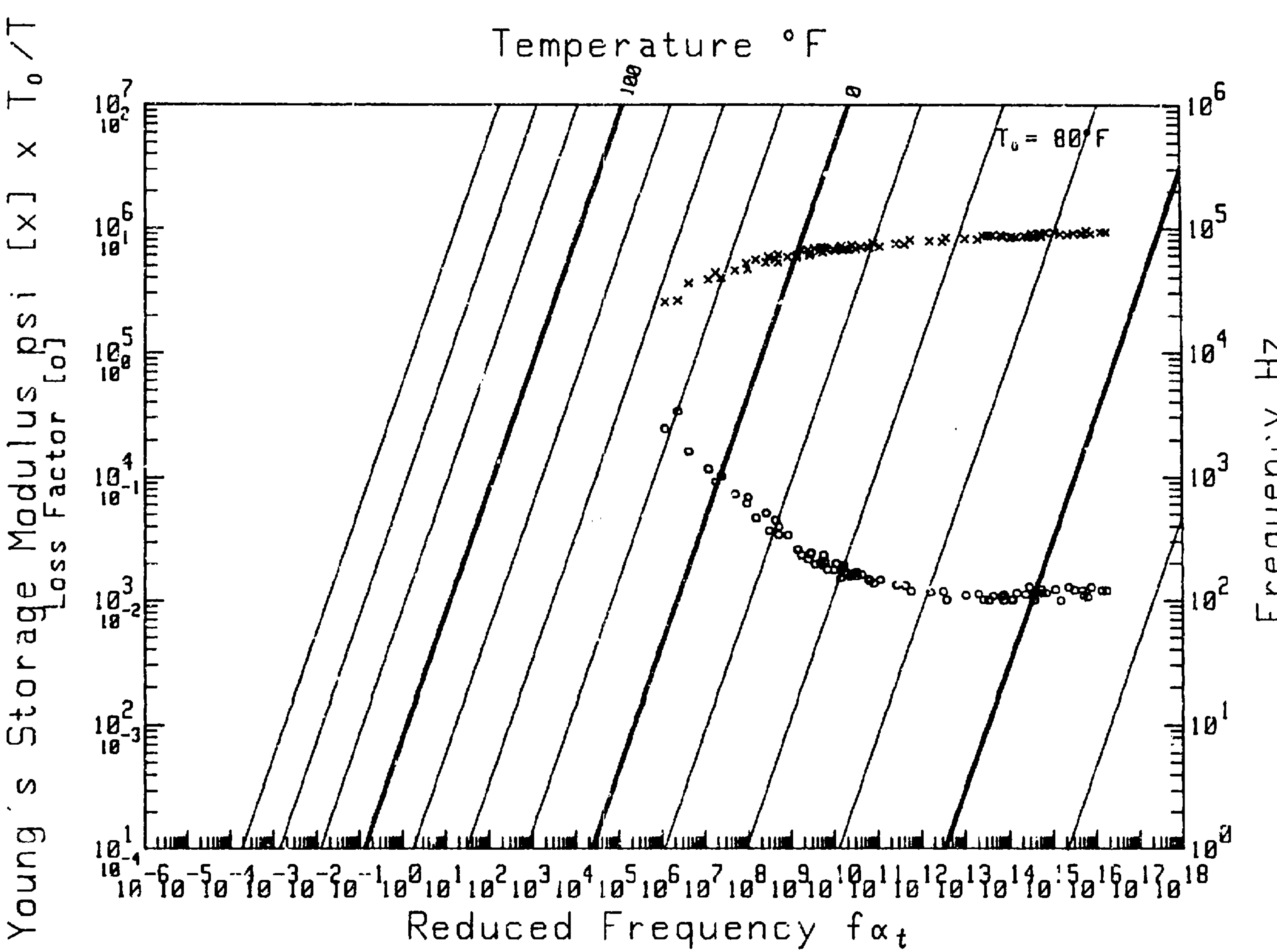


Figure 44. Nomogram of Homogeneous Beam Technique Data in Extension

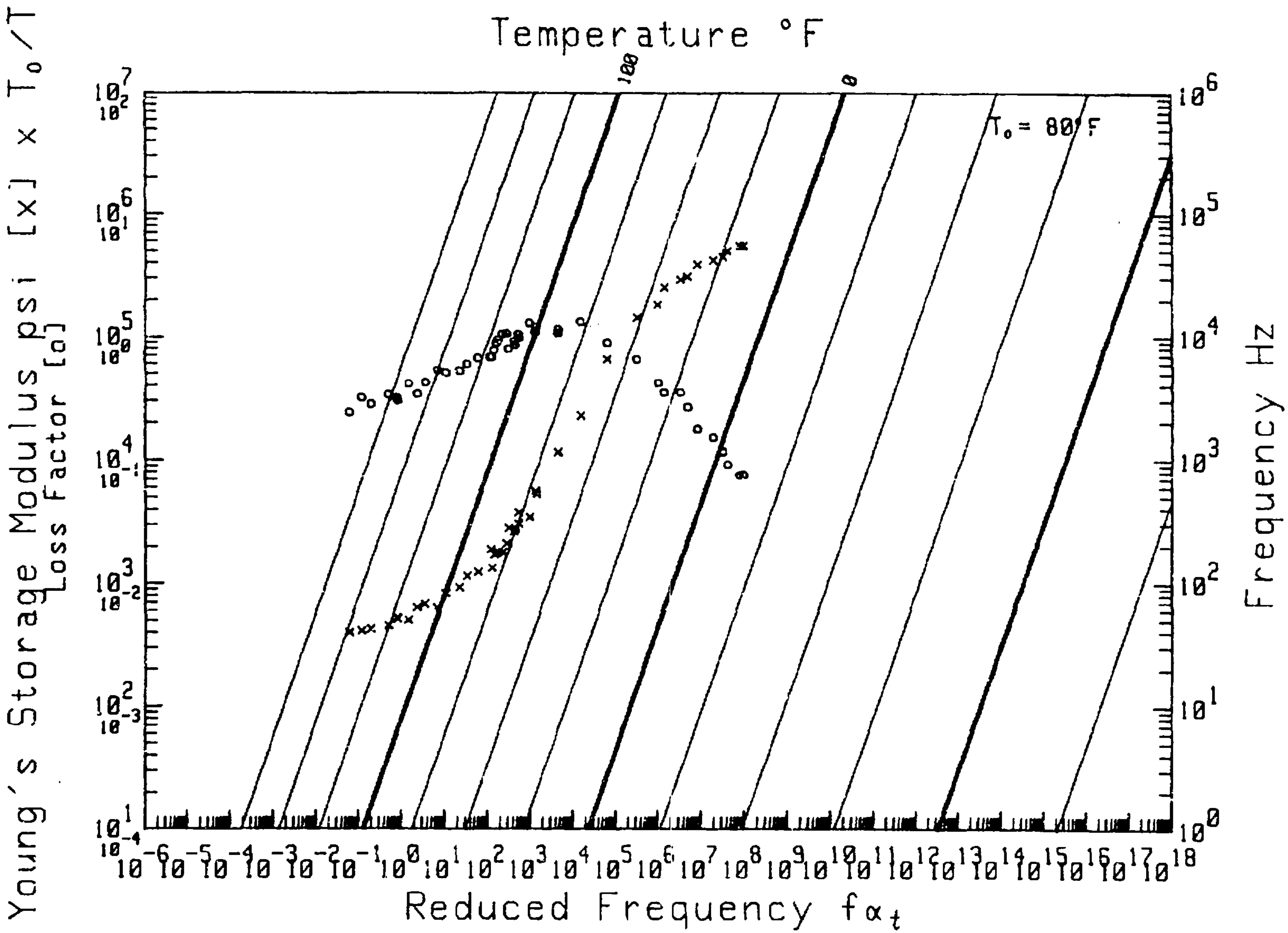


Figure 45. Nomogram of Oberst Beam Technique Data in Extension

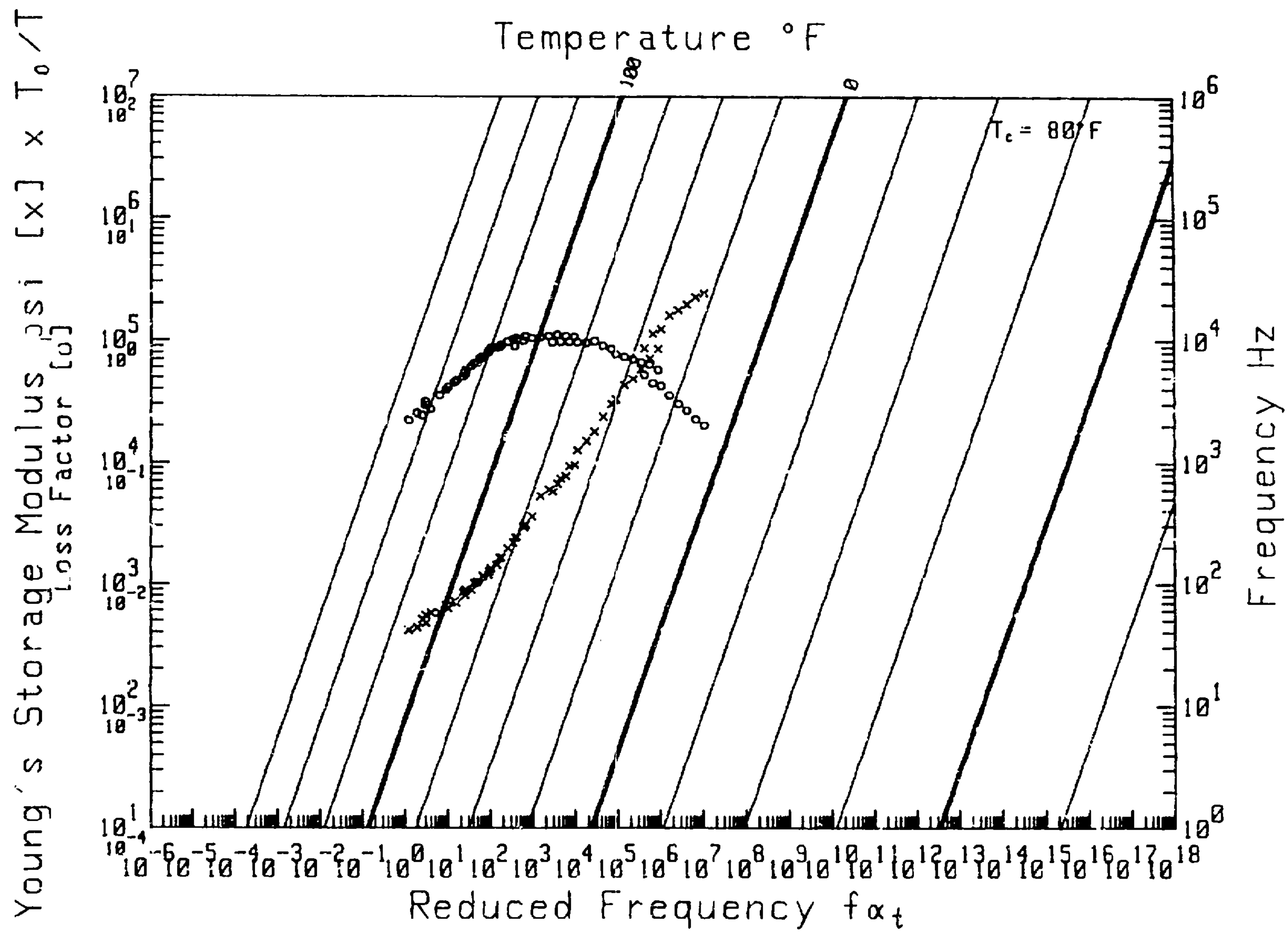


Figure 46. Nomogram of Impedance Technique Data in Extension

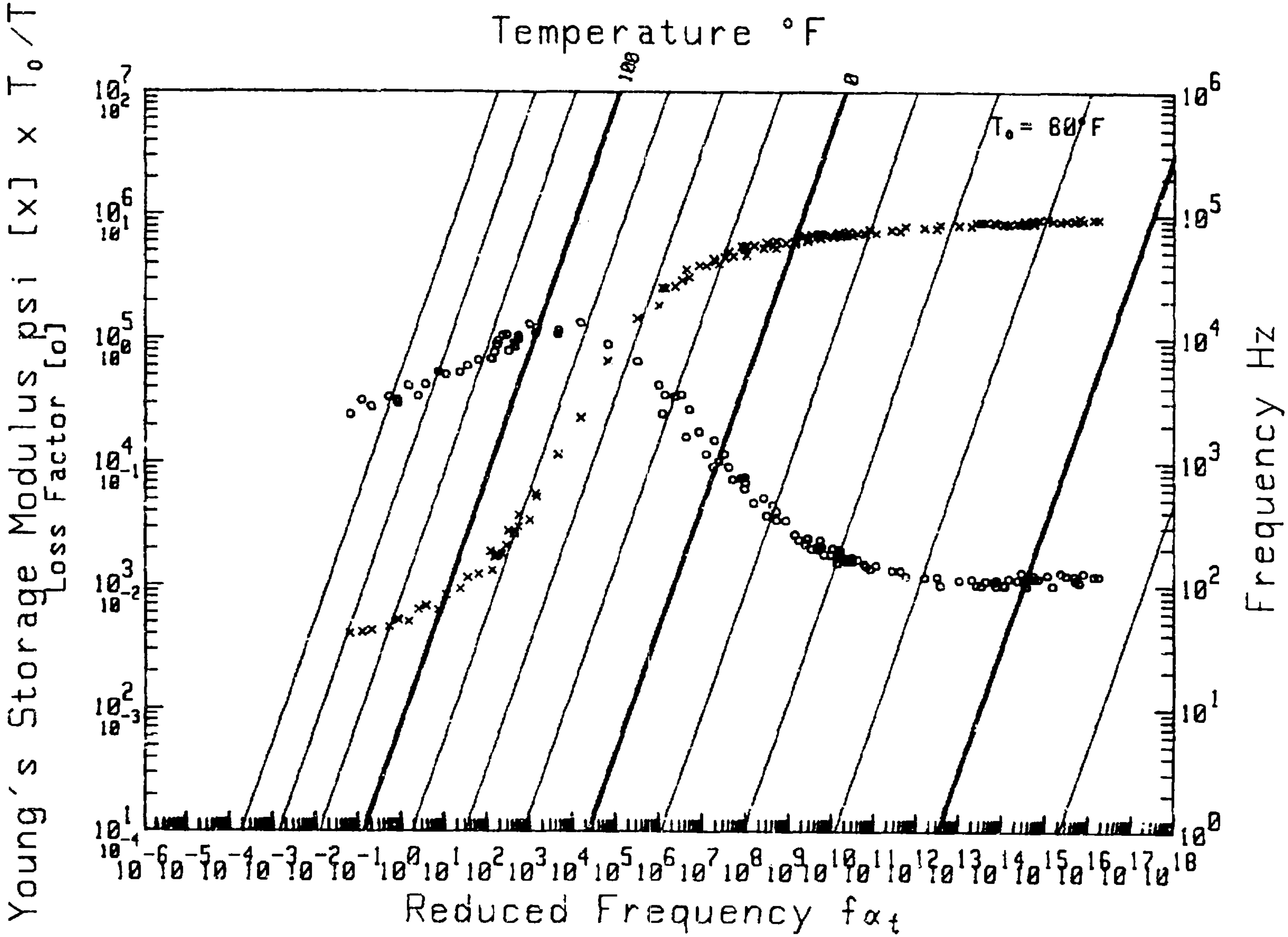


Figure 47. Nomogram of all Vibration Beam Data in Extension

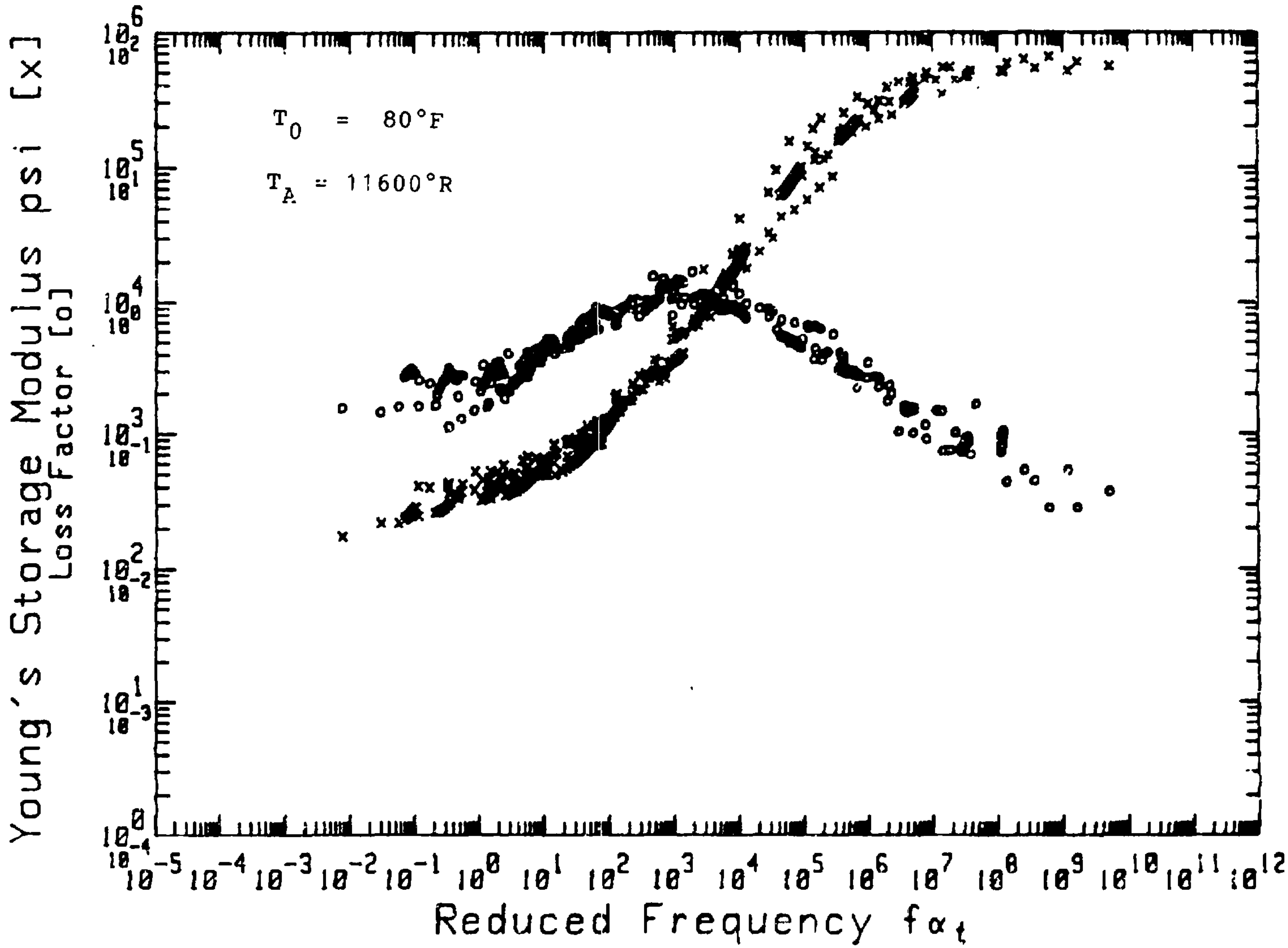


Figure 48. Nomogram of all Vibrating Beam and Impedance Data in Extension

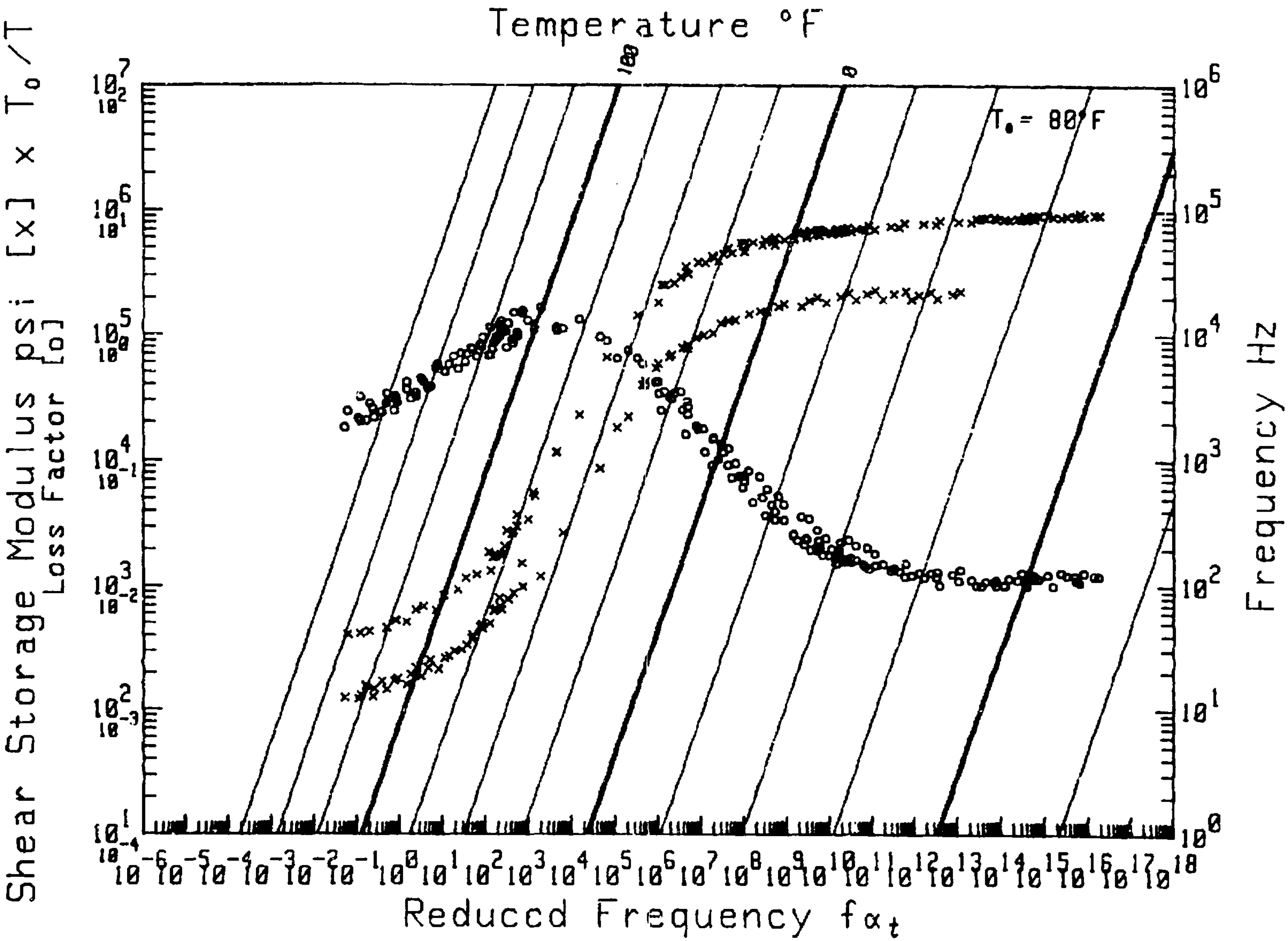


Figure 49. Nomogram of all Vibrating Beam Data in Shear and Extension

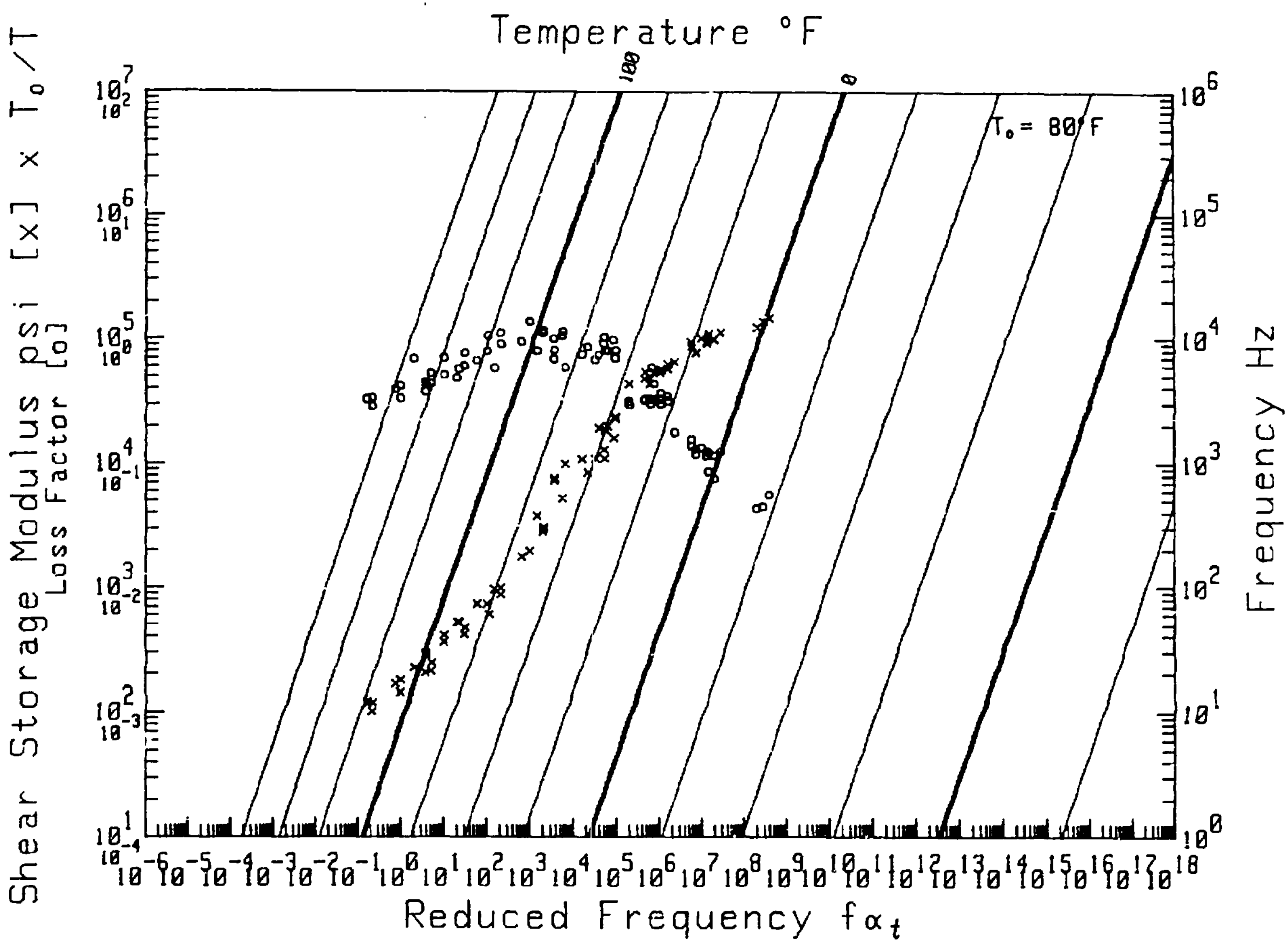


Figure 50. Nomogram of Laboratory A Data

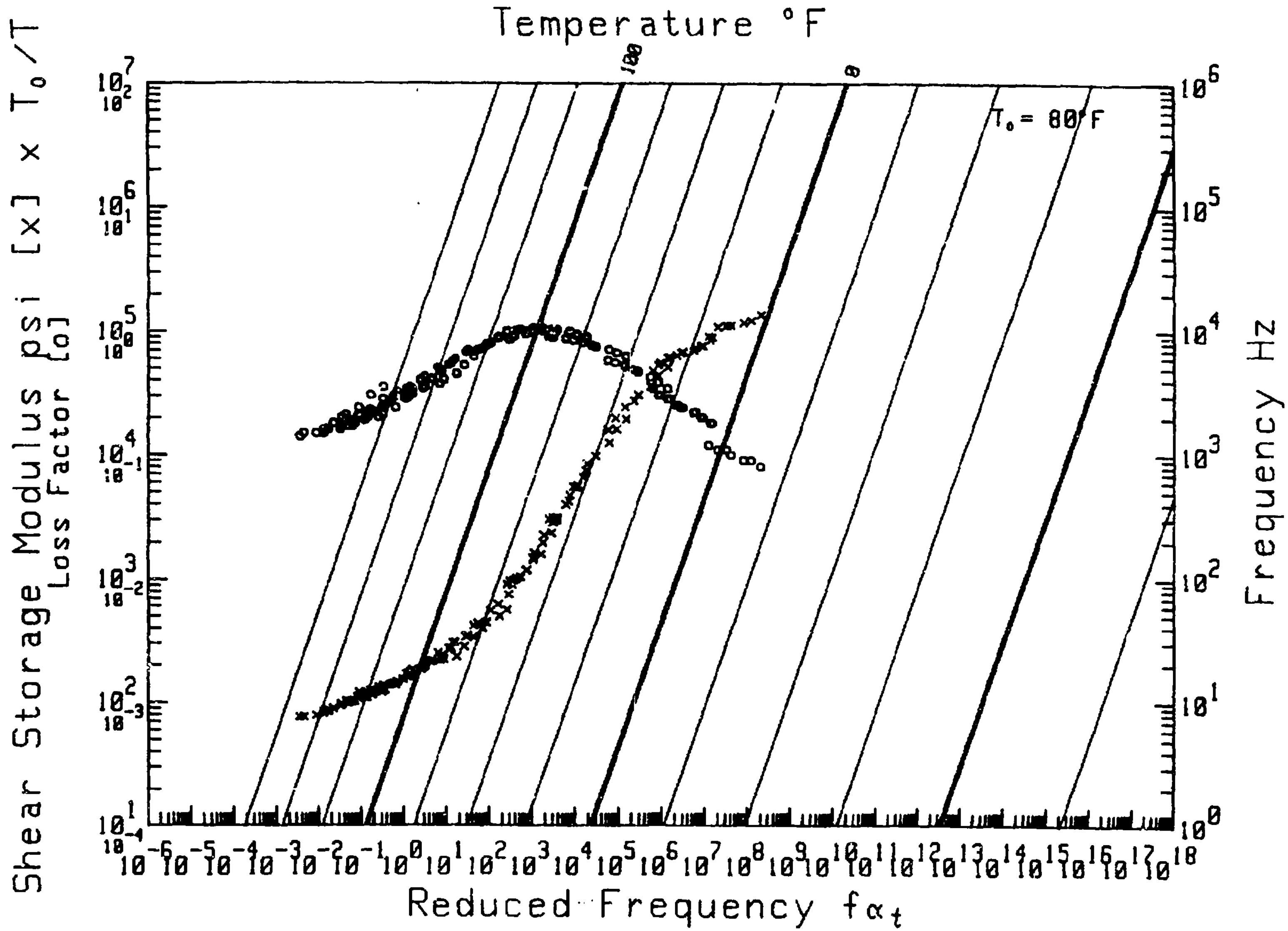


Figure 51. Nomogram of Laboratory C Data

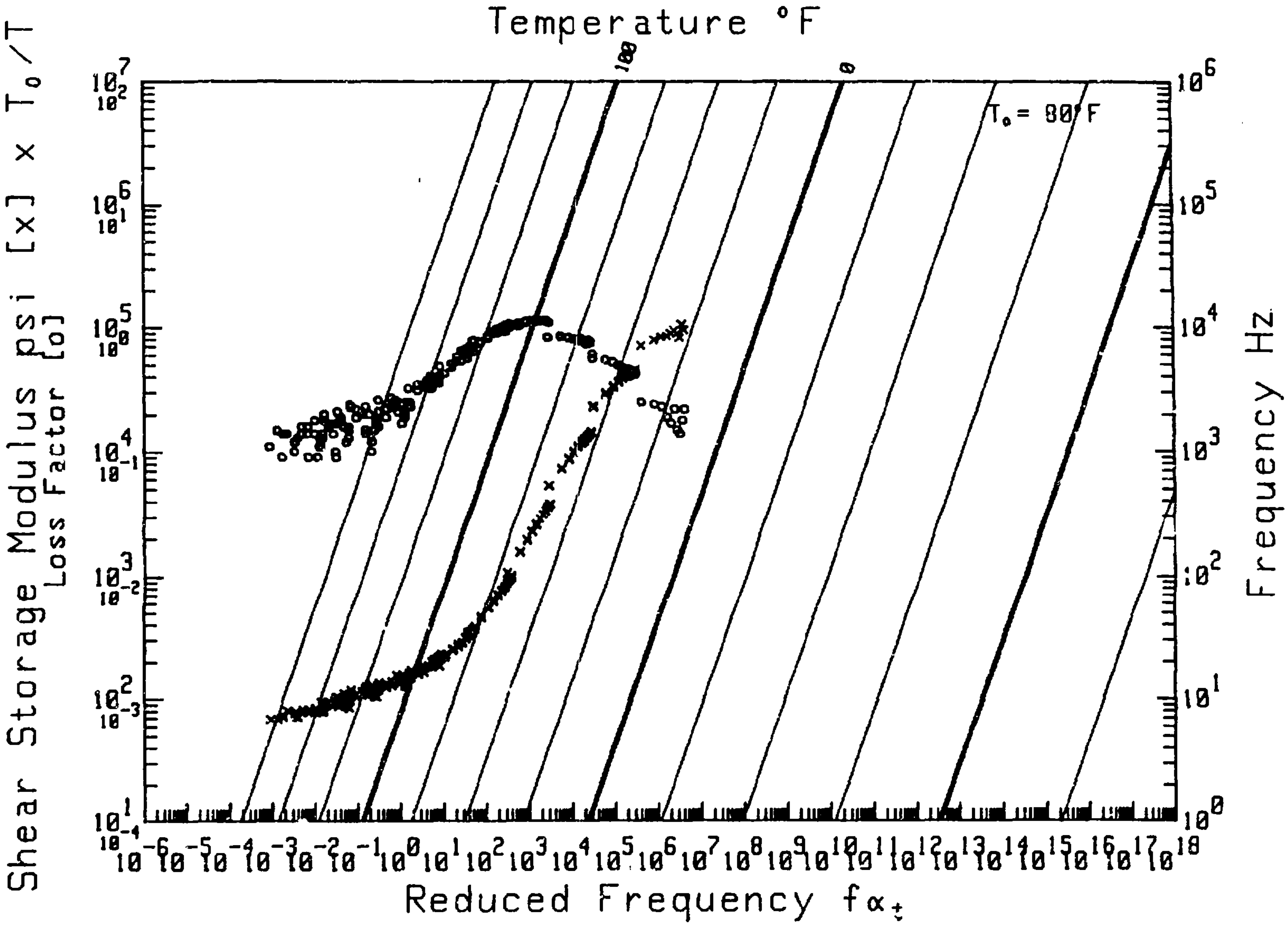


Figure 52. Nomogram of Laboratory D Data

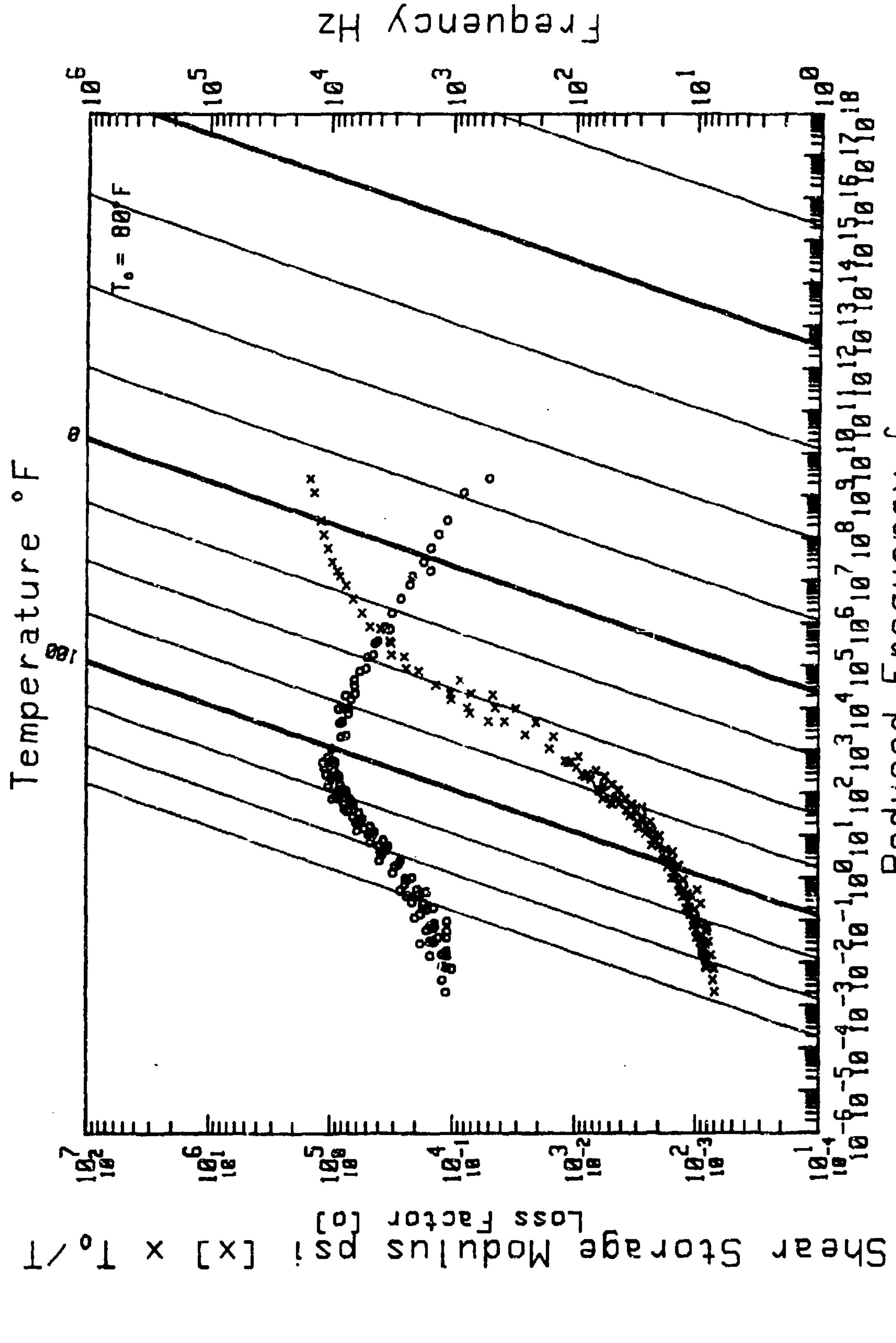


Figure 53. Nomogram of Laboratory E Data (Impedance/Shear)

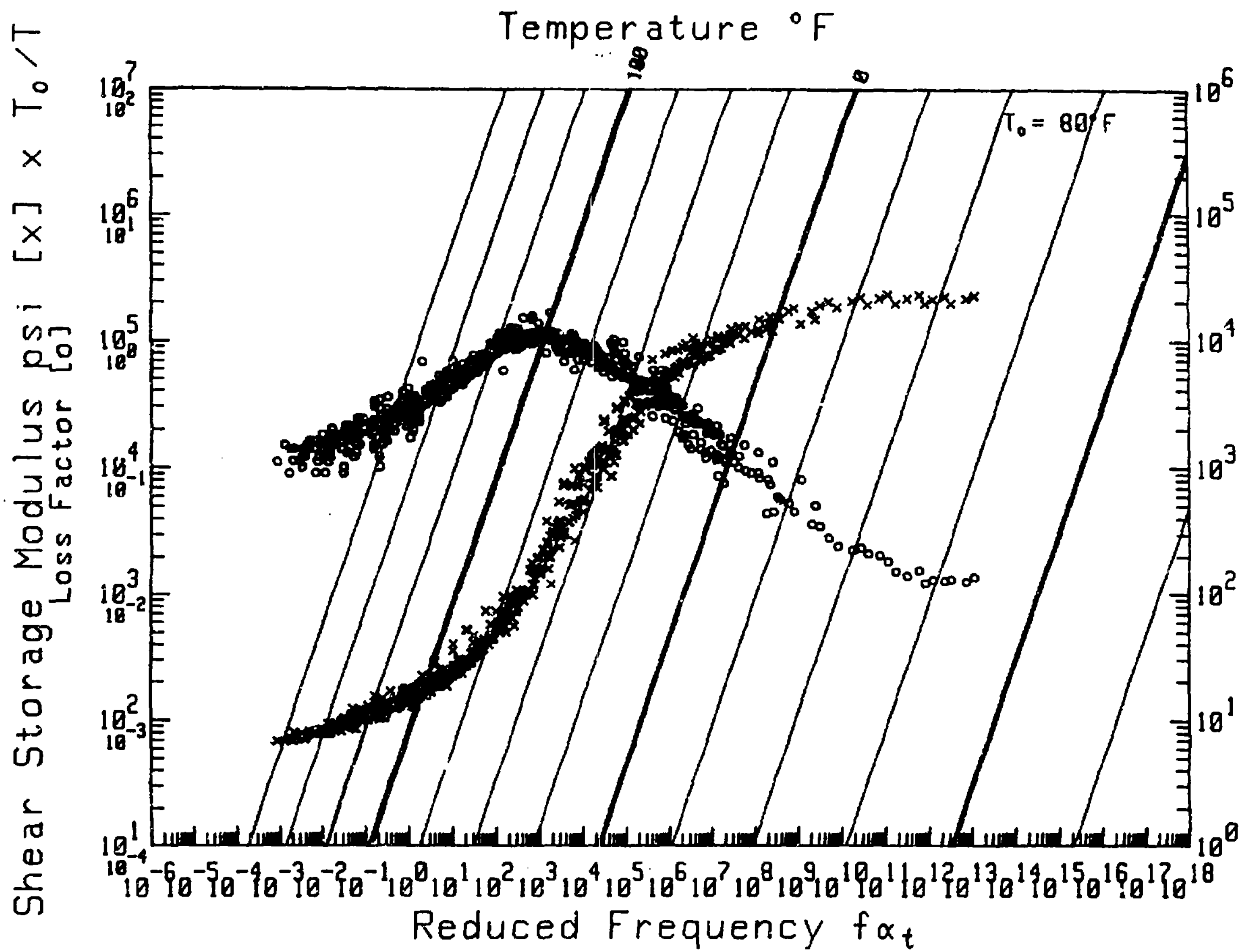


Figure 54. Comparison of Results by Different Techniques and Laboratories (Shear)

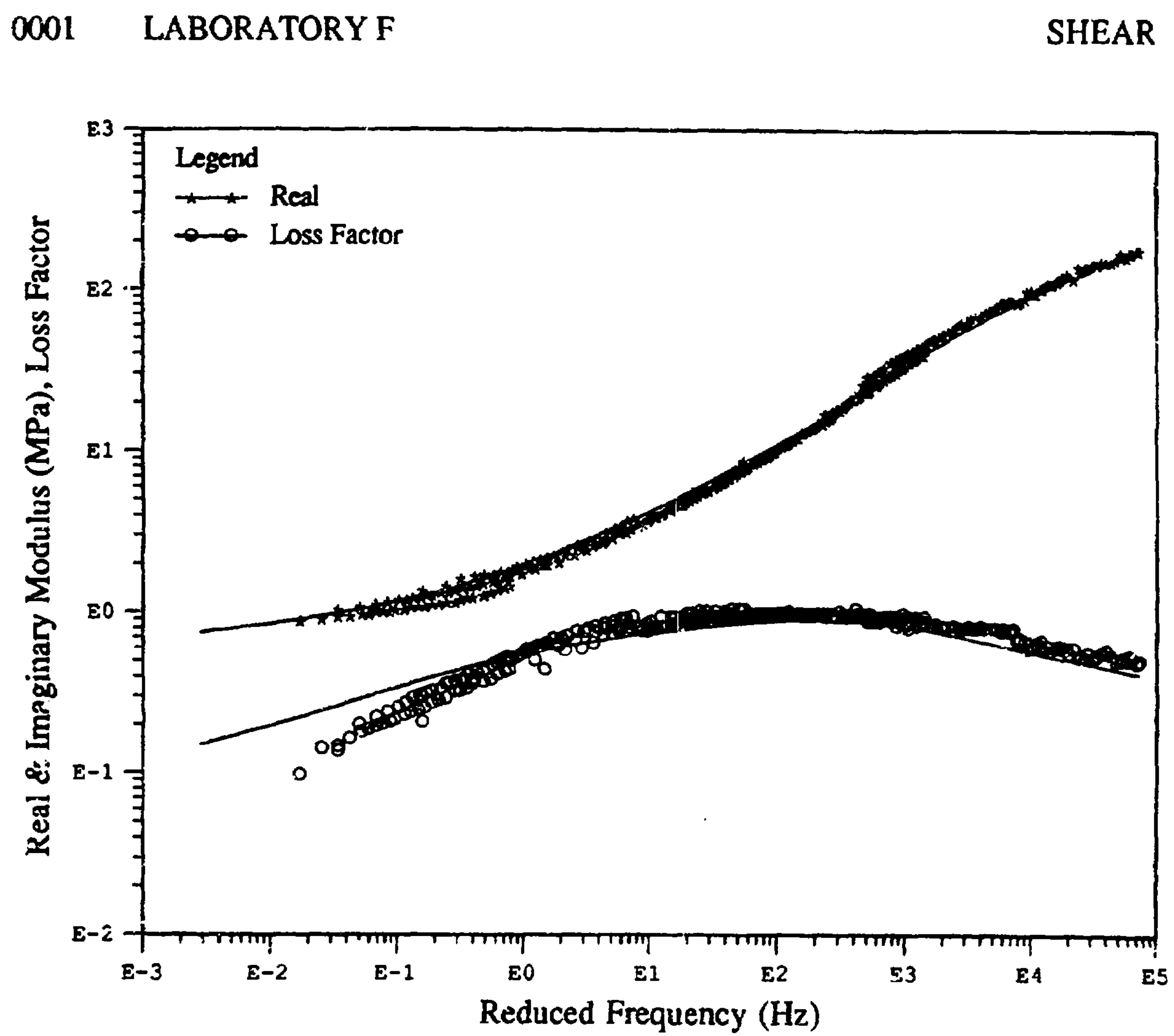


Figure 55. Frequency-Temperature Master Curves for Laboratory F Data (Shear/1 iteration)

0001 LABORATORY F SHEAR

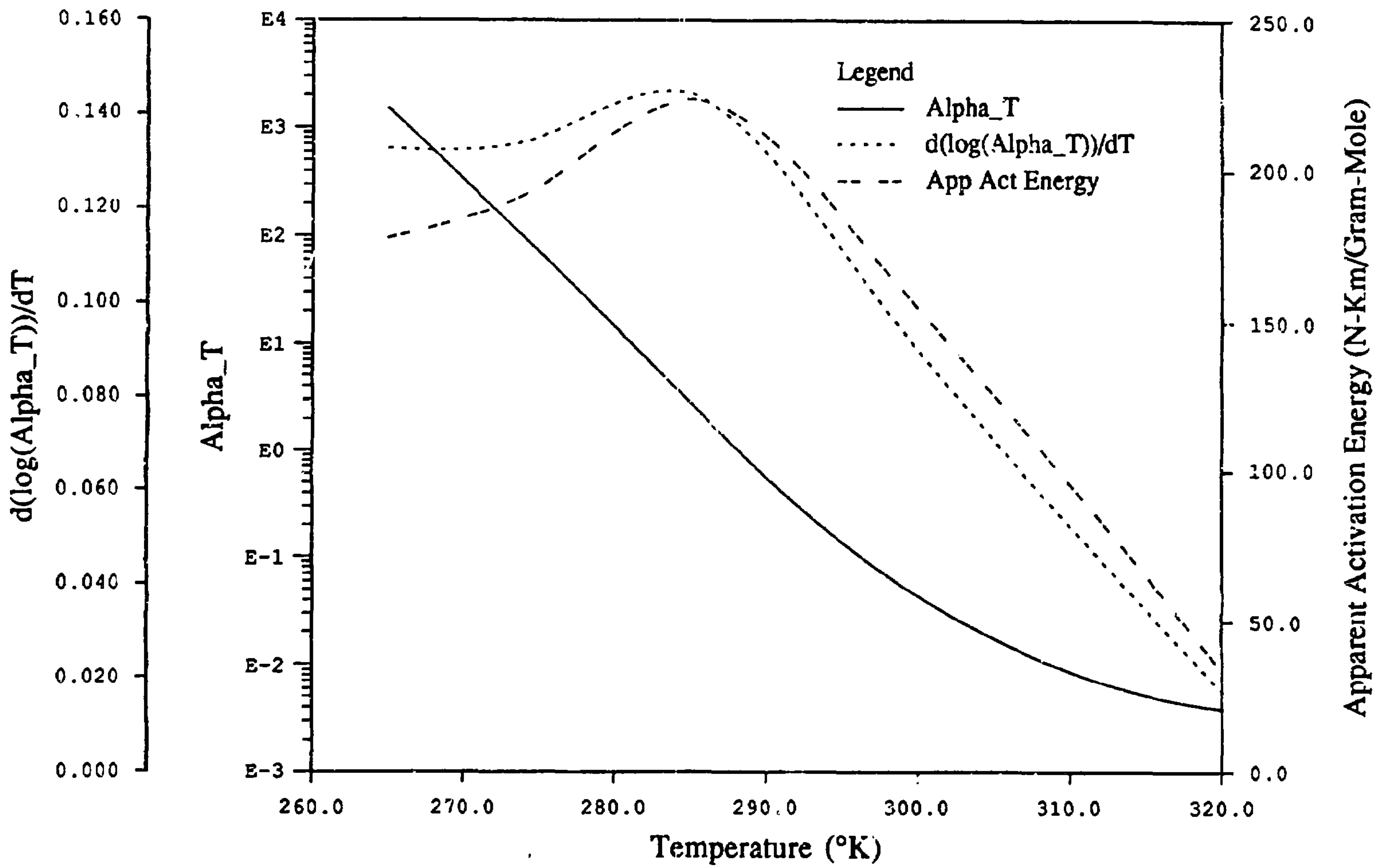


Figure 56. Plot of Shift Factor Versus Temperature for Laboratory F Shear Data (1 Iteration)

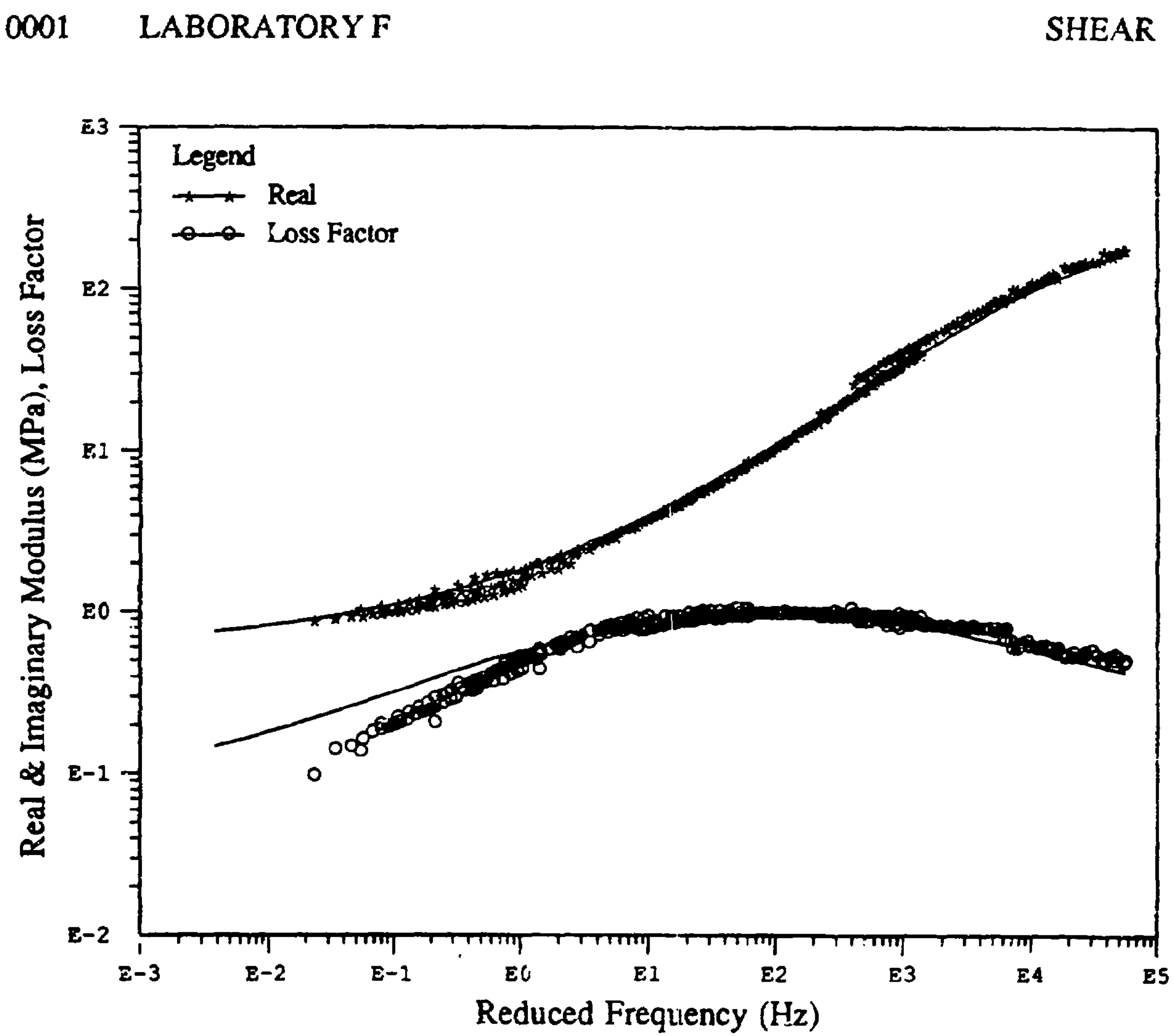


Figure 57. Frequency-Temperature Master Curves for Laboratory F Shear Data (2 Iterations)

0001 LABORATORY F SHEAR

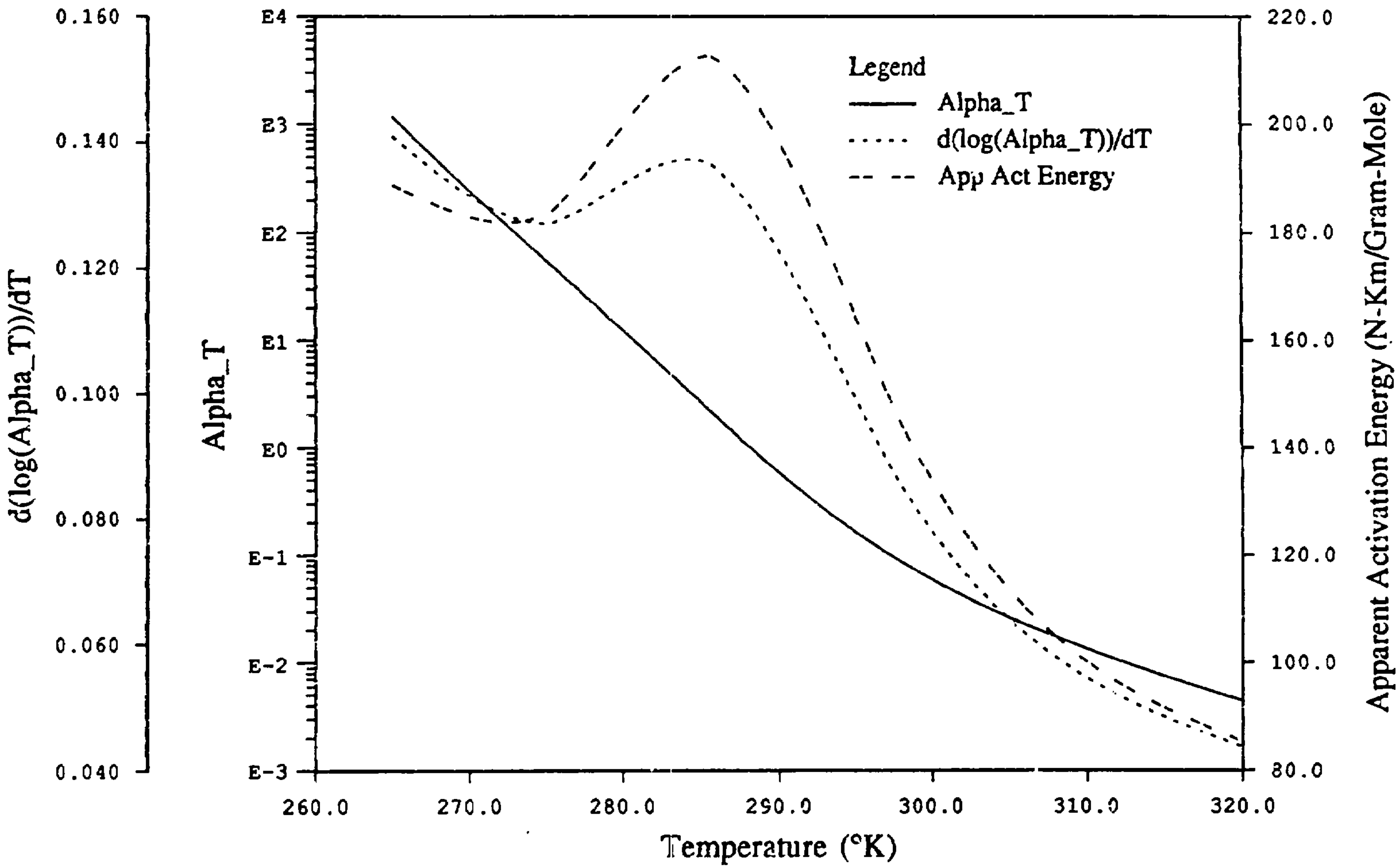


Figure 58. Plot of Shift Factor Versus Temperature for Laboratory F Shear Data (2 Iterations)

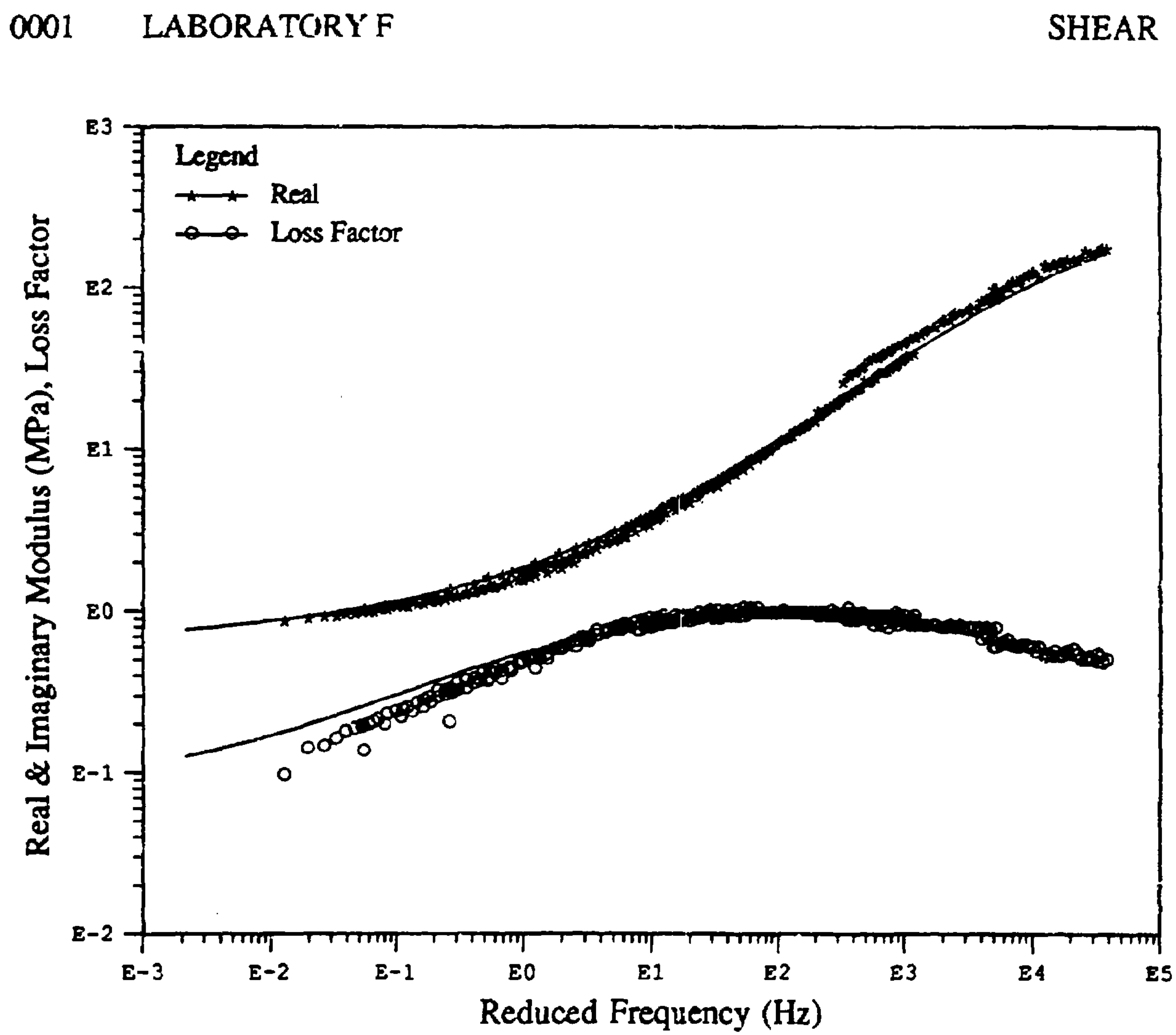


Figure 59. Frequency-Temperature Master Curves for Laboratory F Shear Data (7 Iterations)

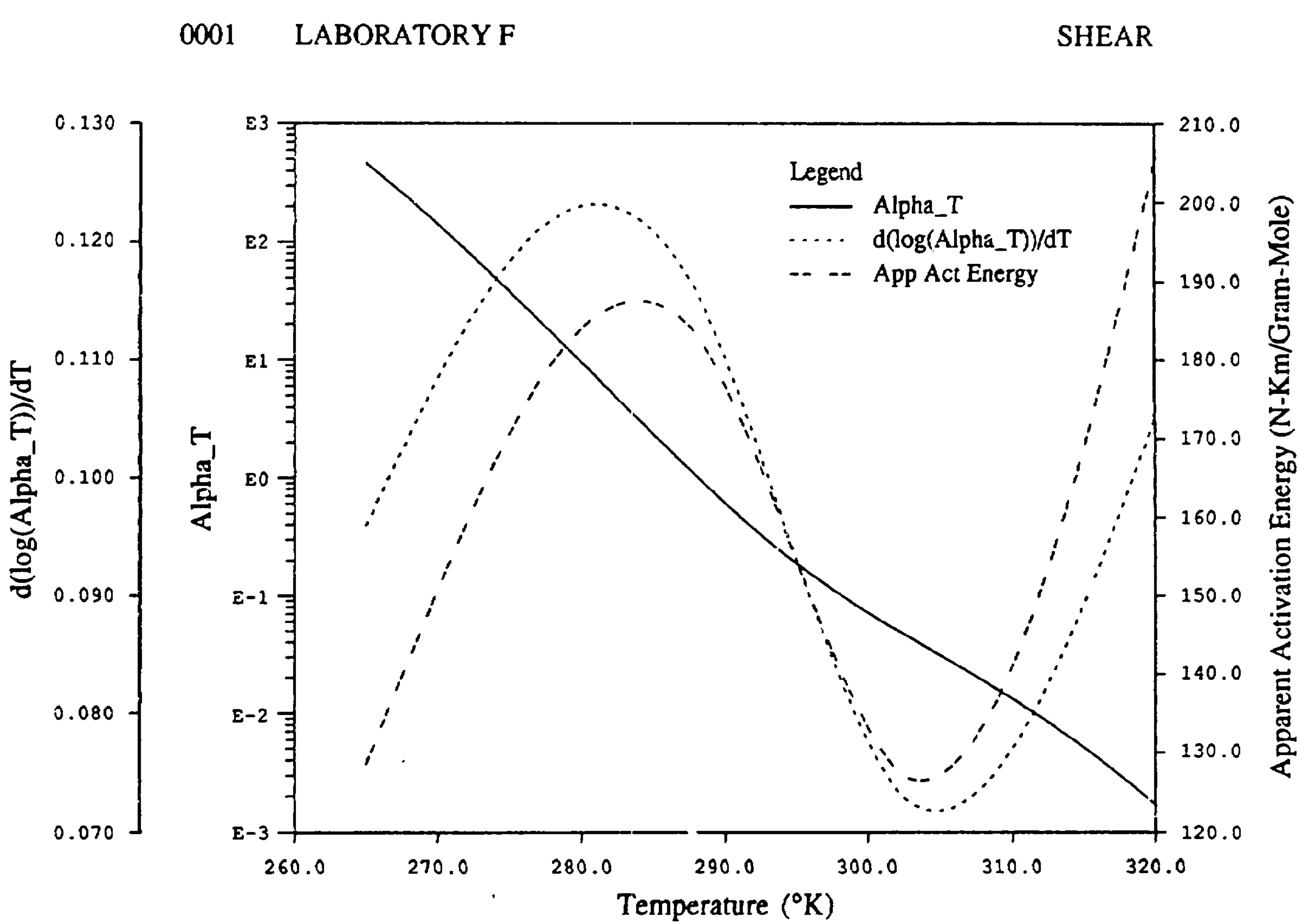


Figure 60. Plot of Shift Factor Versus Temperature for Laboratory F Shear Data (7 Iterations)

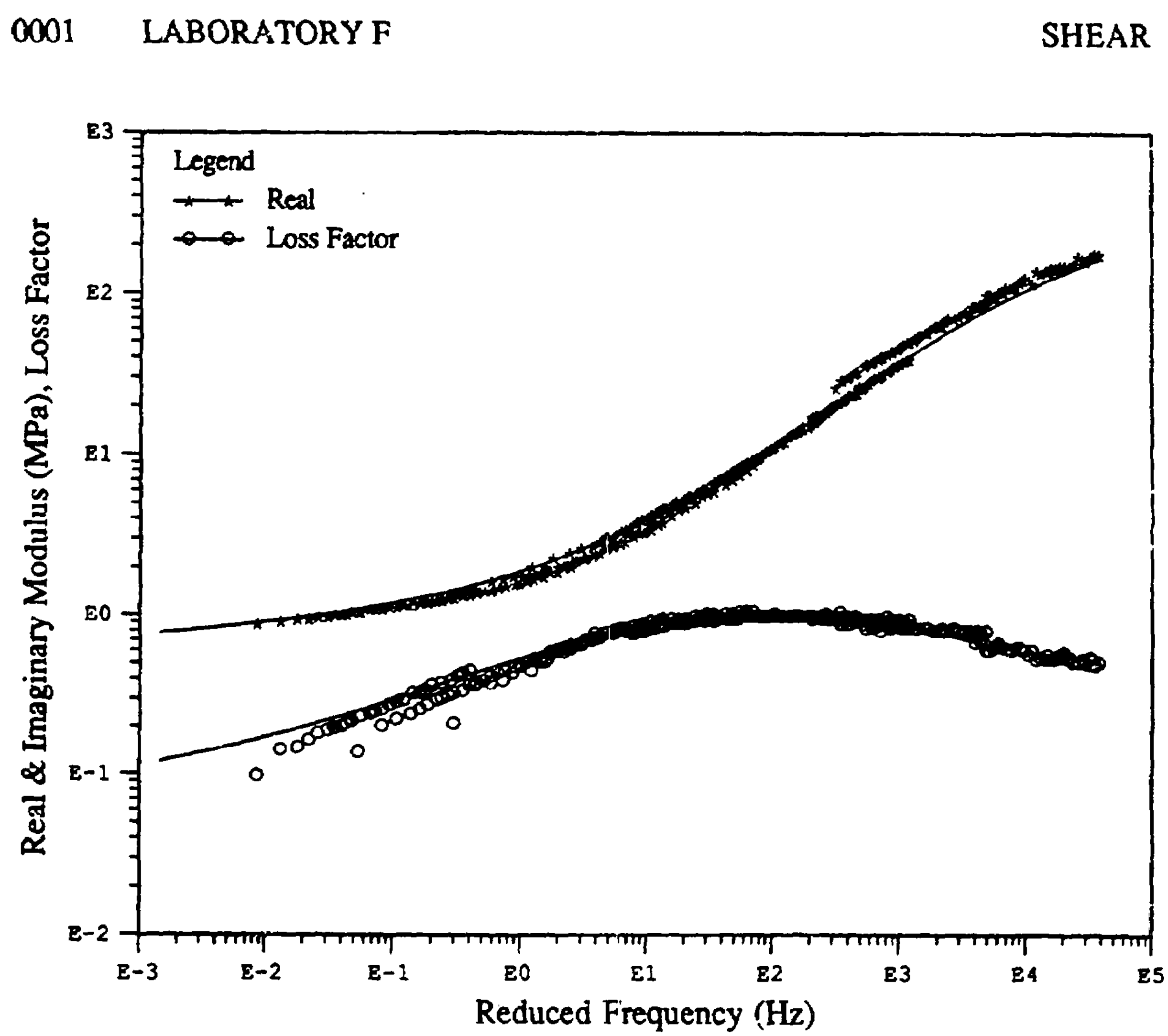


Figure 61. Frequency-Temperature Master Curves for Laboratory F Shear Data (12 Iterations)

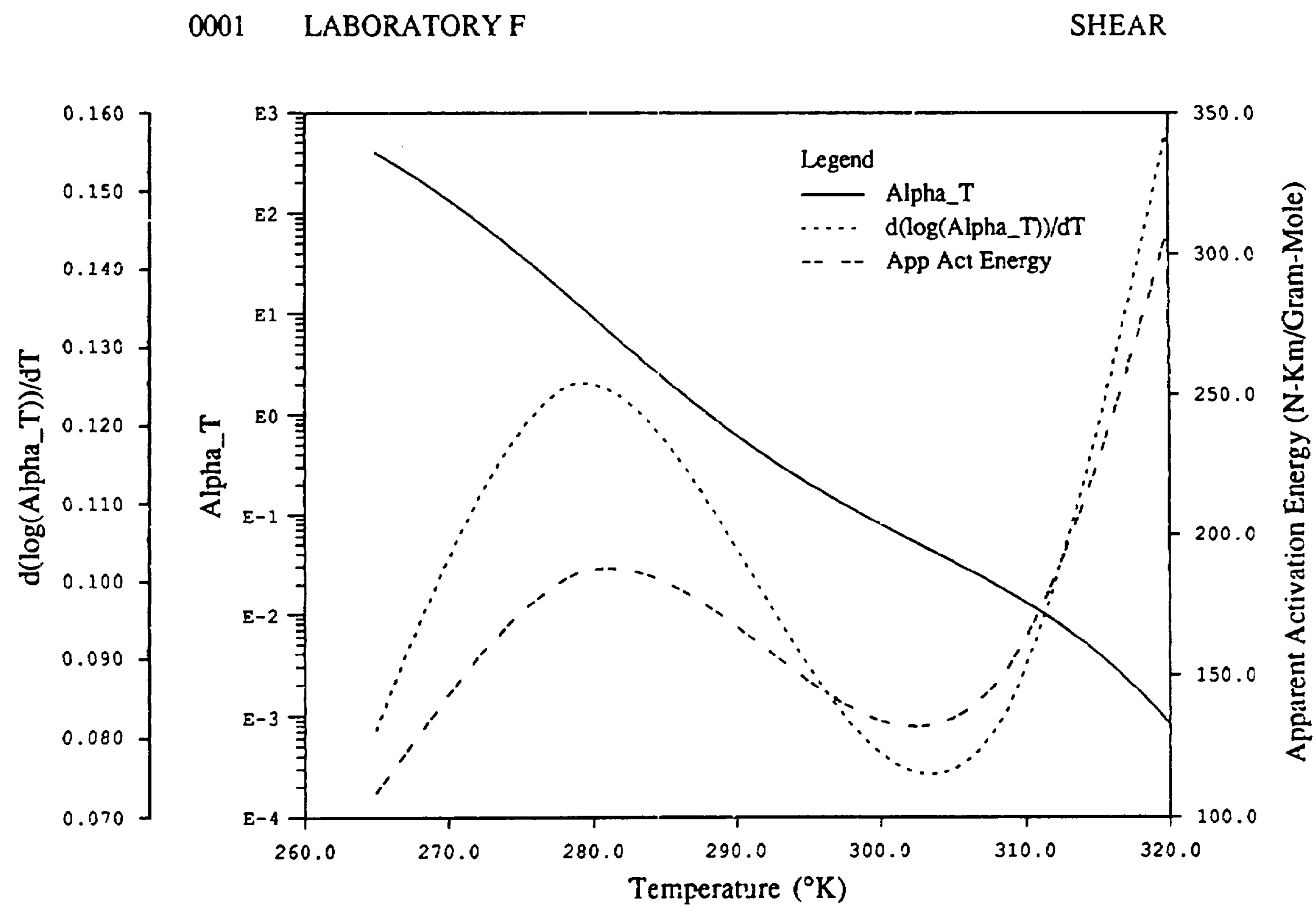


Figure 62. Plot of Shift Factor Versus Temperature for Laboratory F Shear Data (12 Iterations)

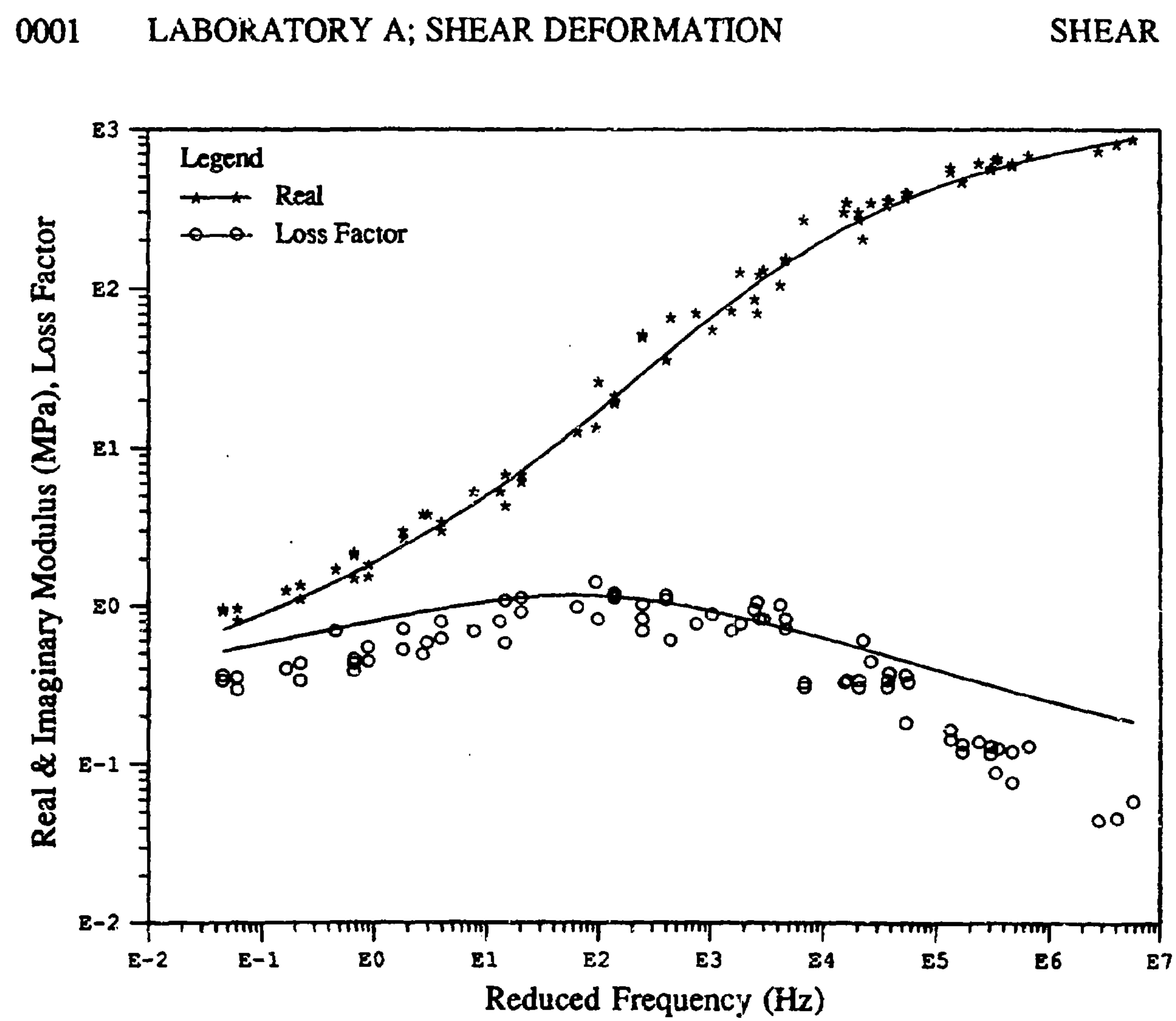


Figure 63. Frequency-Temperature Master Curves for Laboratory A Shear Data as Analyzed by Laboratory F (1 Iteration)

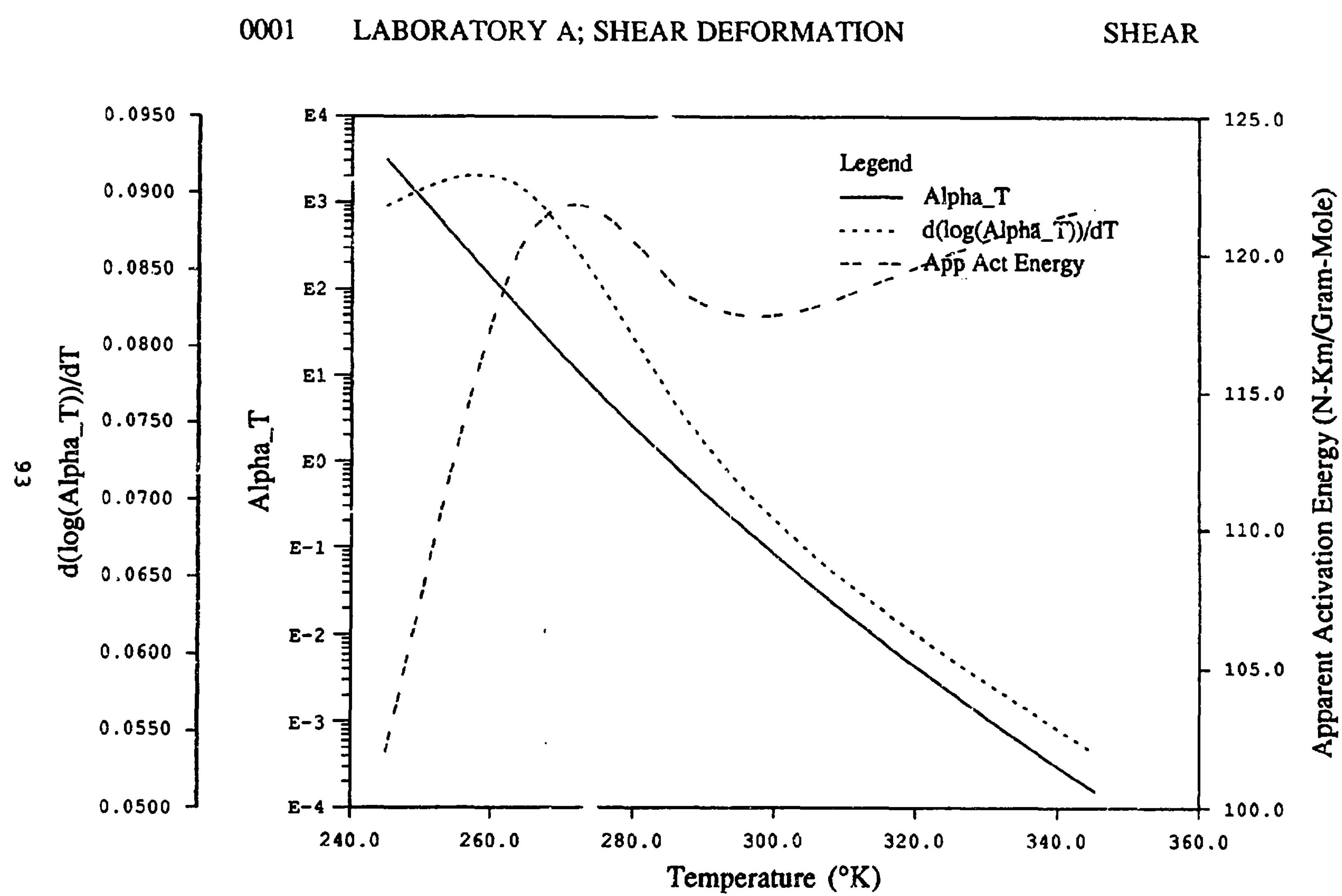


Figure 64. Plot of Shift Factor Versus Temperature for Laboratory A Shear Data as Analyzed by Laboratory F (1 Iteration)

0001 LABORATORY C; SHEAR DEFORMATION SAMPLE 2 SHEAR

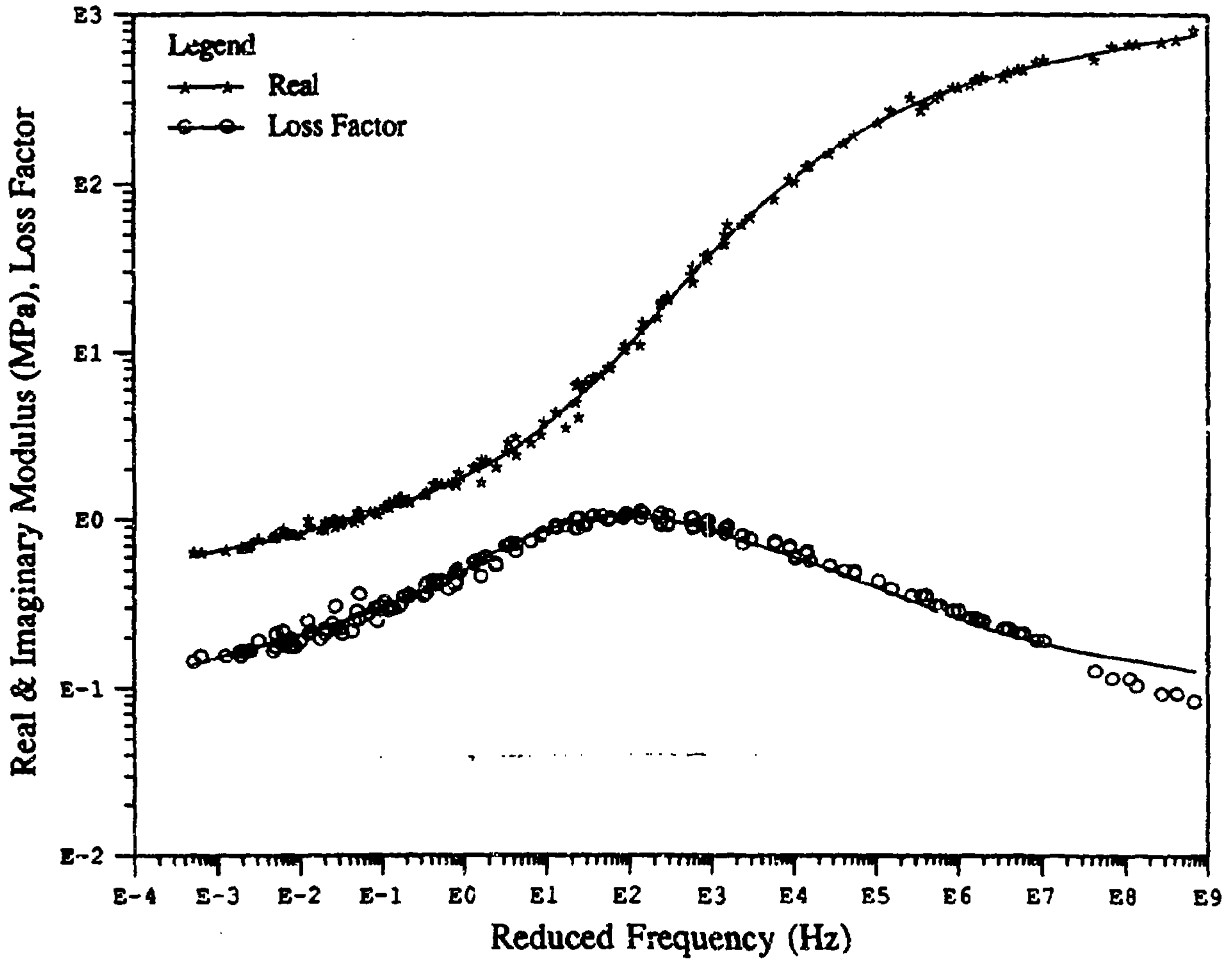


Figure 65. Frequency-Temperature Master Curves for Laboratory C Shear Data as Analyzed by Laboratory F (2 Iterations)

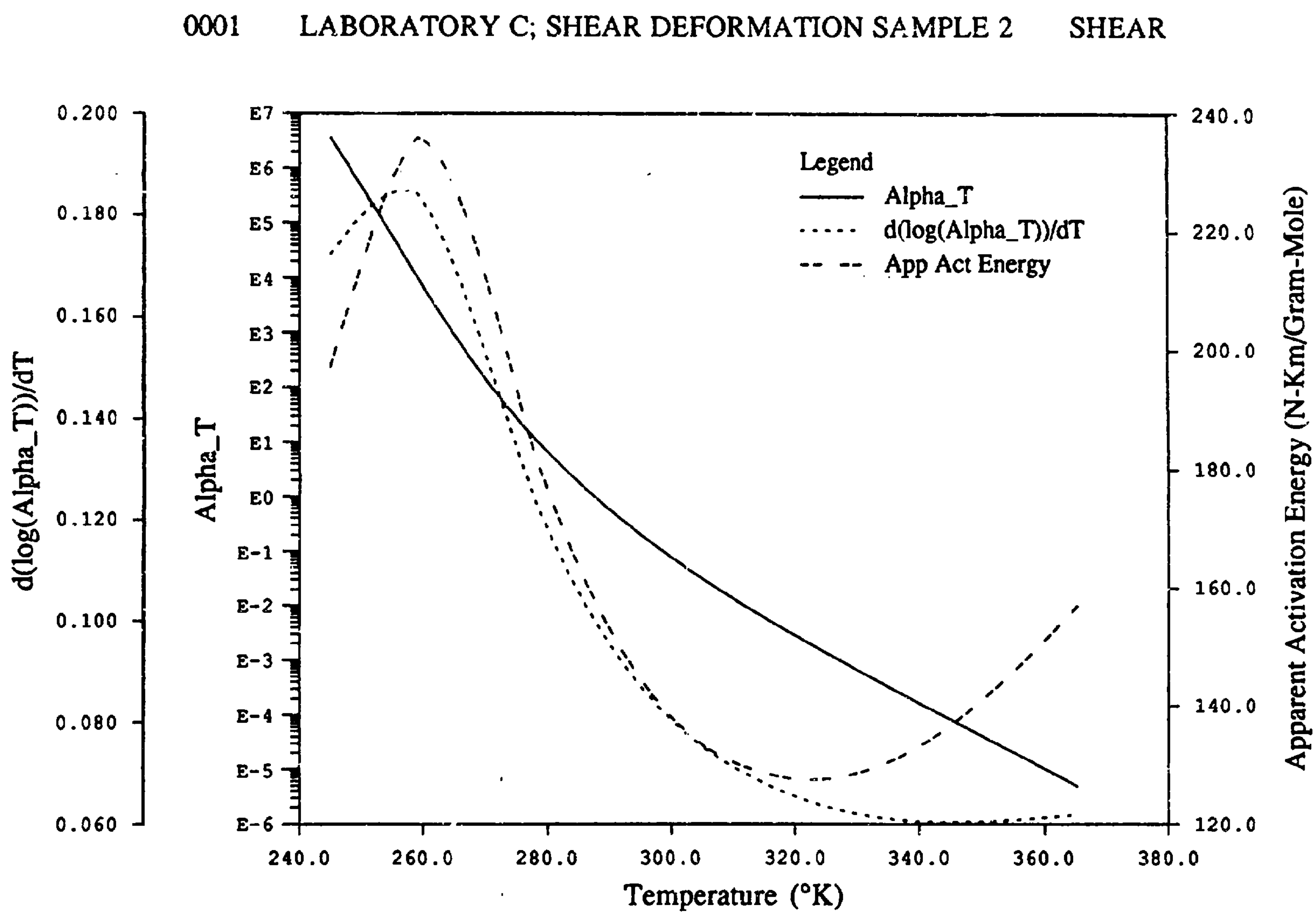


Figure 66. Plot of Shift Factor Versus Temperature for Laboratory C Shear Data as Analyzed by Laboratory F (2 Iterations)

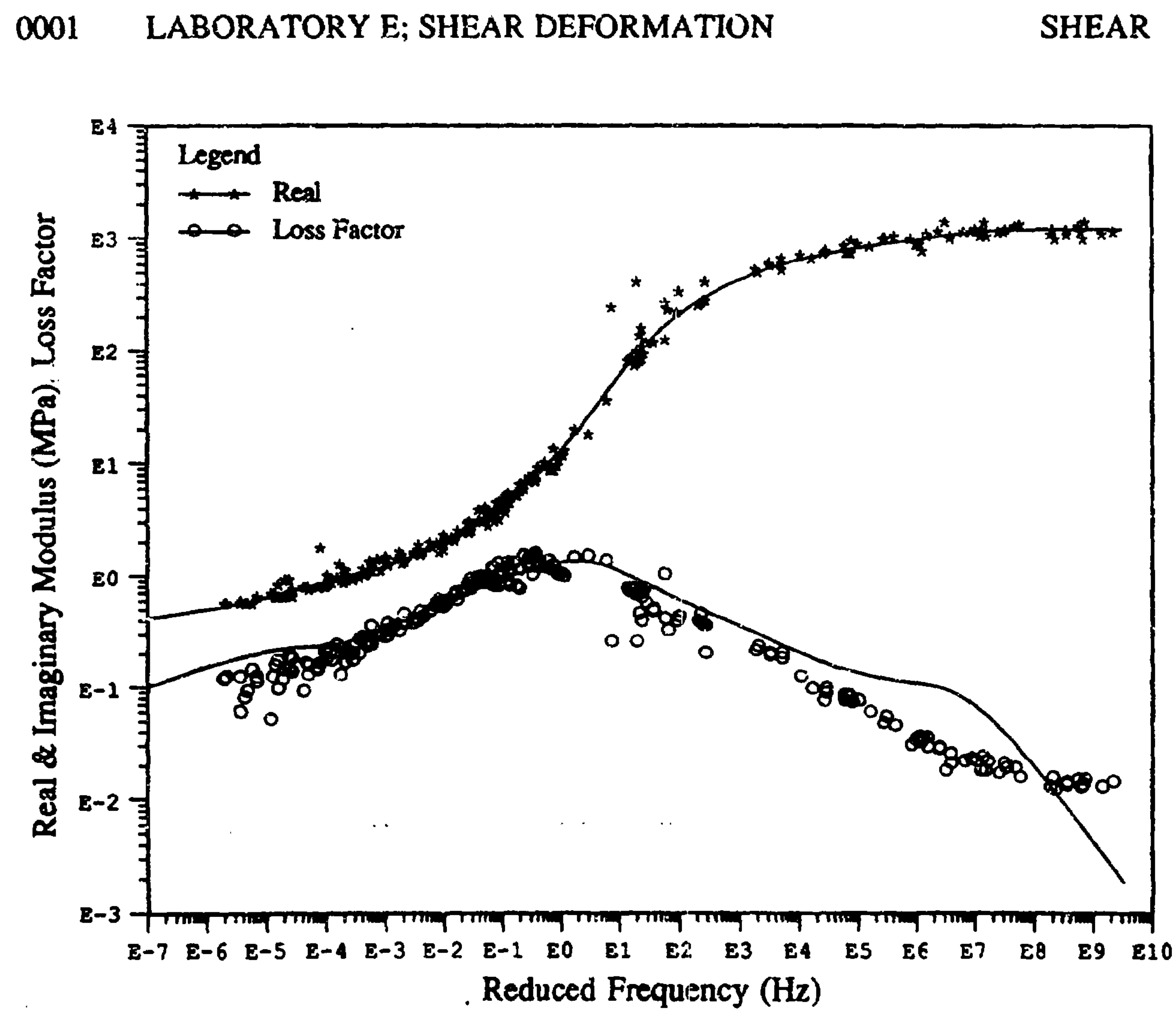


Figure 67. Frequency-Temperature Master Curves for Laboratory E Shear Data as Analyzed by Laboratory F (1 Iteration)

0001 LABORATORY E; SHEAR DEFORMATION SHEAR

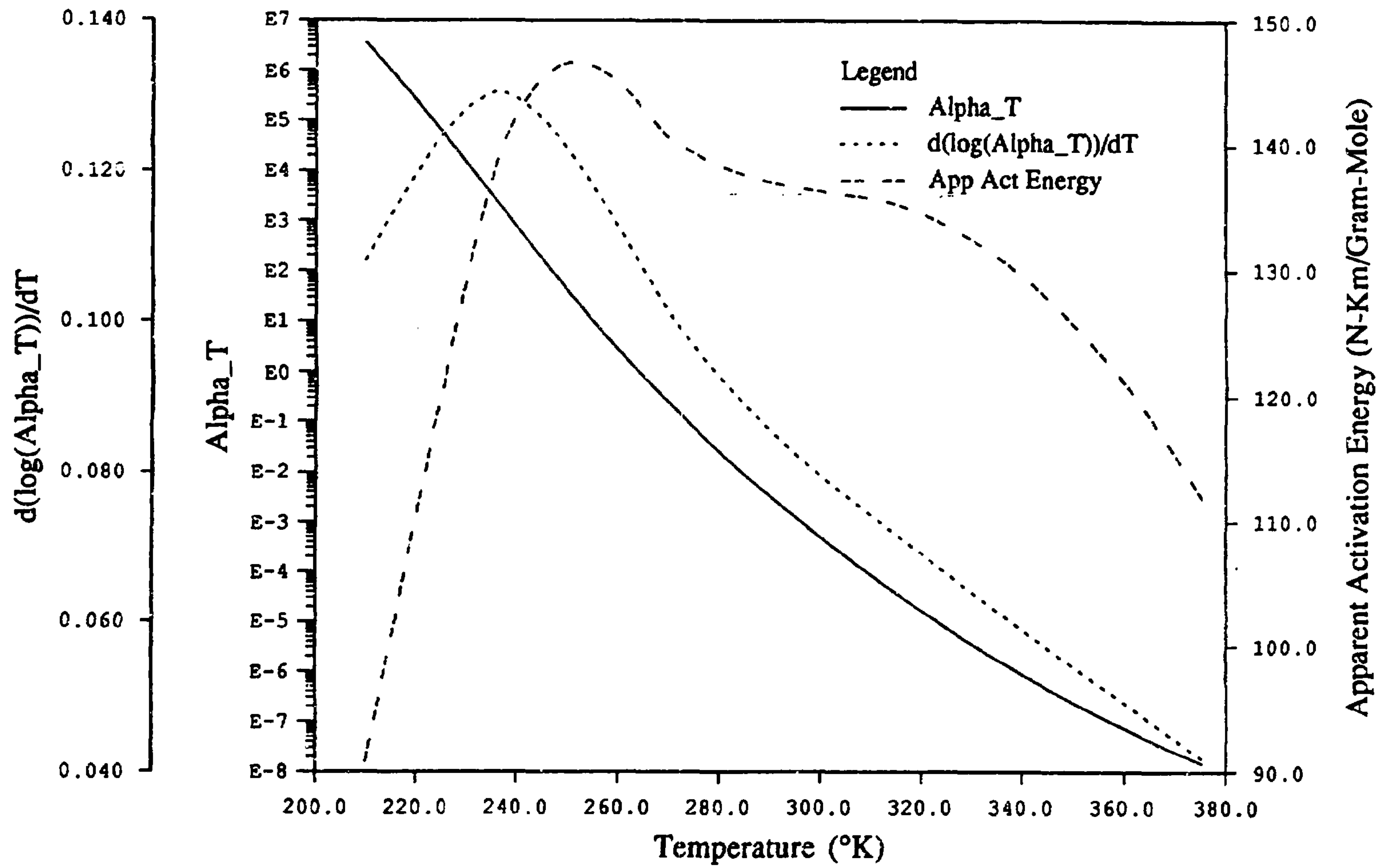


Figure 68. Plot of Shift Factor Versus Temperature for Laboratory E Shear Data as Analyzed by Laboratory F (1 Iteration)

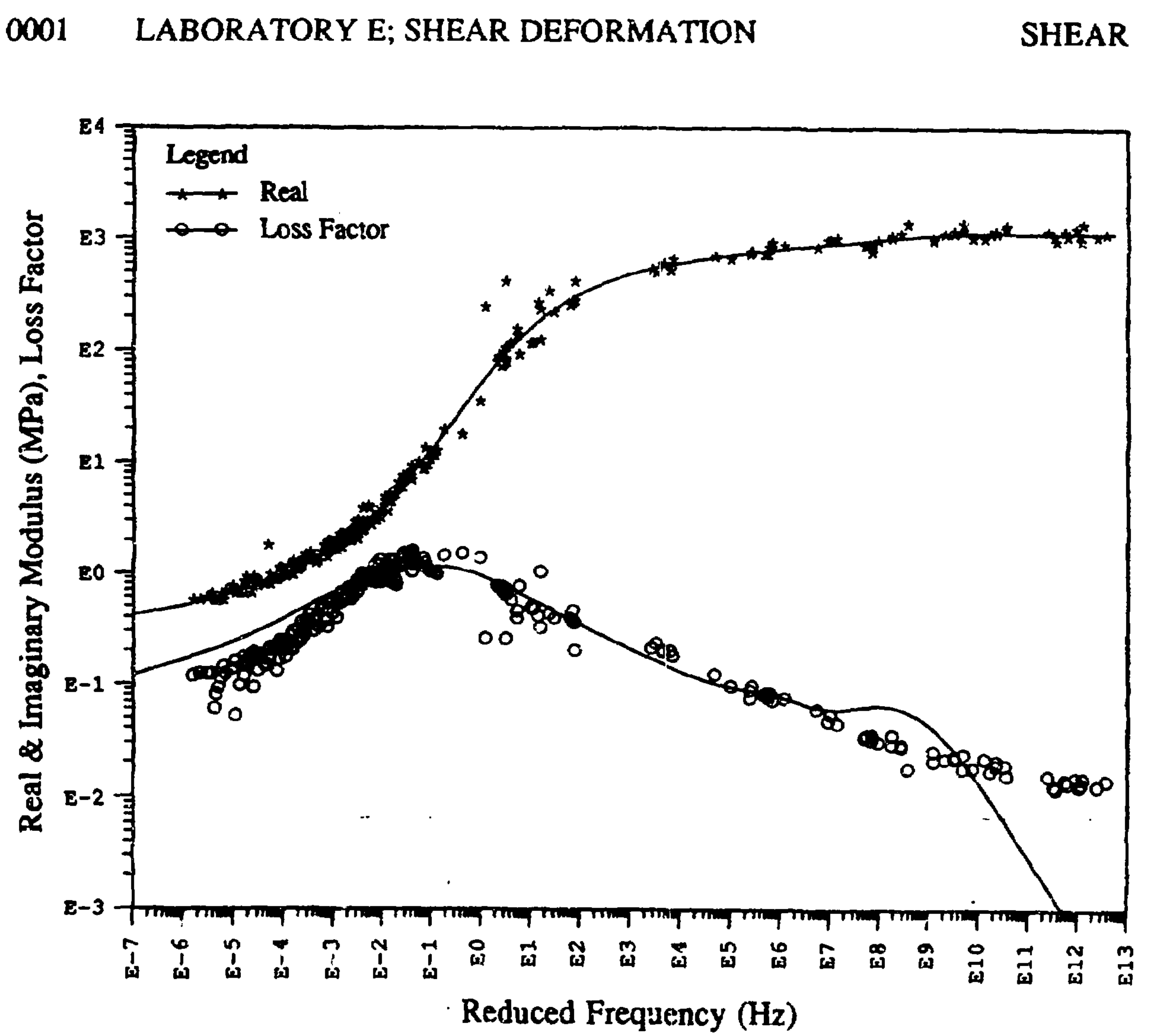


Figure 69. Frequency-Temperature Master Curves for Laboratory E Shear Data as Analyzed by Laboratory F (4 Iterations)

0001 LABORATORY E; SHEAR DEFORMATION SHEAR

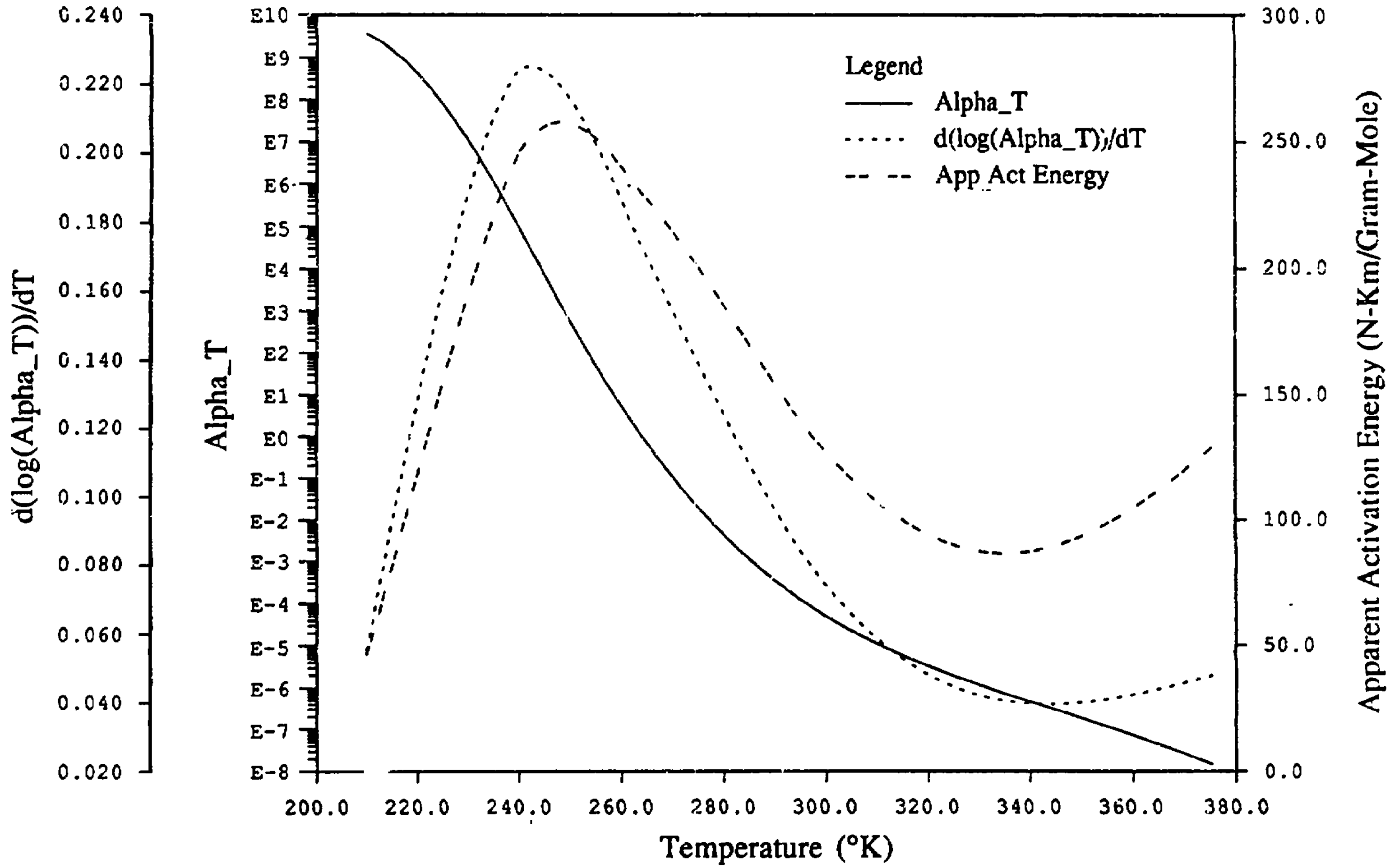


Figure 70. Plot of Shift Factor Versus Temperature for Laboratory E Shear Data as Analyzed by Laboratory F (4 iterations)

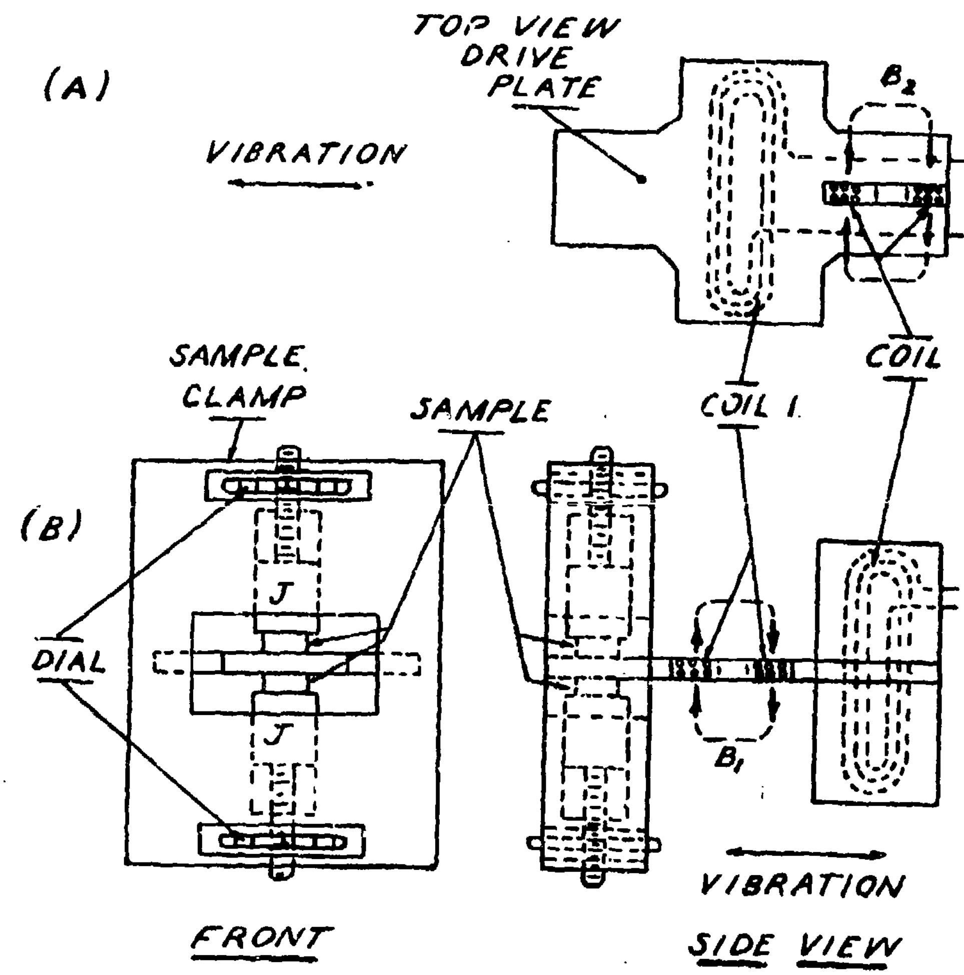


Figure 71. Fitzgerald Test System Configuration (Laboratory L)

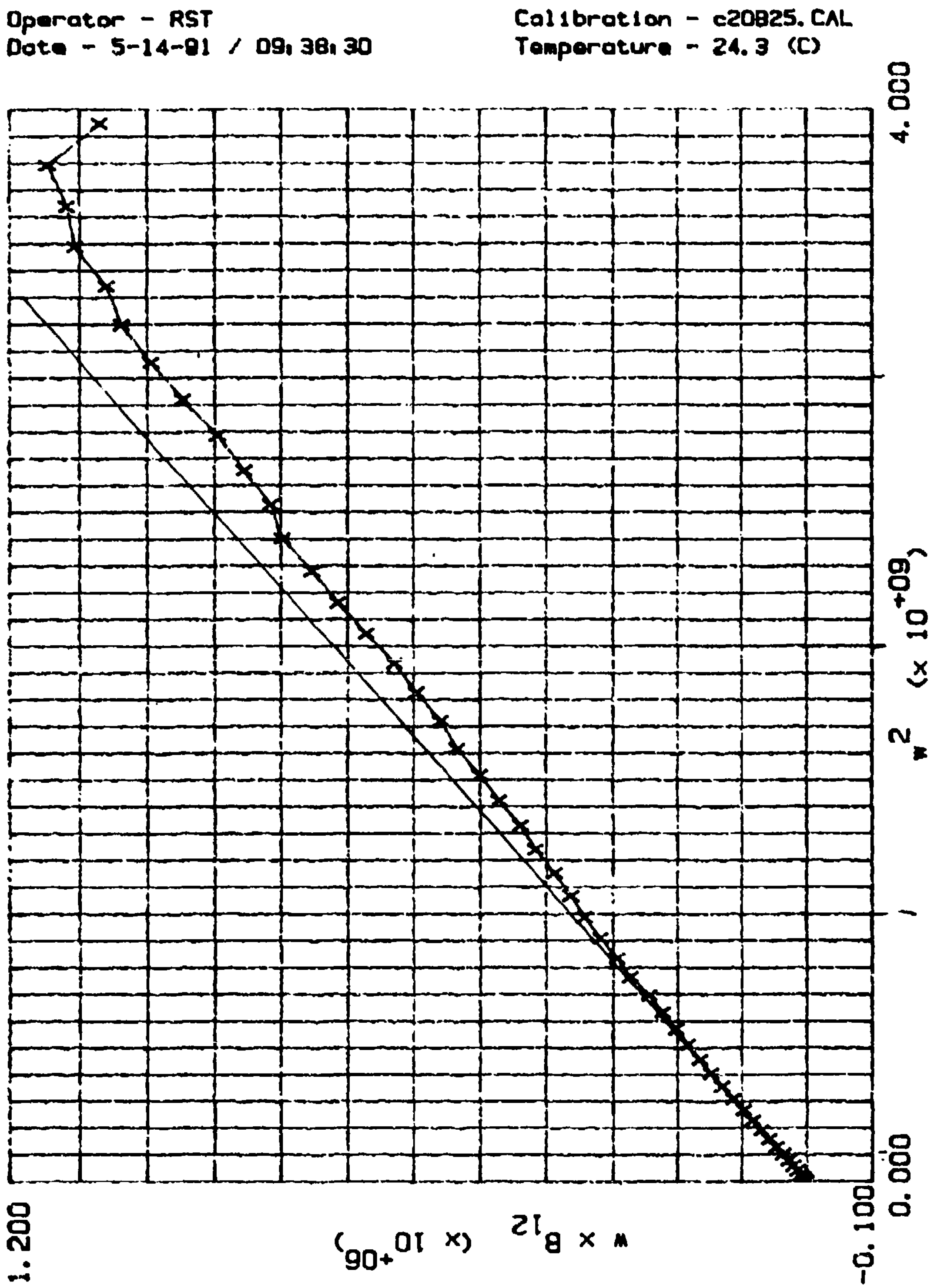


Figure 72. Calibration Plot (w x B_{12} Versus w^2) for Laboratory L

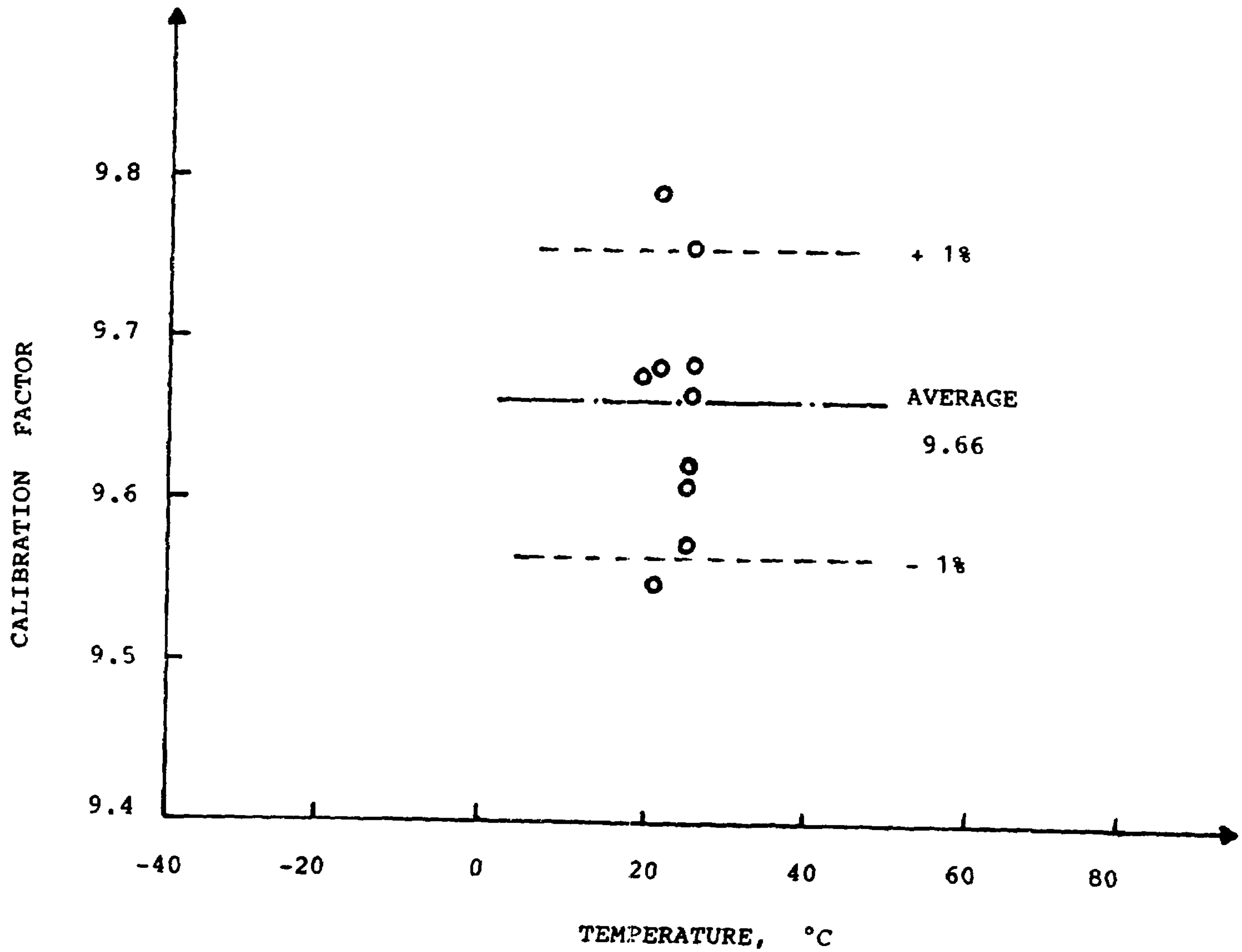


Figure 73. Calibration Factor Versus Temperature for Laboratory L

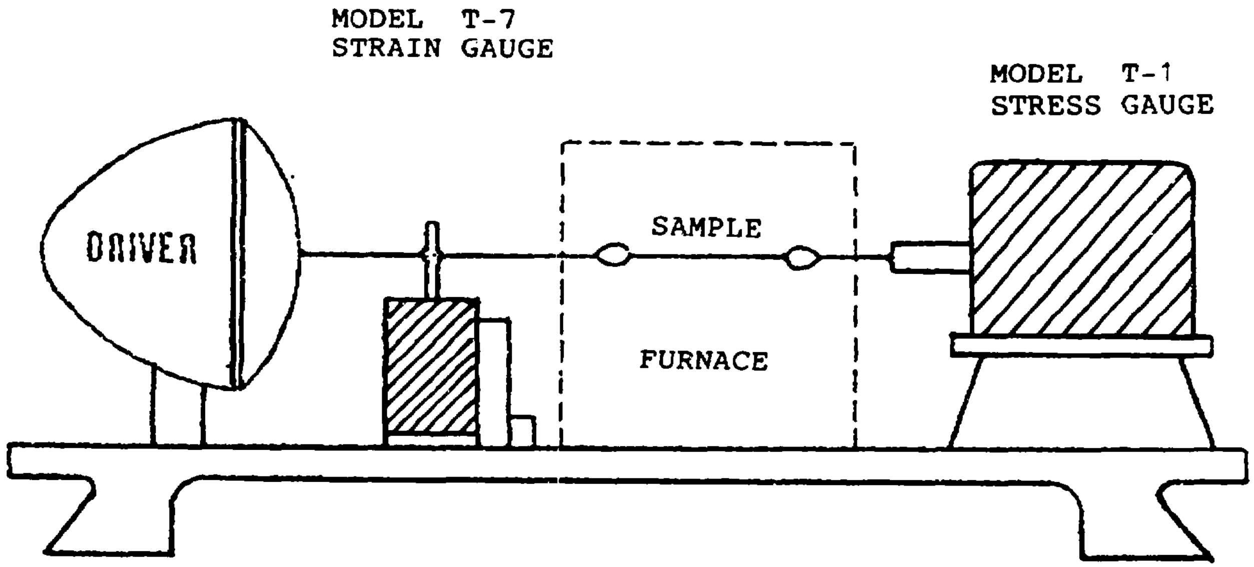


Figure 74. Arrangement of Vibron DDV-II Test Apparatus for Laboratory O

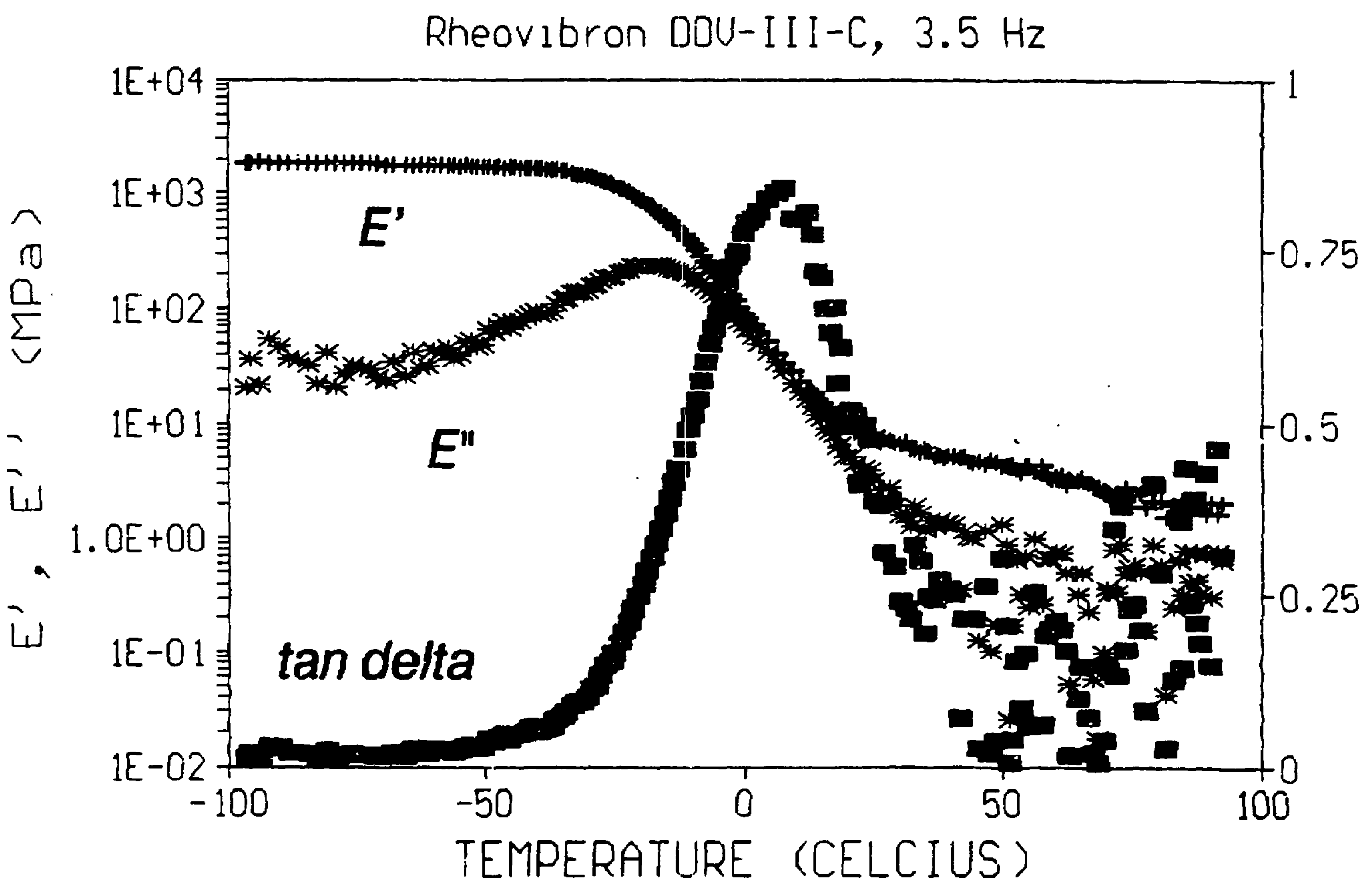


Figure 75. Plot of E', E" and (Tan Delta) vs. Temperature for Laboratory O (Rheovibron DDV-III-C, 3.5 Hz)

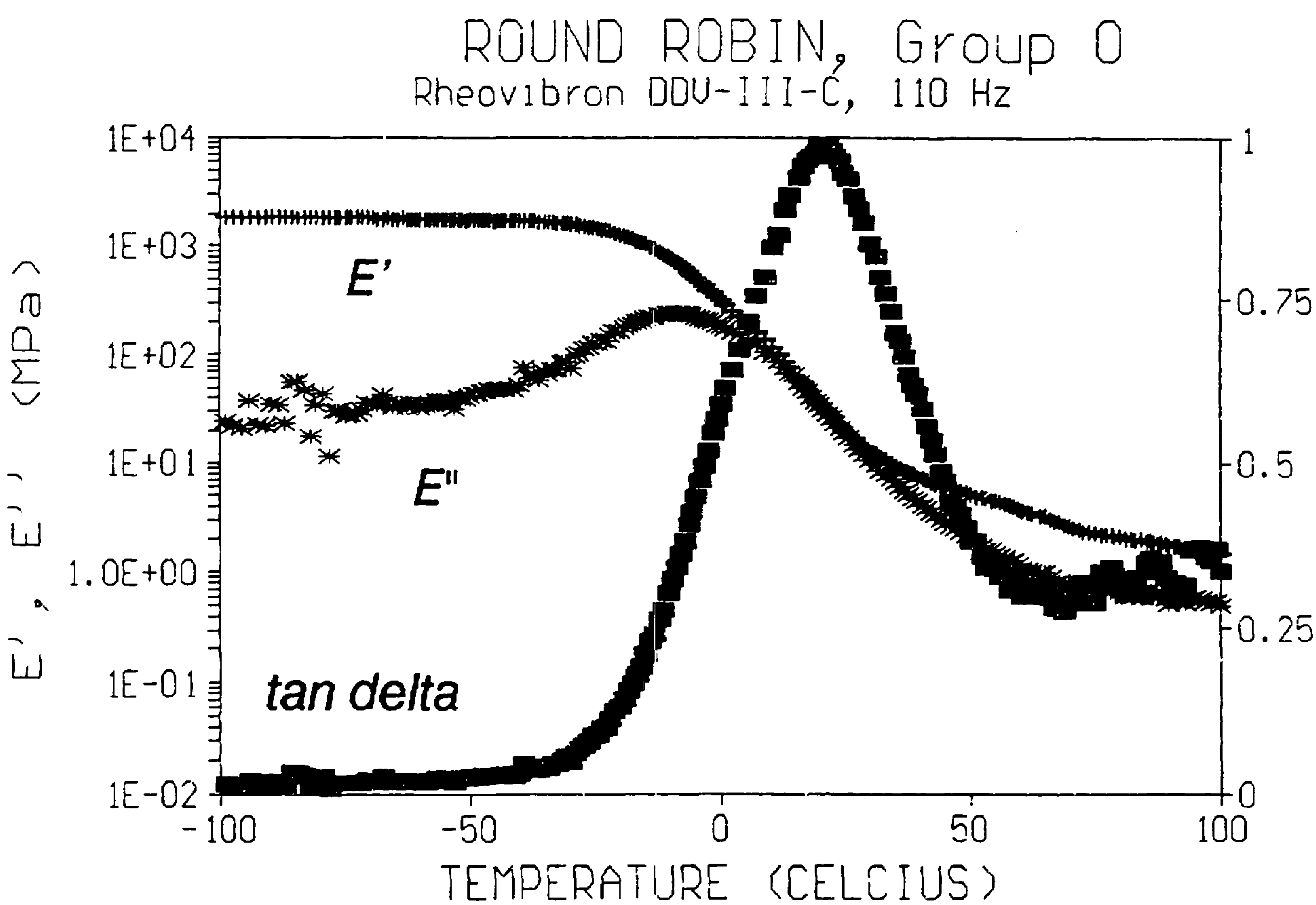
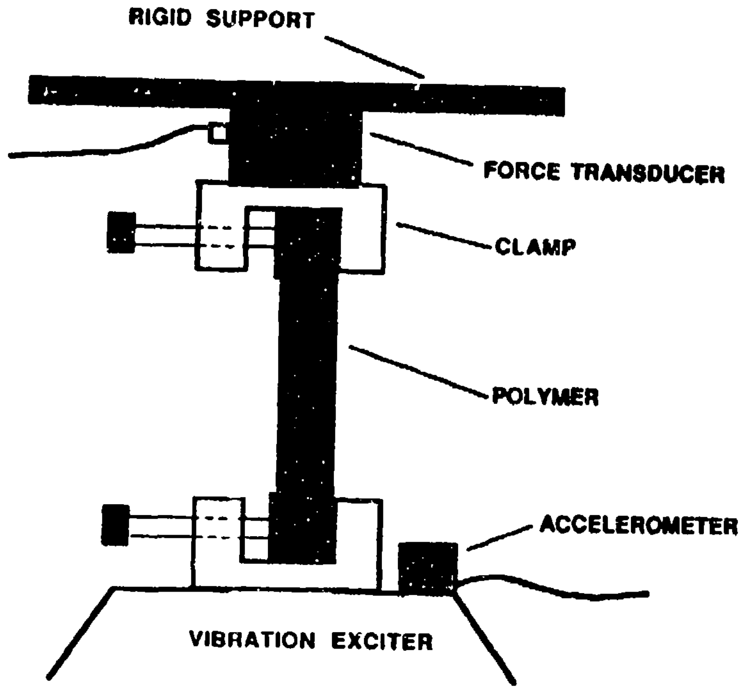
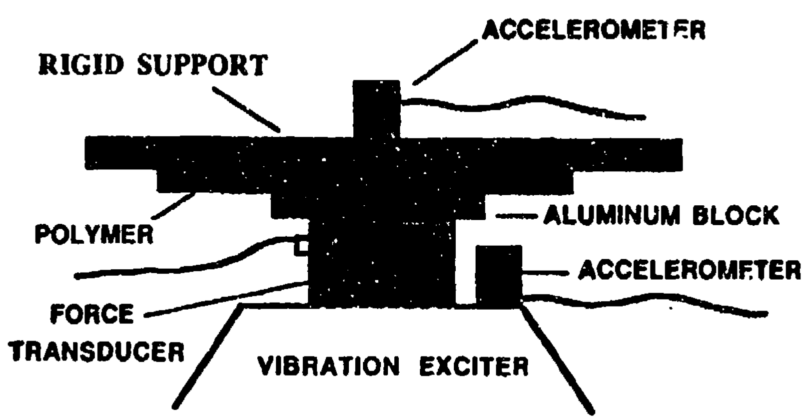


Figure 76. Plot of E', E" and (Tan Delta) vs. Temperature for Laboratory O (Rheovibron DDV-II1-C, 110 Hz)



CONFIGURATION I



CONFIGURATION II

Figure 77. Test Configurations for Laboratory R (Direct Stiffness System)

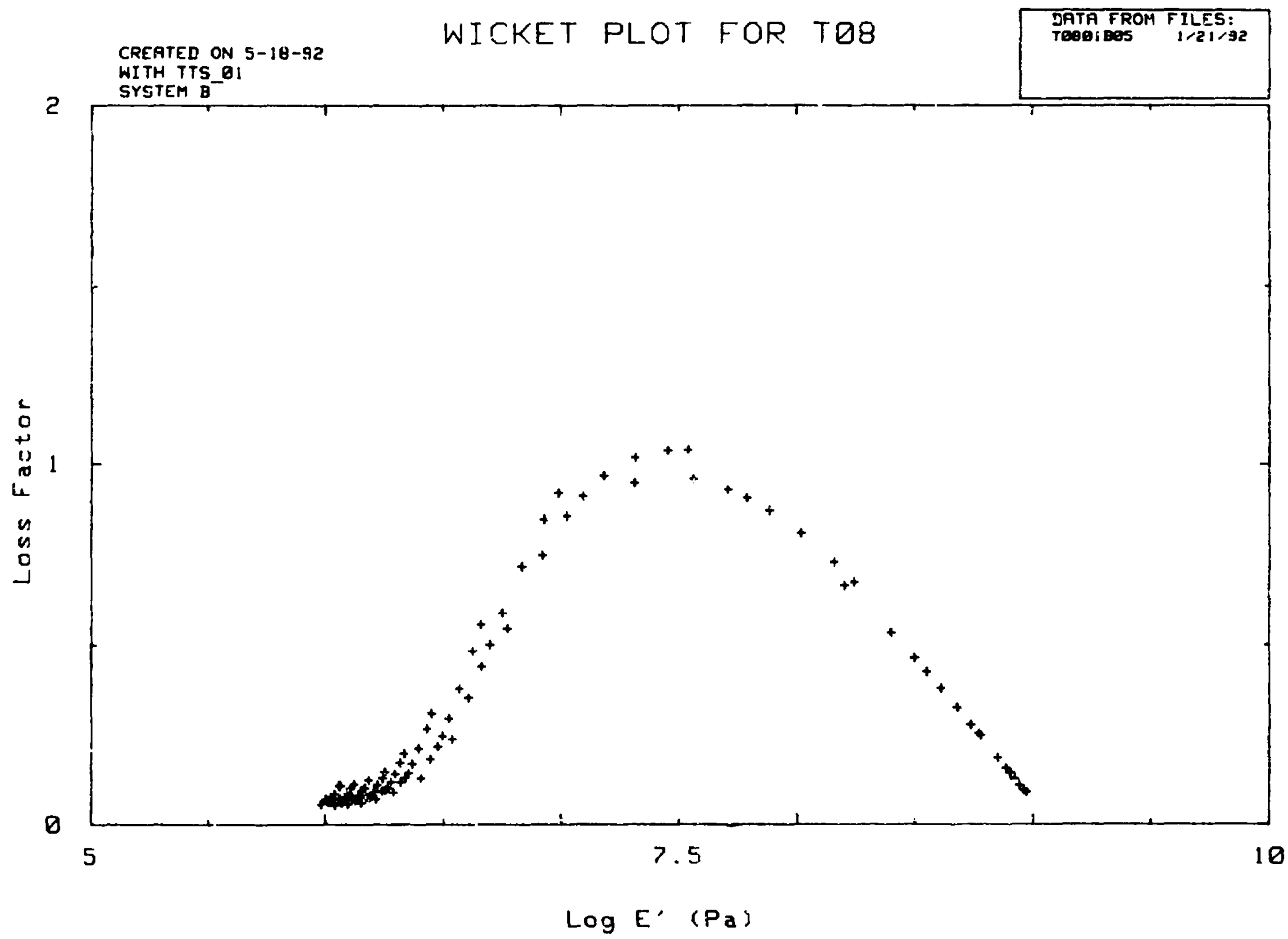


Figure 78. Plot of Loss Factor Versus Log Modulus for Laboratory T

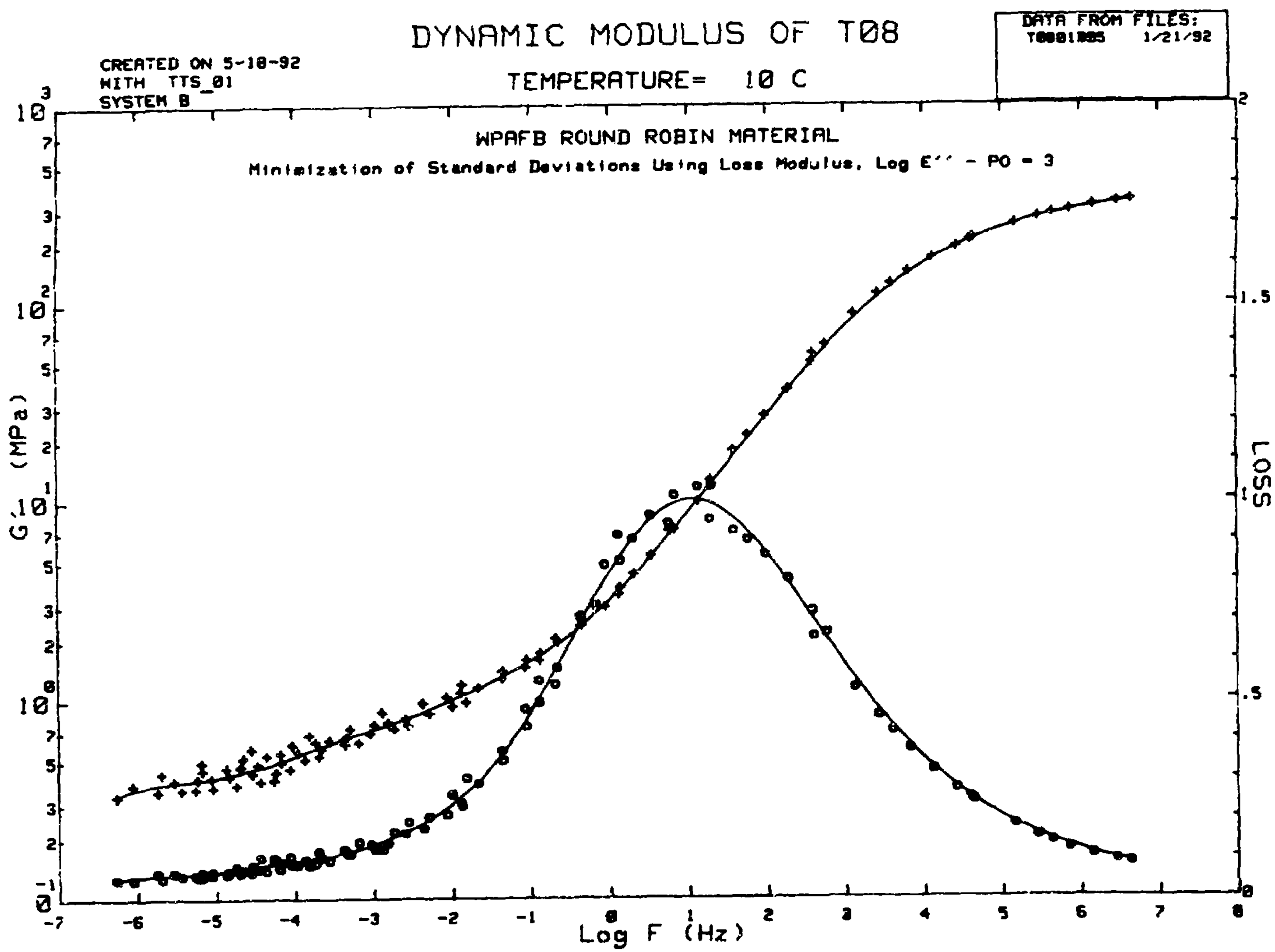


Figure 79. Plot of Modulus and Loss Factor Versus Reduced Frequency for Laboratory T

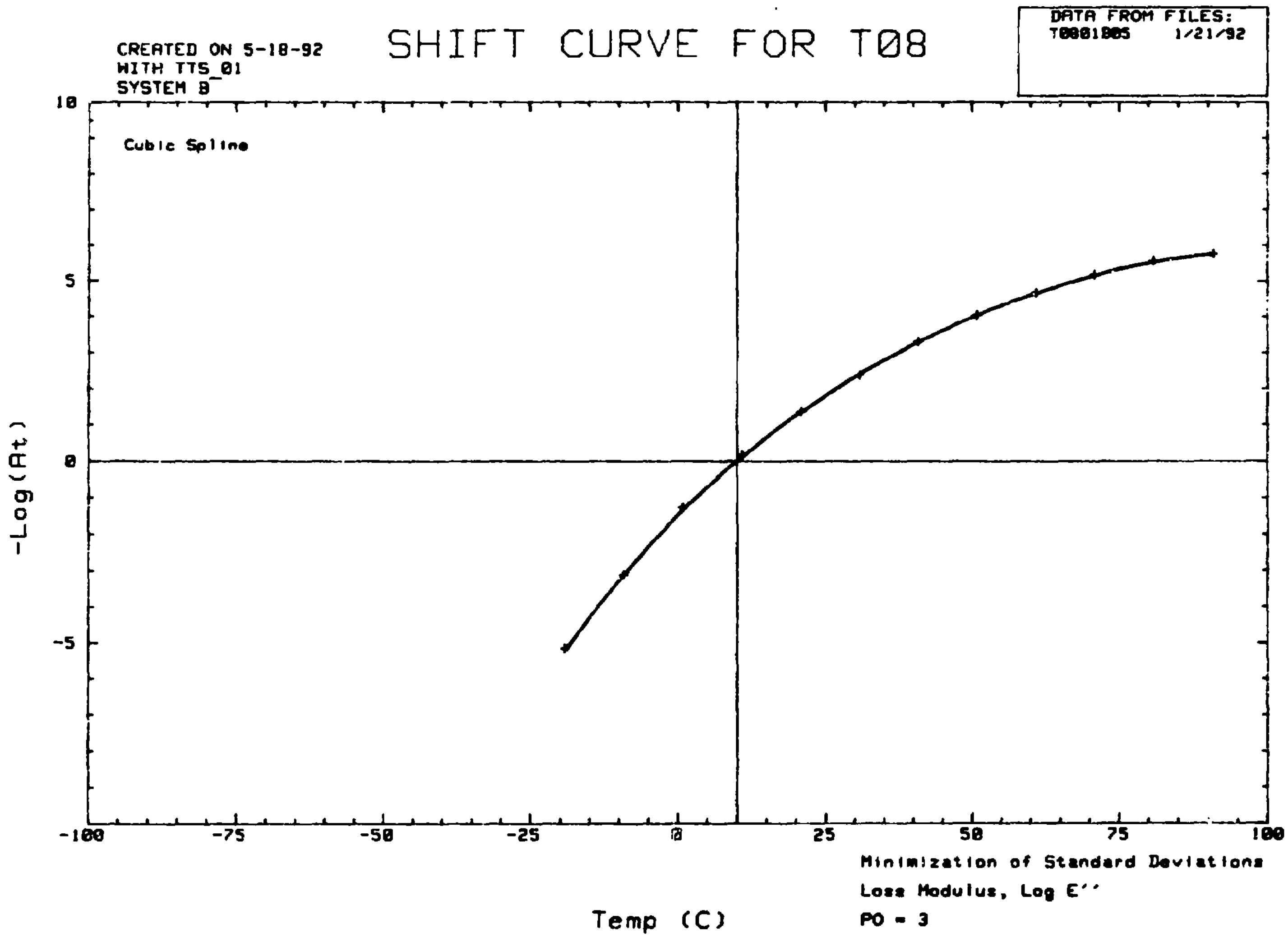


Figure 80. Plot of Log Shift Factor Versus Temperature for Laboratory T

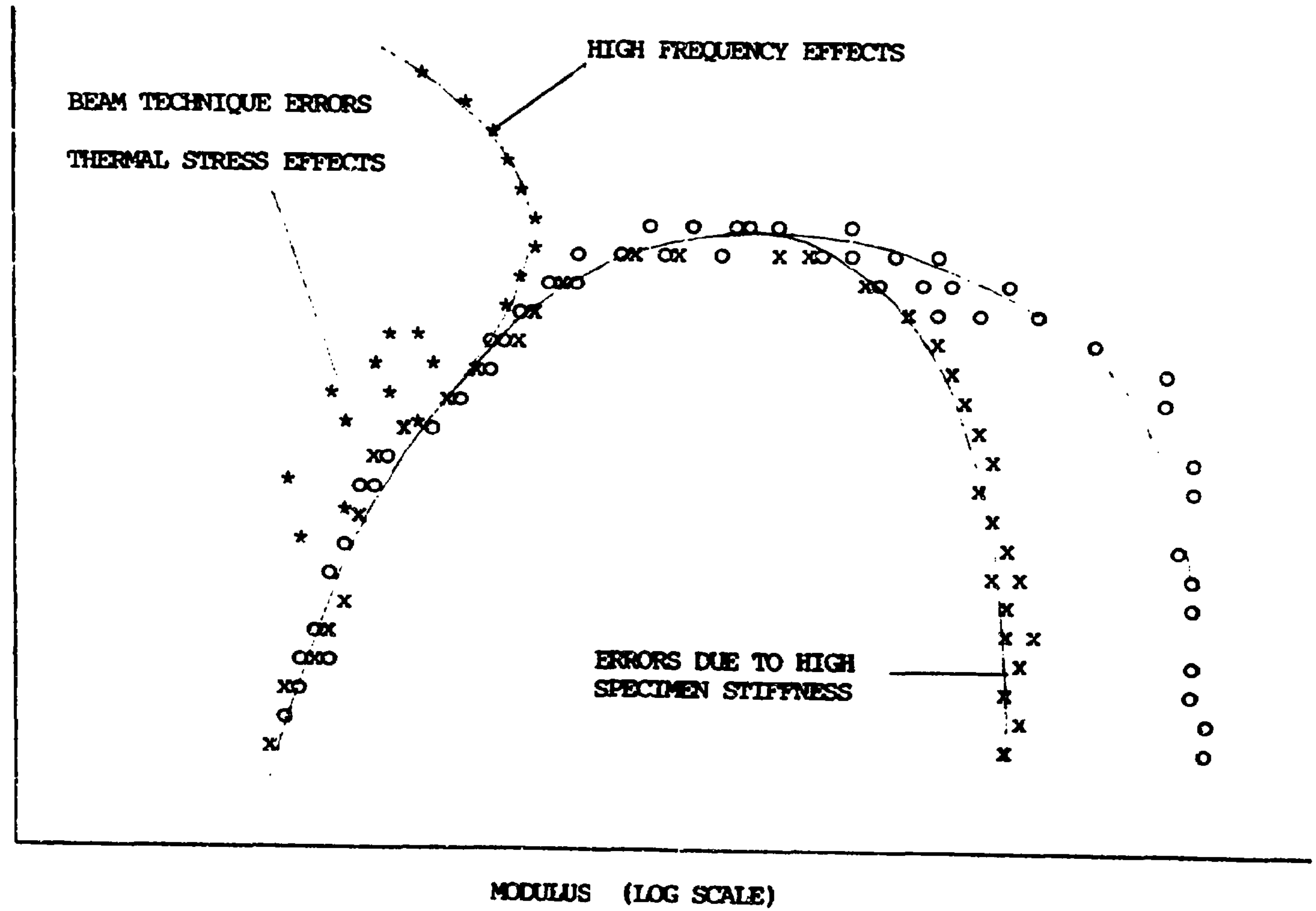


Figure 81. Idealized Wicket Plot showing Typical Types of Error

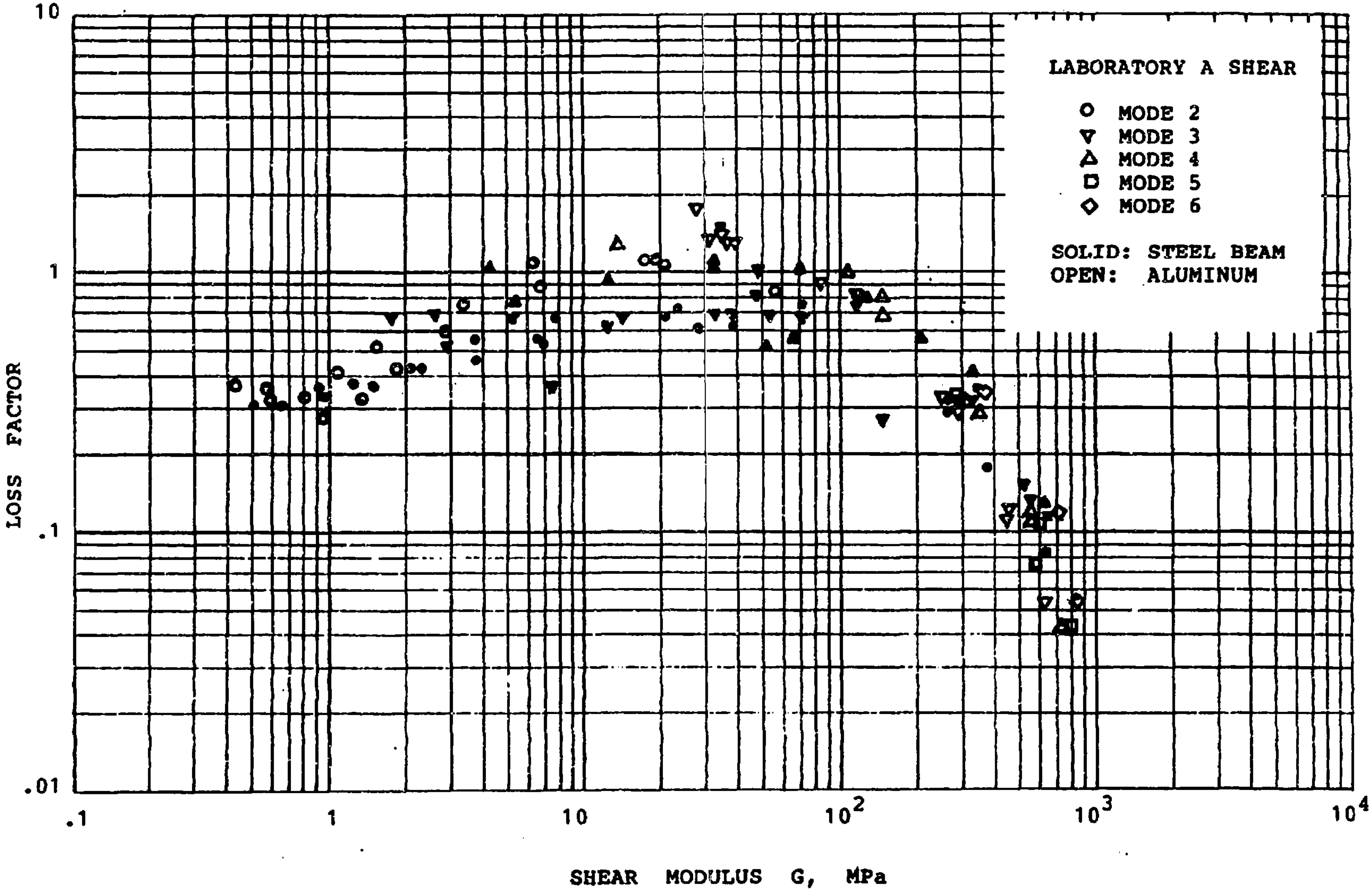


Figure 82. Wicket Plot for Laboratory A Data (Shear, Various Modes)

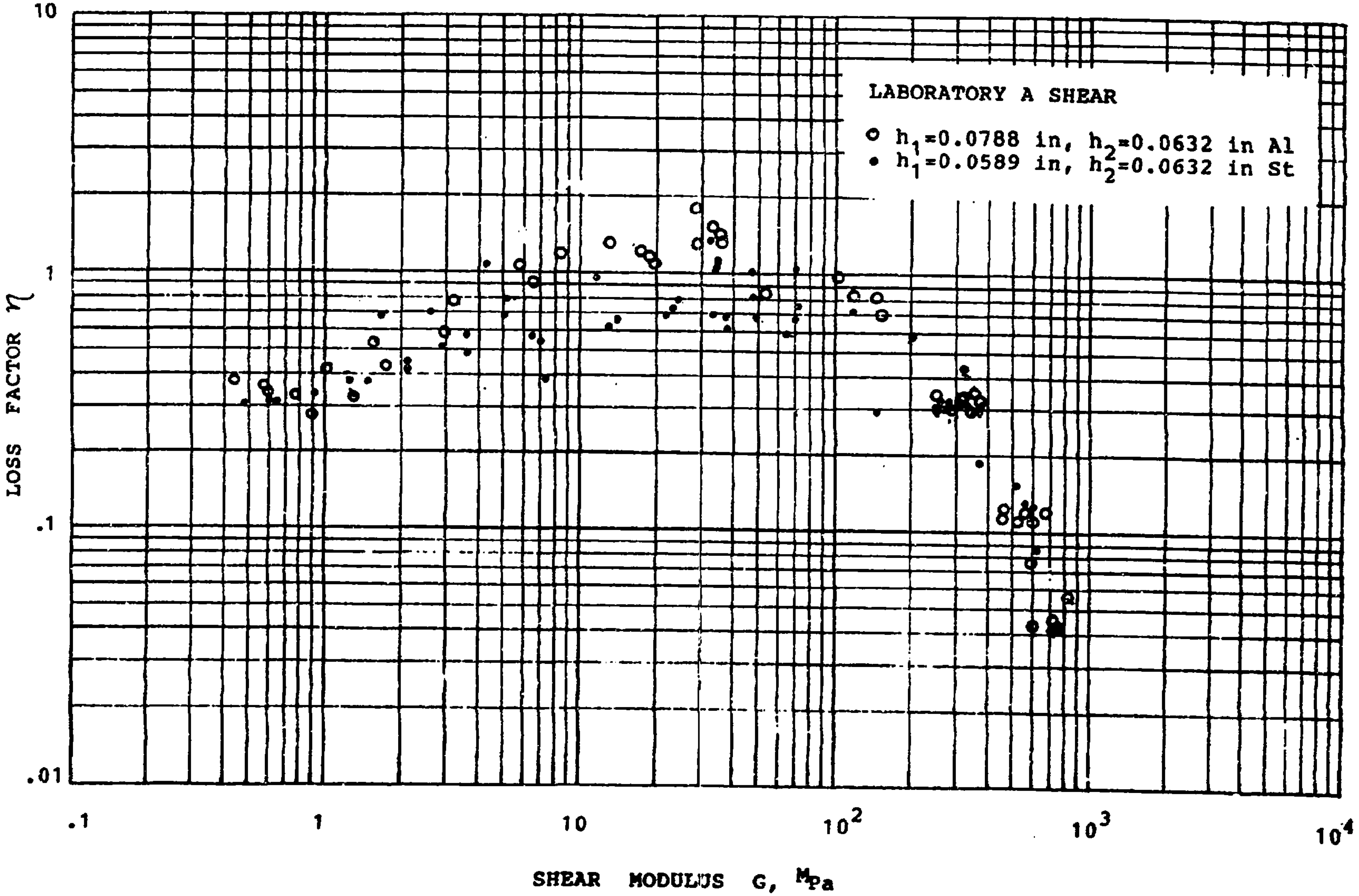


Figure 83. Wicket Plot for Laboratory A Data (Shear, Various Beams)

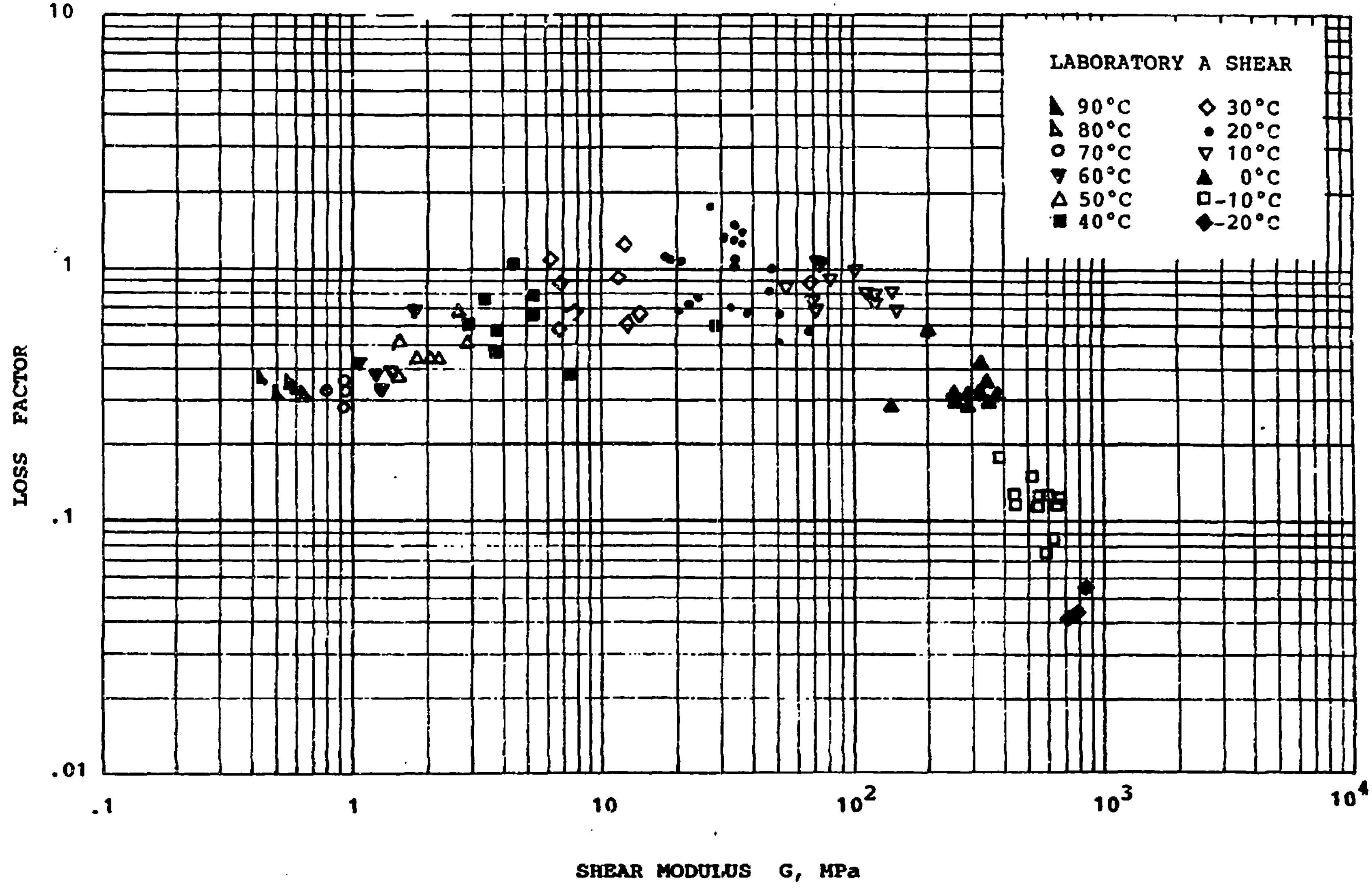


Figure 84. Wicket Plot for Laboratory A Data (Shear, Various Temperatures)

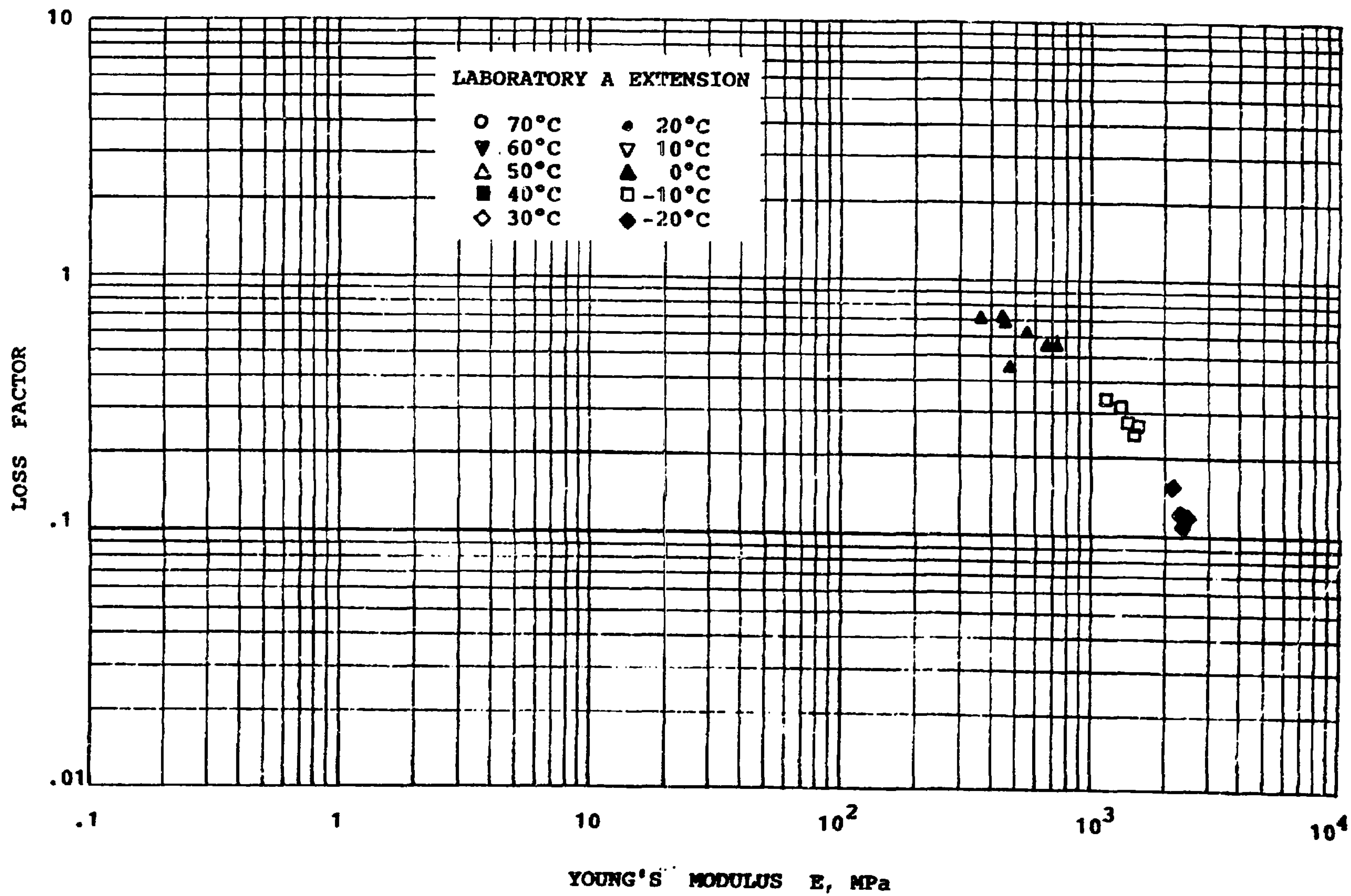


Figure 85. Wicket Plot for Laboratory A Data (Extension, Various Temperatures)

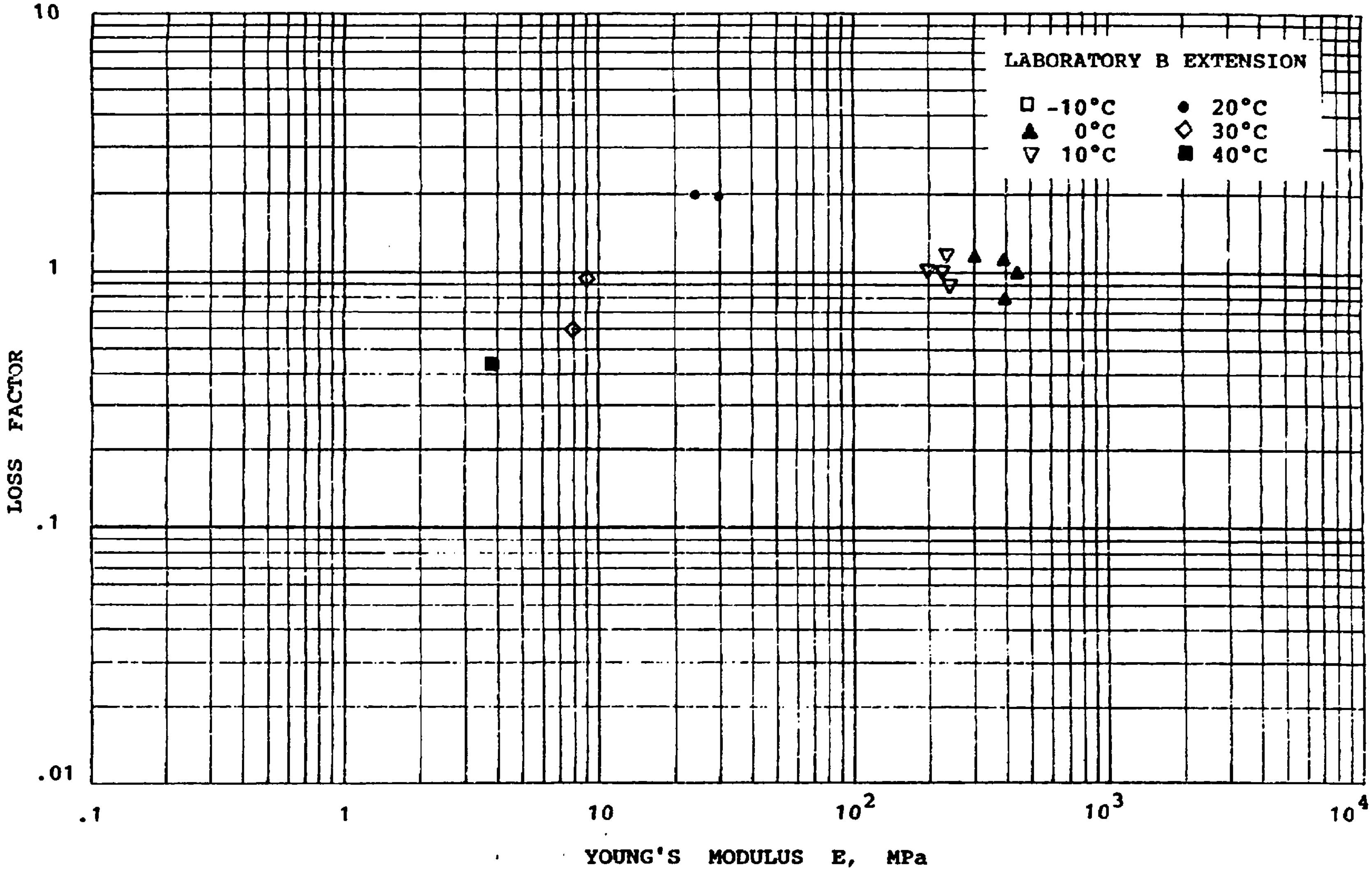


Figure 86. Wicket Plot for Laboratory B Data (Extension, Various Temperatures)

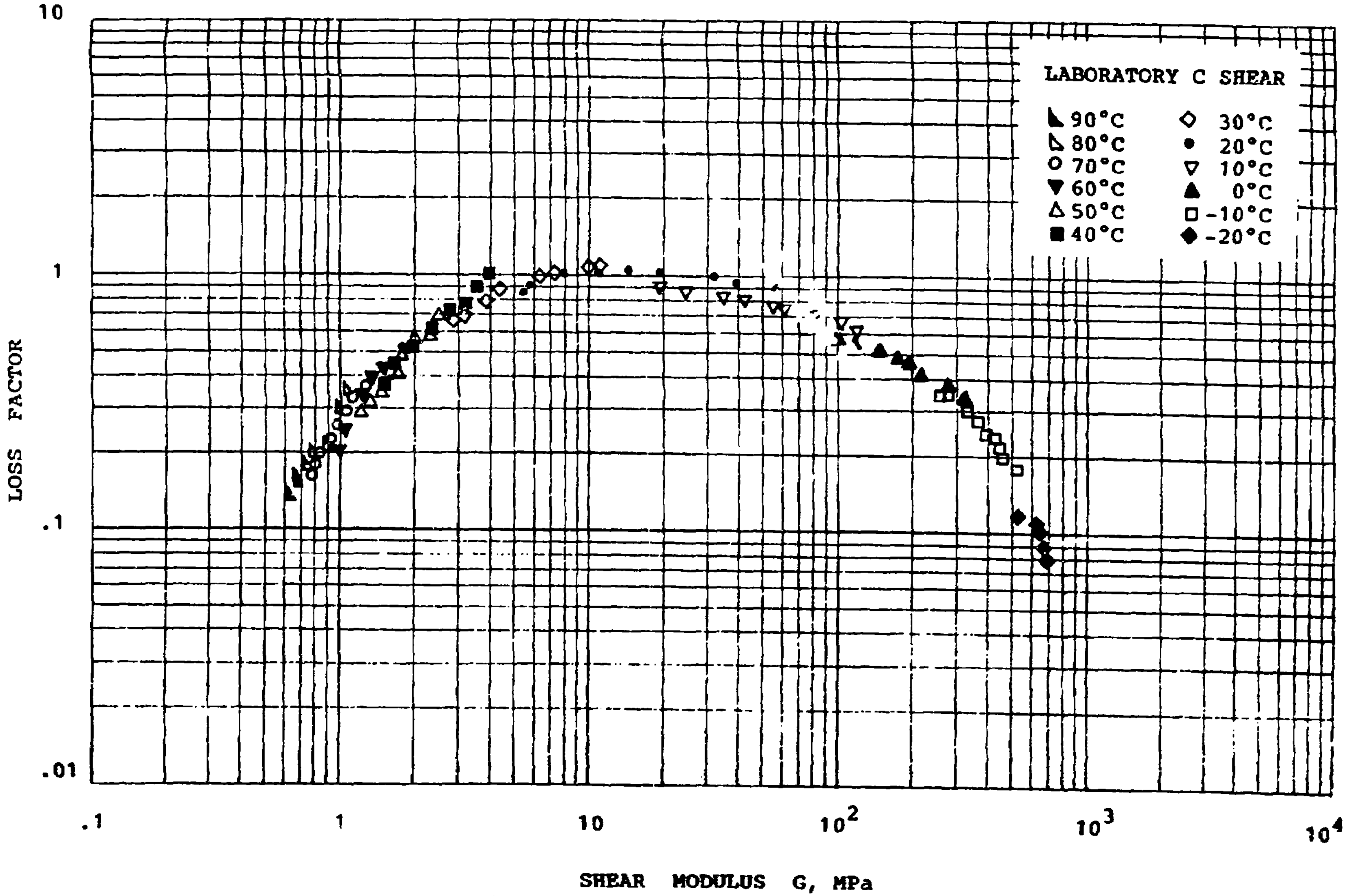


Figure 87. Wicket Plot for Laboratory C Data (Shear, Various Temperatures)

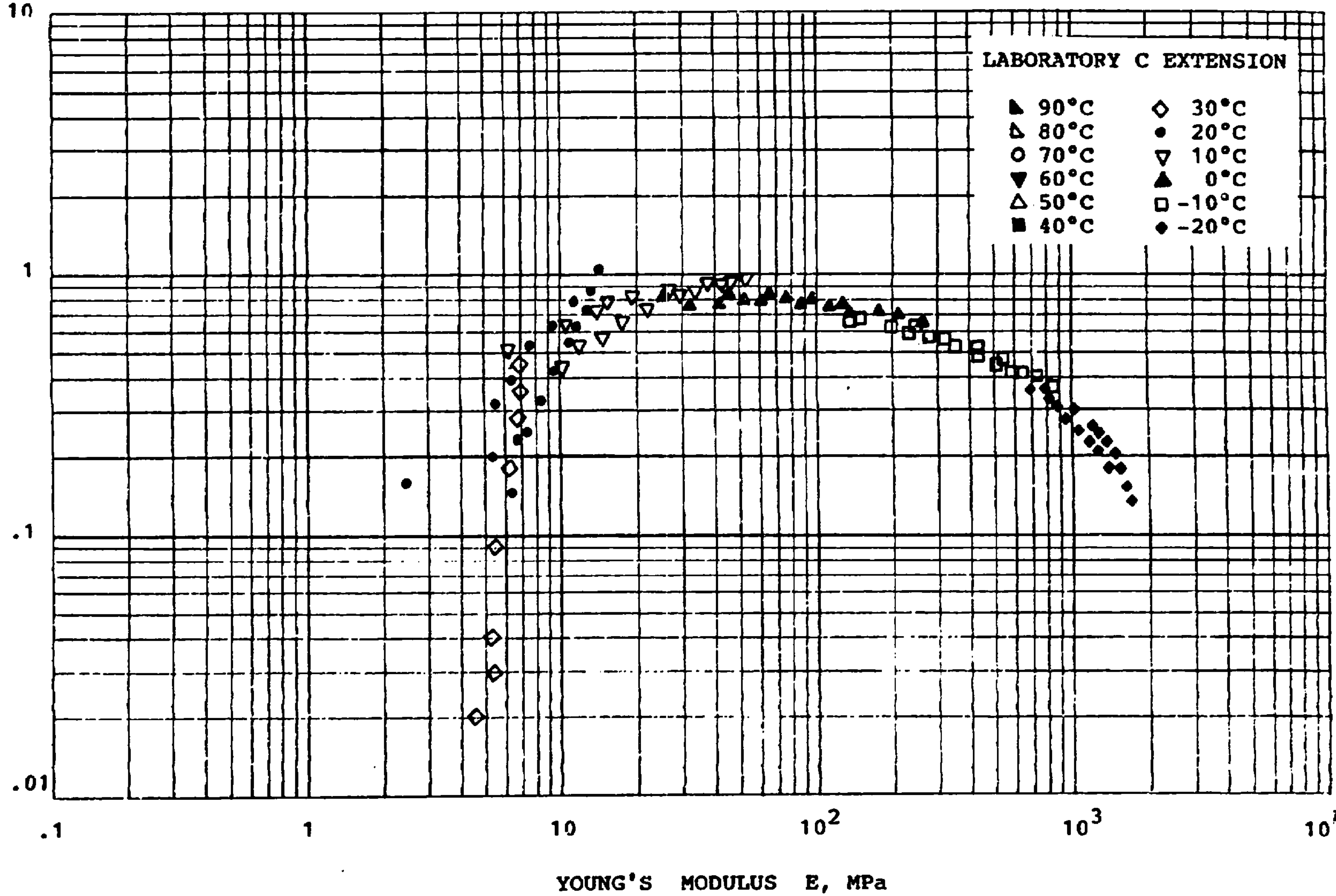


Figure 88. Wicket Plot for Laboratory C Data (Extension, Various Temperatures)

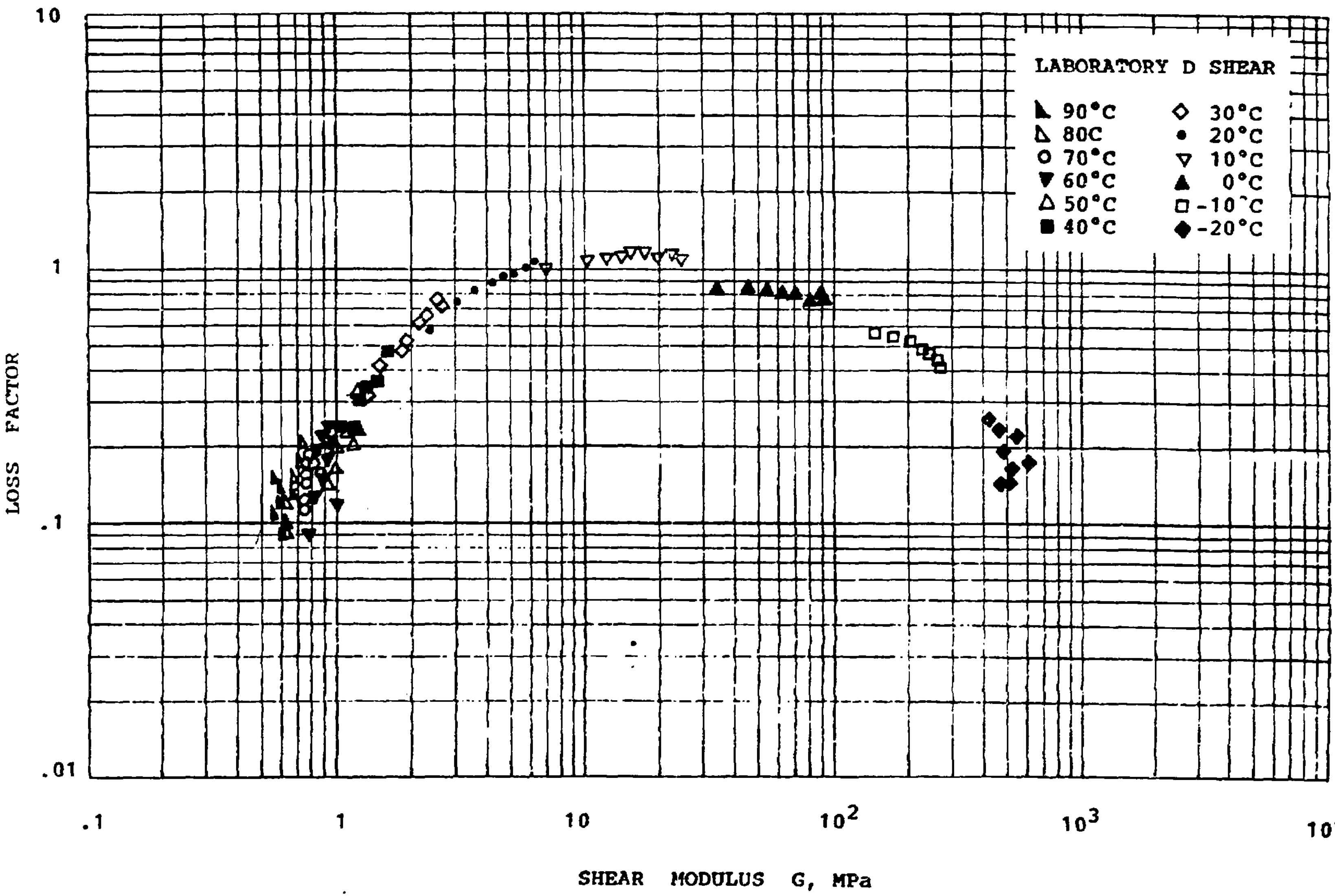


Figure 89. Wicket Plot for Laboratory D Data (Shear, Various Temperatures)

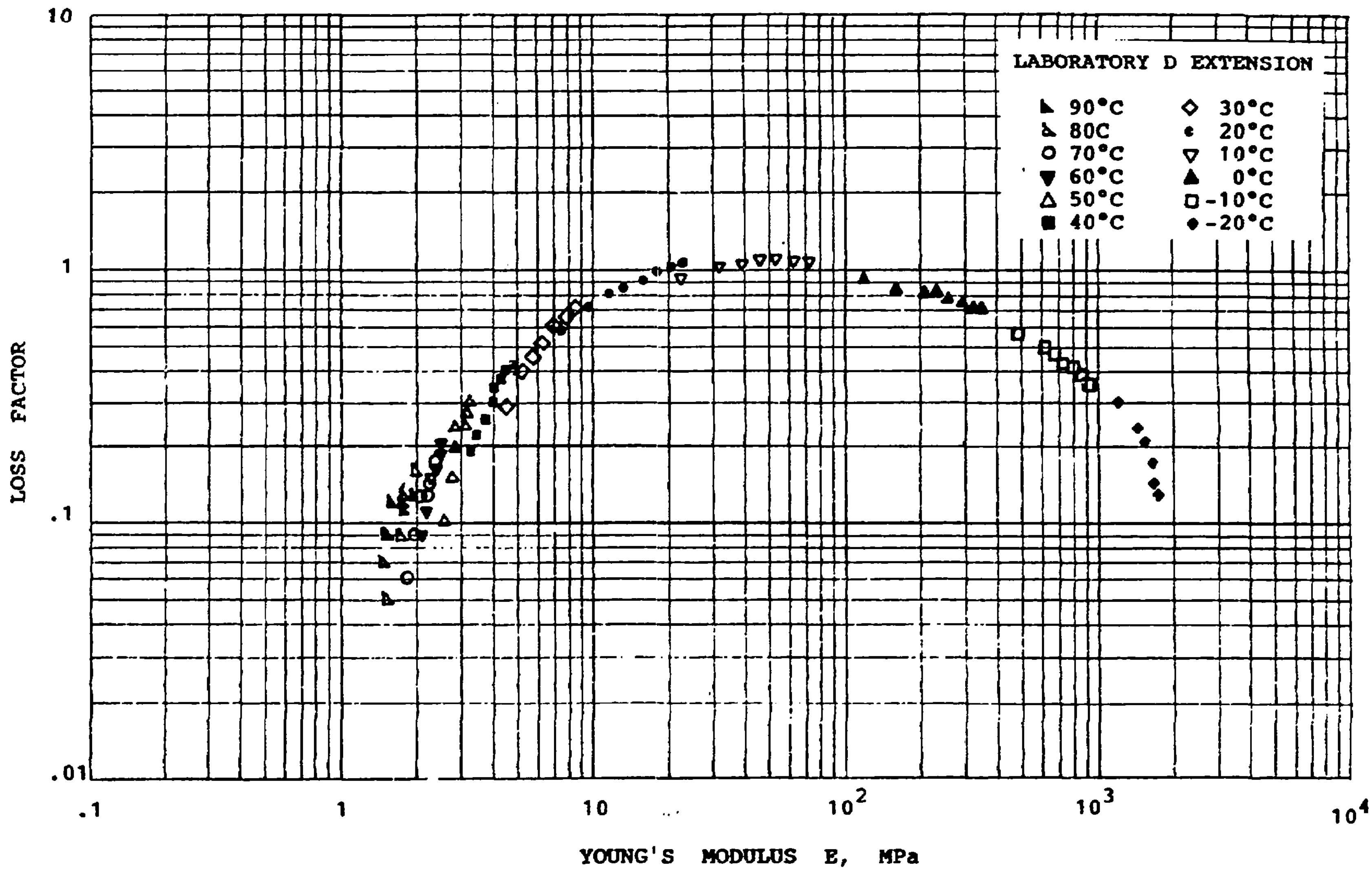


Figure 90. Wicket Plot for Laboratory D Data (Extension, Various Temperatures)

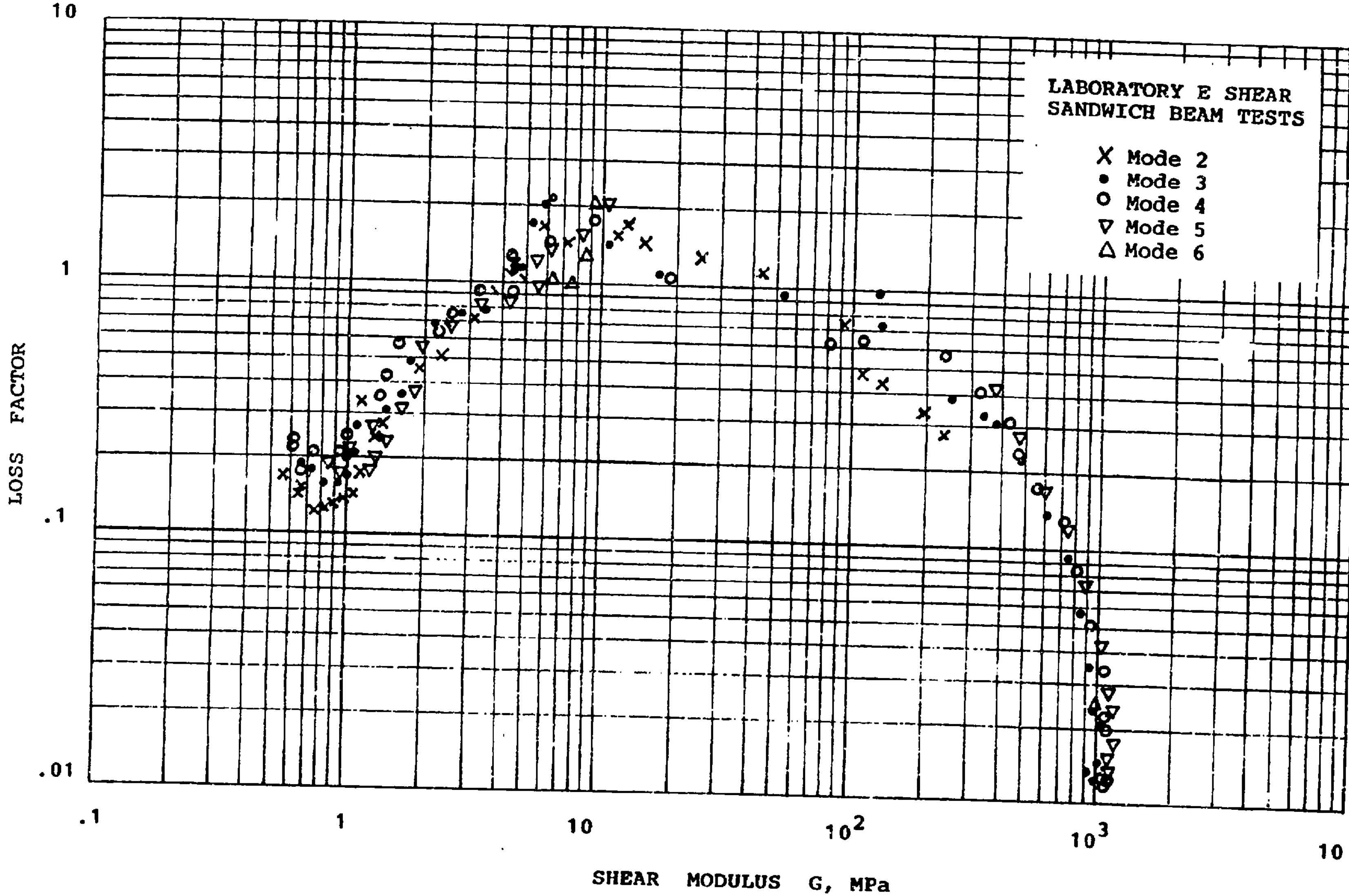


Figure 91. Wicket Plot for Laboratory E Data (Shear, Various Modes)

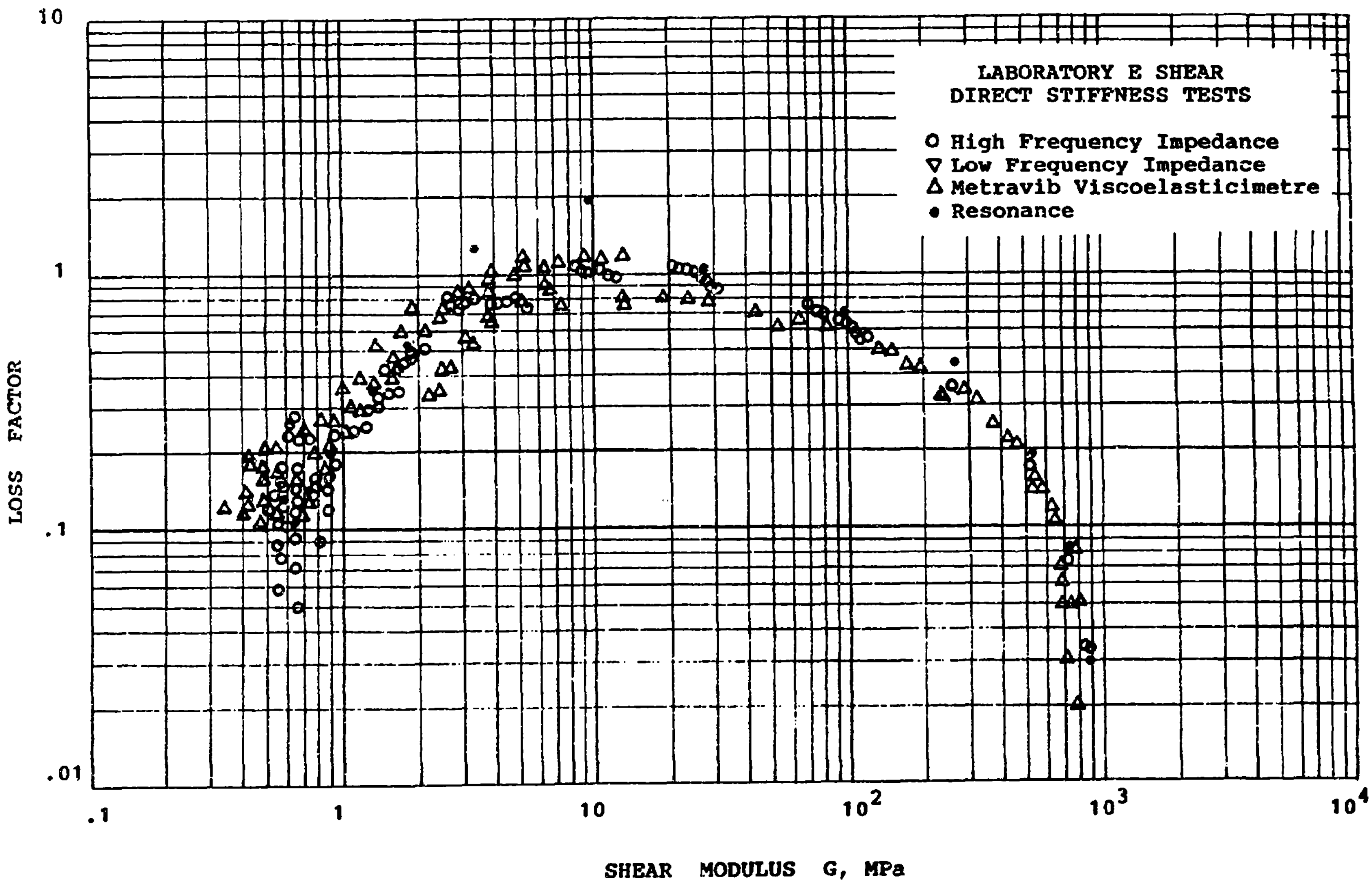


Figure 92. Wicket Plot for Laboratory E Data (Shear, Various Techniques)

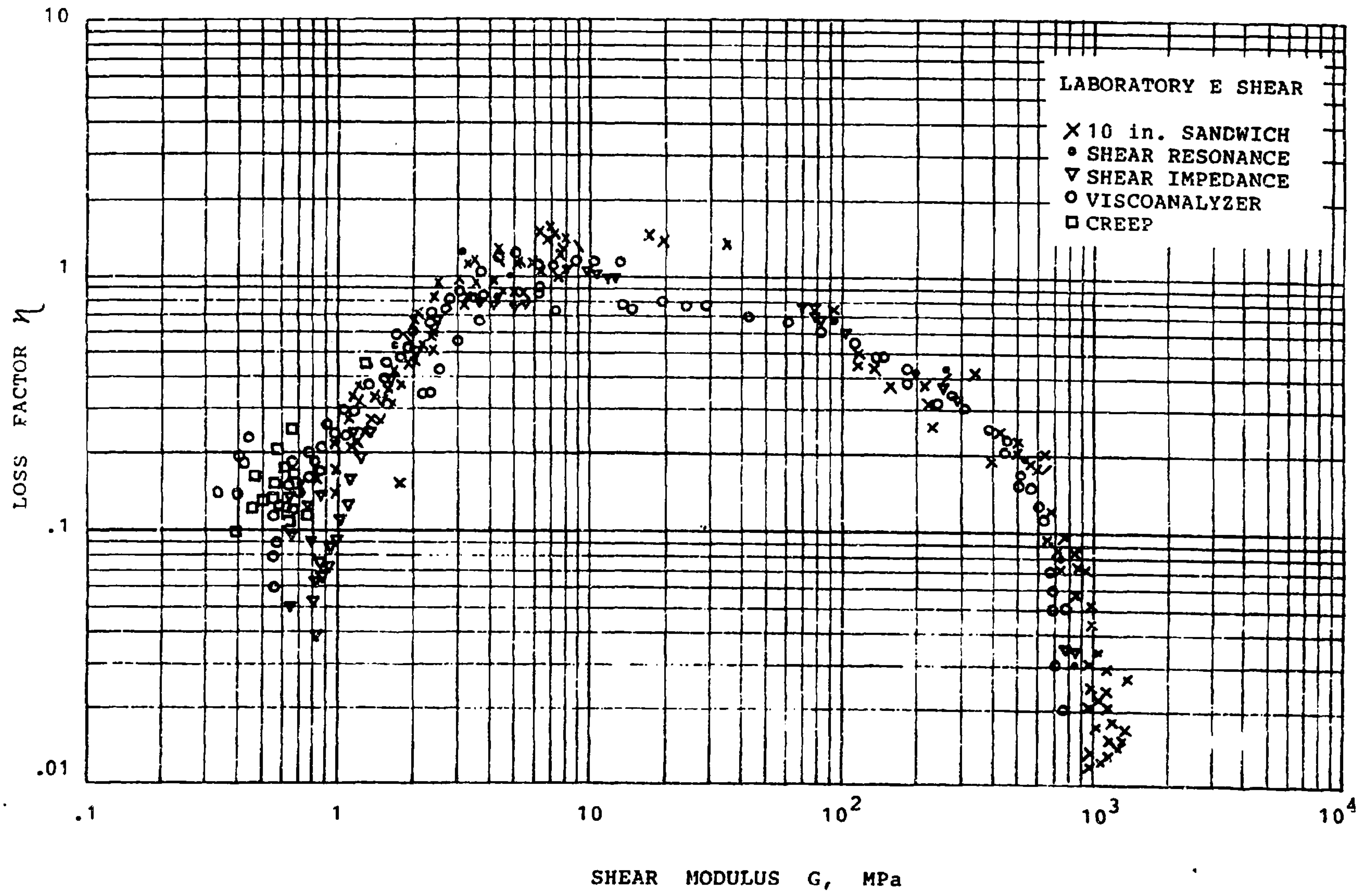


Figure 93. Wicket Plot for Laboratory E Data (Shear, Various Techniques)

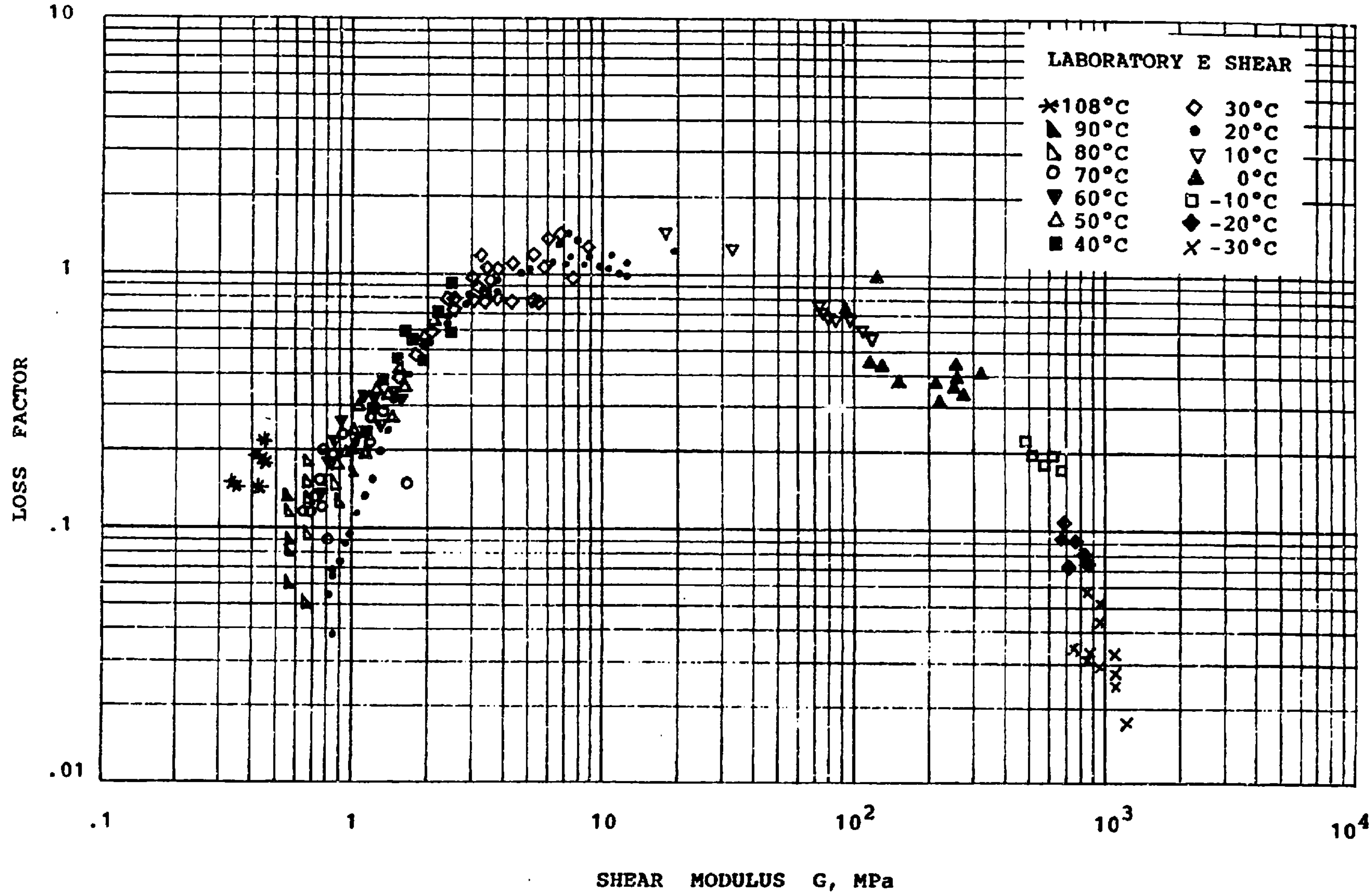


Figure 94. Wicket Plot for Laboratory E Data (Shear, Various Temperatures)

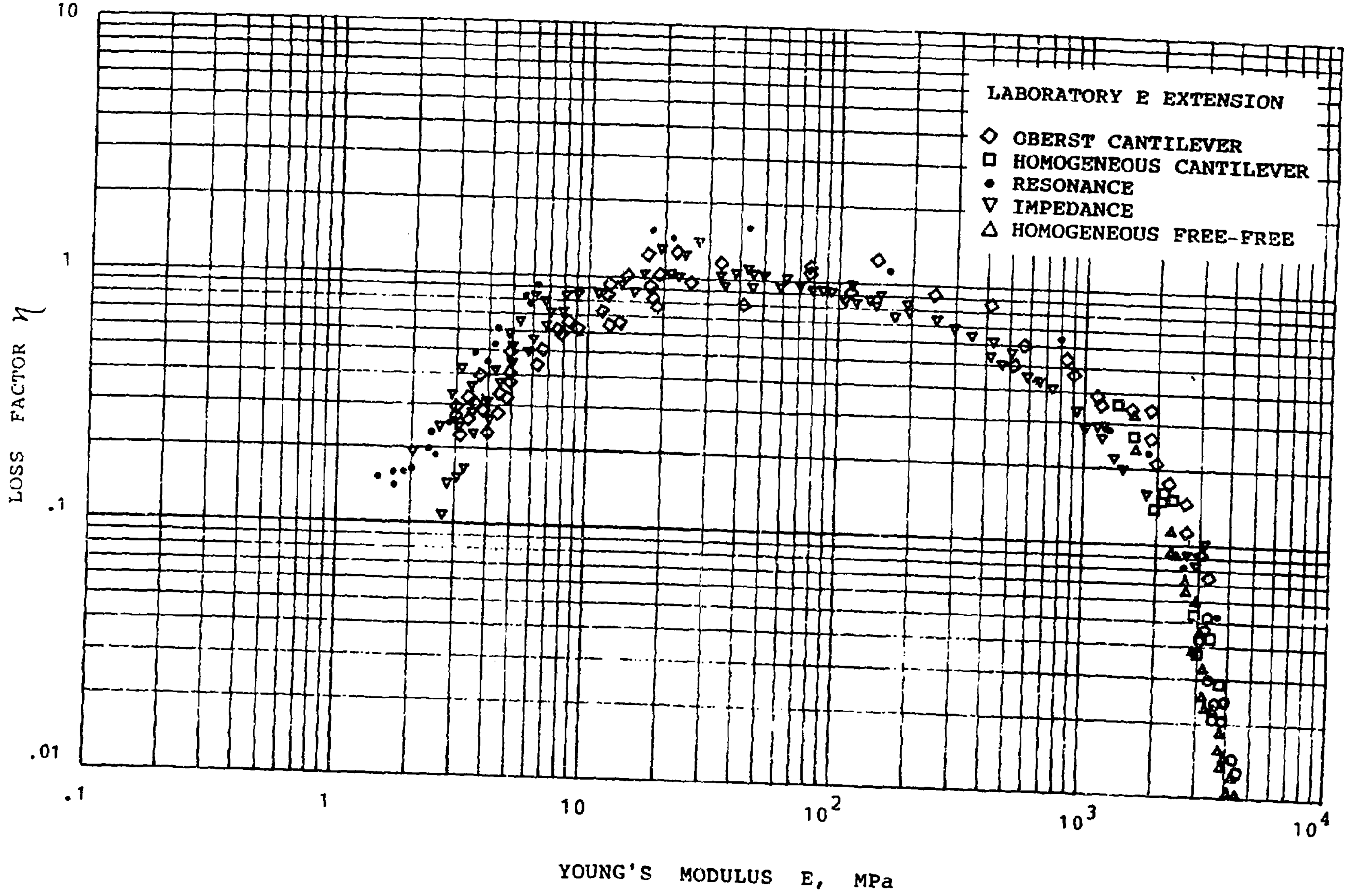


Figure 95. Wicket Plot for Laboratory E Data (Extension, Various Techniques)

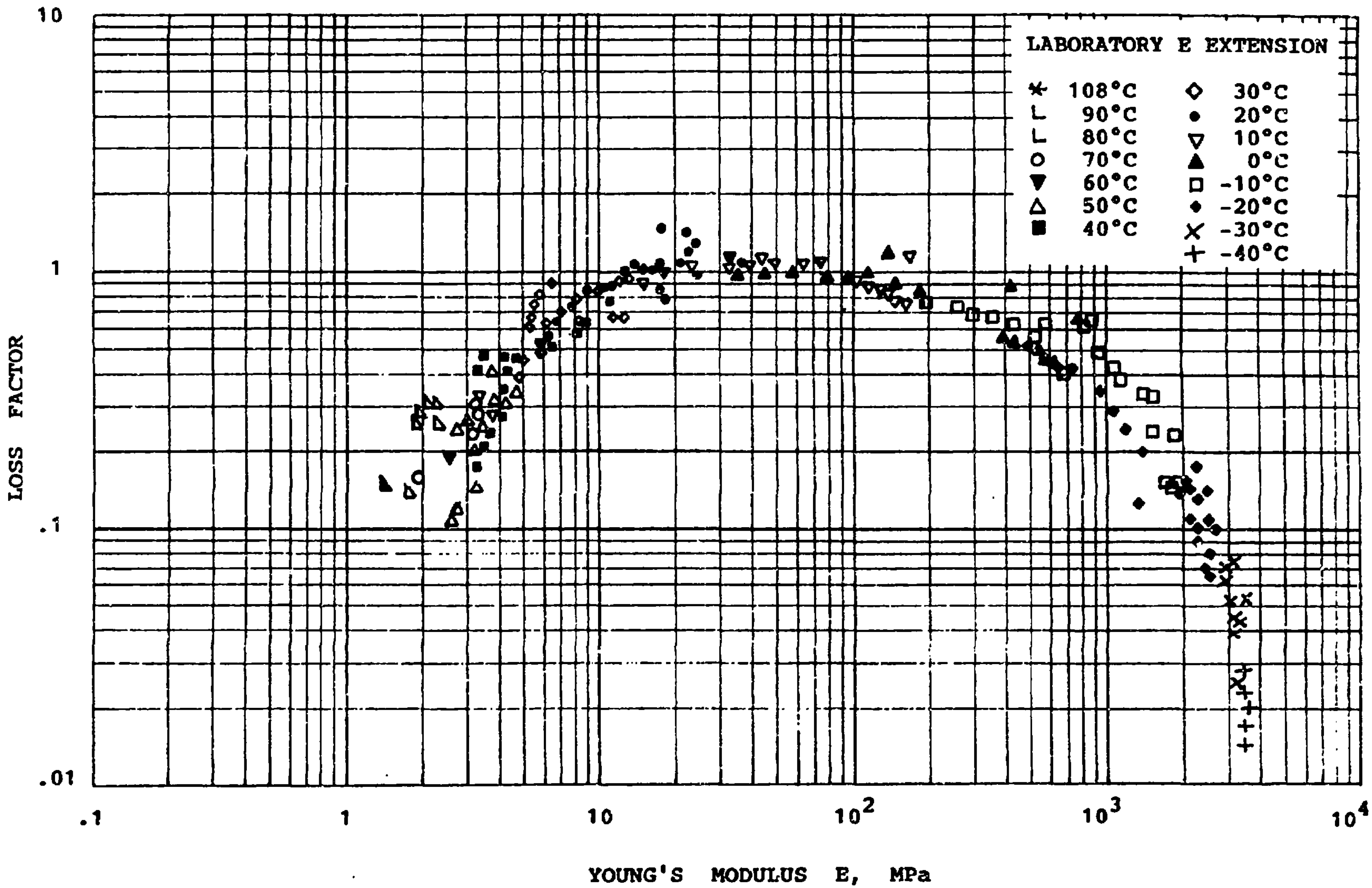


Figure 96. Wicket Plot for Laboratory E Data (Extension, Various Temperatures)

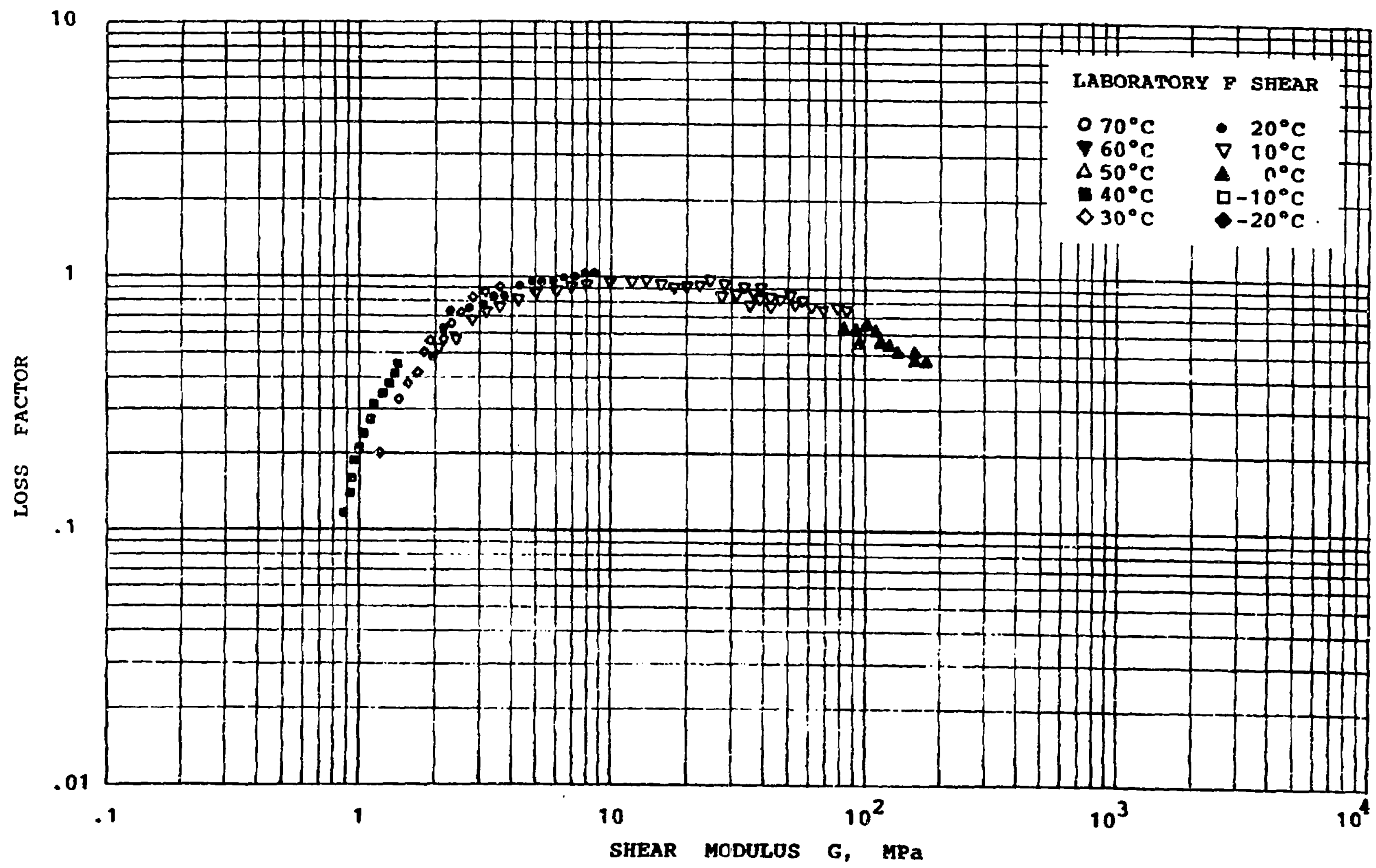


Figure 97. Wicket Plot for Laboratory F Data (Shear, Various Temperatures)

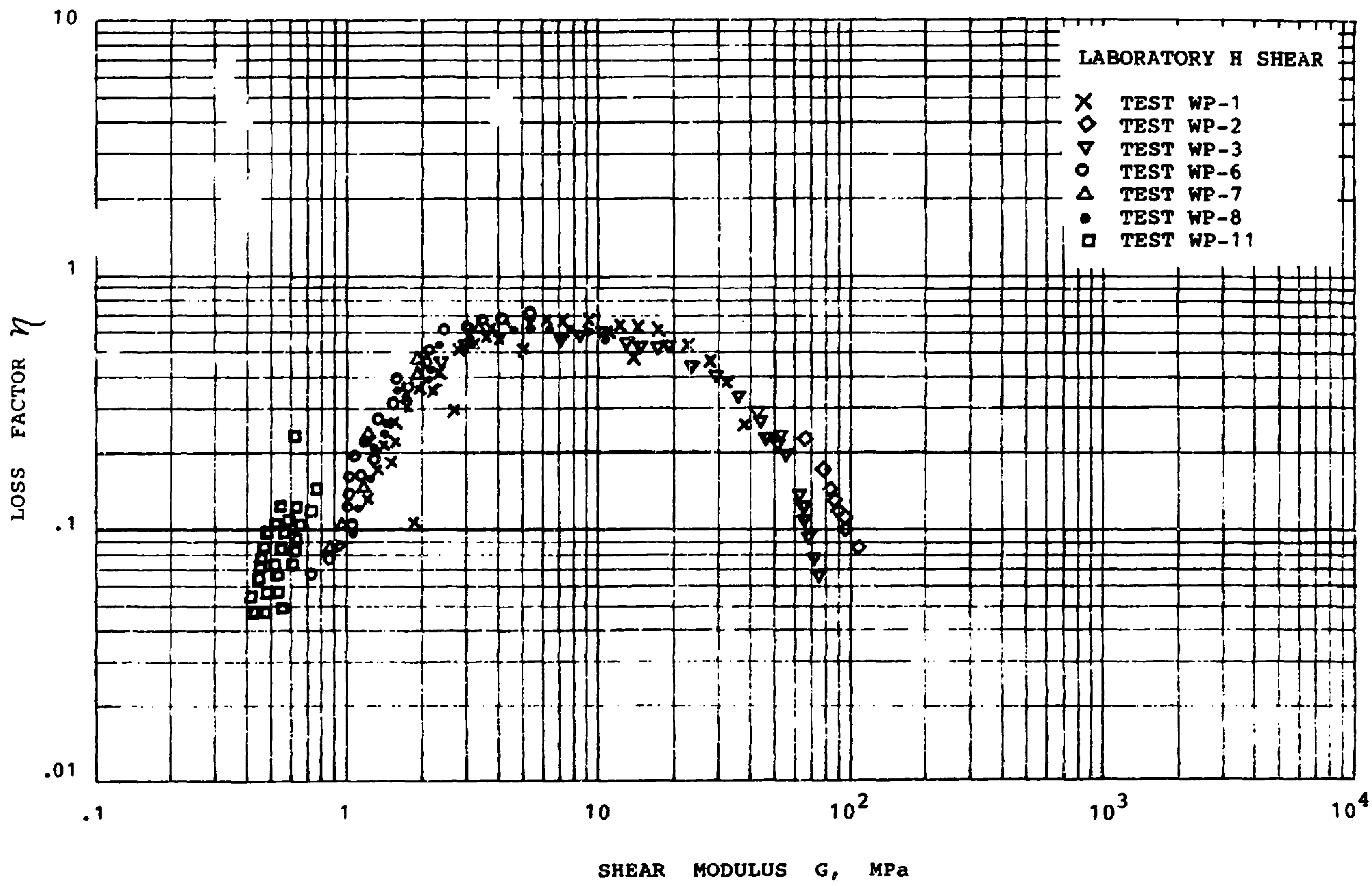


Figure 98. Wicket Plot for Laboratory H Data (Shear, Various Tests)

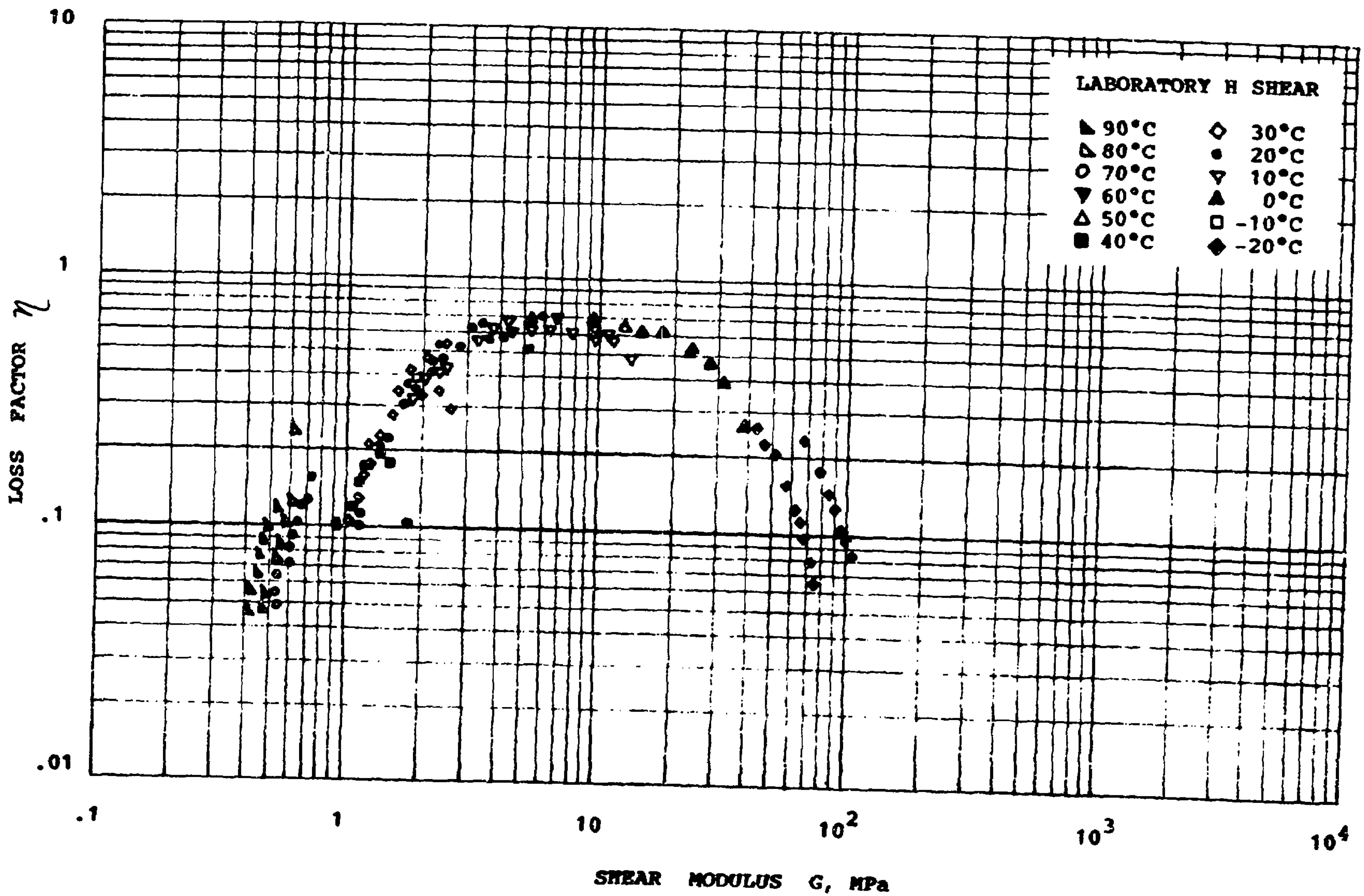


Figure 99. Wicket Plot for Laboratory H Data (Shear, Various Temperatures)

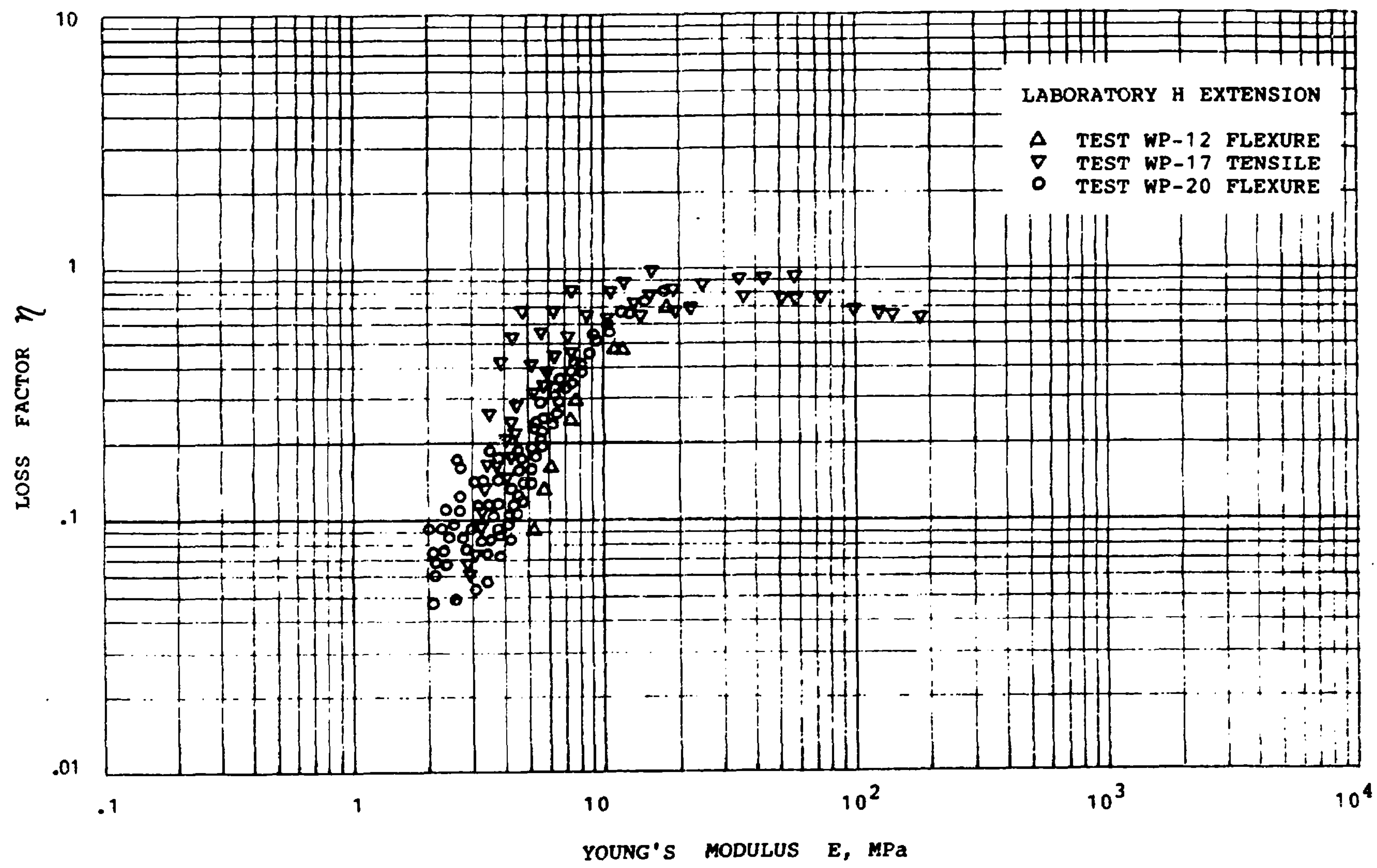


Figure 100. Wicket Plot for Laboratory H Data (Extension, Various Tests)

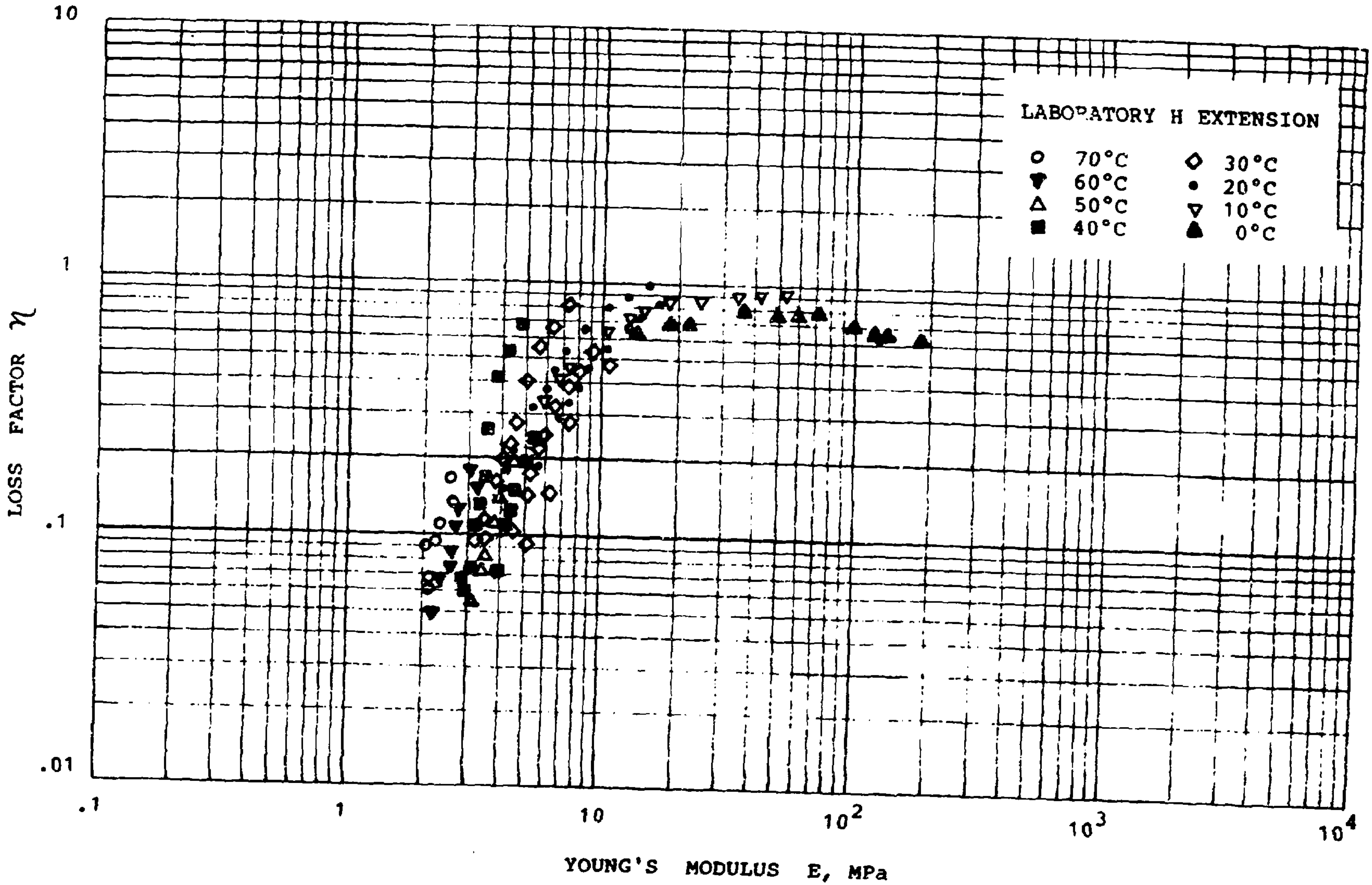


Figure 101. Wicket Plot for Laboratory H Data (Extension, Various Temperatures)

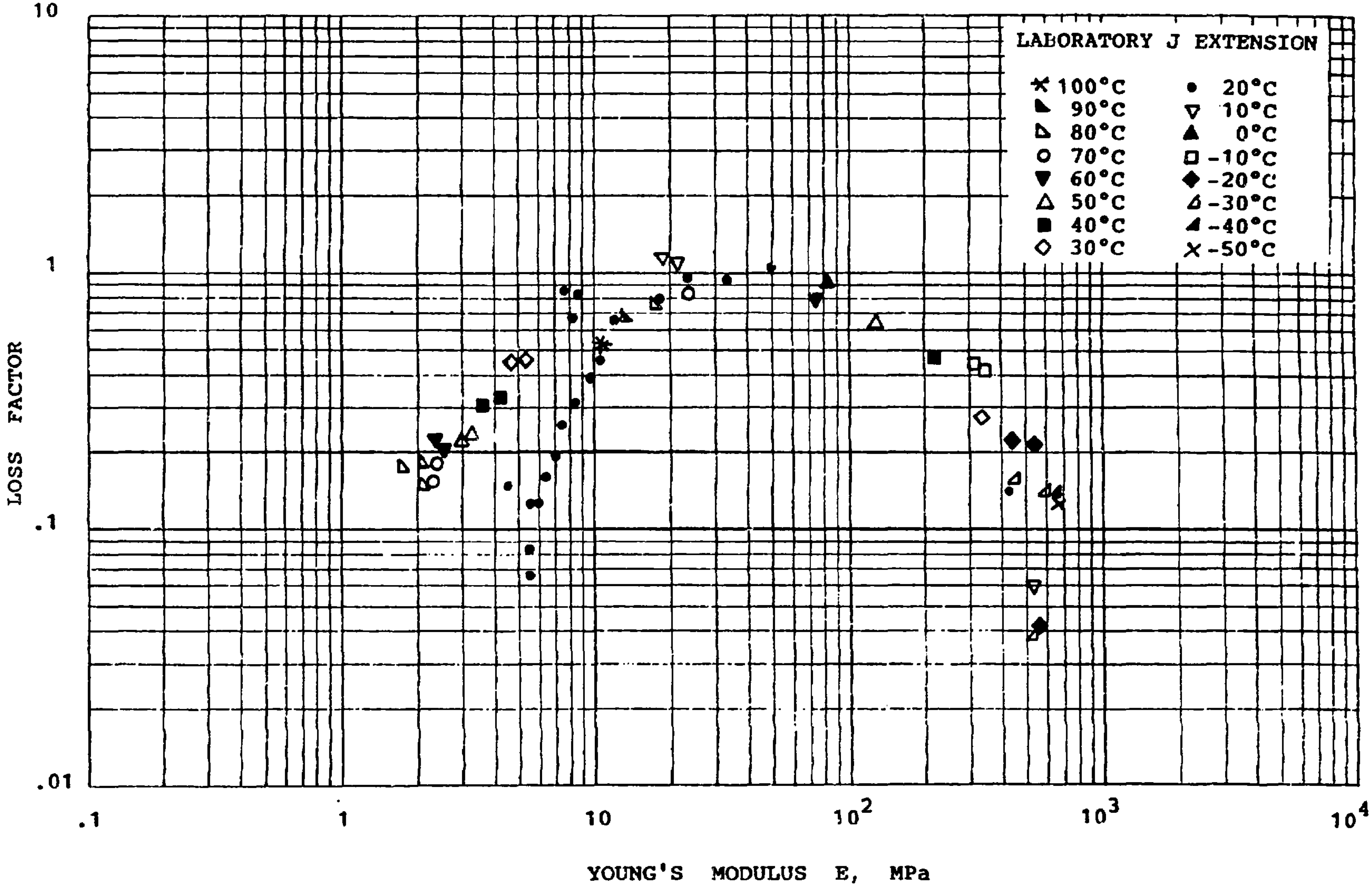


Figure 102. Wicket Plot for Laboratory J Data (Extension, Various Temperatures)

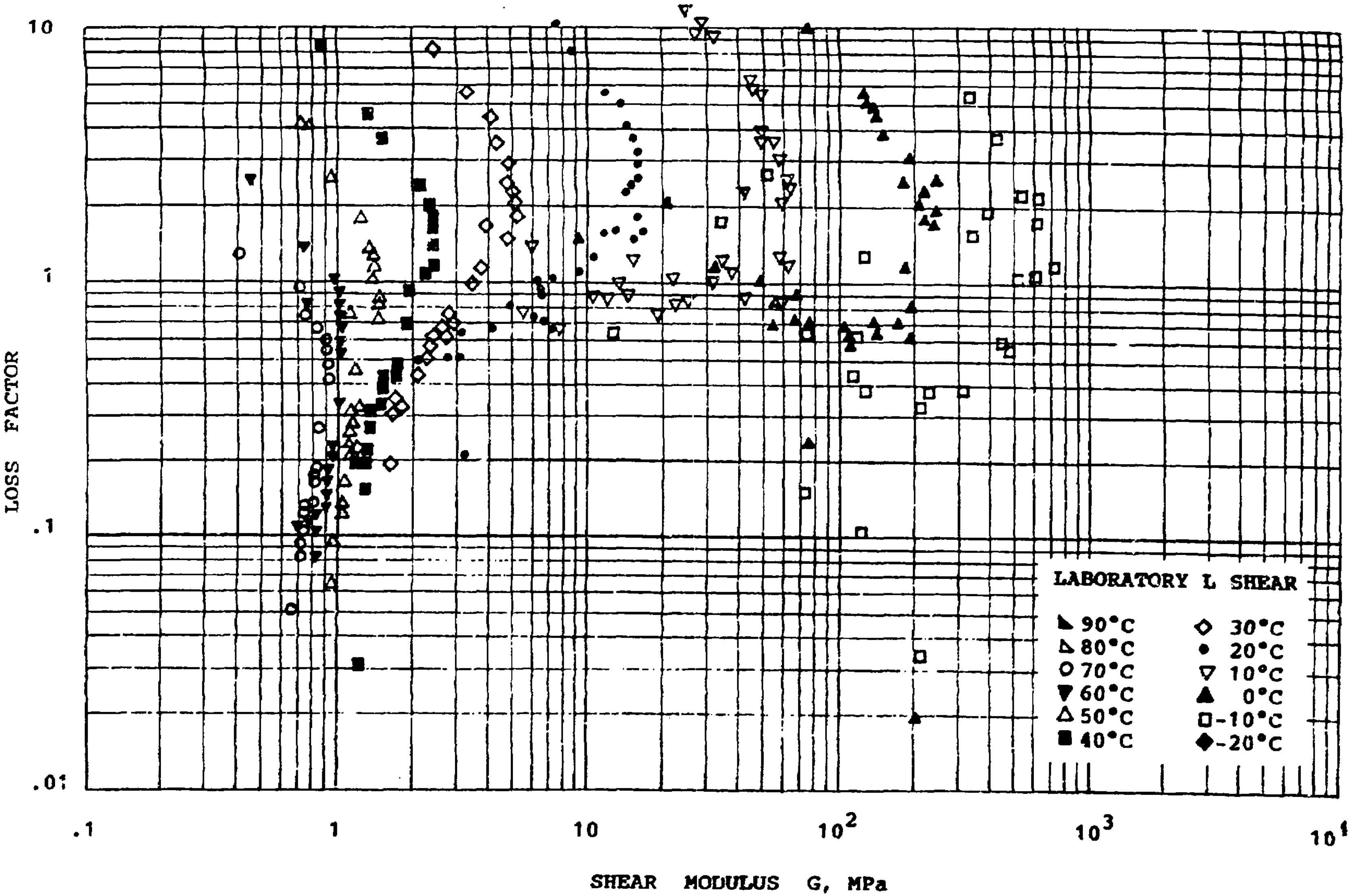


Figure 103. Wicket Plot for Laboratory L Data (Shear, Various Temperatures)

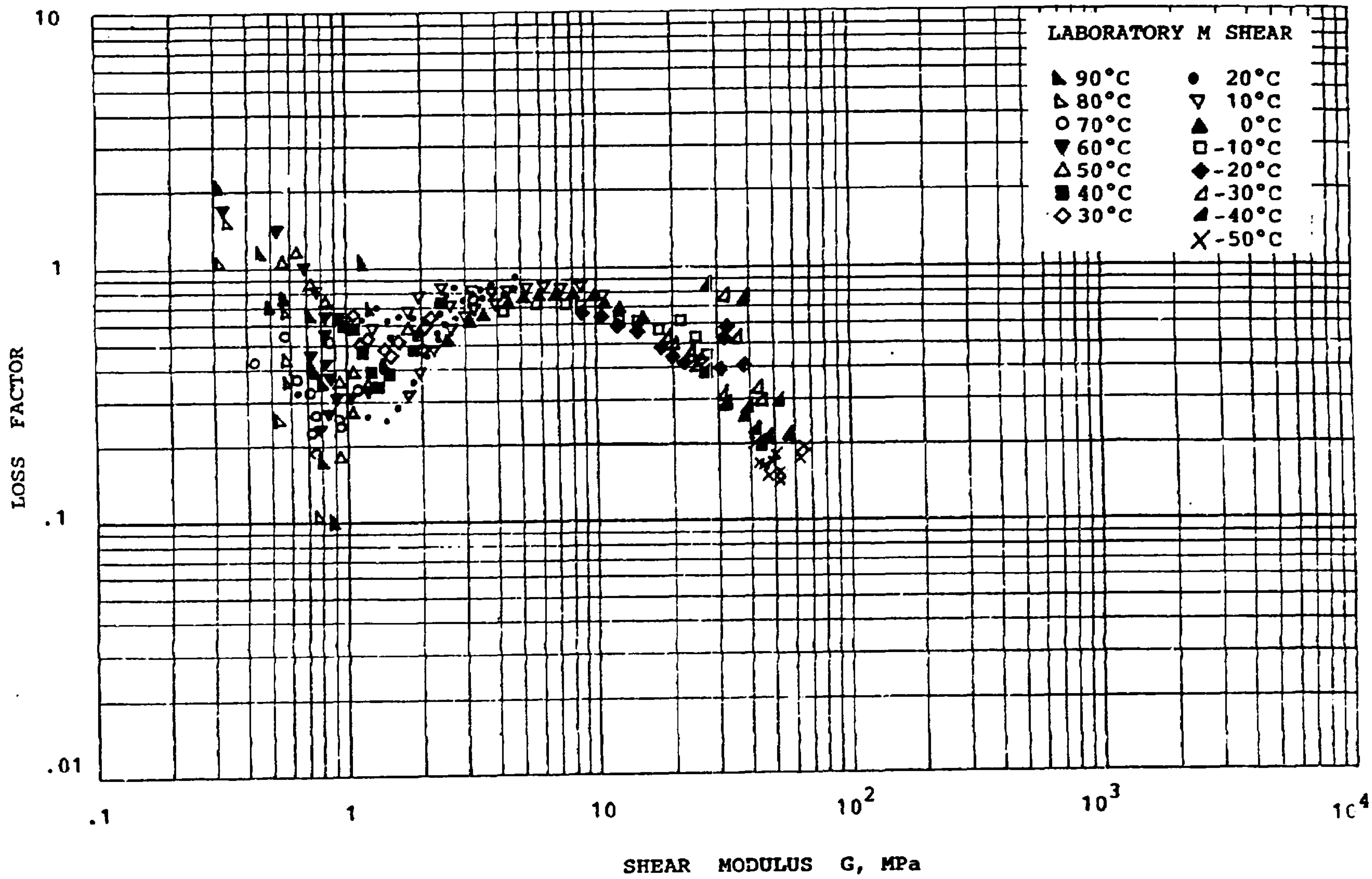


Figure 104. Wicket Plot for Laboratory M Data (Shear, Various Temperatures)

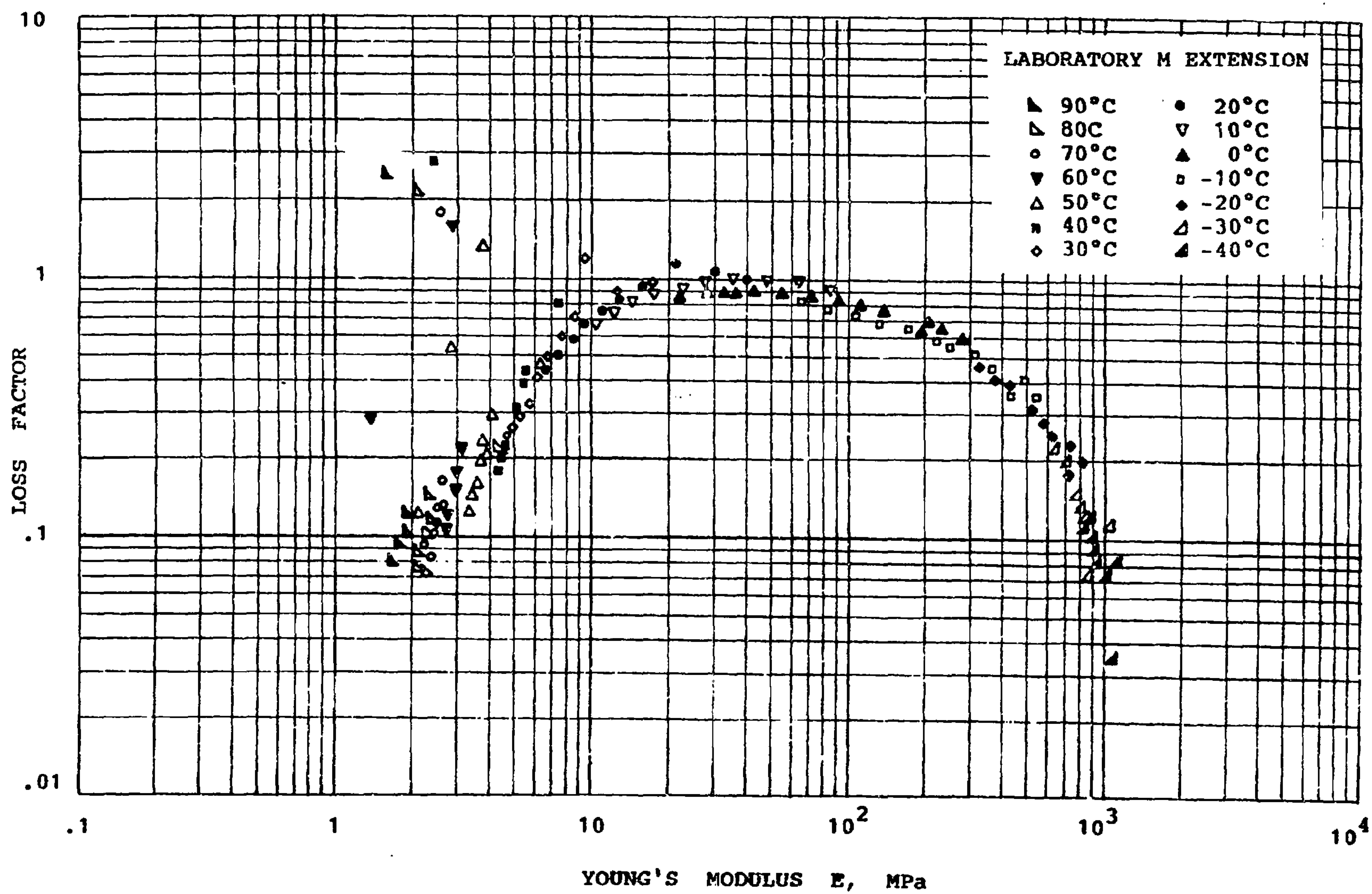


Figure 105. Wicket Plot for Laboratory M Data (Extension, Various Temperatures)

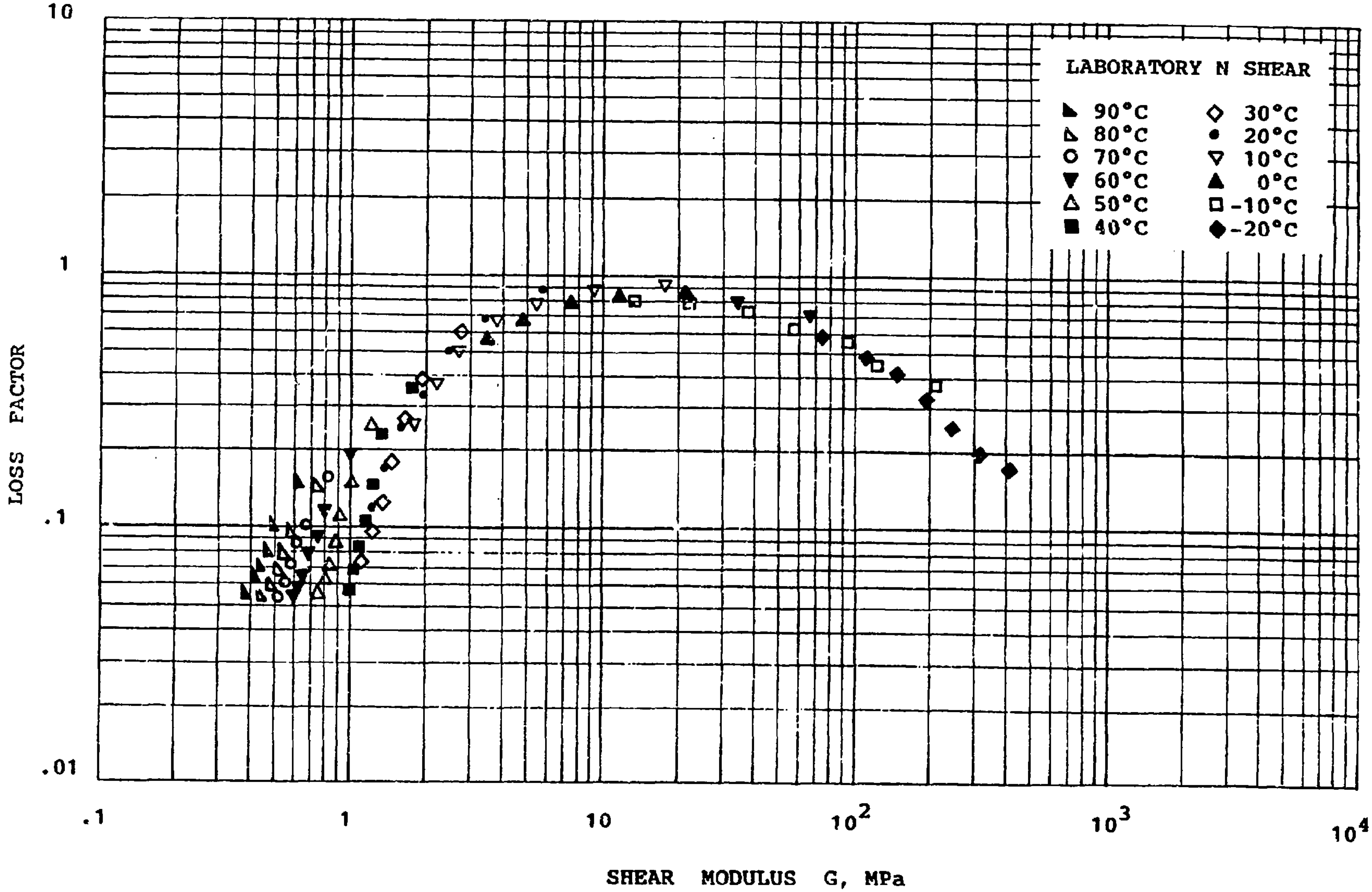


Figure 106. Wicket Plot for Laboratory N Data (Extension, Various Temperatures)

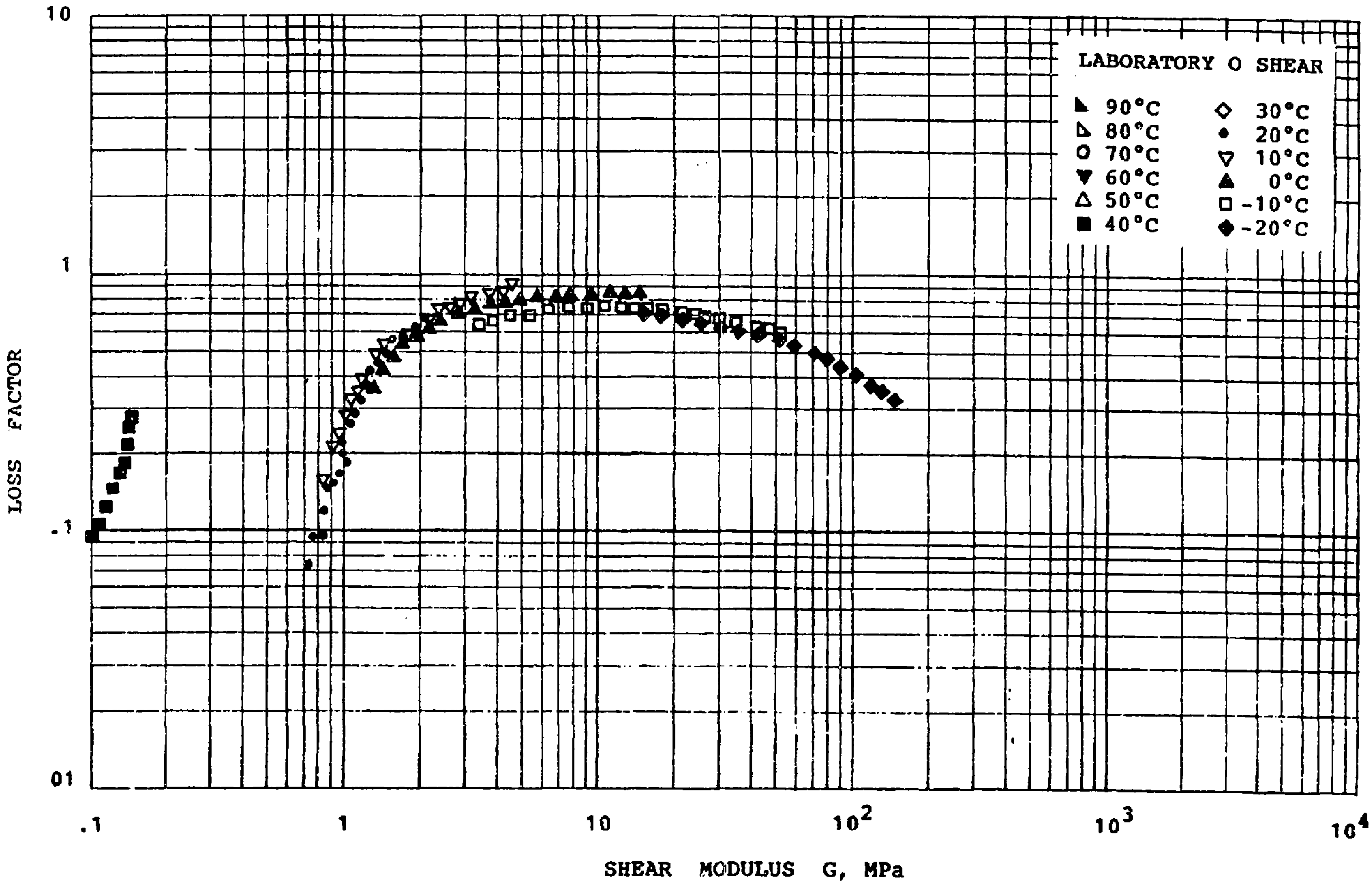


Figure 107. Wicket Plot for Laboratory O Data (Shear, Various Temperatures)

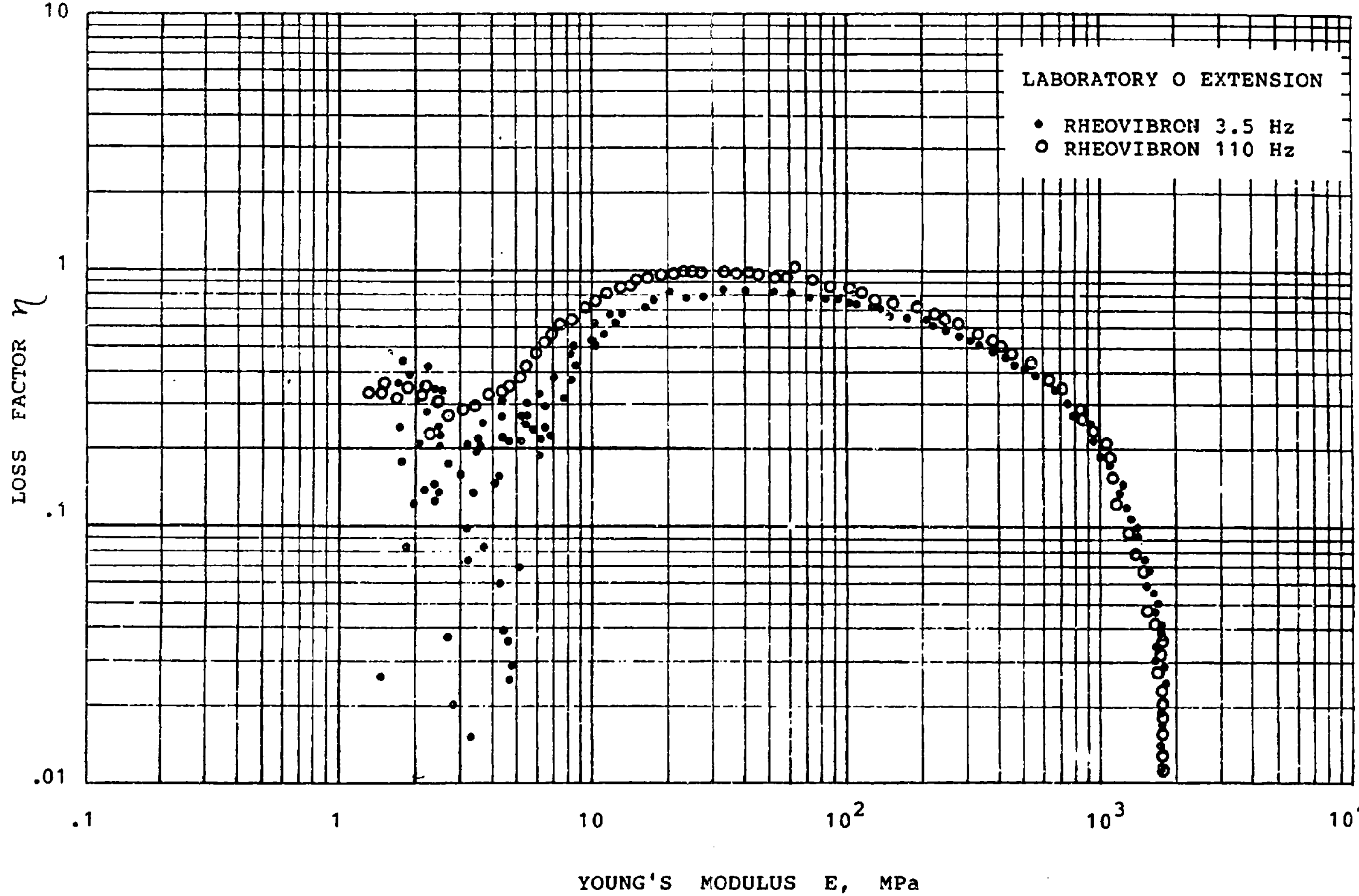


Figure 108. Wicket Plot for Laboratory O Data (Extension, Two Frequencies)

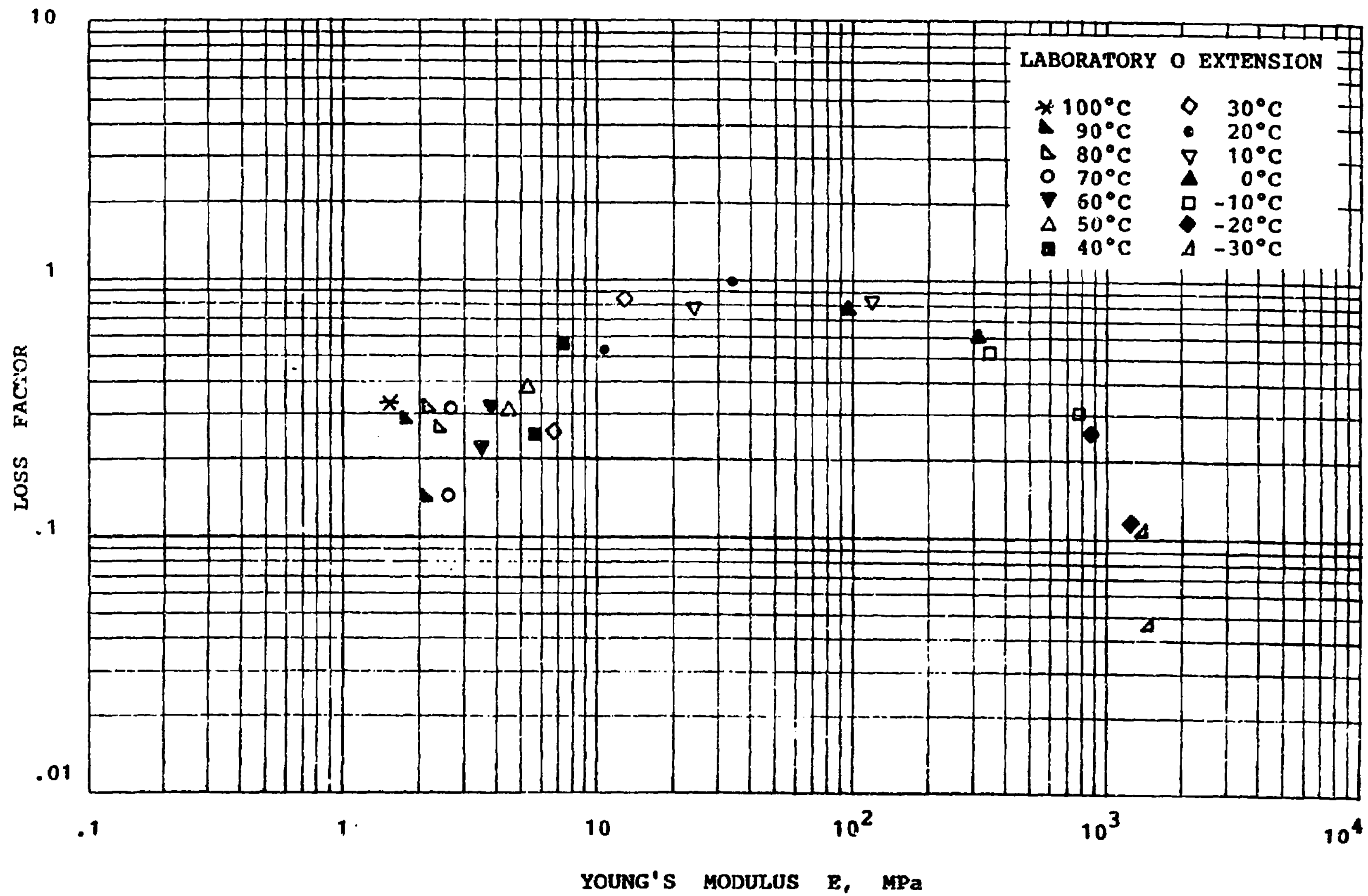


Figure 109. Wicket Plot for Laboratory O Data (Extension, Various Temperatures)

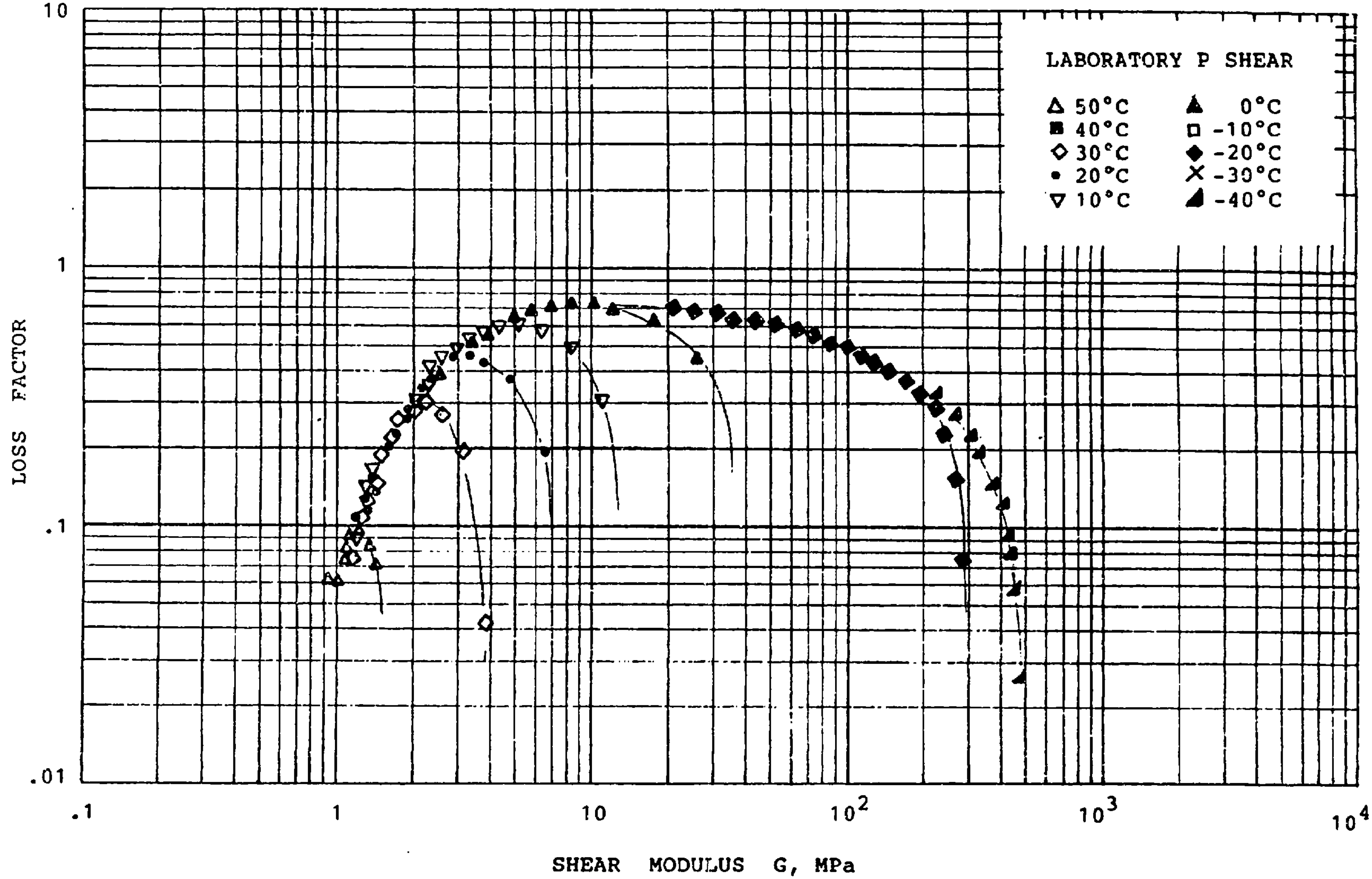


Figure 110. Wicket Plot for Laboratory P Data (Shear, Various Temperatures)

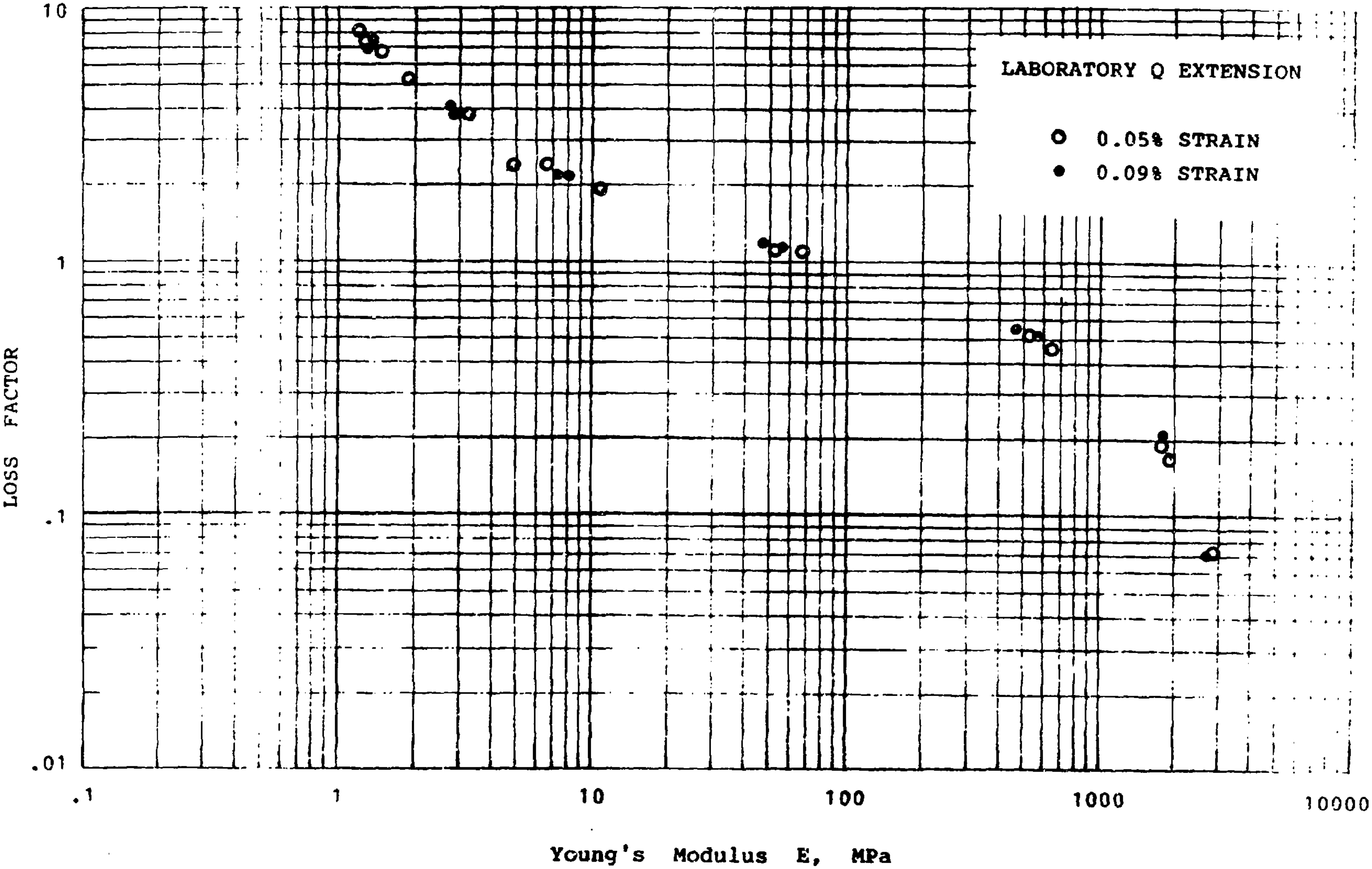


Figure 111. Wicket Plot for Laboratory Q Data (Extension, Two Amplitudes)

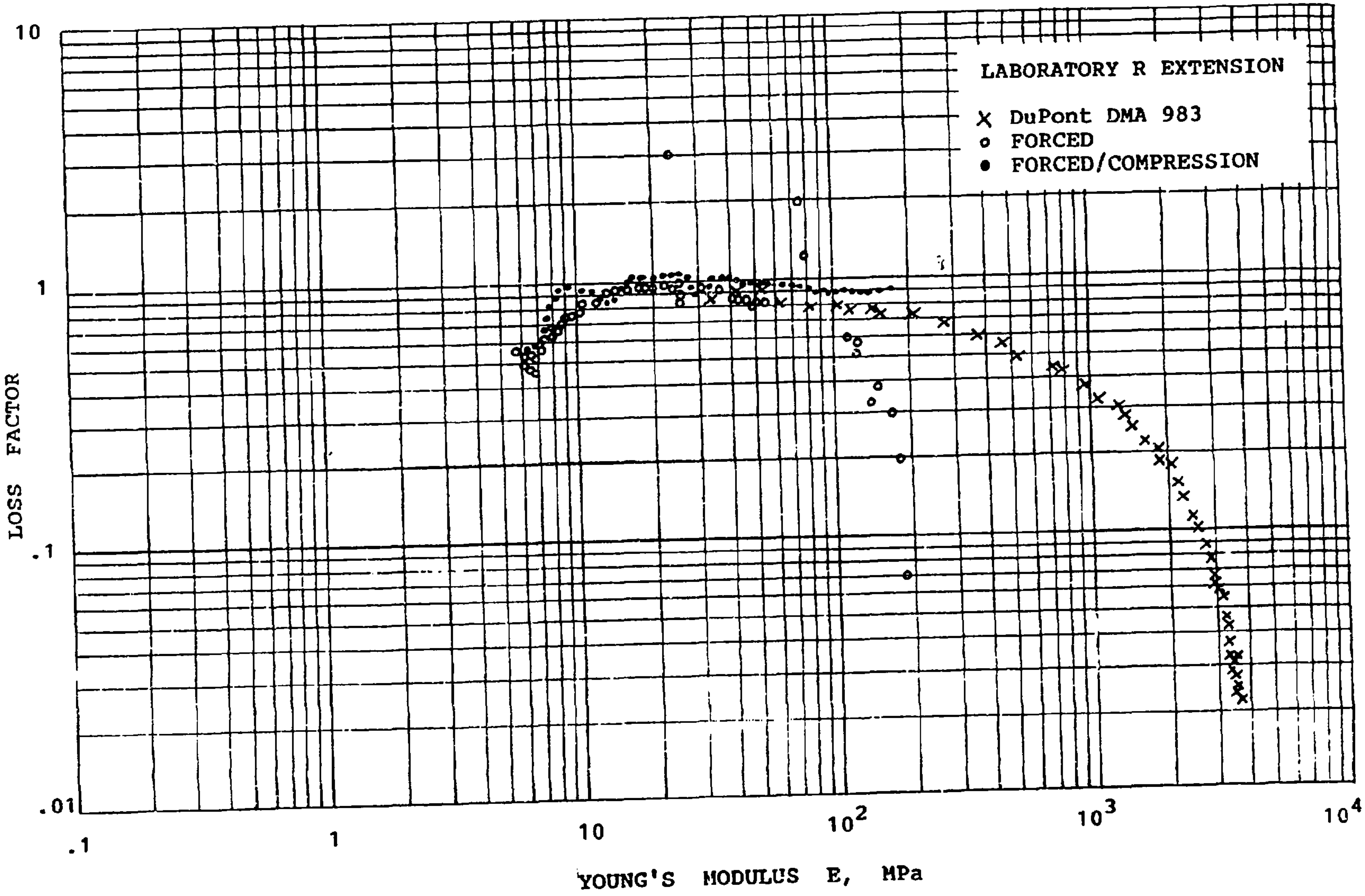


Figure 112. Wicket Plot for Laboratory R Data (Extension, Various Temperatures)

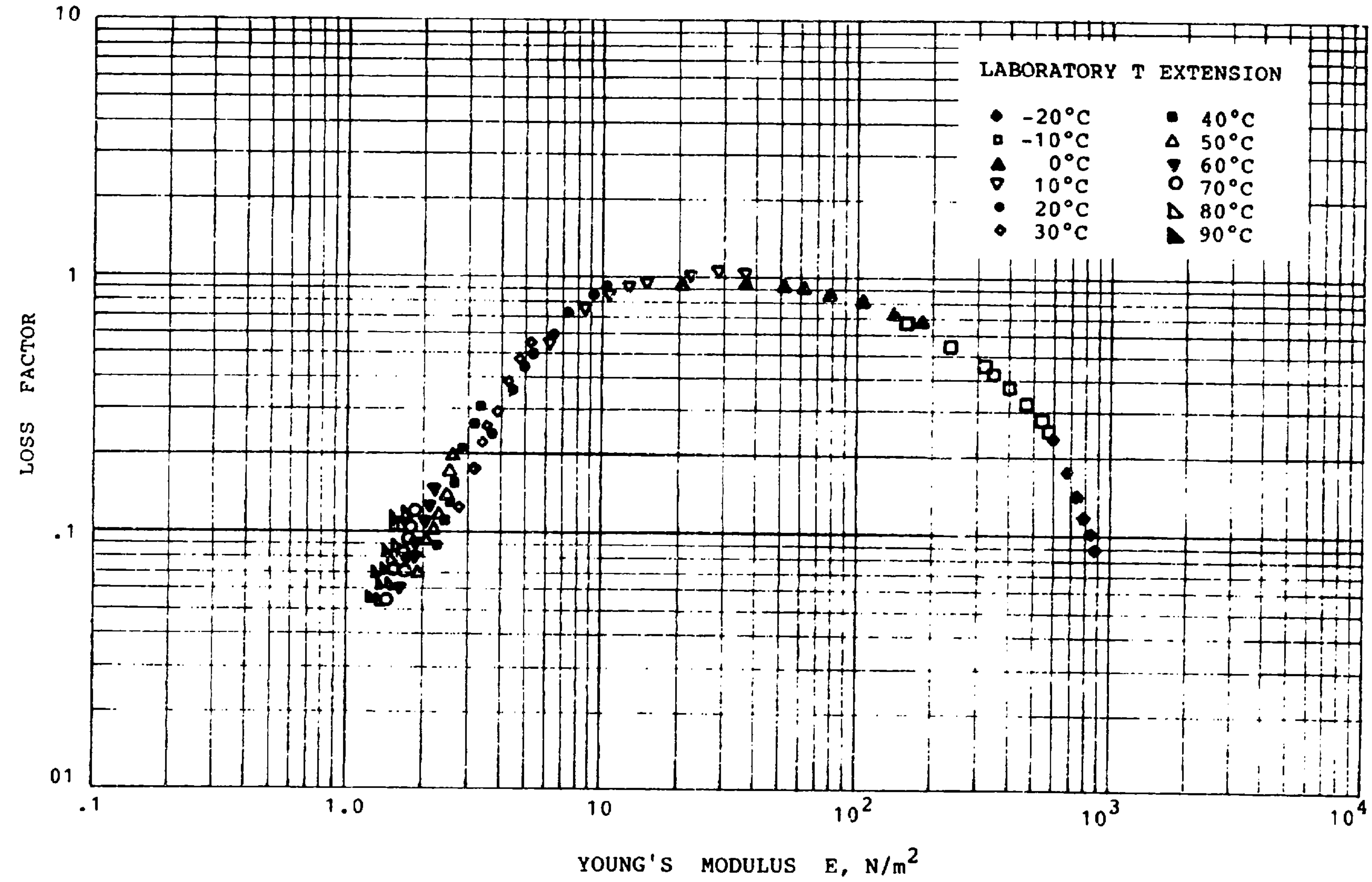


Figure 113. Wicket Plot for Laboratory T Data (Extension, Various Temperatures)

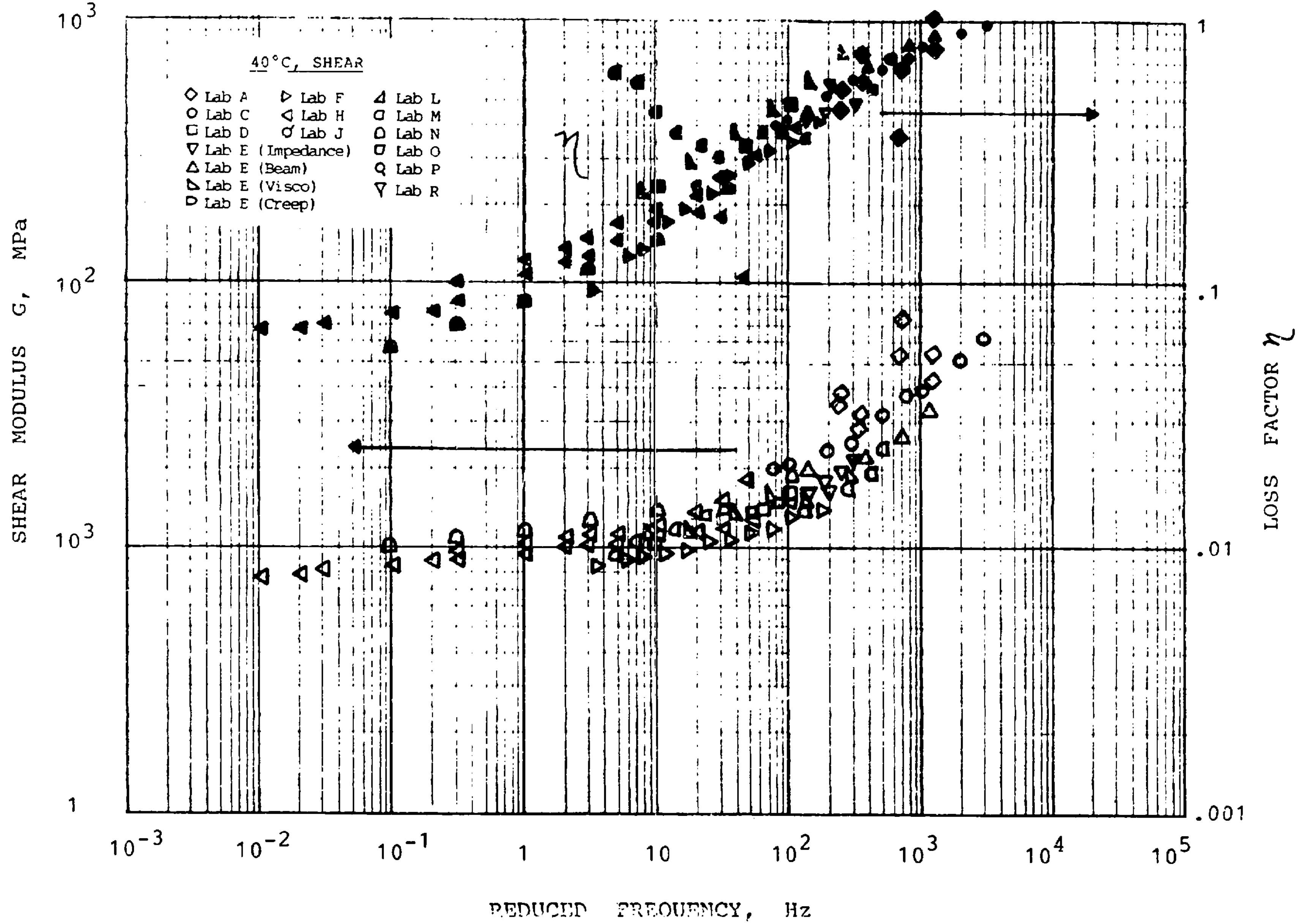


Figure 114. Plot of Shear Modulus and Loss Factor Versus Frequency (40°C)

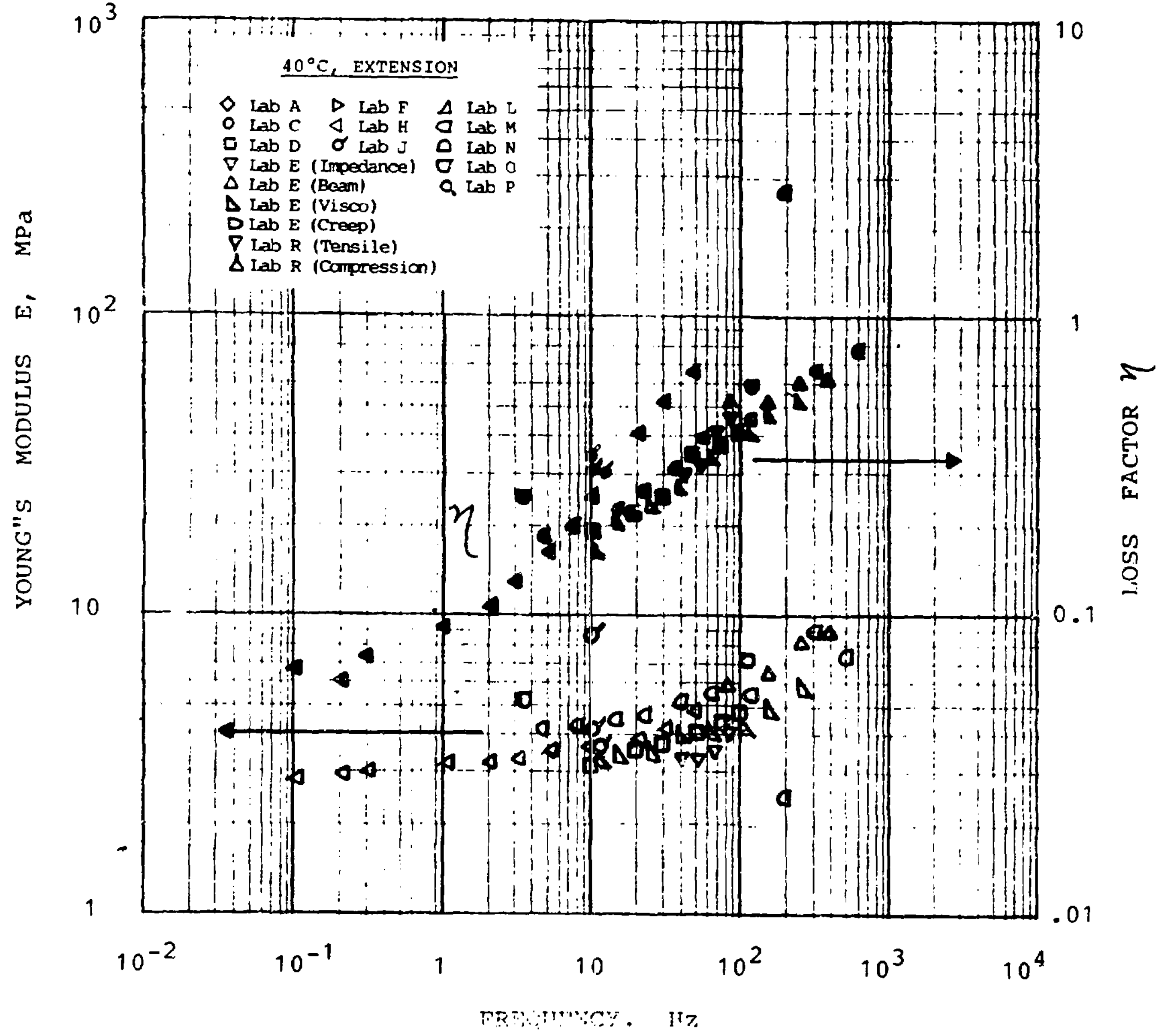


Figure 115. Plot of Young's Modulus and Loss Factor Versus Frequency (40°C)

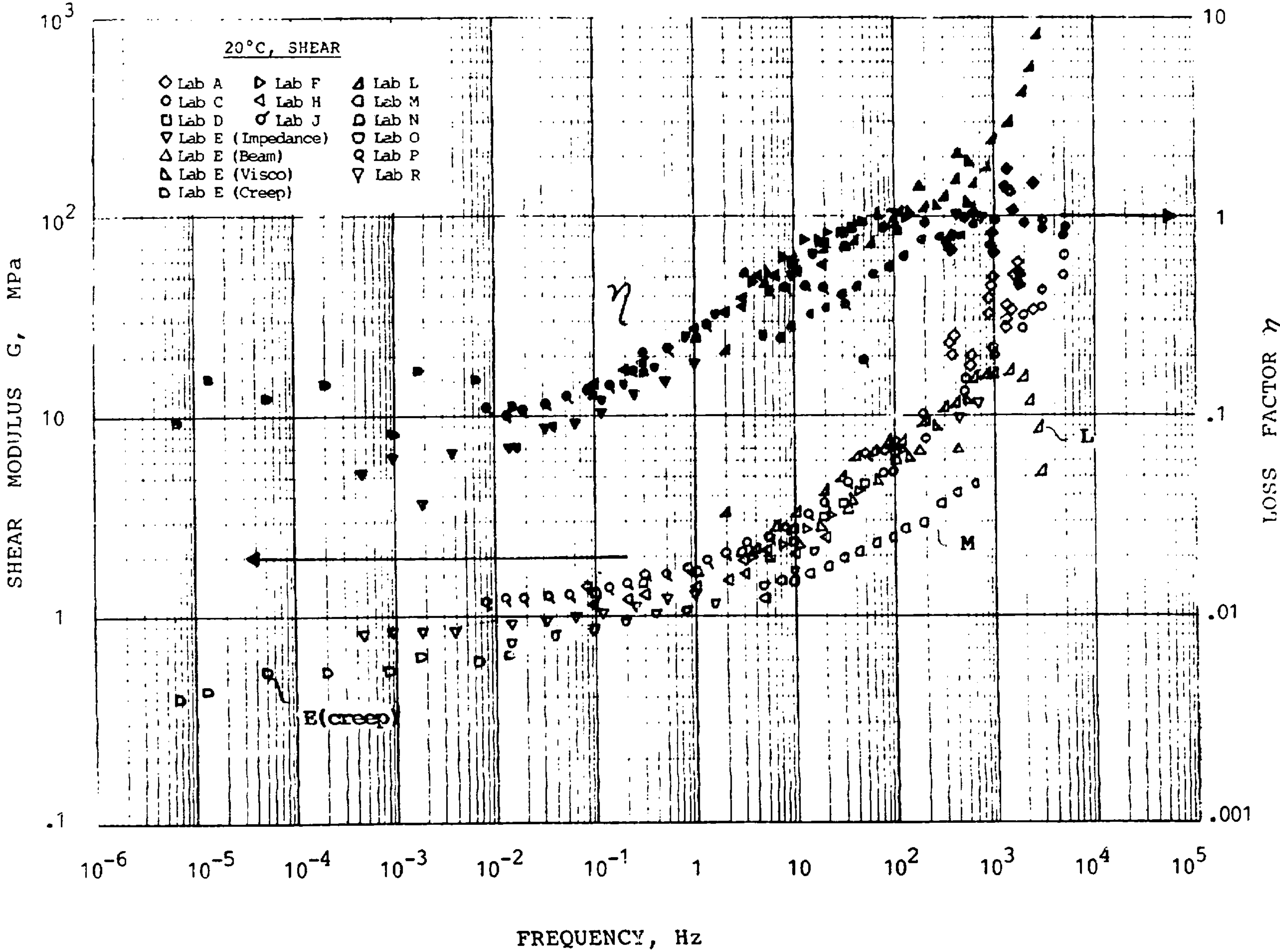


Figure 116. Plot of Shear Modulus and Loss Factor Versus Frequency (20°C)

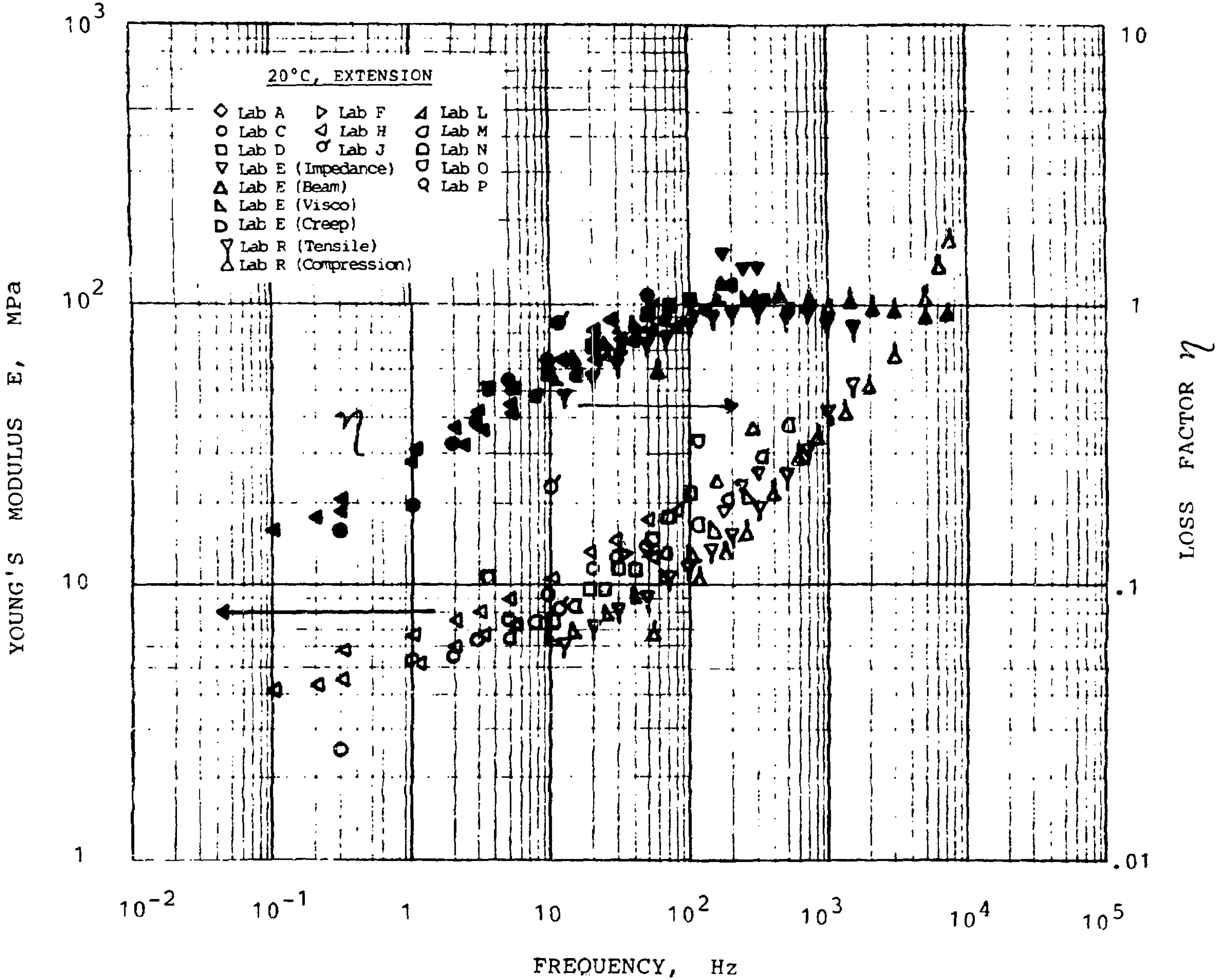


Figure 117. Plot of Young's Modulus and Loss Factor Versus Frequency (20°C)

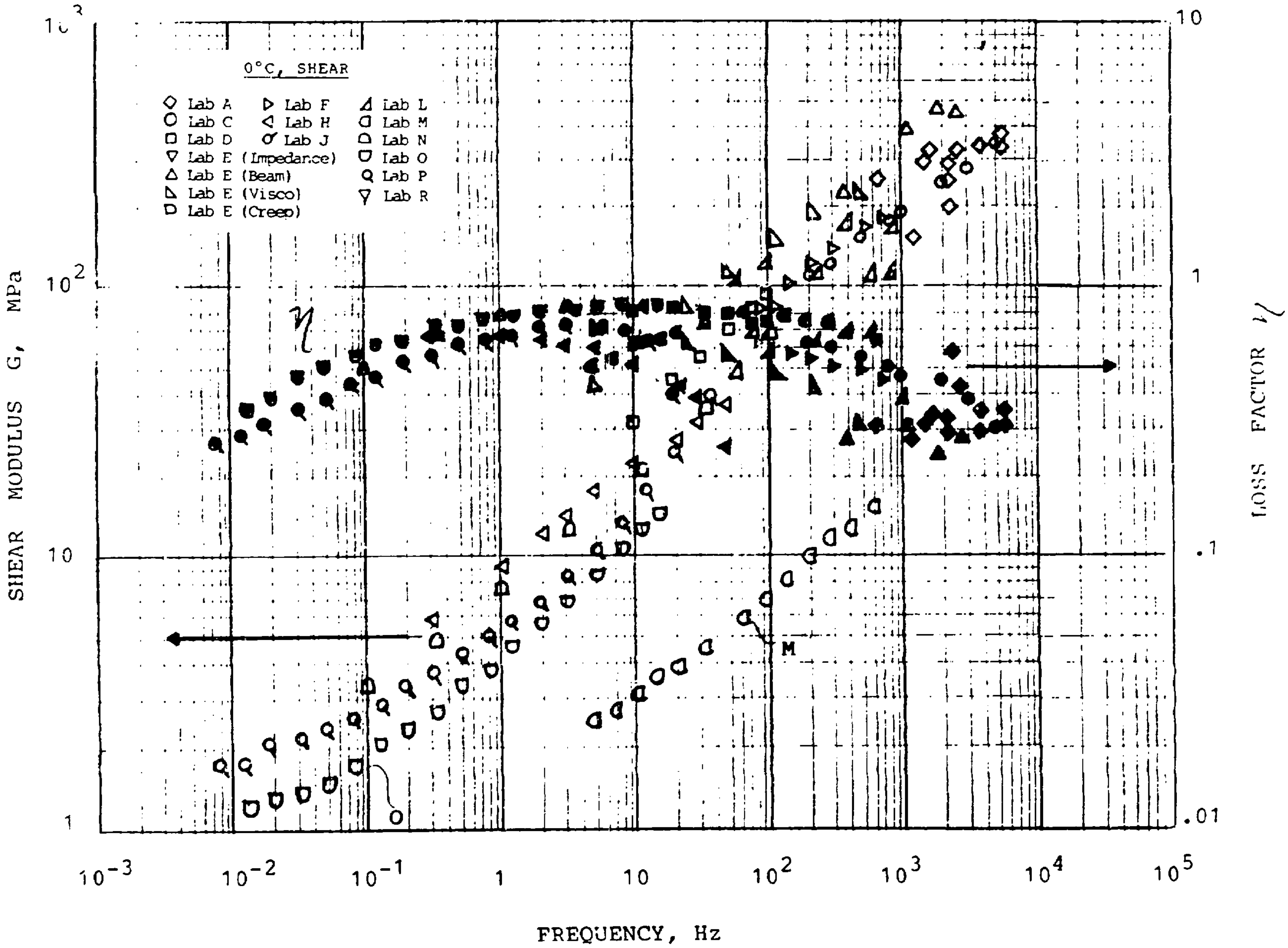


Figure 118. Plot of Shear Modulus and Loss Factor Versus Frequency (0°C)

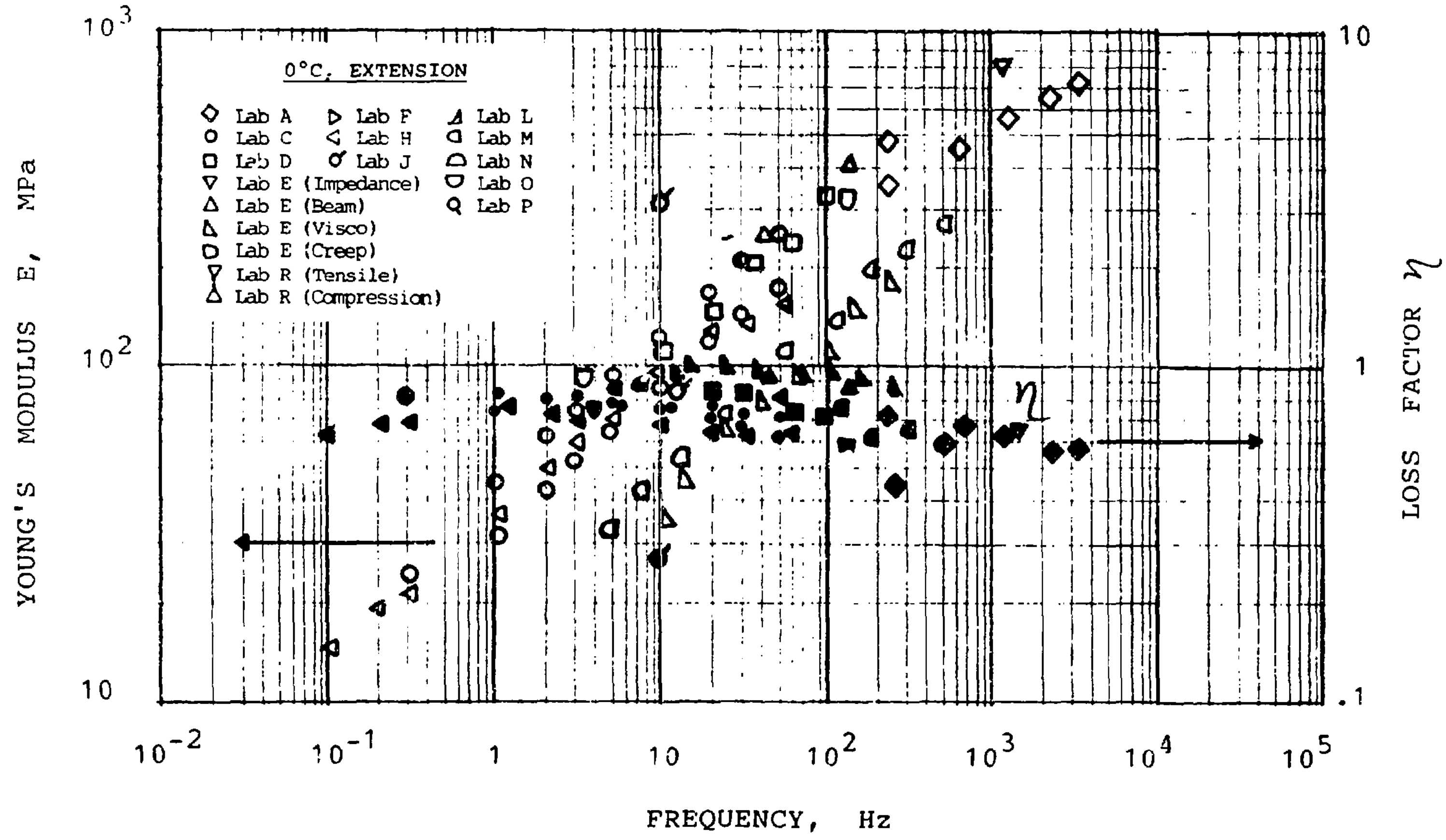


Figure 119. Plot of Young's Modulus and Loss Factor Versus Frequency (0°C)

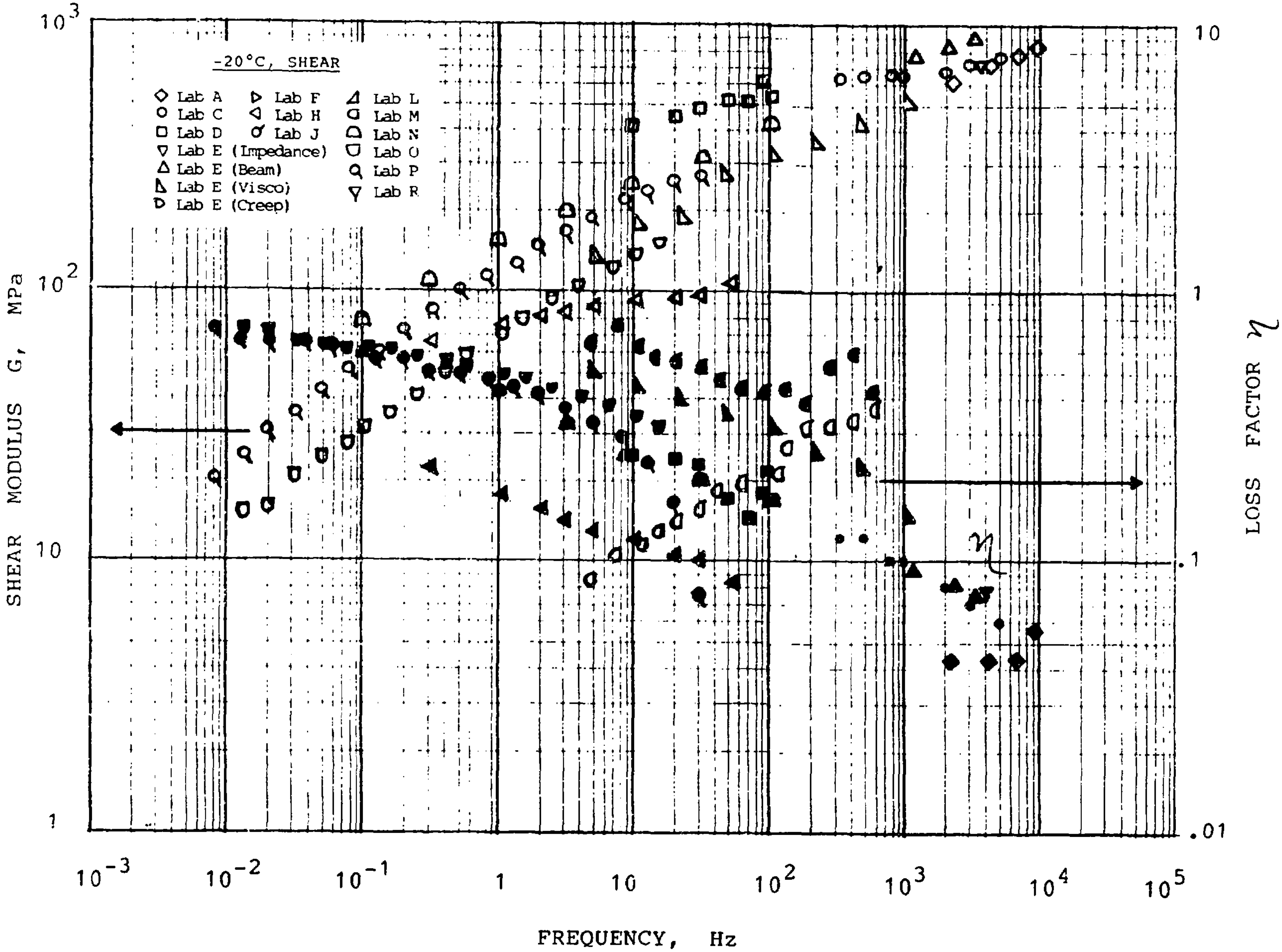


Figure 120. Plot of Shear Modulus and Loss Factor Versus Frequency (-20°C)

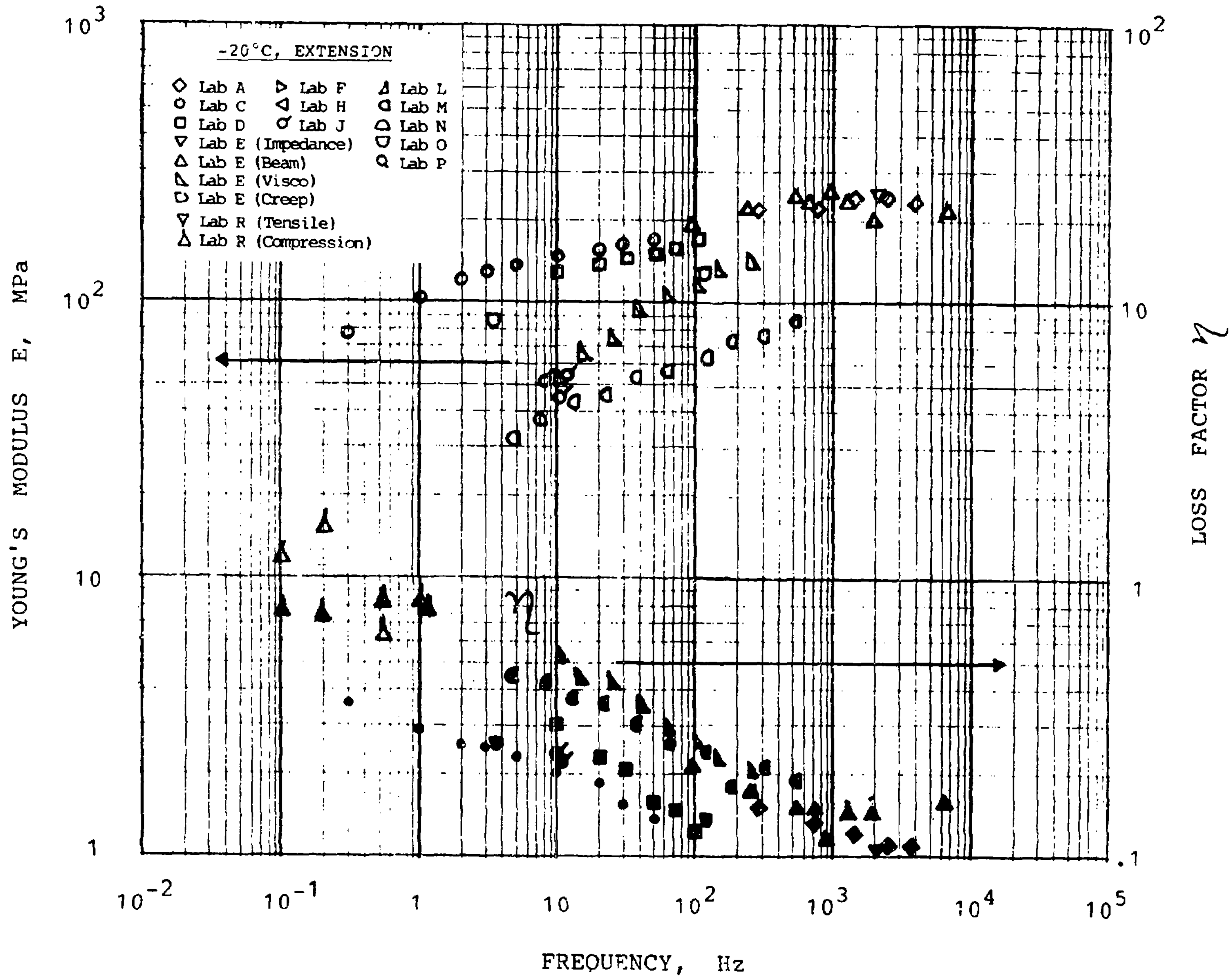


Figure 121. Plot of Young's Modulus and Loss Factor Versus Frequency (-20°C)

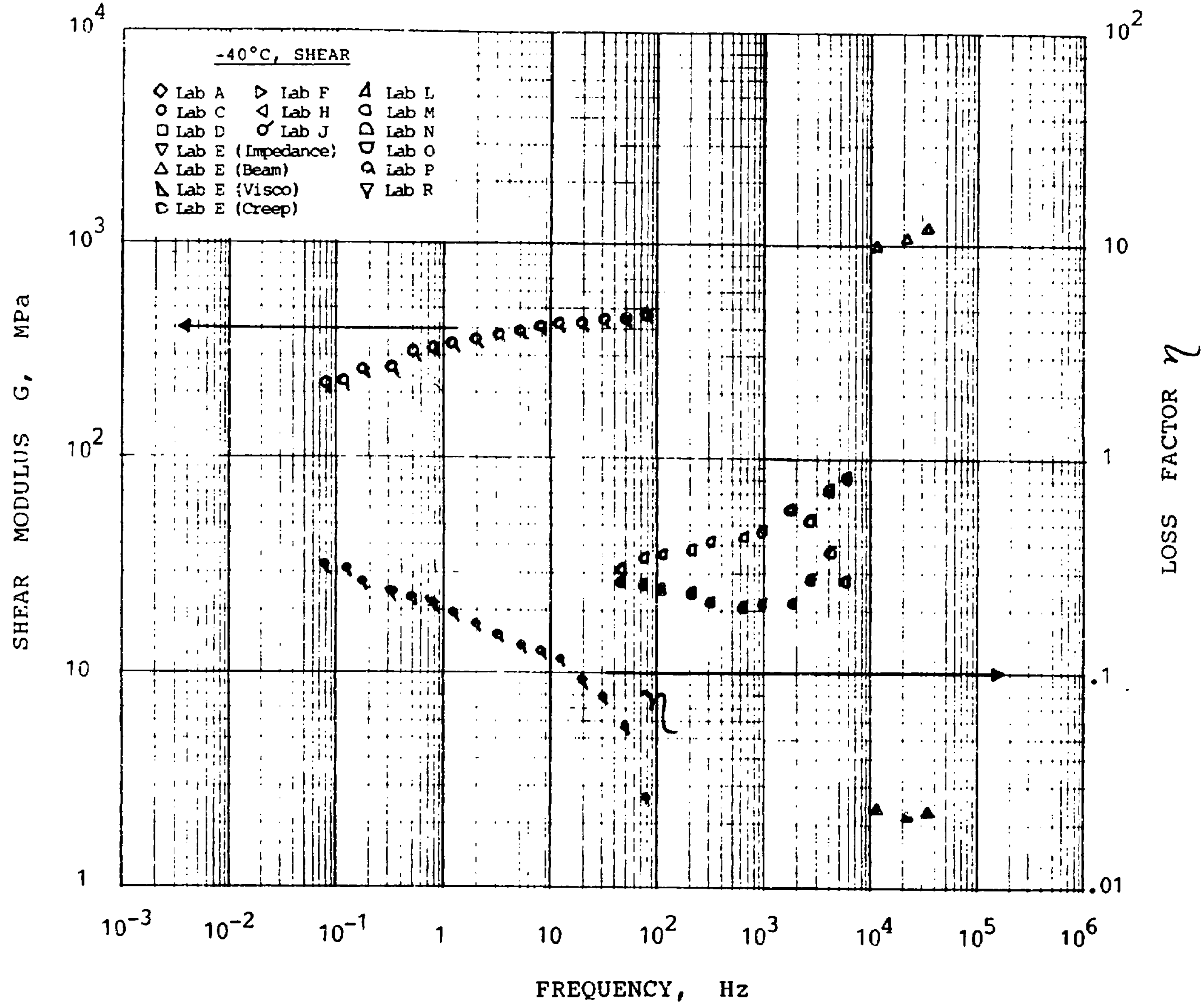


Figure 122. Plot of Shear Modulus and Loss Factor Versus Frequency (-40°C)

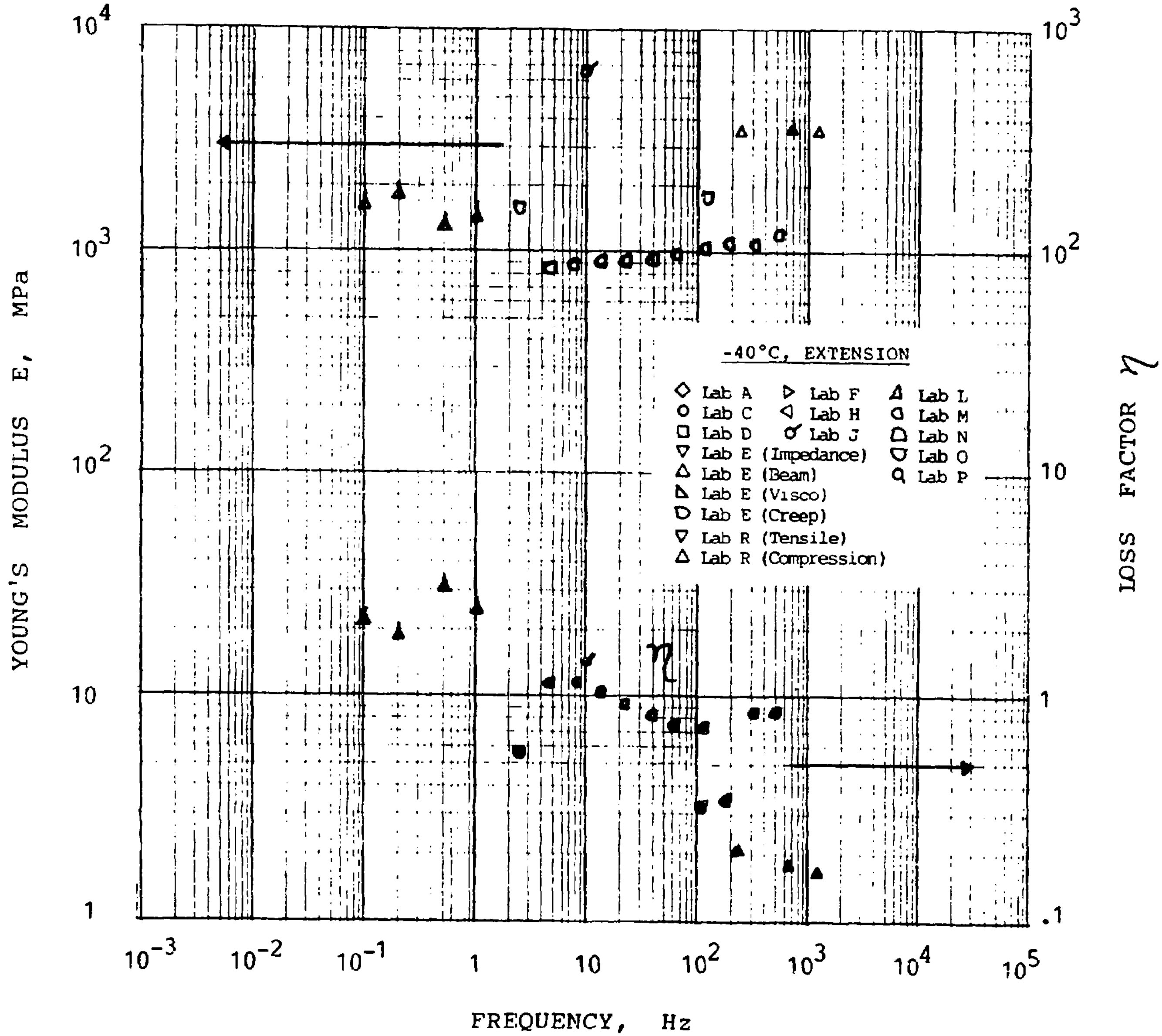


Figure 123. Plot of Young's Modulus and Loss Factor Versus Frequency (-40°C)

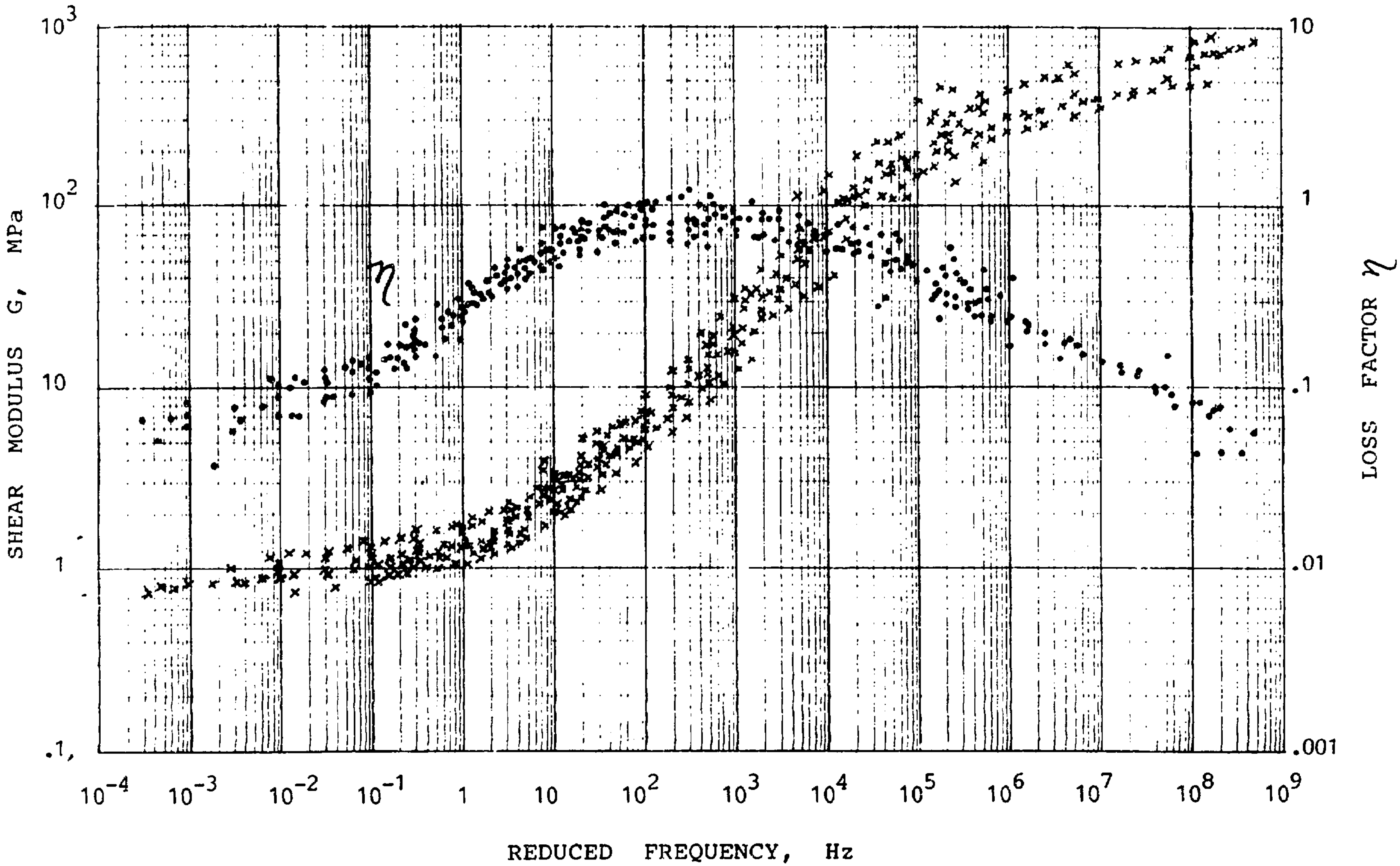


Figure 124. Plot of Shear Modulus and Loss Factor Versus Reduced Frequency (Master Curve)

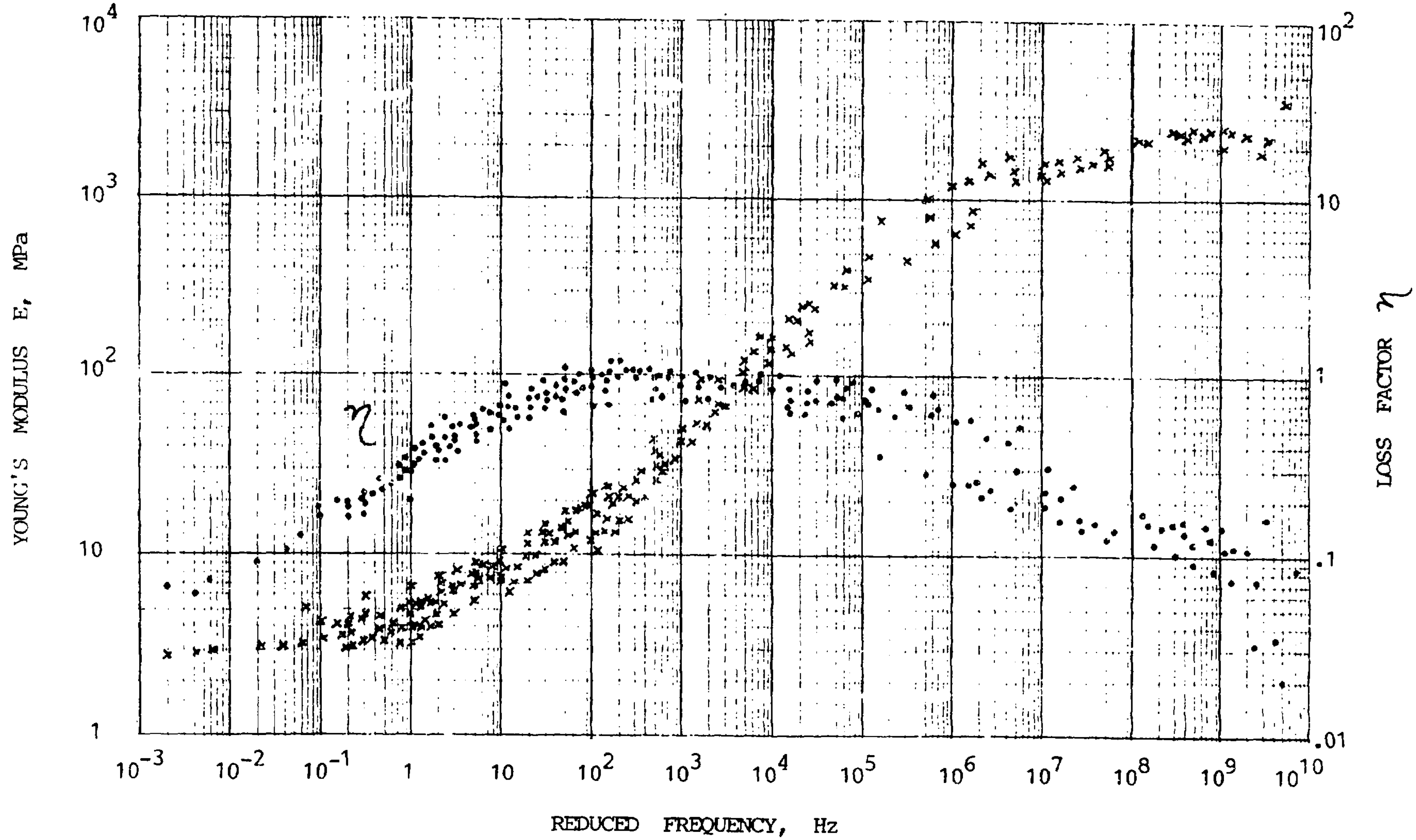


Figure 125. Plot of Young's Modulus and Loss Factor Versus Reduced Frequency (Master Curve)

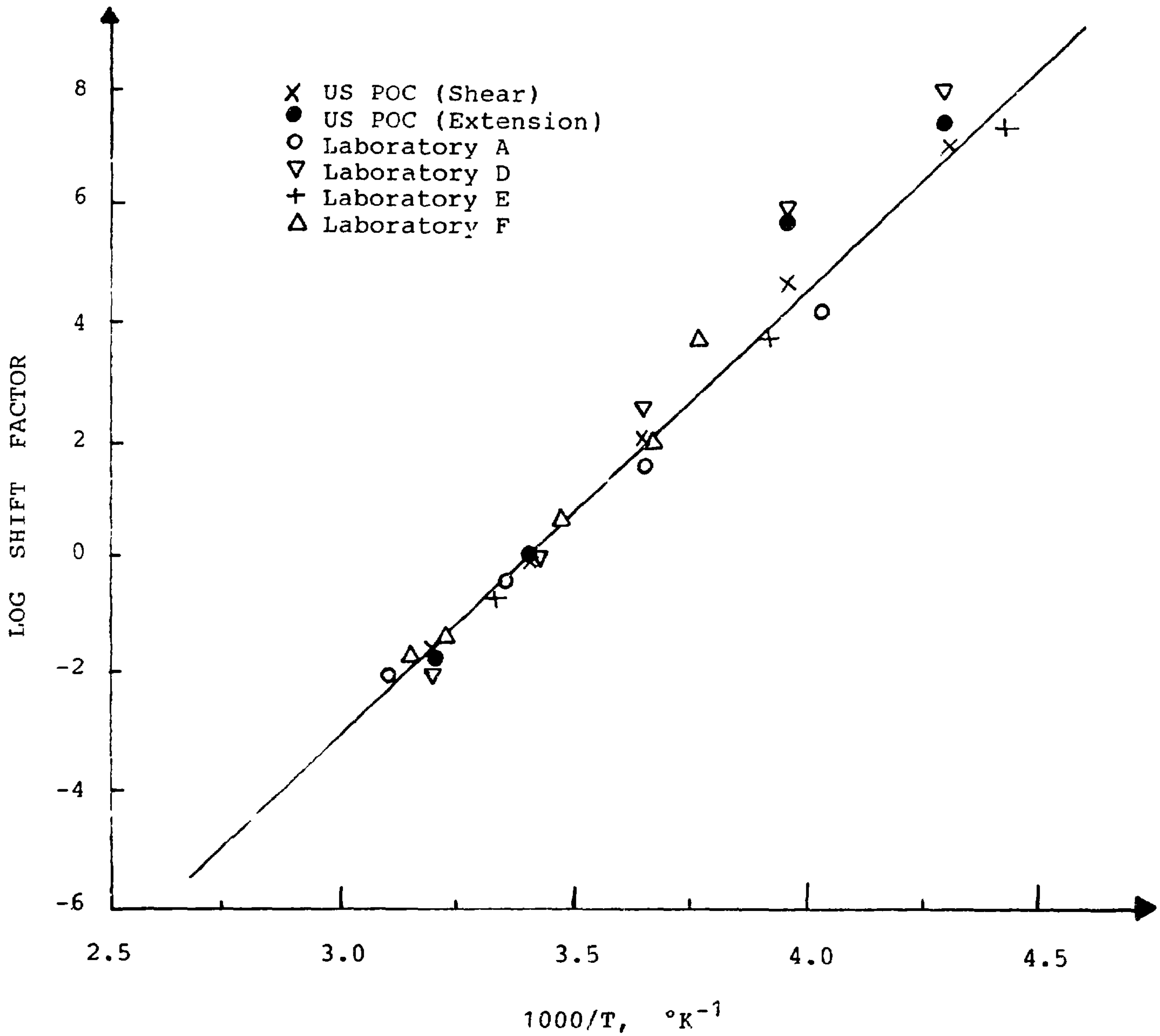


Figure 126. Plot of Log Shift Factor Versus Inverse Absolute Temperature

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CSA Engineering Inc., 2850 W. Bayshore Road, Palo Alto, California 94303-3843 (Dr. C.D. Johnson, Mr. B. Fowler and Mr. B. Allen)

Naval Surface Warfare Center (formerly David Taylor Research Center), Carderock Division, Code 1945.1, Bethesda, Maryland 20084-5000 (Mr. R.J. Deigan and Mr. J. Dlubac)

Defence Research Establishment Atlantic, Dockyard Laboratory, P.O. Box 1012, Dartmouth, Nova Scotia, Canada B2Y 3Z7 (Dr. J.P. Szabo)

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Institute of Sound & Vibration Research, The University of Southampton, Southampton SO3 2DP, England (Dr. R.C. Drew, now at Westland Aerospace, and Prof. R.G. White)

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TABLE 2. ROUND ROBIN TEST REQUIREMENTS

Temperature range:	20°C to -20°C to +90°C to 20°C in steps of 10°C (i.e. 20°C,10°C,0°C, -10°C,-20°C,-10°C,0°C,10°C,20°C, 30°C,40°C,50°C,60°C,70°C,80°C,90°C, 80°C,70°C,60°C,50°C,40°C,30°C,20°C). This was later amended to include additional tests at -30°C,-40°C and -50°C.
Frequency range :	Tester's option
Temperature soak :	At least 30 minutes before testing at each temperature.
Test condition :	Isothermal
Pre-strain :	None (preferably)
Strain amplitude :	Less than 0.1 percent (linear range)
Test methods :	Tester's option
Units :	SI (preferably)
Bonding :	Tester's option

TABLE 3. EIGENVALUES OF VIBRATING BEAMS

MODE NO.	EIGENVALUE (ξ_n)		
n	Clamped-Free	Clamped-Clamped	Free-Free
1	3.516	22.373	0
2	22.035	61.673	0
3	61.697	120.90	22.373
4	120.90	199.86	61.673
5	199.86	298.56	120.90
6	298.56	-	199.86
.	.	.	.
.	.	.	.
n	$(2n-1)^2\pi^2/4$	$(2n+1)^2\pi^2/4$	$(2n-3)^2\pi^2/4$

TABLE 4. TEST SYSTEMS USED BY ROUND ROBIN PARTICIPANTS

LAB	TEST SYSTEM	COMMENTS
A	7-in Oberst Beam (E) 7-in Sandwich Beam (G)	Limited range for extensional data at low moduli. Random scatter in shear data.
B	Direct Stiffness (E)	Resonances in test range. No usable data.
C	Direct Stiffness (HFSMA)(G) Polymer Labs DMTA (E)	Errors in dual cantilever configuration.
D	Direct Stiffness (G,E)	Some scatter at low moduli.
E	FF and CF Homogeneous beam(E) C-F Sandwich & Oberst Beams Resonance & Direct Stiffness Metravib Viscoanalyzer (G,E) Creep/Relaxation(G,E)	Round Robin test program within main test. Widest temperature and frequency ranges.
F	Direct stiffness (G)	Limited number of temperatures and limited data at high modulus values.
G	None	Analysis only.
H	Polymer Labs DMTA (G,E)	Scatter at low moduli, high modulus offset & limited range of Young's moduli.
I	Direct stiffness	No test data yet received.
J	MTS 831.50 Elastomer Test system (E)	High modulus offset, some discrepancies, and limited temperature range.
K	None	Analysis only.
L	Fitzgerald system (G)	Errors at high frequencies (above 900 Hz).
M	Metravib Viscoanalyzer (E,G)	Some scatter and high modulus offset for extensional and shear data.
N	Direct stiffness system (G)	High modulus offset and possible thermal stress effects.
O	Rheometrics RDA2 system (G) Rheovibron (E)	High modulus offset, erroneous data and scatter at low moduli. Two frequencies.
P	Rheometrics RDA2 system (G)	High freq. errors & high modulus offset.
Q	TA Instruments DMA 983	Errors for Young's Modulus < 20 MPa.
R	Dupont DMA 983 & Direct (E)	High modulus offset.
S	Rheometrics RDS system	No data yet received.
T	Polymer Labs DMTA	Scatter at low moduli & high modulus offset.

TABLE 5. TEST SYSTEMS USED BY ROUND ROBIN PARTICIPANTS

TEST SYSTEM	LABORATORIES
Vibrating Beams	A, E
One-of-a-kind Direct Stiffness Systems	B,C,D,E,F,N
Metravib Viscoelasticimetre	E, M
DuPont DMA 983	R, Q
Polymer Laboratories DMTA	C, H, R, T
Rheometrics RDA II	P, O
MTS 831.50 Test System	J
Fitzgerald System	L
Rheovibron DDV-III-C	O

TABLE 6. SPECIMEN DIMENSIONS FOR EACH LABORATORY

LAB	MODE	TEST #	AREA (mm^2)	Height (mm)	Area/Height (mm)
B	Ext'n	-	------------Not known------------		
C	Shear	1	78.54	2.10	37.40
		2	78.54	1.90	41.34
D	Shear	-	321.86	12.00	26.82
	Ext'n	-	160.93	17.50	9.20
E	Shear	88422	406.45	1.57	258.10
		89008	406.45	1.57	258.10
		89001	200.00	3.00	66.67
	Ext'n	884073	196.63	44.00	4.47
		88426	174.11	19.99	8.71
		89059	156.61	13.23	11.83
F	Shear	-	----------Not known------------		
H	Shear	WP-1	38.48	3.00	12.83
		WP-3	113.10	6.00	18.85
		WP-6	113.10	6.00	18.85
		WP-7	113.10	6.00	18.85
		WP-8	113.10	6.00	18.85
		WP-11	113.10	6.00	18.85
	Ext'n	WP-17	15.90	10.00	1.59
J	Ext'n	WP-3	780.64	12.70	69.64
		WP-4	780.64	12.70	69.64
		WP-5	780.64	12.70	69.64
		WPTS1	490.87	12.40	39.59
L	Shear	-	----------- Not known-----------		
M	Shear	-	119.44	1.00	119.44
	Ext'n	-	111.77	15.64	7.15
N	Shear	-	-----------Not known-----------		
O	Shear	5-13	49.02	6.35	7.72
	Ext'n	-	24.36	1.65	14.75
P	Shear	-	490.80	1.52	322.90
		-	50.27	1.52	33.07
R	Shear	-	----------Not known-------------		
	Ext'n	-	----------Not known-------------		

TABLE 7. EXPANSION COEFFICIENT VERSUS TEMPERATURE

System: DuPont 2100 Thermal Analysis, TMA 2940
Sample: EAR C-1002
Method: TMA-5xC/MIN
Calibration Constant: 1.0210

TEMP	EXPANSION COEFFICIENT ALPHA m/m/°C				DENSITY
(°C)	RUN # 37	RUN # 38	RUN # 40	AVERAGE	g/cm^3
-100	66.8	64.6	59.1	63.50	1.3597
- 90	72.7	66.6	70.8	70.03	1.3569
- 80	71.9	65.2	65.2	67.43	1.3541
- 70	67.4	75.1	67.3	69.93	1.3513
- 60	74.0	75.5	71.7	73.73	1.3483
- 50	79.8	86.4	83.7	83.30	1.3451
- 40	86.0	99.7	88.6	91.43	1.3415
- 30	140.0	118.0	114.0	124.00	1.3372
- 20	162.0	132.0	158.0	150.67	1.3316
- 10	180.0	167.0	175.0	174.00	1.3251
0	212.0	191.0	208.0	203.67	1.3176
10	219.0	197.0	216.0	210.67	1.3094
20	229.0	207.0	220.0	218.67	1.3010
30	221.0	210.0	207.0	212.67	1.2926
40	193.0	195.0	193.0	193.67	1.2848
50	164.0	186.0	187.0	179.00	1.2776
60	148.0	159.0	169.0	158.67	1.2713
70	-9.6	104.0	71.4	55.25	1.2672
80	106.0	- 90.3	- 55.8	- 13.37	1.2664
90	256.0	213.0	221.0	230.00	1.2624
100	273.0	260.0	271.0	268.00	1.2530
110	261.0	267.0	259.0	262.30	1.2433
120	191.0	208.0	191.0	196.67	1.2349
130	108.0	112.0	81.3	100.43	1.2294
140	-130.0	-122.0	-186.0	-146.00	1.2303
150	-877.0	-912.0	-1170.0	-986.30	1.2511

TABLE 8: TEST DATA FOR LABORATORY A (OBERST BEAM/EXTENSION)

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
OBERST BEAM TESTS

Beam Length = 177.8 mm (7.0 in)
Beam Thickness = 2.00 mm (0.0788 in)
Beam Material: Aluminum
Polymer Thickness = 1.61 mm (.0632 in)
Beam Material: Aluminum
Polymer Density = 0.046 Lb/in**3
Beam Density = 2.77 g/cm**3 (0.1 Lb/in**3)
Test Date: 2 Nov 1988
Originator's code: CM0703

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR	MODE NO.	BARE BEAM FREQ	COMP LOSS
-20.1	11	270.2	2226.6	0.159	2	244.9	0.0577
	12	764.0	2224.4	0.137	3	696.4	0.0490
	13	1511.0	2339.1	0.122	4	1365.0	0.0449
	14	2491.0	2320.4	0.114	5	2251.9	0.0418
	15	3708.0	2323.2	0.111	6	3347.7	0.0410
-10.1	6	245.9	1198.2	0.341	2	244.4	0.0817
	7	703.0	1305.9	0.313	3	693.8	0.0785
	8	1395.0	1431.9	0.282	4	1360.6	0.0756
	9	2317.0	1494.9	0.284	5	2245.7	0.0786
	10	3450.0	1497.6	0.264	6	3341.0	0.0733
	16	244.4	1137.6	0.355	2	244.4	0.0822
	17	700.0	1261.5	0.325	3	693.8	0.0796
	18	1394.0	1424.1	0.285	4	1360.6	0.0760
	19	2323.0	1523.1	0.262	5	2245.7	0.0736
	20	3460.0	1528.8	0.256	6	3341.0	0.0723
0	1	227.0	479.4	0.455	2	244.0	0.0520
	2	641.2	466.8	0.688	3	691.1	0.0752
	3	1273.0	568.7	0.622	4	1356.3	0.0806
	4	2126.0	668.1	0.558	5	2239.5	0.0830
	5	3180.0	707.8	0.580	6	3334.3	0.0909
	21	224.0	369.3	0.705	2	244.0	0.0638
	22	640.5	457.5	0.720	3	691.1	0.0773
	23	1273.0	568.7	0.626	4	1356.3	0.0812
	24	2133.0	697.7	0.547	5	2239.5	0.0844
	25	3190.0	736.3	0.560	6	3334.3	0.0906

TABLE 9: TEST DATA FOR LABORATORY A (SANDWICH BEAM/STEEL/SHEAR)

SHEAR DEFORMATION (SHEAR MODULUS)
SANDWICH BEAM TESTS (STAINLESS STEEL)

Beam Length = 177.8 mm (7.0 in)
Beam Thickness = 2.00 mm (0.0788 in)
Beam Material: stainless steel
Polymer Thickness = 1.61 mm (.0632 in)
Beam Material: Aluminum
Polymer Density = 0.046 Lb/in**3
Beam Density = 0.3 Lb/in**3
Test Date: 2 Nov 1988
Originator's code: CM0703

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR	MODE NO.	BARE BEAM FREQ	COMP LOSS
+20.0	26	387.0	25.3	0.7949	2	238.3	0.4134
	27	981.0	50.9	0.6798	3	666.6	0.3366
	28	981.0	48.6	0.9907	3	666.6	0.4710
	29	916.0	39.0	0.6742	3	666.6	0.3079
+10.0	30	528.0	70.1	0.7450	2	238.7	0.3636
	31	1285.0	124.9	0.7345	3	667.7	0.3891
	32	2080.0	128.8	0.7946	4	1313.3	0.4087
+ 0.0	33	696.0	266.7	0.3113	2	239.1	0.1000
	34	696.0	268.3	0.2938	2	239.1	0.0946
	35	1597.0	295.2	0.3185	3	668.8	0.1565
	36	1649.0	334.9	0.3221	3	668.8	0.1516
	37	2710.0	333.5	0.4298	4	1315.6	0.2347
	38	3900.0	347.4	0.3580	5	2181.1	0.2026
-10.0	39	733.8	392.4	0.1787	2	239.5	0.0467
	40	1813.0	526.1	0.1566	3	669.9	0.0632
	41	1838.0	564.8	0.1387	3	669.9	0.0542
	42	3166.0	618.6	0.1346	4	1317.9	0.0670
	43	4588.0	623.9	0.0854	5	2185.1	0.0478
	44	4657.0	656.6	0.1224	5	2185.1	0.06785
+ 0.0	45	1318.0	148.9	0.2826	3	668.8	0.1599
	46	2351.0	201.3	0.5781	4	1315.6	0.3178
+10.0	47	439.6	39.85	0.6156	2	238.7	0.3362
	48	1079.0	71.28	0.6752	3	667.7	0.3568
	49	1785.0	70.87	1.0218	4	1313.3	0.4426

TABLE 9 (CONTINUED)

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR	MODE NO.	BARE BEAM FREQ	COMP LOSS
+20.0	50	364.0	20.84	0.6863	2	238.3	0.3503
	51	889.0	34.28	0.6903	3	666.6	0.3003
	52	1540.0	34.56	1.1256	4	1311.0	0.3458
	53	1540.0	34.78	1.0421	4	1311.0	0.3221
+30.0	54	280.7	6.63	0.5750	2	237.9	0.1353
	55	748.0	13.37	0.6064	3	665.5	0.1588
+40.0	56	258.9	3.71	0.5662	2	237.5	0.1244
	57	683.0	5.27	0.6628	3	664.4	0.0849
	58	1291.0	4.40	1.0469	4	1306.4	0.0610
+50.0	59	245.5	2.09	0.4420	2	237.1	0.0620
	60	659.3	2.62	0.6932	3	663.3	0.0479
+60.0	61	240.2	1.50	0.3705	2	236.7	0.0393
	62	650.3	1.71	0.6834	3	662.2	0.0320
+70.0	63	235.2	0.965	0.3247	2	236.3	0.0232
+80.0	64	232.1	0.653	0.3021	2	235.9	0.0151
+90.0	65	230.3	0.498	0.3074	2	235.5	0.0119
+80.0	66	231.8	0.624	0.3148	2	235.9	0.0151
+70.0	67	234.9	0.930	0.3552	2	236.3	0.0246
+60.0	68	238.2	1.27	0.3876	2	236.7	0.0354
+50.0	69	246.2	2.18	0.4179	2	237.1	0.0606
	70	662.4	2.98	0.5046	2	663.3	0.0393
+40.0	71	259.0	3.74	0.4798	2	237.5	0.1060
	72	701.0	7.49	0.3832	3	664.3	0.0665
	73	1299.0	5.24	0.7852	4	1306.2	0.0549
+30.0	74	289.0	7.80	0.6855	2	237.9	0.2415
	75	283.2	7.00	0.5410	2	237.9	0.1801
	76	754.0	14.15	0.6614	3	665.4	0.1799
	77	1362.0	12.37	0.9438	4	1308.5	0.1394
+20.0	78	375.0	23.03	0.7196	2	238.3	0.3728
	79	973.0	48.56	0.8026	3	666.6	0.3885
	80	1643.0	51.29	0.5156	4	1311.0	0.1995
	61	1735.0	66.06	0.5829	4	1311.0	0.2524
	82	2377.0	34.05	1.4371	5	2173.2	0.3113

TABLE 10: TEST DATA FOR LABORATORY A (SANDWICH BEAM/ALUMINUM/SHEAR)

SHEAR DEFORMATION (SHEAR MODULUS)
SANDWICH BEAM TESTS (ALUMINUM)

Beam Length = 177.8 mm (7.0 in)
Beam Thickness = 2.00 mm (0.0788 in)
Beam Material: stainless steel
Polymer Thickness = 1.61 mm (0.0632 in)
Beam Material: Aluminum
Polymer Density = 0.046 Lb/in**3
Beam Density = 0.3 Lb/in**3
Test Date: 2 Nov 1988
Originator's code: CM0703

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR	MODE NO.	BARE BEAM FREQ	COMP LOSS
+20.0	83	549.0	20.62	1.1018	2	325.0	0.4933
	84	1368.0	36.41	1.3925	3	911.1	0.5892
	85	1369.0	36.23	1.4117	3	911.1	0.5948
+10.0	86	1849.0	120.1	0.8038	3	913.5	0.3397
	87	3168.0	148.1	0.8012	4	1775.2	0.3772
	88	3168.0	153.1	0.6936	4	1775.2	0.3346
0.0	89	2171.0	297.6	0.2983	3	916.0	0.1042
	90	3815.0	351.1	0.2976	4	1780.1	0.1294
	91	5726.0	388.6	0.3171	5	2938.6	0.1546
-10.0	92	2322.0	465.8	0.1298	3	918.4	0.0365
	93	4189.0	568.7	0.1252	4	1784.9	0.0457
	94	6303.0	598.2	0.0752	5	2946.8	0.0335
	95	8805.0	670.7	0.1237	6	4398.0	0.0599
-20.0	96	2403.9	604.3	0.0447	3	920.8	0.0107
	97	4364.6	719.2	0.0432	4	1789.7	0.0141
	98	6706.0	797.2	0.0446	5	2955.0	0.0178
	99	9303.0	845.1	0.0559	6	4411.8	0.0254
-10.0	100	2317.0	459.7	0.1184	3	918.4	0.0337
	101	4164.0	551.5	0.1145	4	1784.9	0.0425
	102	6276.0	584.8	0.1155	5	2946.8	0.0516
0.0	103	2131.0	267.2	0.3242	3	916.0	0.1187
	104	3766.0	329.7	0.3238	4	1780.1	0.1431
	105	5610.0	356.8	0.3450	5	2938.6	0.1704

TABLE 10 (CONTINUED)

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR	MODE NO.	BARE BEAM FREQ	COMP LOSS
+10.0	106	707.0	54.70	0.8557	2	325.9	0.3218
	107	1693.0	84.36	0.9094	3	913.5	0.4070
	108	2896.0	103.96	0.9701	4	1775.2	0.4519
+20.0	109	536.0	18.75	1.1592	2	325.0	0.5153
	110	1304.0	28.16	1.8013	3	911.1	0.6902
	111	1304.0	30.54	1.4604	3	911.1	0.6013
+30.0	112	401.0	6.79	0.8985	2	324.0	0.3491
	113	1861.0	13.59	1.3673	4	1765.6	0.3009
+40.0	114	345.5	2.94	0.5996	2	323.1	0.1494
+50.0	115	327.4	1.83	0.4324	2	322.2	0.0768
+60.0	116	318.7	1.35	0.3281	2	321.2	0.0458
+70.0	117	311.1	0.944	0.2851	2	320.3	0.0296
+81.0	118	303.7	0.571	0.3521	2	319.3	0.0234
+90.0	119	300.5	0.433	0.3738	2	318.4	0.0193
+80.0	120	304.2	0.594	0.3341	2	319.4	0.0230
+70.0	121	308.6	0.798	0.3338	2	320.3	0.0299
+60.0	122	314.4	1.09	0.4114	2	321.2	0.0480
+50.0	123	323.0	1.56	0.5213	2	322.2	0.0814
+40.0	124	351.9	3.34	0.7603	2	323.1	0.2055
+30.0	125	393.0	6.02	1.0975	2	324.0	0.4005
+20.0	126	543.0	19.66	1.1412	2	325.0	0.5077
	127	1355.0	33.97	1.5422	3	911.1	0.6303

TABLE 11: TEST DATA FOR LABORATORY B (TAKEN FROM FIGURES)

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
DIRECT STIFFNESS SYSTEM

Specimen Type: Cylindrical
Polymer density: 0.046 Lb/in**3

TEMP (°C)	FREQ (Hz)	E (MPa)	LOSS FACTOR
0	600	400	1.2
	700	450	1.0
	800	300	1.2
	900	400	0.8
	1000	300	2.0
10	500	100	2.0
	600	250	0.9
	700	200	1.0
	800	180	1.8
	900	220	1.0
	1000	230	1.2
20	300	30	2.0
	400	25	2.0
	500	25	2.0
	600	30	2.0
	700	30	2.5
	800	25	3.0
	900	28	4.0
	1000	16	10.0
30	100	8	0.6
	200	9	0.95
	300	9	1.4
40	100	3.8	0.45
	200	3.0	0.8

TABLE 12: TEST DATA FOR LABORATORY C (PL DMTA/EXTENSION)

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
POLYMER LABORATORIES DMTA SYSTEM
Specimen Type: Single Cantilever (Sample 1)
Dual Cantilever (Sample 2)
Specimen Length: 12.21 mm (Sample 1)
11.6 mm (Sample 2)
Specimen Thickness: 1.225 mm (Sample 1)
1.12 mm (Sample 2)
Specimen Width: 3.0 mm (both samples)
Polymer Density = 0.046 Lb/in**3
Test Dates: 5 Jan 1989 (Sample 1)
24 Feb 1989 (Sample 2)

TEMP (C)	FREQ (Hz)	SAMPLE #1 MODULUS (MPa)	SAMPLE #1 LOSS FACTOR	SAMPLE #2 MODULUS (MPa)	SAMPLE #2 LOSS FACTOR
-20.0	0.3	773.0	0.36	-	-
	1.0	1009.0	0.29	698.0	0.36
	2.0	1148.0	0.26	807.0	0.33
	3.0	1236.0	0.25	883.0	0.31
	5.0	1337.0	0.22	984.0	0.28
	10.0	1472.0	0.20	1112.0	0.25
	20.0	1603.0	0.18	1225.0	0.23
	30.0	1675.0	0.16	1297.0	0.21
	50.0	1762.0	0.14	1403.0	0.18
-10.0	0.3	149.0	0.68	-	-
	1.0	244.0	0.61	152.0	0.67
	2.0	315.0	0.57	200.0	0.33
	3.0	366.0	0.54	233.0	0.60
	5.0	436.0	0.51	279.0	0.57
	10.0	542.0	0.47	356.0	0.53
	20.0	664.0	0.42	447.0	0.49
	30.0	740.0	0.40	502.0	0.46
	50.0	836.0	0.36	579.0	0.42
0	0.3	25.1	0.81	-	-
	1.0	45.0	0.83	32.0	0.75
	2.0	61.8	0.81	42.9	0.77
	3.0	75.0	.80	51.3	0.78
	5.0	94.4	0.79	64.1	0.78
	10.0	129.0	0.76	87.0	0.77
	20.0	175.0	0.72	118.0	0.75
	30.0	207.0	0.69	140.0	0.73
	50.0	253.0	0.64	171.0	0.72

TABLE 12 (CONCLUDED)

TEMP (C)	FREQ (Hz)	SAMPLE #1 MODULUS (MPa)	SAMPLE #1 LOSS FACTOR	SAMPLE #2 MODULUS (MPa)	SAMPLE #2 LOSS FACTOR
+10.0	0.3	6.1	0.51	-	-
	1.0	10.8	0.64	10.9	0.43
	2.0	13.4	0.71	12.7	0.52
	3.0	15.7	0.77	14.8	0.57
	5.0	19.9	0.81	17.4	0.65
	10.0	27.0	0.87	22.3	0.74
	20.0	37.0	0.91	29.3	0.82
	30.0	44.5	0.93	34.3	0.85
	50.0	54.8	0.96	42.1	0.90
+20.0	0.3	2.5	0.16	-	-
	1.0	5.3	0.20	6.5	0.15
	2.0	5.6	0.33	6.8	0.23
	3.0	6.4	0.39	7.5	0.24
	5.0	7.6	0.53	8.2	0.32
	10.0	9.3	0.63	9.6	0.43
	20.0	11.5	0.78	11.4	0.56
	30.0	12.8	0.88	12.1	0.61
	50.0	13.8	1.05	13.1	0.73
+30.0	1.0	-	-	4.8	0.02
	2.0	-	-	5.2	0.04
	3.0	-	-	5.4	0.03
	5.0	-	-	5.7	0.09
	10.0	-	-	6.2	0.18
	20.0	-	-	6.7	0.28
	30.0	-	-	7.0	0.35
	50.0	-	-	6.9	0.45

TABLE 13: TEST DATA FOR LABORATORY C (HFSMA/SHEAR)

SHEAR DEFORMATION (SHEAR MODULUS)
HIGH FREQUENCY SHEAR MODULUS APPARATUS

Specimen Type: double lap specimen
Specimen Diameter: 10 mm (all samples)
Specimen Thickness: 2.1 mm (Sample 1)
1.9 mm (Samples 2 and 3)
Polymer Density = 0.046 Lb/in**3
Test Dates: 13 July 1988 (Sample 1)
14 August 1988 (Sample 2)
13 February 1989 (Sample 3)

		SAMPLE #1		SAMPLE #2		SAMPLE #3	
TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR	MODULUS (MPa)	LOSS FACTOR	MODULUS (MPa)	LOSS FACTOR
+20.0	80	6.92	0.87	5.01	0.86	6.92	0.85
	100	7.56	0.90	6.03	0.90	7.94	0.88
	200	10.0	0.92	7.94	0.95	10.0	0.95
	300	12.3	0.95	10.0	0.98	12.6	0.97
	500	15.8	0.96	13.2	1.00	16.6	0.97
	800	19.9	0.96	15.8	1.00	19.9	0.97
	1000	22.9	0.95	20.0	0.99	22.4	0.96
	2000	31.6	0.90	28.2	0.97	31.6	0.91
	3000	42.7	0.85	36.3	0.92	46.8	0.85
	5000	63.1	0.80	50.0	0.87	46.8	0.78
+10.0	80	20.9	0.91	19.5	0.90	20.4	0.92
	100	23.9	0.91	20.0	0.88	25.1	0.90
	200	31.6	0.86	25.7	0.86	31.6	0.86
	300	39.8	0.83	35.5	0.84	39.8	0.84
	500	50.1	0.80	42.7	0.80	50.1	0.80
	800	64.6	0.75	57.5	0.77	63.1	0.76
	1000	77.6	0.73	63.1	0.75	67.6	0.74
	2000	105.0	0.66	81.3	0.71	100.0	0.70
	3000	126.0	0.60	105.0	0.67	126.0	0.62
	5000	121.0	0.52	126.0	0.62	166.0	0.53
0.0	80	100.0	-	80.0	-	100.0	-
	100	105.0	-	90.0	-	105.0	-
	200	115.0	0.62	100.0	0.57	112.0	0.62
	300	132.0	0.60	125.0	0.55	132.0	0.58
	500	159.0	0.55	151.0	0.51	166.0	0.52
	800	174.0	0.50	151.0	0.48	174.0	0.49
	1000	190.0	0.48	190.0	0.47	190.0	0.46
	2000	251.0	0.45	224.0	0.42	251.0	0.41
	3000	283.0	0.38	270.0	0.38	283.0	0.38
	5000	347.0	0.30	316.0	0.34	380.0	0.30

TABLE 13 (CONTINUED)

TEMP (C)	FREQ (Hz)	SAMPLE #1 MODULUS (MPa)	SAMPLE #1 LOSS FACTOR	SAMPLE #2 MODULUS (MPa)	SAMPLE #2 LOSS FACTOR	SAMPLE #3 MODULUS (MPa)	SAMPLE #3 LOSS FACTOR
-10.0	200	316.0	0.35	263.0	0.34	324.0	0.31
	300	331.0	0.31	316.0	0.30	331.0	0.30
	500	354.0	0.28	363.0	0.28	354.0	0.28
	800	398.0	0.25	380.0	0.25	398.0	0.25
	1000	417.0	0.24	400.0	0.24	410.0	0.23
	2000	447.0	0.21	416.0	0.22	417.0	0.20
	3000	501.0	0.18	457.0	0.20	537.0	0.18
	5000	603.0	0.16	513.0	0.18	603.0	0.16
-20.0	300	630.0	0.12	525.0	0.12	631.0	0.13
	500	645.0	0.12	631.0	0.11	645.0	0.11
	800	661.0	0.10	646.0	0.11	661.0	0.10
	1000	676.0	0.10	650.0	0.10	676.0	0.09
	2000	692.0	0.08	680.0	0.09	692.0	0.08
	3000	708.0	0.07	708.0	0.09	708.0	0.07
	5000	794.0	0.06	794.0	0.08	794.0	0.06
-10.0	200	324.0	0.36	283.0	0.34	355.0	0.33
	300	331.0	0.32	331.0	0.30	363.0	0.27
	500	355.0	0.26	363.0	0.28	371.0	0.25
	800	398.0	0.23	398.0	0.25	398.0	0.22
	1000	417.0	0.21	410.0	0.24	417.0	0.20
	2000	447.0	0.20	440.0	0.22	447.0	0.18
	3000	537.0	0.18	457.0	0.20	537.0	0.17
	5000	617.0	0.16	537.0	0.18	602.0	0.15
0.0	200	115.0	0.59	100.0	0.58	115.0	0.59
	300	141.0	0.58	125.0	0.55	141.0	0.57
	500	159.0	0.52	151.0	0.52	159.0	0.50
	800	173.0	0.48	170.0	0.48	173.0	0.46
	1000	199.0	0.46	190.0	0.46	199.0	0.43
	2000	240.0	0.42	224.0	0.42	251.0	0.39
	3000	309.0	0.38	270.0	0.38	316.0	0.36
	5000	339.0	0.31	316.0	0.34	398.0	0.30
+10.0	80	19.5	0.91	19.5	0.92	20.4	0.91
	100	24.6	0.91	20.0	0.91	25.0	0.90
	200	31.6	0.88	25.7	0.88	31.6	0.88
	300	39.8	0.85	35.5	0.85	39.8	0.85
	500	50.1	0.80	42.7	0.80	50.1	0.80
	800	64.6	0.76	57.7	0.76	64.5	0.76
	1000	77.6	0.74	63.1	0.74	67.6	0.73
	2000	105.0	0.66	81.3	0.70	100.0	0.67
	3000	126.0	0.60	105.0	0.66	132.0	0.59
	5000	191.0	0.52	126.0	0.61	166.0	0.52

TABLE 13 (CONTINUED)

TEMP (C)	FREQ (Hz)	SAMPLE #1 MODULUS (MPa)	SAMPLE #1 LOSS FACTOR	SAMPLE #2 MODULUS (MPa)	SAMPLE #2 LOSS FACTOR	SAMPLE #3 MODULUS (MPa)	SAMPLE #3 LOSS FACTOR
+20.0	80	7.24	0.94	6.51	0.85	7.59	0.95
	100	7.94	0.96	6.61	0.90	7.94	0.96
	200	10.7	0.98	8.00	1.00	10.7	0.98
	300	12.5	0.98	11.0	1.03	13.8	0.99
	500	16.6	0.98	15.1	1.04	16.6	1.00
	800	22.3	0.97	19.1	1.04	25.1	0.99
	1000	25.1	0.95	20.9	1.03	26.3	0.97
	2000	34.6	0.90	31.6	1.00	34.6	0.90
	3000	44.6	0.85	38.0	0.95	44.6	0.84
	5000	63.1	0.78	56.3	0.90	70.7	0.77
+30.0	80	3.16	0.67	2.90	0.67	3.31	0.68
	100	3.39	0.70	3.02	0.70	3.39	0.70
	200	4.17	0.79	3.80	0.80	4.17	0.79
	300	5.01	0.87	4.27	0.88	5.01	0.88
	500	6.31	0.92	6.31	0.97	6.31	0.94
	800	7.94	0.96	7.08	1.01	7.94	0.97
	1000	9.55	1.00	7.24	1.03	9.55	1.00
	2000	13.2	1.05	10.0	1.07	13.2	1.04
	3000	16.2	1.05	11.0	1.08	16.2	1.03
	5000	21.9	1.00	-	-	24.0	1.00
+40.0	80	2.00	0.40	1.58	0.37	2.00	0.40
	100	2.10	0.42	1.60	0.40	2.04	0.42
	200	2.29	0.51	1.66	0.44	2.29	0.51
	300	2.57	0.58	2.00	0.52	2.57	0.60
	500	3.16	0.66	2.40	0.62	3.16	0.67
	800	3.80	0.72	2.82	0.72	3.80	0.77
	1000	3.98	0.80	3.16	0.76	3.98	0.80
	2000	5.01	0.90	3.55	0.90	5.01	0.91
	3000	6.17	0.97	4.00	1.00	6.17	0.98
	5000	7.59	-	-	-	7.94	0.99
+50.0	80	1.51	0.30	1.26	0.28	1.45	0.30
	100	1.58	0.31	1.32	0.30	1.58	0.32
	200	1.86	0.36	1.41	0.34	1.66	0.37
	300	2.00	0.41	1.58	0.40	2.10	0.43
	500	2.24	0.50	1.73	0.47	2.20	0.50
	800	2.40	0.56	2.00	0.53	2.51	0.57
	1000	2.63	0.60	2.24	0.57	2.63	0.60
	2000	3.31	0.72	2.51	0.67	3.24	0.72
	3000	3.80	0.81	-	0.74	3.38	0.83
	5000	5.00	-	-	-	4.47	0.90

TABLE 13 (CONTINUED)

TEMP (C)	FREQ (Hz)	SAMPLE #1 MODULUS (MPa)	SAMPLE #1 LOSS FACTOR	SAMPLE #2 MODULUS (MPa)	SAMPLE #2 LOSS FACTOR	SAMPLE #3 MODULUS (MPa)	SAMPLE #3 LOSS FACTOR
+60.0	80	1.00	0.21	1.00	0.20	1.00	0.20
	100	1.09	0.22	1.00	0.21	1.09	0.20
	200	1.20	0.24	1.05	0.24	1.20	0.25
	300	1.26	0.28	1.17	0.30	1.26	0.30
	500	1.41	0.33	1.25	0.34	1.41	0.33
	800	1.51	0.40	1.41	0.39	1.58	0.40
	1000	1.58	0.43	1.58	0.42	1.62	0.43
	2000	1.99	0.55	1.90	0.50	1.99	0.52
+70.0	80	0.91	0.17	0.79	0.17	0.91	0.17
	100	0.96	0.18	0.80	0.17	0.96	0.18
	200	1.00	0.20	0.85	0.19	1.00	0.20
	300	1.12	0.22	0.90	0.22	1.05	0.21
	500	1.15	0.25	0.95	0.24	1.20	0.24
	800	1.25	0.30	1.09	0.27	1.26	0.30
	1000	1.32	0.32	1.12	0.30	1.31	0.32
	2000	1.58	0.40	1.26	0.34	1.51	0.40
+80.0	80	0.71	0.16	0.66	0.15	0.79	0.16
	100	0.76	0.16	0.68	0.16	0.81	0.16
	200	0.83	0.18	0.76	0.16	0.83	0.17
	300	0.89	0.20	0.80	0.18	0.85	0.20
	500	0.95	0.23	0.89	0.20	0.89	0.22
	800	1.00	0.28	0.96	0.22	1.00	0.26
	1000	1.05	0.30	1.00	0.23	1.05	0.30
	2000	1.15	0.36	1.10	0.28	1.17	0.37
+90.0	80	0.63	0.15	0.63	0.14	0.64	0.15
	100	0.63	0.15	0.63	0.15	0.64	0.15
	200	0.72	0.16	0.65	0.15	0.72	0.15
	300	0.74	0.16	0.67	0.16	0.75	0.16
	500	0.794	0.17	0.74	0.18	0.79	0.17
	800	0.91	0.18	0.80	0.20	0.91	0.18
	1000	0.98	0.20	0.85	0.21	0.98	0.20
	2000	1.00	0.24	1.00	0.24	1.00	0.23
+80.0	80	0.71	0.16	0.68	0.16	0.80	0.16
	100	0.76	0.16	0.69	0.16	0.81	0.16
	200	0.83	0.18	0.78	0.17	0.83	0.17
	300	0.89	0.20	0.81	0.19	0.85	0.19
	500	0.95	0.23	0.90	0.21	0.89	0.21
	800	1.00	0.28	0.96	0.22	1.00	0.22
	1000	1.05	0.30	1.00	0.30	1.05	0.31
	2000	1.15	0.36	1.10	0.35	1.17	0.36

TABLE 13 (CONTINUED)

TEMP (C)	FREQ (Hz)	SAMPLE #1 MODULUS (MPa)	SAMPLE #1 LOSS FACTOR	SAMPLE #2 MODULUS (MPa)	SAMPLE #2 LOSS FACTOR	SAMPLE #3 MODULUS (MPa)	SAMPLE #3 LOSS FACTOR
+70.0	80	0.91	0.17	0.79	0.17	0.91	0.17
	100	C.96	0.18	0.80	0.18	0.96	0.18
	200	1.00	0.20	0.85	0.20	1.00	0.20
	300	1.12	0.22	0.93	0.22	1.05	0.22
	500	1.15	0.25	0.98	0.25	1.20	0.25
	800	1.25	0.30	1.10	0.29	1.26	0.29
	1000	1.32	0.32	1.15	0.32	1.31	0.32
	2000	1.58	0.40	1.28	0.35	1.51	0.38
+60.0	80	1.00	0.21	0.95	0.20	0.99	0.20
	100	1.09	0.22	1.00	0.21	1.10	0.20
	200	1.20	0.24	1.05	0.24	1.20	0.24
	300	1.26	0.28	1.17	0.29	1.26	0.29
	500	1.41	0.33	1.25	0.34	1.41	0.34
	800	1.51	0.40	1.41	0.40	1.58	0.40
	1000	1.58	0.43	1.58	0.42	1.62	0.42
	2000	1.99	0.55	1.90	0.50	1.99	0.51
+50.0	80	1.51	0.30	1.26	0.29	1.41	0.31
	100	1.58	0.31	1.35	0.31	1.58	0.33
	200	1.86	0.36	1.45	0.35	1.62	0.37
	300	2.00	0.41	1.60	0.41	1.99	0.44
	500	2.24	0.50	1.75	0.48	2.20	0.51
	800	2.40	0.56	2.00	0.54	2.50	0.57
	1000	2.63	0.60	2.24	0.59	2.63	0.61
	2000	3.31	0.72	2.55	0.70	3.24	0.72
	3000	3.80	0.81	-	0.78	3.38	0.84
+40.0	80	2.00	0.40	1.58	0.37	2.00	0.40
	100	2.10	0.42	1.60	0.41	2.04	0.42
	200	2.29	0.51	1.66	0.45	2.29	0.51
	300	2.57	0.58	2.00	0.53	2.57	0.60
	500	3.16	0.66	2.40	0.62	3.16	0.67
	800	3.80	0.72	2.82	0.72	3.80	0.77
	1000	3.98	0.80	3.16	0.78	3.98	0.80
	2000	5.01	0.90	3.55	0.90	5.01	0.92
	3000	6.17	0.97	-	0.98	6.17	0.99
+30.0	80	3.16	0.67	2.90	0.67	3.31	0.68
	100	3.39	0.70	3.02	0.70	3.39	0.70
	200	4.17	0.79	3.80	0.79	4.17	0.79
	300	5.01	0.87	4.27	0.87	5.01	0.88
	500	6.31	0.92	6.31	0.97	6.31	0.94
	800	7.94	0.96	7.08	1.01	7.94	0.97
	1000	9.55	1.00	7.24	1.03	9.55	1.00
	2000	13.2	1.05	10.0	1.07	13.2	1.04
	3000	16.2	1.05	11.0	1.08	16.2	1.03
	5000	21.9	1.00	-	-	24.0	1.00

TABLE 13 (CONCLUDED)

TEMP (C)	FREQ (Hz)	SAMPLE #1 MODULUS (MPa)	SAMPLE #1 LOSS FACTOR	SAMPLE #2 MODULUS (MPa)	SAMPLE #2 LOSS FACTOR	SAMPLE #3 MODULUS (MPa)	SAMPLE #3 LOSS FACTOR
+20.0	80	7.24	0.94	6.51	0.86	7.59	0.95
	100	7.94	0.97	6.61	0.91	7.94	0.96
	200	10.7	0.99	8.00	1.00	10.7	0.98
	300	12.5	0.99	11.0	1.03	13.8	0.99
	500	16.6	1.00	15.1	1.04	16.6	1.00
	800	22.3	0.98	19.1	1.05	25.1	1.01
	1000	25.1	0.96	20.9	1.03	26.3	0.98
	2000	34.6	0.90	31.6	1.00	34.6	0.90
	3000	44.6	0.85	38.0	0.95	44.6	0.84
	5000	63.1	0.78	56.3	0.90	70.7	0.77

TABLE 14: TEST DATA FOR LABORATORY D (DIRFCT STIFFNESS/EXTENSION)

SHEAR DEFORMATION (SHEAR MODULUS) AND
EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
DIRECT STIFFNESS TEST SYSTEM
Specimen Type: N/A
Specimen Length: N/A
Specimen Thickness: N/A
Specimen Width: N/A
Polymer Density = 0.046 Lb/in**3
Test Dates: N/A

TEMP (C)	FREQ (Hz)	YOUNG'S MODULUS (MPa)	LOSS FACTOR	SHEAR MODULUS (MPa)	LOSS FACTOR
+20.0	10	7.59	0.58	2.35	0.58
	20	9.84	0.72	3.04	0.74
	30	11.76	0.81	3.65	0.82
	40	13.46	0.87	4.14	0.88
	50	14.98	0.92	4.68	0.92
	60	16.55	0.93	5.05	0.96
	70	17.80	0.98	5.40	0.97
	80	19.02	1.01	5.80	1.01
	90	20.25	1.03	6.16	1.04
	100	21.60	1.02	6.55	1.01
+10.0	10	21.76	0.94	6.92	0.99
	20	31.64	1.02	10.05	1.08
	30	39.74	1.06	12.47	1.12
	40	46.54	1.09	14.60	1.13
	50	52.50	1.10	16.59	1.15
	60	57.20	1.09	18.35	1.14
	70	62.74	1.09	19.94	1.14
	80	67.27	1.09	21.47	1.14
	90	71.60	1.08	22.97	1.14
	100	75.72	1.07	24.22	1.10
0	10	118.6	0.92	33.4	0.83
	20	168.7	0.86	46.2	0.85
	30	203.1	0.83	55.6	0.83
	40	231.6	0.81	63.2	0.81
	50	256.9	0.79	70.0	0.80
	60	259.8	0.77	76.7	0.81
	70	292.3	0.75	80.5	0.76
	80	306.3	0.73	84.6	0.73
	90	317.7	0.72	87.7	0.79
	100	338.2	0.72	91.9	0.75

TABLE 14 (CONTINUED)

TEMP (C)	FREQ (Hz)	YOUNG'S MODULUS (MPa)	LOSS FACTOR	SHEAR MODULUS (MPa)	LOSS FACTOR
-10.0	10	483.7	0.56	141.6	0.56
	20	608.0	0.50	177.7	0.54
	30	685.6	0.47	202.1	0.52
	40	739.8	0.44	219.3	0.49
	50	796.1	0.41	235.9	0.47
	60	814.7	0.40	239.3	0.44
	70	840.1	0.39	258.7	0.46
	80	849.7	0.38	263.4	0.43
	90	848.6	0.36	268.2	0.41
	100	915.1	0.36	272.9	0.43
-20.0	10	1281.1	0.30	411.0	0.25
	20	1460.7	0.23	456.5	0.24
	30	1536.1	0.21	482.7	0.23
	40	1567.6	0.17	488.5	0.19
	50	1664.4	0.15	514.5	0.17
	60	1668.9	0.15	545.1	0.22
	70	1673.4	0.15	511.5	0.15
	80	1633.6	0.14	475.0	0.14
	90	1674.1	0.13	610.7	0.18
	100	1714.7	0.13	550.8	0.22
-10.0	10	487.9	0.54	137.1	0.61
	20	611.6	0.50	172.5	0.54
	30	688.2	0.48	195.6	0.52
	40	739.2	0.44	213.0	0.49
	50	798.2	0.41	229.8	0.47
	60	830.0	0.40	238.0	0.44
	70	853.7	0.40	242.2	0.45
	80	864.8	0.38	250.8	0.43
	90	865.8	0.36	248.6	0.43
	100	931.1	0.36	269.1	0.44
0	10	118.3	0.89	33.3	0.82
	20	165.1	0.86	45.0	0.83
	30	200.7	0.84	53.7	0.82
	40	228.7	0.81	61.0	0.80
	50	254.2	0.80	67.7	0.79
	60	262.4	0.77	73.1	0.77
	70	289.0	0.75	76.2	0.76
	80	302.7	0.74	81.1	0.75
	90	314.4	0.72	83.5	0.74
	100	331.8	0.72	88.7	0.76

TABLE 14 (CONTINUED)

TEMP (C)	FREQ (Hz)	YOUNG'S MODULUS (MPa)	LOSS FACTOR	SHEAR MODULUS (MPa)	LOSS FACTOR
+10.0	10	20.76	0.92	7.01	0.92
	20	30.70	1.00	10.22	1.02
	30	38.22	1.06	12.76	1.09
	40	44.80	1.08	14.89	1.11
	50	50.80	1.11	16.99	1.11
	60	55.15	1.10	18.69	1.11
	70	60.83	1.09	20.29	1.13
	80	65.16	1.09	21.89	1.12
	90	69.42	1.09	23.38	1.11
	100	73.48	1.08	24.65	1.09
+20.0	10	7.61	0.55	2.34	0.56
	20	10.03	0.70	3.16	0.74
	30	11.86	0.79	3.75	0.81
	40	13.61	0.86	4.30	0.88
	50	15.28	0.91	4.81	0.89
	60	16.61	0.94	5.22	0.95
	70	17.92	0.97	5.60	0.98
	80	19.18	1.00	6.01	1.01
	90	20.36	1.02	6.41	1.05
	100	21.44	1.01	6.88	0.99
+30.0	10	4.51	0.29	1.37	0.32
	20	5.22	0.40	1.59	0.42
	30	5.77	0.46	1.78	0.47
	40	6.21	0.52	1.93	0.53
	50	6.56	0.57	2.00	0.53
	60	7.12	0.60	2.20	0.61
	70	7.46	0.63	2.29	0.67
	80	7.86	0.66	2.43	0.69
	90	8.22	0.69	2.56	0.76
	100	8.66	0.71	2.68	0.63
+40.0	10	3.25	0.19	1.07	0.24
	20	3.56	0.22	1.23	0.23
	30	3.77	0.25	1.28	0.31
	40	3.92	0.30	1.33	0.33
	50	4.00	0.34	1.36	0.34
	60	4.30	0.35	1.46	0.36
	70	4.40	0.37	1.51	0.37
	80	4.53	0.39	1.55	0.39
	90	4.66	0.41	1.58	0.39
	100	4.83	0.42	1.65	0.48

TABLE 14 (CONTINUED)

TEMP (C)	FREQ (Hz)	YOUNG'S MODULUS (MPa)	LOSS FACTOR	SHEAR MODULUS (MPa)	LOSS FACTOR
+50.0	10	2.61	0.10	0.93	0.14
	20	2.75	0.16	0.99	0.16
	30	2.85	0.18	0.99	0.19
	40	2.93	0.20	1.03	0.23
	50	2.91	0.23	1.16	0.23
	60	3.12	0.24	1.12	0.24
	70	3.15	0.24	1.17	0.23
	80	3.20	0.25	1.12	0.20
	90	3.26	0.27	1.12	0.24
	100	3.34	0.23	1.21	0.32
+60.0	10	2.20	0.09	0.79	0.09
	20	2.32	0.11	0.84	0.13
	30	2.38	0.15	0.85	0.19
	40	2.44	0.16	0.89	0.21
	50	2.49	0.16	0.92	0.23
	60	2.52	0.16	0.93	0.20
	70	2.57	0.18	1.00	0.12
	80	2.61	0.19	0.90	0.15
	90	2.64	0.19	0.92	0.17
	100	2.66	0.19	1.04	0.21
+70.0	10	1.92	0.06	0.68	0.05
	20	2.04	0.09	0.74	0.11
	30	2.08	0.13	0.75	0.16
	40	2.10	0.13	0.77	0.17
	50	2.12	0.13	0.81	0.17
	60	2.16	0.13	0.79	0.19
	70	2.21	0.15	0.87	0.16
	80	2.23	0.15	0.77	0.12
	90	2.26	0.15	0.76	0.15
	100	2.32	0.18	0.93	0.23
+80.0	10	1.66	0.05	0.58	0.07
	20	1.79	0.09	0.64	0.10
	30	1.84	0.11	0.66	0.16
	40	1.83	0.12	0.66	0.17
	50	1.87	0.13	0.69	0.05
	60	1.89	0.13	0.68	0.14
	70	1.92	0.13	0.64	0.09
	80	1.97	0.13	0.65	0.13
	90	1.97	0.13	0.65	0.14
	100	1.98	0.16	0.71	0.18

TABLE 14 (CONTINUED)

TEMP (C)	FREQ (Hz)	YOUNG'S MODULUS (MPa)	LOSS FACTOR	SHEAR MODULUS (MPa)	LOSS FACTOR
+90.0	10	1.52	0.07	0.54	0.05
	20	1.58	0.09	0.57	0.11
	30	1.62	0.12	0.57	0.15
	40	1.62	0.12	0.59	0.14
	50	1.53	0.12	0.67	0.14
	60	1.67	0.12	0.61	0.20
	70	1.68	0.13	0.54	0.04
	80	1.73	0.13	0.60	0.12
	90	1.73	0.12	0.59	0.13
	100	1.80	0.12	0.65	0.21
+80.0	10	1.62	0.07	0.60	0.09
	20	1.69	0.09	0.61	0.12
	30	1.72	0.13	0.63	0.13
	40	1.76	0.12	0.63	0.14
	50	1.82	0.12	0.71	0.08
	60	1.84	0.12	0.68	0.18
	70	1.84	0.13	0.61	0.07
	80	1.87	0.13	0.64	0.11
	90	1.88	0.13	0.63	0.13
	100	1.91	0.14	0.72	0.20
+70.0	10	1.76	0.08	0.64	0.09
	20	1.87	0.11	0.67	0.12
	30	1.93	0.15	0.72	0.17
	40	1.95	0.14	0.71	0.14
	50	2.01	0.14	0.69	0.21
	60	2.03	0.14	0.72	0.18
	70	2.05	0.15	0.77	0.06
	80	2.06	0.16	0.69	0.12
	90	2.10	0.15	0.67	0.16
	100	2.19	0.16	0.84	0.24
+60.0	10	1.98	0.07	0.71	0.10
	20	2.08	0.11	0.76	0.13
	30	2.08	0.15	0.79	0.22
	40	2.16	0.17	0.81	0.20
	50	2.29	0.17	0.88	0.14
	60	2.28	0.17	0.83	0.20
	70	2.29	0.18	0.95	0.10
	80	2.32	0.19	0.79	0.15
	90	2.34	0.20	0.79	0.18
	100	2.48	0.21	0.95	0.26

TABLE 14 (CONCLUDED)

TEMP (C)	FREQ (Hz)	YOUNG'S MODULUS (MPa)	LOSS FACTOR	SHEAR MODULUS (MPa)	LOSS FACTOR
+50.0	10	2.26	0.14	0.80	0.15
	20	2.46	0.17	0.87	0.16
	30	2.55	0.17	0.92	0.22
	40	2.57	0.22	0.94	0.27
	50	2.71	0.20	1.03	0.26
	60	2.75	0.25	0.98	0.25
	70	2.80	0.27	1.08	0.17
	80	2.85	0.28	0.95	0.19
	90	2.92	0.29	0.94	0.25
	100	3.08	0.32	1.15	0.32
+40.0	10	2.70	0.19	0.97	0.21
	20	2.94	0.26	1.06	0.25
	30	3.08	0.27	1.14	0.34
	40	3.24	0.33	1.18	0.34
	50	3.30	0.34	1.32	0.37
	60	3.57	0.38	1.30	0.40
	70	3.66	0.40	1.37	0.36
	80	3.80	0.43	1.39	0.35
	90	3.90	0.45	1.32	0.35
	100	4.07	0.47	1.54	0.40
+30.0	10	3.65	0.34	1.28	0.33
	20	4.24	0.45	1.52	0.42
	30	4.77	0.48	1.71	0.50
	40	5.12	0.57	1.83	0.57
	50	5.64	0.64	1.95	0.64
	60	5.95	0.65	2.13	0.65
	70	6.27	0.70	2.25	0.65
	80	6.63	0.73	2.37	0.68
	90	6.96	0.75	2.47	0.67
	100	7.35	0.78	2.52	0.78
+20.0	10	6.60	0.64	2.30	0.60
	20	8.67	0.80	3.06	0.76
	30	10.44	0.90	3.64	0.84
	40	12.12	0.97	4.11	0.92
	50	13.72	1.01	4.64	0.96
	60	15.01	1.04	5.08	0.99
	70	16.30	1.08	5.47	1.00
	80	17.56	1.10	5.87	1.03
	90	18.75	1.12	6.31	1.05
	100	20.04	1.13	6.50	1.06

TABLE 15: TEST DATA FOR LABORATORY E (HOMOGENEOUS CANTILEVER BEAM/EXTENSION)

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
HOMOGENEOUS CANTILEVER BEAM TESTS

Originator's file number: 046:90128MF
Beam Length = 152.4 mm (6 inches)
Beam Thickness = 3.29 mm (0.1296 in.)
Polymer Density = 0.0455 Lb/in**3
Operator: DEF

TEMP (C)	INDEX No	MODE No	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
A. Beam Length = 152.4 mm (6 in.), Test Date: 2/7/90					
-77.5	1	2	263.8	4253.4	0.0106
-77.9	2	3	730.6	4161.2	0.0120
-77.3	3	3	730.6	4161.2	0.0120
-75.1	7	3	728.6	4140.7	0.0110
-74.6	8	4	1420.0	4093.6	0.0127
-74.0	9	2	262.6	4214.8	0.0122
-74.0	10	3	727.8	4129.4	0.0121
-73.4	11	4	1417.0	4076.3	0.0120
-72.9	12	2	262.4	4208.4	0.0114
-72.3	15	2	262.0	4195.6	0.0122
-72.3	16	3	725.8	4106.7	0.0099
-71.8	17	4	1415.0	4064.8	0.0127
-71.2	18	2	262.2	4202.0	0.0107
-69.0	19	3	723.2	4077.4	0.0100
-67.3	20	4	1402.0	3990.5	0.0114
-66.2	21	2	259.8	4125.4	0.0108
-66.2	22	3	721.4	4057.1	0.0100
-66.8	23	4	1405.0	4007.6	0.0128
-67.3	24	2	261.0	4163.6	0.0107
-67.9	25	3	723.2	4077.4	0.0111
-68.4	26	4	1406.0	4013.3	0.0114
-65.7	27	2	260.2	4138.1	0.0100
-65.1	28	3	720.4	4045.8	0.0100
-65.1	29	4	1403.0	3996.2	0.0114
-44.4	30	2	247.0	3728.9	0.0181
-44.4	31	3	686.2	3670.8	0.0162
-43.8	32	4	1335.4	3620.3	0.0145
-46.1	34	2	248.7	3779.8	0.0165
-45.6	35	3	690.4	3715.9	0.0149
-45.5	36	4	1[illegible]45.6	3675.9	0.0146
-49.4	38	2	251.8	3876.5	0.0137
-49.[illegible]	39	3	699.6	3815.6	0.0132
-49.[illegible]	40	4	1362.0	3766.0	0.0131
-54.9	42	2	255.6	3991.8	0.0119
-54.9	43	3	708.2	3910.0	0.0116
-54.9	44	4	1379.4	3862.8	0.0118

TABLE 15 (CONTINUED)

TEMP (C)	INDEX No.	MODE No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
-59.9	46	2	257.9	4064.6	0.0100
-59.9	47	3	715.2	3937.7	0.0110
-59.9	48	4	1394.0	3945.0	0.0112
-64.9	49	2	260.1	4135.6	0.0101
-65.0	50	3	721.6	4059.3	0.0111
-64.4	51	4	1403.2	3997.3	0.0102
-41.6	52	2	244.5	3653.2	0.0206
-41.6	53	3	680.6	3611.2	0.0187
-41.6	54	4	1327.6	3578.2	0.0168
-41.6	56	2	244.4	3650.8	0.0202
-41.6	57	3	679.0	3594.2	0.0193
-41.6	58	4	1324.0	3568.8	0.0157
-41.1	60	2	245.6	3686.6	0.0195
-41.1	61	3	683.2	3638.8	0.0152
-40.6	62	4	1330.5	3595.4	0.0157
-40.0	63	2	244.4	3650.8	0.0196
-40.0	64	3	679.2	3596.3	0.0177
-40.0	65	4	1326.0	3569.6	0.0166
-38.9	66	2	242.0	3579.5	0.0215
-38.9	67	3	675.4	3556.2	0.0178
-38.9	68	4	1319.0	3532.0	0.0182
-37.8	69	2	241.0	3550.0	0.0232
-37.8	70	3	672.0	3520.5	0.0202
-38.3	71	4	1312.0	3494.6	0.0198
-36.1	73	3	664.4	3441.3	0.0241
-36.1	74	4	1299.0	3425.7	0.0231
-33.9	75	2	232.8	3312.5	0.0340
-33.9	76	3	650.6	3299.8	0.0258
-33.9	77	4	1273.0	3289.9	0.0236
-32.2	78	2	229.0	3205.2	0.0367
-32.2	79	3	641.4	3207.0	0.0337
-31.7	80	4	1252.0	3182.3	0.0256
-30.0	81	2	224.4	3077.7	0.0463
-30.0	82	3	630.4	3098.1	0.0444
-28.3	83	2	218.0	2904.7	0.0606
-28.3	84	3	615.6	2954.3	0.0507
-28.3	85	4	1208.0	2962.5	0.0397
-22.8	86	2	201.8	2489.0	0.0912
-22.8	87	3	577.2	2597.3	0.0721
-22.8	88	4	1142.0	2647.6	0.0683
-17.8	89	2	184.6	2082.8	0.1603
-17.8	90	3	535.0	2131.4	0.1159
-17.8	91	4	1066.0	2307.0	0.1013
-9.4	93	3	443.0	1929.9	0.2440
-9.4	94	4	879.0	1568.6	0.3370

TABLE 15 (CONCLUDED)

TEMP (C)	INDEX No	MODE No	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
6 Beam Length = 75.44 mm (2.97 in.), Test Date: 12/16/88					
-37.2	0	2	908.8	3535.0	0.0280
-37.2	1	3	2433.8	3233.7	0.0280
-37.2	2	5	7600.0	3005.0	0.0370
-31.7	3	2	871.2	3248.6	0.0440
-31.7	4	3	2332.0	2968.8	0.0446
-31.7	5	5	7376.0	2830.4	0.0530
-26.7	6	2	825.2	2914.6	0.0700
-18.9	7	2	723.6	2241.1	0.1550
-18.9	8	3	1911.0	1993.7	0.1480
-18.9	9	5	6367.0	2109.0	0.1670
-13.3	10	1	89.8	1355.5	0.3650
-13.3	11	2	604.0	1561.5	0.2720
- 8.9	12	1	74.4	930.5	0.4950
- 8.9	13	2	522.0	1166.3	0.3910

TABLE 16: TEST DATA FOR LABORATORY (OBERST BEAM/EXTENSION)

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
OBERST CANTILEVER BEAM TESTS

Originator's file number: D37:88421MP
Beam Length = 254.0 mm (10 inches)
Beam Thickness = 0.51 mm (0.02 in.)
Beam material: Steel
Polymer Density = 0.0455 Lb/in**3
Polymer thickness: 3.05 mm (0.12 in.)
Test date: 10/24/88
Operator: JED

TEMP (C)	INDEX No	MODE No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
23.8	1	3	80.8	11.59	0.7635
23.8	2	4	158.8	14.21	1.0563
23.2	3	5	266.0	20.36	1.0379
23.2	4	6	392.8	17.68	1.2682
18.2	5	2	30.4	13.20	0.6898
18.2	6	3	82.3	18.47	0.8479
17.7	7	4	162.2	22.63	1.2858
18.8	8	5	276.6	37.15	1.0891
12.8	10	3	85.4	34.20	1.1998
13.3	12	5	299.0	75.09	1.0699
7.8	14	2	32.5	42.35	0.7899
7.7	15	3	92.8	74.43	1.1443
2.8	16	2	37.0	110.6	0.9651
2.8	17	3	104.2	143.4	1.3225
-2.8	18	2	45.0	256.1	0.9061
-2.2	19	3	38.6	405.0	0.8860
-7.8	21	2	58.6	575.9	0.6167
-7.8	22	3	183.0	868.0	0.6433
-7.8	23	4	328.0	695.0	0.4066
-7.2	24	5	649.0	1107.8	0.4136
-12.8	25	2	76.2	1137.6	0.3674
-12.8	26	3	228.0	1499.5	0.3445
-13.3	27	4	472.0	1731.0	0.3466
-12.8	28	5	798.0	1836.9	0.2633
-18.9	29	2	94.0	1899.6	0.2197
-18.9	30	3	269.0	2238.6	0.176[illegible]
-19.4	31	4	543.0	2429.9	0.1509
-19.4	32	5	917.0	2571.5	0.1153
-19.4	33	6	1351.0	2518.8	0.1484
-24.7	34	2	103.4	2390.8	0.1037
-24.4	35	3	295.6	2813.9	0.0910
-25.0	36	4	600.4	3104.2	0.0749
-26.7	38	2	106.8	2585.7	0.1011
-26.7	39	3	306.6	3076.7	0.0741

TABLE 16 (CONCLUDED)

TEMP (C)	INDEX No	MODE No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
23.2	44	3	80.9	11.76	0.8804
23.3	45	4	160.6	16.35	0.7813
23.2	46	5	269.0	25.13	0.9706
28.2	49	3	80.2	8.50	0.6548
28.2	50	4	158.2	12.95	0.6694
28.2	51	5	260.6	12.27	0.9420
27.7	52	6	389.8	14.60	1.0125
37.7	54	3	79.5	5.92	0.5023
37.7	55	4	155.5	6.59	0.5197
37.7	56	5	257.6	8.20	0.5911
37.7	57	6	383.4	8.73	0.6256
43.8	59	3	79.2	4.92	0.4170
43.8	60	4	154.5	4.58	0.5258
44.3	62	6	380.9	6.52	0.4575
52.8	64	3	78.9	3.90	0.3146
53.2	65	4	154.0	3.74	0.4076
53.2	66	5	254.7	4.73	0.3371
52.7	67	6	378.9	4.95	0.3866
59.8	70	4	153.7	3.44	0.3320
59.9	71	5	253.9	3.91	0.2961
61.0	72	6	377.9	4.45	0.2833
69.3	74	3	78.6	3.13	0.2403
69.3	75	4	153.4	3.21	0.3132
69.3	76	5	253.2	3.32	0.2779
68.8	77	6	377.1	4.07	0.2475
76.5	82	6	376.1	3.45	0.2824
85.4	87	6	375.5	3.35	0.2539
24.3	94	3	80.3	9.04	0.6752
24.9	95	4	158.0	12.23	1.0432
24.3	96	5	264.4	17.92	0.9056
24.4	97	6	392.0	16.91	1.2486

TABLE 17: TEST DATA FOR LABORATORY E (VISCOELASTICIMETRE/EXTENSION)

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
IMPEDANCE: VISCOELASTICIMETRE

Originator's file number: D37:884073MP
Specimen length: 44 mm (1.73 in.)
Specimen Breadth: 13.75 mm (0.54 in.)
Specimen Width: 14.3 mm (0.56 in.)
Polymer Density = 0.0455 Lb/in**3
Test date: 12/16/88

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
21.9	0	10.0	6.04	0.560
	1	15.8	6.83	0.640
	2	25.1	7.84	0.730
	3	39.7	9.00	0.860
	4	62.9	11.02	0.880
	5	99.7	13.18	0.970
	6	157.8	16.27	1.040
	7	250.0	20.79	1.070
21.9	8	9.7	5.83	0.540
	9	18.6	7.00	0.650
	10	36.0	8.52	0.820
	11	69.5	11.07	0.910
	12	134.1	14.68	1.020
	13	258.8	20.64	1.070
29.8	14	10.0	-	-
	15	15.8	4.60	0.390
	16	25.1	4.98	0.450
	17	39.7	5.90	0.500
	18	62.9	6.14	0.610
	19	99.7	7.03	0.705
	20	157.8	8.18	0.795
	21	250.0	9.90	0.866
39.2	22	10.0	3.33	0.170
	23	15.8	3.46	0.210
	24	25.1	3.63	0.240
	25	39.7	4.07	0.270
	26	62.9	4.09	0.350
	27	99.7	4.42	0.410
	28	157.8	4.91	0.470
	29	250.0	5.71	0.530

TABLE 17 (CONCLUDED)

TEMP (C)	INDEX No	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
48.9	30	10.0	2.68	0.112
	31	15.8	2.76	0.130
	32	25.1	2.82	0.150
	33	39.7	3.10	0.160
	34	62.9	3.05	0.220
	35	99.7	3.21	0.250
	36	157.8	3.48	0.290
	37	157.8	4.03	0.310
9.0	38	10.0	15.42	0.894
	39	15.8	18.81	0.990
	40	25.1	23.09	1.043
	41	39.7	33.94	1.060
	42	62.9	38.72	1.079
	43	99.7	43.02	1.110
	44	157.8	49.84	1.079
	45	250.0	61.70	1.068
0.0	46	10.0	35.82	0.960
	47	15.8	46.09	0.970
	48	25.1	58.44	0.970
	49	39.7	79.08	0.960
	50	62.9	93.76	0.950
	51	99.7	111.7	0.980
	52	157.8	148.1	0.900
	53	250.0	187.0	0.850
-10.5	54	25.1	196.5	0.770
	55	39.7	257.2	0.730
	56	62.9	290.2	0.698
	57	99.7	348.2	0.660
	58	157.8	427.4	0.630
	59	250.0	511.6	0.570
-20.0	60	10.0	499.8	0.520
	61	15.8	656.3	0.443
	62	25.1	717.0	0.420
	63	39.7	930.7	0.350
	64	62.9	1027.2	0.298
	65	99.7	1144.4	0.263
	66	157.8	1309.9	0.224
	67	250.0	1406.4	0.200

TABLE 18: TEST DATA FOR LABORATORY E (RESONANCE/EXTENSION)

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
RESONANCE: EXTENSION

Originator's file number: D37:88426MP
Specimen length: A: 0.781 in. (19.84 mm); B: 0.521 in. (13.23 mm)
Specimen Breadth: A: 0.522 in. (13.26 mm); B: 0.2394 in. (6.08 mm)
Specimen Width: A: 0.517 in. (13.13 mm); B: 0.338 in. (8.59 mm)
Number of links: A: 1; B: 3
Polymer Density = 0.0455 Lb/in**3
Test Date: A: 10/28/88; B: 12/16/88
Operator: JED

TEST	TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
A	21.1	0	178.1	18.50	1.5550
	30.0	1	105.0	6.43	0.9130
	40.0	2	83.7	4.09	0.4710
	50.8	3	72.5	3.06	0.2745
	60.0	4	66.2	2.56	0.1910
	19.4	5	193 7	21.88	1.4860
	80.6	6	55 0	1.76	0.1450
	91.7	7	50 0	1.46	0.1560
	70.0	8	57.5	[illegible].93	0.1610
	10.0	9	520.0	15[illegible].69	1.1610
	0.0	10	1177.5	808.56	0.6540
	-10.8	11	1765.6	181[illegible].92	0.2330
	-20.6	12	2070.0	2493.80	0.1020
	-30.0	13	2445.0	3486.17	0.0530
	15.6	14	270.0	41.82	1.6730
B	18.9	0	237.5	23 25	1.3600
	30.0	1	117.5	5.80	0.8390
	35.0	2	102.5	4.36	0.6100
	52 8	3	77.5	2.48	0.2410
	43.9	4	90.0	3.34	0.4110
	40.0	5	92.5	3.57	0.4860
	10.6	6	555.0	127.00	0.8580
	31.7	7	117.5	5.78	0.8000
	3.9	8	1110.0	507.30	0.5000
	- 4.4	9	1699.2	1190.89	0.2950
	-13.3	10	2133.6	1966.51	0 1550
	-21 1	11	2496.1	2568.06	0.0820
	13.9	12	407.5	68 42	0.9770
	-26.7	13	2648.4	2891.33	0.1000
	34.4	14	102.5	4 38	0.5330
	46.1	15	82.5	2.85	0.2640
	66.7	16	70.0	2 02	0.1640
	55.0	17	76.2	2.41	0.2080
	76.7	18	65.0	1.74	0 1600

TABLE 19: TEST DATA FOR LABORATORY E (IMPEDANCE/EXTENSION)

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
IMPEDANCE: EXTENSION, 3 LINKS

Originator's file number: D37:89017MP
Specimen length: 0.521 in. (13.23 mm)
Specimen Breadth: 0.239 in. (6.07 mm)
Specimen Width: 0.338 in. (8.59 mm)
Polymer Density = 0.0455 Lb/in**3
Test date: 12/16/88
Operator: JED

INDEX	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
0	18.9	237.5	23.25	1.360
1		240.0	23.58	1.345
2		245.0	23.67	1.348
3		250.0	23.56	1.370
4		255.0	23.90	1.380
5		260.0	24.47	1.370
6		265.0	24.16	1.390
7		270.0	24.49	1.392
8		275.0	24.71	1.390
9		280.0	24.82	1.403
10		285.0	24.34	1.460
11		290.0	25.03	1.424
12		295.0	25.11	1.434
13		300.0	25.72	1.399
14		305.0	25.98	1.411
15		310.0	25.96	1.420
16		315.0	26.25	1.430
17		320.0	26.28	1.443
18		325.0	26.49	1.427
19		330.0	26.94	1.411
20		340.0	27.14	1.396
21		350.0	27.47	1.405
22		230.0	23.46	1.327
23		225.0	23.01	1.335
24		220.0	22.61	1.345
25		215.0	22.39	1.340
26		210.0	22.16	1.320
27		205.0	21.90	1.330
28		200.0	22.01	1.303
29		190.0	21.25	1.327
30		180.0	20.68	1.342
31		170.0	20.41	1.304
32		160.0	19.25	1.305
33	30.0	117.5	5.80	0.839
34		110.0	5.76	0.822

TABLE 19 (CONTINUED)

INDEX	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
35	30.0	105.0	5.80	0.799
36		100.0	5.78	0.774
37		95.0	5.74	0.743
38		90.0	5.72	0.721
39		85.0	5.65	0.697
40		80.0	5.56	0.670
41		75.0	5.42	0.665
42		70.0	5.39	0.619
43		65.0	5.20	0.606
44		60.0	5.18	0.578
45		55.0	4.88	0.595
46		120.0	5.82	0.857
47		125.0	5.87	0.866
48		130.0	5.87	0.882
49	43.9	90.0	3.34	0.411
50		80.0	3.27	0.385
51		70.0	3.14	0.362
52		60.0	3.03	0.331
53		100.0	3.51	0.425
54		110.0	3.62	0.440
55		120.0	3.75	0.447
56		130.0	3.88	0.456
57		140.0	4.03	0.477
58		150.0	4.18	0.478
59		160.0	4.30	0.508
60		170.0	4.49	0.520
61		180.0	4.73	0.523
62		190.0	4.95	0.520
63	40.0	92.5	3.57	0.486
64		90.0	3.56	0.475
65		85.0	3.57	0.460
66		80.0	3.58	0.439
67		70.0	3.55	0.404
68		60.0	3.56	0.360
69		50.0	3.43	0.330
70		40.0	3.48	0.299
71	10.6	555.0	127.00	0.858
72		550.0	126.37	0.864
73		540.0	124.18	0.859
74		530.0	124.08	0.855
75		520.0	120.42	0.871
76		510.0	119.10	0.861
77		500.0	116.48	0.894
78		490.0	114.45	0.885
79		480.0	113.26	0.892

TABLE 19 (CONTINUED)

INDEX	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
80	10.6	470.0	112.06	0.896
81		460.0	108.62	0.903
82		450.0	107.87	0.894
83		425.0	103.80	0.916
84		400.0	100.14	0.905
85		375.0	94.50	0.939
86		350.0	92.84	0.900
87		325.0	89.44	0.954
88		300.0	84.33	0.944
89		560.0	127.06	0.870
90		570.0	129.40	0.860
91		580.0	132.30	0.847
92		590.0	134.07	0.837
93		600.0	134.97	0.841
94		625.0	138.77	0.843
95		650.0	145.09	0.822
96		675.0	149.98	0.803
97		700.0	157.94	0.779
98		725.0	161.10	0.779
99		750.0	166.63	0.753
100	31.7	117.5	5.76	0.800
101		120.0	5.85	0.798
102		125.0	5.95	0.808
103		130.0	6.13	0.803
104		135.0	6.23	0.806
105		140.0	6.40	0.810
106		145.0	6.55	0.813
107		150.0	6.71	0.810
108		155.0	6.80	0.816
109		160.0	6.89	0.822
110		165.0	7.03	0.827
111		170.0	7.16	0.824
112		175.0	7.30	0.827
113		180.0	7.49	0.824
114		185.0	7.56	0.829
115		190.0	7.69	0.834
116		200.0	7.96	0.834
117		210.0	8.24	0.846
118		220.0	8.53	0.834
119		230.0	8.85	0.837
120		240.0	9.19	0.825
121		250.0	9.36	0.847
122		260.0	9.77	0.841
123		270.0	10.14	0.841
124		280.0	10.36	0.849
125		290.0	10.86	0.841

TABLE 19 (CONTINUED)

INDEX	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
126	31.7	300.0	11.33	0.816
127		110.0	5.57	0.790
128		105.0	5.47	0.776
129		100.0	5.36	0.765
130		90.0	5.11	0.753
131		80.0	4.94	0.708
132	3.9	1110.0	507.27	0.500
133		1100.0	505.52	0.499
134		1075.0	497.88	0.505
135		1050.0	488.67	0.510
136		1025.0	483.64	0.511
137		1000.0	476.01	0.508
138		975.0	466.87	0.520
139		950.0	460.13	0.525
140		925.0	453.96	0.526
141		900.0	446.63	0.529
142		875.0	436.19	0.531
143		850.0	430.40	0.539
144		825.0	421.04	0.543
145		800.0	414.69	0.542
146		775.0	410.22	0.541
147		750.0	401.57	0.550
148		725.0	396.33	0.553
149		700.0	390.78	0.554
150		1125.0	512.69	0.495
151		1150.0	520.36	0.496
152		1175.0	527.78	0.497
153		1200.0	536.08	0.490
154		1225.0	545.34	0.482
155		1250.0	551.49	0.482
156		1275.0	559.81	0.474
157		1300.0	569.40	0.472
158		1325.0	644.62	0.471
159		1350.0	585.67	0.464
160		1375.0	590.30	0.463
161		1400.0	596.60	0.467
162		1425.0	604.53	0.464
163		1450.0	615.99	0.453
164		1475.0	617.86	0.453
165		1500.0	631.73	0.451
166	-4.4	1699.2	1190.89	0.295
167		1675.0	1180.49	0.298
168		1650.0	1165.00	0.291
169		1625.0	1156.68	0.293
170		1600.0	1147.60	0.291
171		1575.0	1141.51	0.287

TABLE 19 (CONTINUED)

INDEX	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
172	-4.4	1550.0	1130.20	0.292
173		1525.0	1113.86	0.297
174		1500.0	1111.90	0.292
175		1475.0	1102.41	0.288
176		1450.0	1097.17	0.290
177		1425.0	1082.42	0.293
178		1400.0	1079.62	0.294
179		1350.0	1064.59	0.290
180		1300.0	1042.71	0.302
181		1250.0	1030.56	0.306
182		1200.0	1005.49	0.298
183		1150.0	992.34	0.305
184		1100.0	961.30	0.309
185		1725.0	1196.32	0.288
186		1750.0	1210.24	0.287
187		1775.0	1218.59	0.290
188		1800.0	1223.74	0.284
189		1825.0	1233.88	0.285
190		1850.0	1244.49	0.281
191		1875.0	1250.10	0.284
192		1900.0	1260.03	0.282
193		1925.0	1266.43	0.285
194		1950.0	1270.98	0.285
195		1975.0	1281.52	0.282
196		2000.0	1291.91	0.279
197		2050.0	1306.14	0.276
198		2100.0	1322.43	0.286
199		2150.0	1337.72	0.274
200		2200.0	1343.47	0.278
201		2250.0	1362.83	0.282
202		2300.0	1370.00	0.274
203	-13.3	2183.6	1966.51	0.155
204		2175.0	1960.60	0.157
205		2150.0	1944.33	0.159
206		2125.0	1925.72	0.158
207		2100.0	1906.41	0.158
208		2075.0	1900.98	0.153
209		2050.0	1893.92	0.152
210		2025.0	1884.04	0.149
211		2000.0	1870.87	0.149
212		1975.0	1864.21	0.148
213		1950.0	1856.56	0.147
214		1925.0	1841.56	0.148
215		1900.0	1834.48	0.149
216		1875.0	1824.27	0.145
217		1850.0	1812.43	0.147

TABLE 19 (CONTINUED)

INDEX	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
218	-13.3	1825.0	1803.16	0.149
219		1800.0	1798.60	0 148
220		1750.0	1786.44	0.150
221		1700.0	1750.22	0.163
222		2200.0	1970.98	0.155
223		2225.0	1977.01	0.153
224		2250.0	1988.62	0.153
225		2275.0	2002.79	0.151
226		2300.0	2009.14	0.152
227		2325.0	2021.37	0.151
228		2350.0	2026.78	0.152
229		2375.0	2035.99	0.153
230		2400.0	2053.24	0.154
231		2425.0	2056.67	0.151
232		2450.0	2066.32	0.154
233		2475.0	2071.98	0.155
234		2500.0	2087.72	0.154
235	-21.1	2496.1	2568.06	0.082
236		2475.0	2556.65	0.081
237		2450.0	2556.27	0.079
238		2425.0	2539.86	0.080
239		2400.0	2533.18	0.080
240		2375.0	2524.88	0.079
241		2350.0	2503.40	0.077
242		2300.0	2498.47	0.075
243		2250.0	2471.53	0.073
244		2200.0	2467.54	0.077
245		2500.0	2565.97	0.082
246		2550.0	2591.69	0.086
247		2600.0	2622.71	0.089
248		2650.0	2644.32	0.088
249		2700.0	2671.25	0.090
250		2750.0	2701.18	0.094
251		2800.0	2727.68	0.095
252		2850.0	2741.20	0.092
253		2900.0	2764.41	0.087
254	13.9	407.5	68.42	0.977
255		400.0	67.33	0.985
256		390.0	66.74	0.987
257		380.0	65.63	0.985
258		370.0	64.38	0.978
259		360.0	63.19	0.995
260		350.0	61.90	0.998
261		340.0	61.90	0.976
262		320.0	59.44	0.998
263		310.0	57.64	1.011

TABLE 19 (CONTINUED)

INDEX	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
264	13.9	300.0	55.95	1.038
265		280.0	53.02	1.055
266		260.0	50.84	1.060
267		240.0	47.58	1.082
268		220.0	44.85	1.091
269		410.0	69.17	0.974
270		425.0	71.00	0.969
271		450.0	73.79	0.965
272		475.0	77.65	0.949
273		500.0	80.21	0.952
274		525.0	84.59	0.922
275		550.0	86.98	0.862
276		575.0	90.71	0.904
277		600.0	94.15	0.910
278		625.0	97.93	0.880
279		670.0	105.54	0.869
280	-26.7	2648.4	2891.33	0.100
281		2625.0	2878.81	0.104
282		2600.0	2862.80	0.101
283		2575.0	2862.19	0.093
284		2550.0	2866.80	0.090
285		2525.0	2882.43	0.082
286		2500.0	2886.98	0.079
287		2450.0	2908.36	0.073
288	34.4	102.5	4.38	0.533
289		110.0	4.52	0.550
290		115.0	4.62	0.562
291		120.0	4.67	0.565
292		130.0	4.87	0.580
293		140.0	5.04	0.577
294		150.0	5.25	0.604
295		160.0	5.49	0.599
296		170.0	5.77	0.610
297		180.0	6.03	0.614
298		190.0	6.28	0.618
299		95.0	4.26	0.528
300		85.0	4.07	0.509
301		75.0	3.89	0.463
302		65.0	3.63	0.449
303		50.0	3.49	0.410
304	46.1	82.5	2.85	0.264
305		80.0	2.[illegible]	0.253
306		75.0	2.76	0.257
307		70.0	2.74	0.235
308		65.0	2.71	0.235

TABLE 19 (CONCLUDED)

INDEX	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
309	46.1	60.0	2.66	0.208
310		55.0	2.60	0.216
311		50.0	2.55	0.184
312		85.0	2.89	0.275
313		90.0	2.98	0.280
314		95.0	2.99	0.285
315		100.0	3.10	0.295
316		105.0	3.16	0.295
317		110.0	3.23	0.297
318		115.0	3.28	0.305
319		120.0	3.33	0.301
320		125.0	3.39	0.319
321	55.0	80.0	2.45	0.226
322		85.0	2.48	0.245
323		90.0	2.53	0.257
324		95.0	2.56	0.277
325		100.0	2.63	0.276
326		105.0	2.61	0.293
327		110.0	2.77	0.285
328		115.0	2.81	0.306
329		120.0	2.84	0.321
330		130.0	2.99	0.345
331		140.0	3.02	0.351
332		150.0	3.25	0.313
333		160.0	3.30	0.299
334	66.7	75.0	2.03	0.197
335		80.0	2.07	0.214
336		85.0	2.12	0.232
337		90.0	2.14	0.250
338		95.0	2.17	0.250
339		100.0	2.19	0.267
340		110.0	2.31	0.275
341		120.0	2.43	0.300
342		140.0	2.65	0.260
343		150.0	2.62	0.256
344		160.0	2.76	0.280
345	76.7	80.0	1.85	0.269
346		85.0	1.92	0.283
347		90.0	1.96	0.294
348		95.0	2.00	0.299
349		100.0	2.03	0.311
350		105.0	2.13	0.281
351		110.0	2.19	0.305
352		120.0	2.30	0.284

TABLE 20: TEST DATA FOR LABORATORY E

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
TEST CODE: 0: 10 in. HOMOGENEOUS FREE-FREE BEAM
1: 10 in. OBERST BEAM
2: 6 in HOMOGENEOUS CANTILEVER BEAM
Originator's file number: N/A
Polymer Density = 0 0455 Lb/in**3
Polymer Thickness: 0.115 in (2.92 mm)

TEMP (C)	INDEX No.	TEST CODE	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
-62.2	0	0	517.4	4325.22	0.0136
-42.8	1		250.1	3883.94	0.0253
-42.8	2		487.7	3842.92	0.0205
-33.3	3		231.5	3327.71	0.0535
-33.3	4		450.5	3279.03	0.0488
-58.3	5		259.6	4178.69	0.0140
-40.6	6		244.4	3703.68	0.0245
23.8	7	1	80.8	11.59	0.7635
23.8	8		158.8	14.21	1.0563
23.2	9		266.0	20.36	1.0379
18.2	10		82.3	18.47	0.8479
17.7	11		162.2	22.63	1.2858
18.8	12		276.6	37.15	1.0891
12.8	13		85.4	34.20	1.1998
13.3	14		299.0	75.09	1.0699
7.7	15		92.8	74.43	1.1443
2.8	16		104.2	143.42	1.3225
- 2.2	17		138.6	405.02	0.8860
- 7.8	18		183.0	868.00	0.6433
- 7.2	19		649.0	1107.78	0.4136
-12.8	20		228.0	1499.45	0.3445
-13.3	21		472.0	1731.03	0.3466
-12.8	22		798.0	1836.85	0.2633
-18.9	23		269.0	2238.61	0.1761
-19.4	24		543.0	2429.93	0.1509
-19.4	25		917.0	2571.51	0.1153
-24.4	26		295.6	2813.88	0.0910
-25.0	27		600.4	3104.15	0.0749
-26.7	28		306.6	3076.69	0.0741
23.2	29		80.9	11.76	0.8804
23.3	30		160.6	18.83	0.7813
23.2	31		269.0	25.13	0.9706
28.2	32		80.2	8.50	0.6548
28.2	33		158.2	12.95	0.6694
28.8	34		260.6	12.27	0.9420
37.7	35		79.5	5.92	0.5023
37.2	36		155.5	6.59	0.5197
37.2	37		257.6	8.20	0.5911
43.8	38		79.2	4.92	0.4170
43.3	39		154.5	4.58	0.5258
52.8	40		78.9	3.90	0.3146
53.2	41		154.0	3.74	0.4076

TABLE 20 (CONTINUED)

TEMP (C)	INDEX No.	TEST CODE	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
53.2	42	1	254.7	4.73	0.3371
59.8	43		153.7	3.44	0.3320
59.8	44		253.9	3.91	0.2961
69.3	45		78.6	3.13	0.2403
69.3	46		153.4	3.21	0.3132
69.3	47		253.2	3.32	0.2779
24.3	48		80.3	9.04	0.6752
24.9	49		158.0	12.23	1.0432
24.3	50		264.4	17.92	0.9056
-77.8	51	2	263.8	4253.40	0.0106
-77.8	52		730.6	4161.22	0.0120
-77.2	55		730.6	4161.22	0.0120
-75.0	58		720.8	4140.74	0.0110
-74.4	59		1420.0	4093.58	0.0127
-73.9	60		262.6	4214.79	0.0122
-73.9	61		727.8	4129.39	0.0121
-73.3	62		1417.0	4076.30	0.0120
-72.8	63		262.4	4208.37	0.0114
-72.2	66		262.0	4195.55	0.0122
-72.2	67		725.8	4106.72	0.0099
-71.7	68		1415.0	4064.80	0.0127
-71.1	69		262.2	4201.96	0.0107
-68.9	70		723.2	4077.35	0.0100
-67.2	71		1402.0	3990.45	0.0114
-66.1	72		259.8	4125.39	0.0108
-66.1	73		721.4	4057.08	0.0100
-66.7	74		1405.0	4007.55	0.0128
-67.2	75		261.0	4163.59	0.0107
-67.8	76		723.2	4077.35	0.0111
-68.3	77		1406.0	4013.26	0.0114
-65.6	78		260.2	4138.10	0.0100
-65.0	79		720.4	4045.84	0.0100
-65.0	80		1403.0	3996.15	0.0114
-44.4	81		247.0	3728.90	0.0181
-44.4	82		686.2	3670.82	0.0162
-43.8	83		1335.4	3620.34	0.0145
-46.1	85		248.7	3779.79	0.0165
-45.6	86		690.4	3715.89	0.0149
-45.5	87		1345.6	3675.85	0.0146
-49.4	89		251.8	3875.47	0.0137
-49.9	90		699.6	3815.58	0.0132
-49.3	91		1362.0	3766.00	0.0131
-54.9	93		255.6	3991.83	0.0119
-54.9	94		708.2	3909.97	0.0116
-54.9	95		1379.4	3862.84	0.0118
-59.9	97		257.9	4064.64	0.0100
-59.9	98		715.2	3987.65	0.0110
-59.9	99		1394.0	3945.04	0.0112
-64.9	100		260.1	4135.56	0.0101

TABLE 20 (CONCLUDED)

TEMP (C)	INDEX No.	TEST CODE	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
-65.0	101	2	721.6	4059.33	0.0111
-64.4	102		1403.2	3997.23	0.0102
-41.6	103		244.5	3653.20	0.0206
-41.6	104		680.6	3611.15	0.0187
-41.6	105		1327.6	3573.17	0.0168
-41.6	107		244.4	3650.81	0.0202
-41.6	108		679.0	3594.19	0.0193
-41.6	109		1324.0	3558.79	0.0157
-41.1	111		245.6	3686.75	0.0195
-41.1	112		683.2	3638.79	0.0152
-40.6	113		1330.8	3595.44	0.0157
-40.0	114		244.4	3650.81	0.0196
-40.0	115		679.2	3596.31	0.0177
-40.0	116		1326.0	3569.55	0.0166
-38.9	117		242.0	3579.46	0.0215
-38.9	118		675.4	3556.18	0.0178
-39.4	119		1319.0	3531.96	0.0182
-37.8	120		241.0	3549.94	0.0232
-37.8	121		672.0	3520.46	0.0202
-38.3	122		1312.0	3494.57	0.0193
-36.1	124		664.4	3441.29	0.0241
-36.1	125		1299.0	3425.66	0.0231
-33.9	126		232.8	3312.47	0.0340
-33.9	127		650.6	3299.82	0.0258
-33.9	128		1273.0	3289.90	0.0236
-32.2	129		229.0	3205.22	0.0367
-32.2	130		641.4	3207.15	0.0337
-31.7	131		1252.0	3182.25	0.0256
-30.0	132		224.4	3077.74	0.0463
-30.0	133		630.4	3098.09	0.0444
-28.3	134		218.0	2904.69	0.0606
-28.3	135		615.6	2954.33	0.0507
-28.3	136		1208.0	2962.51	0.0397
-22.8	137		201.8	2489.02	0.0912
-22.8	138		577.2	2597.25	0.0721
-22.8	139		1142.0	2647.64	0.0683
-17.8	140		184.6	2082.81	0.1603
-17.8	141		535.0	2231.36	0.1159
-17.8	142		1066.0	2306.96	0.1013
- 9.4	144		443.0	1529.85	0.2440
- 9.4	145		879.0	1568.57	0.3370

TABLE 21: TEST DATA FOR LABORATORY E (SANDWICH BEAM/SHEAR)

SHEAR DEFORMATION (SHEAR MODULUS)
SANDWICH BEAM

Originator's file number: D37:88425MP
Beam length: 10 in.
Beam thickness:: 0.06265 in.
Beam material: Steel
Beam density: 0.2835 lb/in**3
Polymer thickness: 0.063 in.
Polymer Density = 0.0455 Lb/in**3
Test date: 11/16/88
Operator: JED

TEMP (C)	INDEX No.	MODE NO.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
24.3	0	2	159.2	4.58	1.2249
24.9	1	3	398.0	6.24	2.1300
24.9	4	6	1818.0	19.36	1.0515
20.9	5	2	174.0	6.68	1.4090
21.6	6	3	403.0	6.86	2.0607
19.3	9	2	177.0	7.11	1.4310
16.0	12	2	198.0	10.21	1.5897
13.8	13	2	220.0	13.64	1.7060
13.8	14	3	471.0	17.57	1.1150
10.6	18	2	228.0	15.99	1.4950
7.8	19	2	264.0	25.60	1.3494
7.2	21	4	1137.0	81.88	0.6072
5.6	22	2	307.0	43.55	1.1926
6.1	23	3	644.0	54.95	0.9564
5.0	24	4	1260.0	115.41	0.6394
2.1	25	2	351.0	92.06	0.7428
2.7	26	3	830.0	122.78	0.9806
0.5	27	2	353.0	107.80	0.4774
0.6	28	3	834.0	137.56	0.7431
0.0	29	4	1570.0	247.01	0.5801
-2.8	30	2	368.0	137.38	0.4377
-2.8	31	3	943.0	260.56	0.3932
-2.8	32	4	1673.0	330.49	0.4105
-6.1	35	2	386.4	196.97	0.3366
-5.6	36	3	998.0	354.92	0.3328
-6.1	37	4	1761.0	420.42	0.3027
-6.1	38	5	2530.0	389.32	0.4381
-7.8	40	2	393.8	232.17	0.2878
-7.8	41	3	1017.0	397.48	0.3128
-8.3	42	4	1803.0	472.63	0.2478
-7.8	43	5	2636.0	468.93	0.2885
-11.7	45	3	1049.6	496.80	0.2285
-11.2	46	4	1871.0	570.16	0.1858
-11.1	47	5	2791.0	598.62	0.1781
-16.7	49	3	1076.8	605.96	0.1470

TABLE 21 (CONTINUED)

TEMP (C)	INDEX No.	MODE NO.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
-16.1	50	4	1956.0	724.89	0.1337
-16.1	51	5	2943.0	755.39	0.1221
-16.2	52	6	4241.0	988.79	0.0253
-21.2	54	3	1105.2	753.71	0.0939
-21.7	55	4	2004.8	839.14	0.0822
-22.2	56	5	3047.0	888.47	0.0740
-27.2	59	3	1120.6	853.47	0.0589
-27.2	60	4	2046.2	952.86	0.0519
-26.7	61	5	3129.0	1012.64	0.0446
-33.4	64	3	1131.2	931.03	0.0357
-32.8	65	4	2074.2	1039.93	0.0344
-32.9	66	5	3188.0	1112.44	0.0281
-37.8	69	3	1137.7	983.22	0.0241
-38.4	70	4	2091.6	1097.40	0.0223
-38.4	71	5	3222.8	1175.13	0.0234
-42.8	74	3	1141.8	1013.94	0.0211
-42.8	75	4	2101.2	1129.18	0.0202
-42.8	76	5	3243.4	1213.20	0.0182
-47.3	79	3	1141.8	1007.47	0.0150
-47.2	80	4	2097.8	1110.63	0.0139
-47.8	81	5	3225.4	1170.67	0.0153
-51.8	84	3	1140.2	984.17	0.0121
-51.2	85	4	2089.4	1074.33	0.0128
-51.8	86	5	3203.8	1124.35	0.0126
-55.6	89	3	1140.2	978.08	0.0130
-56.2	90	4	2086.8	1059.27	0.0124
-56.2	91	5	3202.0	1116.62	0.0135
24.3	93	2	171.0	5.90	1.7632
24.3	94	3	427.0	10.48	1.4781
27.6	96	2	160.0	4.82	1.0091
27.6	97	3	390.0	5.44	1.7355
27.7	98	4	753.0	9.17	1.8217
27.7	99	5	1203.0	10.21	2.0057
27.7	100	6	1741.0	9.26	2.0866
29.3	101	2	153.0	3.78	0.9500
29.9	102	3	383.0	4.70	1.1853
29.3	103	4	727.0	6.05	1.4975
29.3	104	5	1174.0	6.81	1.5542
28.8	105	6	1736.0	8.84	1.3351
33.2	106	2	147.4	3.02	0.7136
32.6	107	3	373.0	3.42	1.1271
32.7	108	4	714.0	4.49	1.2651
33.3	109	5	1162.0	5.45	1.2251
32.1	110	6	1725.0	7.62	0.9819
34.3	111	2	144.4	2.59	0.6904
34.9	112	3	372.0	3.34	0.7921
34.3	113	4	714.0	4.55	0.9058
36.0	114	5	1163.0	5.67	0.9684
34.9	115	6	1713.0	6.20	1.0211

TABLE 21 (CONTINUED)

TEMP (C)	INDEX No.	MODE NO.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
38.2	116	2	142.2	2.30	0.5034
37.6	117	3	367.8	2.81	0.7573
38.2	118	4	703.0	3.20	0.9376
37.6	119	5	1153.0	4.45	0.8538
41.5	121	2	139.8	1.98	0.4609
40.9	122	3	362.6	2.17	0.6931
41.6	123	4	698.4	2.68	0.7683
41.5	124	5	1143.0	3.30	0.8351
46.6	126	2	137.8	1.72	0.3315
46.0	127	3	360.2	1.90	0.4933
47.1	128	4	693.6	2.15	0.6531
45.9	129	5	1135.0	2.41	0.6855
52.0	131	2	135.6	1.44	0.2702
51.5	132	3	357.6	1.61	0.3681
52.1	133	4	688.4	1.57	0.5707
51.5	134	5	1130.6	1.99	0.5653
57.1	136	2	134.4	1.30	0.2350
57.1	137	3	356.0	1.44	0.3023
57.7	138	4	686.4	1.40	0.4358
57.7	139	5	1128.6	1.89	0.3792
63.1	141	2	133.2	1.16	0.1847
62.6	142	3	354.6	1.30	0.2422
62.6	143	4	684.4	1.22	0.3567
62.6	144	5	1125.8	1.65	0.3157
69.8	146	2	132.2	1.05	0.1573
69.9	147	3	353.0	1.15	0.2144
69.8	148	4	683.0	1.14	0.2783
69.2	149	5	1122.4	1.39	0.2813
74.3	151	2	131.5	0.97	0.1467
74.9	152	3	351.8	1.03	0.2011
74.9	153	4	681.4	1.00	0.2546
74.9	154	5	1121.0	1.34	0.2368
80.5	156	2	130.8	0.90	0.1375
80.9	157	3	351.2	1.00	0.1794
80.4	158	4	680.6	0.98	0.2109
80.9	159	5	1119.2	1.26	0.2029
85.5	161	2	130.1	0.82	0.1312
85.5	162	3	350.4	0.92	0.1647
86.0	163	4	679.4	0.91	0.2060
86.6	164	5	1117.8	1.21	0.1802
91.6	166	2	129.4	0.75	0.1288
91.1	167	3	349.2	0.82	0.1673
91.0	168	4	677.8	0.76	0.2093
91.0	169	5	1115.3	1.01	0.2053
97.8	171	2	128.6	0.66	0.1578
98.3	172	3	348.2	0.73	0.1845
98.3	173	4	676.4	0.69	0.1896
98.3	174	5	1113.8	0.98	0.1732

TABLE 21 (CONCLUDED)

TEMP (C)	INDEX No.	MODE NO.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
103.9	176	2	126.2	0.62	0.1563
103.3	177	3	347.4	0.67	0.1843
103.3	178	4	675.2	0.60	0.2358
103.9	179	5	1112.1	0.90	0.1882
106.1	181	2	127.6	0.56	0.1752
106.7	182	3	347.2	0.67	0.1927
106.1	183	4	674.9	0.60	0.2162
106.1	184	5	1111.5	0.88	0.1955
24.3	186	2	157.0	4.27	1.1913
23.8	187	3	395.0	5.92	2.0314
24.3	189	5	1186.0	8.17	1.6445

TABLE 22: TEST DATA FOR LABORATORY E (IMPEDANCE/SHEAR)

SHEAR DEFORMATION (SHEAR MODULUS)
IMPEDANCE: SHEAR, 2 LINKS

Originator's file number: D37:89008MP
Specimen thickness: 0.062 in.
Specimen Breadth. 0.315 in.
Specimen Width: 1.00 in.
Polymer Density = 0.0455 Lb/in**3
Test date: 12/16/88
Operator: JED

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
20.0	0	457.0	9.77	1.0400
	1	470.7	9.98	1.0396
	2	490.2	10.13	1.0443
	3	511.7	10.64	1.0181
	4	531.2	11.04	0.9966
	5	560.5	11.15	0.9986
	6	425.8	9.33	1.0560
	7	400.4	8.71	1.1068
	8	375.0	8.52	1.0950
	9	599.6	11.75	0.9950
	10	625.0	12.24	0.9800
	11	660.2	12.65	0.9700
29.4	12	261.7	3.22	0.7850
	13	250.0	3.17	0.7880
	14	234.4	3.06	0.7880
	15	220.7	2.97	0.7800
	16	201.2	2.86	0.8010
	17	179.7	2.72	0.7830
	18	281.2	3.33	0.7880
	19	300.8	3.47	0.7860
	20	345.7	3.71	0.8050
	21	371.1	3.95	0.7740
	22	400.4	4.08	0.7890
	23	431.6	4.36	0.7710
	24	470.7	4.59	0.7740
	25	500.0	4.86	0.7670
	26	531.2	5.07	0.7680
	27	580.1	5.53	0.7410
	28	173.8	2.68	0.8080

TABLE 22 (CONTINUED)

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
40.0	29	191.4	1.73	0.4540
	30	181.6	1.70	0.4480
	31	171.9	1.68	0.4395
	32	160.2	1.65	0.4370
	33	150.4	1.62	0.4280
	34	140.6	1.60	0.4330
	35	201.2	1.76	0.4560
	36	210.9	1.76	0.4596
	37	230.5	1.83	0.4720
	38	250.0	1.92	0.4670
	39	271.5	1.98	0.4856
	40	291.0	2.03	0.4870
	41	310.5	2.14	0.4940
49.4	42	166.0	1.28	0.2920
	43	150.4	1.26	0.2770
	44	130.9	1.24	0.2630
	45	115.2	1.21	0.2590
	46	101.6	1.21	0.2510
	47	181.6	1.31	0.2950
	48	195.3	1.34	0.3020
	49	210.9	1.37	0.3120
	50	230.5	1.41	0.3170
	51	259.8	1.48	0.3430
	52	277.3	1.52	0.3310
	53	293.0	1.59	0.3360
	54	316.4	1.65	0.3510
	55	330.1	1.68	0.3380
	56	351.6	1.76	0.3360
60.6	57	85.9	0.89	0.1270
	58	99.6	0.90	0.1580
	59	115.2	0.89	0.1630
	60	130.9	0.90	0.1710
	61	138.7	0.91	0.1770
	62	156.2	0.92	0.1890
	63	175.8	0.94	0.1970
	64	189.5	0.96	0.2080
	65	207.0	1.01	0.2190
	66	220.7	1.03	0.2280
	67	244.1	1.08	0.2390
	68	261.7	1.11	0.2300

TABLE 22 (CONTINUED)

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
70.0	69	74.2	0.80	0.0900
	70	91.8	0.76	0.1240
	71	107.4	0.76	0.1280
	72	123.0	0.78	0.1390
	73	140.6	0.79	0.1550
	74	128.9	0.78	0.1440
	75	160.2	0.80	0.1660
	76	181.6	0.84	0.1910
	77	197.3	0.85	0.1970
	78	218.7	0.88	0.1930
	79	263.7	0.93	0.2320
9.4	80	1271.5	76.00	0.7160
	81	1273.4	75.79	0.7080
	82	1291.0	76.46	0.7110
	83	1312.5	77.15	0.7000
	84	1330.1	77.92	0.7000
	85	1351.6	78.88	0.6960
	86	1371.1	79.43	0.6900
	87	1390.6	80.24	0.6870
	88	1416.0	80.68	0.6870
	89	1439.5	81.72	0.6810
	90	1455.1	82.25	0.6780
	91	1478.5	83.52	0.6700
	92	1250.0	74.73	0.7200
	93	1230.5	74.26	0.7250
	94	1209.0	73.29	0.7300
	95	1189.5	72.30	0.7400
	96	1166.0	71.22	0.7480
	97	1140.6	70.60	0.7530
-0.6	98	2360.0	261.03	0.3680
	99	2340.0	259.07	0.3710
	100	2320.0	259.63	0.3700
	101	2290.0	257.52	0.3740
	102	2260.0	255.33	0.3770
	103	2240.0	255.24	0.3800
	104	2220.0	253.95	0.3830
	105	2390.0	262.57	0.3660
	106	2420.0	263.30	0.3670
	107	2450.0	264.69	0.3630
	108	2480.0	266.03	0.3604
	109	2500.0	266.96	0.3574
	110	2560.0	269.86	0.3530
	111	2600.0	271.40	0.3530
	112	2640.0	274.43	0.3510
	113	2680.0	276.23	0.3480
	114	2700.0	277.62	0.3450
	115	2800.0	281.24	0.3380

TABLE 22 (CONTINUED)

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
-10.6	116	3325.0	517.41	0.1730
	117	3350.0	518.27	0.1720
	118	3375.0	519.20	0.1710
	119	3400.0	520.25	0.1700
	120	3425.0	520.94	0.1700
	121	3450.0	522.24	0.1700
	122	3475.0	523.49	0.1674
	123	3500.0	524.32	0.1673
	124	3525.0	525.32	0.1676
	125	3570.0	527.17	0.1675
	126	3275.0	515.46	0.1740
	127	3225.0	513.44	0.1760
	128	3180.0	512.73	0.1770
	129	3120.0	513.52	0.1810
-20.0	130	3943.7	727.58	0.0760
	131	3975.0	728.51	0.0758
	132	4000.0	728.17	0.0755
	133	4050.0	729.59	0.0750
	134	4100.0	729.85	0.0745
	135	4150.0	729.87	0.0736
	136	4200.0	729.98	0.0739
	137	4250.0	739.46	0.0732
	138	4300.0	730.56	0.0739
	139	3900.0	726.85	0.0770
	140	3850.0	725.56	0.0771
	141	3800.0	724.70	0.0779
	142	3750.0	723.27	0.0780
	143	3700.0	721.87	0.0778
	144	3600.0	719.43	0.0783
	145	3500.0	717.81	0.0790
	146	3400.0	715.82	0.0795
-29.4	147	4287.5	859.72	0.0340
	148	4300.0	859.21	0.0340
	149	4375.0	854.66	0.0339
	150	4450.0	847.63	0.0337
	151	4525.0	837.62	0.0347
	152	4600.0	820.23	0.0338
	153	4700.0	774.10	0.0347
	154	4200.0	861.92	0.0349
	155	4125.0	863.65	0.0350
	156	4050.0	864.23	0.0348
	157	3975.0	864.33	0.0344
	158	3900.0	864.72	0.0343
	159	3825.0	864.98	0.0351
	160	3750.0	864.19	0.0337

TABLE 22 (CONTINUED)

TEMP (C)	INDEX No	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
-29.4	161	3675.0	864.59	0.0351
	162	3600.0	864.69	0.0353
	163	3525.0	864.26	0.0333
	164	3450.0	861.12	0.0323
10.0	165	1425.0	94.83	0.6570
	166	1375.0	92.84	0.6680
	167	1325.0	90.45	0.6830
	168	1250.0	87.69	0.6960
	169	1200.0	85.06	0.7074
	170	1150.0	83.44	0.7190
	171	1100.0	81.23	0.7300
	172	1050.0	79.23	0.7480
	173	1500.0	97.94	0.6470
	174	1450.0	95.75	0.6530
	175	1550.0	100.25	0.6350
	176	1600.0	102.34	0.6230
	177	1650.0	104.41	0.6150
	178	1700.0	106.01	0.6096
	179	1800.0	110.22	0.5940
	180	1900.0	114.37	0.5820
	181	2000.0	118.99	0.5690
14.4	182	755.0	26.81	0.9540
	183	730.0	25.58	1.0040
	184	705.0	25.44	0.9960
	185	690.0	24.36	1.0340
	186	670.0	24.45	1.0160
	187	650.0	23.96	1.0320
	188	630.0	22.92	1.0445
	189	610.0	23.16	1.0090
	190	590.0	22.15	1.0740
	191	570.0	21.36	1.0450
	192	550.0	21.23	1.0950
	193	530.0	20.75	1.0980
	194	770.0	27.0[illegible]	0.9505
	195	790.0	27.54	0.9540
	196	810.0	28.38	0.9380
	197	830.0	28.21	0.9360
	198	850.0	29.12	0.9270
	199	870.0	29.65	0.9140
	200	890.0	30.08	0.9360
	201	915.0	31.15	0.8890

TABLE 22 (CONCLUDED)

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
80.6	202	118.7	0.66	0.1230
	203	110.0	0.65	0.1190
	204	100.0	0.66	0.0930
	205	90.0	0.65	0.0710
	206	80.0	0.67	0.0500
	207	130.0	0.66	0.1380
	208	140.0	0.66	0.1498
	209	150.0	0.67	0.1618
	210	160.0	0.68	0.1730
	211	170.0	0.68	0.2290
	212	180.0	0.70	0.1697
	213	190.0	0.71	0.1910
	214	200.0	0.72	0.1870
	215	210.0	0.74	0.2170
89.4	216	110.0	0.56	0.1260
	217	100.0	0.56	0.1050
	218	90.0	0.56	0.0880
	219	80.0	0.57	0.0790
	220	70.0	0.57	0.0590
	221	120.0	0.56	0.1380
	222	130.0	0.56	0.1480
	223	140.0	0.57	0.1570
	224	150.0	0.58	0.1780
	225	160.0	0.59	0.2050
	226	170.0	0.60	0.2190
	227	180.0	0.61	0.2350
	228	190.0	0.61	0.2380
	229	200.0	0.61	0.2180
	230	210.0	0.61	0.2620
	231	220.0	0.65	0.2720

TABLE 23: TEST DATA FOR LABORATORY E (VISCOELASTICIMETRE/SHEAR)

SHEAR DEFORMATION (SHEAR MODULUS)
IMPEDANCE: VISCOELASTICIMETRE, 2 LINKS

Originator's file number: D37:89001MP
Specimen thickness: 3 mm
Specimen Breadth: 10 mm
Specimen Width: 10 mm
Polymer Density = 0.0455 Lb/in**3
Test date: 12/16/88
Operator: TML

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
A: File # D37:89001MP, 12/16/88				
21.0	0	5.0	1.96	0.520
	1	9.7	2.30	0.640
	2	18.6	2.81	0.760
	3	36.0	3.86	0.850
	4	69.5	4.85	0.990
	5	134.1	6.45	1.100
	6	258.8	9.00	1.150
	7	500.0	13.29	1.180
29.4	8	9.7	1.55	0.390
	9	18.6	1.76	0.480
	10	36.0	2.04	0.600
	11	69.5	2.53	0.720
	12	134.1	3.03	0.880
	13	258.8	3.87	1.020
	14	500.0	5.02	1.240
39.1	15	9.7	1.10	0.238
	16	18.6	1.19	0.290
	17	36.0	1.32	0.370
	18	69.5	1.53	0.460
	19	134.1	1.65	0.590
	20	258.8	1.96	0.750
48.6	22	9.7	0.87	0.171
	23	18.6	0.93	0.198
	24	36.0	1.00	0.240
	25	69.5	1.08	0.300
	26	134.1	1.15	0.390
	27	258.8	1.28	0.510
58.5	28	9.7	0.74	0.130
	29	18.6	0.79	0.150
	30	36.0	0.83	0.180
	31	69.5	0.88	0.210
	32	134.1	0.93	0.260
	33	258.8	0.99	0.350

TABLE 23 (CONTINUED)

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
68.6	34	9.7	0.64	0.120
	35	18.6	0.68	0.120
	36	36.0	0.71	0.140
	37	69.5	0.77	0.160
	38	134.1	0.78	0.200
	39	258.8	0.81	0.270
78.3	40	9.7	0.56	0.112
	41	18.6	0.58	0.120
	42	36.0	0.59	0.110
	43	69.5	0.66	0.150
	44	134.1	0.66	0.180
	45	258.8	0.68	0.230
88.4	46	9.7	0.48	0.110
	47	18.6	0.50	0.130
	48	36.0	0.56	0.120
	49	69.5	0.57	0.150
	50	134.1	0.57	0.170
	51	258.8	0.59	0.210
98.1	52	9.7	0.40	0.125
	53	18.6	0.43	0.130
	54	36.0	0.48	0.130
	55	69.5	0.50	0.160
	56	134.1	0.48	0.180
	57	258.8	0.50	0.210
107.8	58	9.7	0.34	0.140
	60	36.0	0.41	0.140
	61	69.5	0.43	0.180
	62	134.1	0.42	0.190
	63	258.8	0.43	0.230
19.5	64	9.7	2.40	0.695
	65	18.6	2.98	0.830
	66	18.6	3.85	0.950
	67	69.5	5.11	1.060
	68	134.1	7.19	1.130
	69	258.8	10.15	1.170
B: File # D42; 89434MP, 9/14/89				
24.4	0	5.0	2.20	0.340
	1	10.7	2.56	0.430
	2	22.7	3.02	0.550
	3	48.4	3.73	0.670
	4	103.2	4.78	0.790
	5	220.1	6.35	0.900

TABLE 23 (CONCLUDED)

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
25.0	8	5.0	2.32	0.340
	9	10.7	2.68	0.430
	10	22.7	3.20	0.530
	11	48.4	3.92	0.650
	12	103.2	4.99	0.780
	13	220.1	6.58	0.880
13.3	15	48.4	7.16	0.730
	16	220.1	14.84	0.740
				0
4.4	18	10.7	13.73	0.800
	19	22.7	19.46	0.810
	20	48.4	23.80	0.790
	21	103.2	28.38	0.770
	22	469.9	54.40	0.620
-7.2	24	5.0	43.60	0.700
	25	10.7	62.19	0.660
	26	22.7	83.42	0.620
	27	48.4	113.06	0.560
	28	103.2	149.60	0.490
	29	220.1	190.97	0.420
	30	469.9	233.71	0.320
-16.7	31	5.0	138.57	0.500
	32	10.7	183.39	0.440
	33	22.7	188.21	0.400
	34	48.4	275.08	0.350
	35	103.2	321.27	0.310
	36	220.1	377.11	0.260
	37	469.9	432.95	0.220
	38	1000.0	510.17	0.150
-34.4	39	5.0	455.70	0.210
	40	10.7	523.27	0.170
	41	22.7	569.46	0.150
	42	48.4	617.03	0.130
	43	103.2	652.19	0.110
	44	469.9	737.68	0.080
	45	1000.0	799.72	0.050
-53.3	46	5.0	684.59	0.070
	47	10.7	675.63	0.070
	48	22.7	685.28	0.060
	49	48.4	696.31	0.050
	50	103.2	710.10	0.050
	51	220.1	703.21	0.030
	52	469.9	723.89	0.050
	53	1000.0	772.15	0.020

TABLE 24: TEST DATA FOR LABORATORY E (RESONANCE/SHEAR)

SHEAR DEFORMATION (SHEAR MODULUS)
RESONANCE: 2 LINKS

Originator's file number: D37:88422MP
Specimen thickness: 0.062 in. (1.57 mm)
Specimen Breadth: 0.315 in. (8.00 mm)
Specimen Width: 1.00 in (25.4 mm)
Polymer Density = 0.0455 Lb/in**3
Test date: 10/26/88
Operator: JED

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
20.0	0	457.0	9.77	1.9430
29.4	1	261.7	3.20	1.2560
40.0	2	191.4	1.71	0.5350
49.4	3	166.0	1.29	0.3620
60.6	4	138.7	0.90	0.1900
70.0	5	128.9	0.78	0.1489
- 0.6	6	2360.0	260.62	0.4420
-10.6	7	3325.0	517.33	0.1910
-20.0	8	3943.7	727.77	0.0800
-29.4	9	4287.5	860.19	0.0306
10.0	10	1425.0	95.02	0.6899
14.4	11	765.0	27.39	1.0360
80.6	12	118.7	0.66	0.1150
89.4	13	110.0	0.57	0.1360

TABLE 25: TEST DATA FOR LABORATORY E (CREEP/SHEAR)

SHEAR DEFORMATION (SHEAR MODULUS)
CREEP

Originator's file number: D42:894420MP
Specimen thickness: N/A
Specimen Breadth: N/A
Specimen Width: N/A
Polymer Density = 0.0455 Lb/in**3
Test date: 10/10/88
Operator: JED

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
10.0	0	6.469 E-6	0.469	0.1230
	1	1.294 E-5	0.502	0.1320
	2	2.588	0.538	0.1440
	3	5.175	0.567	0.1509
	4	1.035 E-4	0.573	0.2083
	5	2.070	0.638	0.2525
	6	6.624 E-3	1.307	0.4578
22.2	7	6.178 E-6	0.390	0.0963
	8	1.236 E-5	0.446	0.1621
	9	4.943	0.537	0.1332
	10	1.977 E-4	0.537	0.1538
	11	7.908	0.546	0.0838
	12	1.582 E-3	0.618	0.1769
	13	6.326 E-3	0.588	0.1648
	14	1.265 E-2	0.664	0.1151

TABLE 26: TEST DATA FOR LABORATORY E (IMPEDANCE/SHEAR)

SHEAR DEFORMATION (SHEAR MODULUS)
LOW FREQUENCY IMPEDANCE

Originator's file number: C1:1910132MP
Specimen thickness: 0.063 in. (1.60 mm)
Specimen Breadth: N/A
Specimen Width: N/A
Polymer Density = 0.0455 Lb/in**3
Test date: 8/31/90
Operator: MPM

TEMP (C)	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
22.4	2	1.000 E 0	1.310	0.1920
22.5	3	5.000 E-1	1.206	0.1600
22.6	4	2.500	1.105	0.1360
22.8	5	1.250	1.032	0.1150
23.0	6	6.250 E-2	0.995	0.0942
23.2	7	3.125	0.948	0.0872
23.4	9	1.563	0.918	0.0712
24.0	16	9.760 E-4	0.832	0.0620
24.0	18	4.770	0.822	0.0530
25.6	21	2.000 E 0	1.286	0.2460
25.6	22	4.000	1.420	0.3250
25.6	23	8.000	1.655	0.3930
25.6	24	16.000	1.915	0.5020
25.6	25	32.000	2.168	0.6640
25.6	26	64.000	2.620	0.8150
25.0	28	1.562 E-2	0.882	0.0670
24.9	29	7.810 E-3	0.878	0.0720
24.4	30	3.930	0.836	0.0670
23.3	31	1.970	0.840	0.0370

TABLE 27: TEST DATA FOR LABORATORY F (DIRECT STIFFNESS/SHEAR)

SHEAR DEFORMATION (SHEAR MODULUS)
DIRECT STIFFNESS TEST SYSTEM

Polymer Density = 0.046 Lb/in**3
Test Date: N/A

TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
+ 27	3.750	1.318	0.205
	5.625	1.426	0.348
	7.500	1.570	0.369
	9.375	1.629	0.373
	11.25	1.677	0.419
	13.13	1.689	0.468
	15.00	1.748	0.497
	16.88	1.779	0.503
	18.75	1.844	0.502
	20.63	1.907	0.516
	24.38	1.932	0.568
	28.13	2.040	0.571
	31.88	2.088	0.615
	35.63	2.150	0.624
	41.25	2.248	0.668
	46.88	2.335	0.683
	52.50	2.398	0.707
	61.88	2.560	0.734
	69.38	2.658	0.751
	76.88	2.748	0.774
	86.25	2.848	0.805
	103.1	3.055	0.832
	120.0	3.265	0.861
	136.9	3.412	0.873
	153.8	3.600	0.885
	170.6	3.769	0.903
+ 36.5	3.750	1.015	0.134
	5.625	1.069	0.198
	7.500	1.102	0.214
	9.375	1.126	0.233
	11.25	1.160	0.249
	13.13	1.172	0.268
	15.00	1.191	0.281
	16.88	1.209	0.293
	18.75	1.233	0.304
	20.63	1.253	0.313
	24.38	1.281	0.331
	28.13	1.309	0.346
	31.88	1.338	0.365
	35.63	1.364	0.378

TABLE 27 (CONTINUED)

TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
+ 36.5	41.25	1.403	0.398
	46.88	1.426	0.418
	52.50	1.467	0.428
	61.88	1.515	0.454
	69.38	1.556	0.471
	76.88	1.595	0.488
	86.25	1.638	0.509
	103.1	1.715	0.536
	120.0	1.794	0.561
	136.9	1.851	0.585
	153.8	1.926	0.603
	170.6	1.985	0.622
+ 43.8	3.750	0.859	0.0947
	5.625	0.897	0.137
	7.500	0.923	0.142
	9.375	0.929	0.160
	11.25	0.945	0.174
	13.13	0.956	0.182
	15.00	0.971	0.187
	16.88	0.975	0.195
	18.75	0.994	0.204
	20.63	1.001	0.212
	24.38	1.023	0.224
	28.13	1.039	0.232
	31.88	1.052	0.240
	35.63	1.065	0.252
	41.25	1.089	0.267
	46.88	1.105	0.275
	52.50	1.120	0.290
	61.88	1.136	0.313
	69.38	1.173	0.318
	76.88	1.189	0.328
	86.25	1.218	0.346
	103.1	1.264	0.363
	120.0	1.291	0.378
	136.9	1.346	0.401
	153.8	1.381	0.417
	170.6	1.418	0.431
+ 18.8	3.750	1.975	0.492
	5.625	2.056	0.609
	7.500	2.276	0.649
	9.375	2.442	0.734
	11.25	2.622	0.742
	13.13	2.727	0.781
	15.00	2.868	0.797
	16.88	3.124	0.774
	20.63	3.229	0.836

TABLE 27 (CONTINUED)

TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
+ 18.8	24.38	3.577	0.805
	28.13	3.704	0.836
	31.88	3.954	0.859
	37.50	4.182	0.906
	43.13	4.415	0.922
	48.75	4.659	0.930
	58.13	4.945	0.961
	65.63	5.389	0.945
	73.13	5.611	0.977
	82.50	5.932	0.969
	99.38	6.488	0.992
	116.3	7.001	0.992
	133.1	7.428	1.031
	150.0	7.966	1.016
	166.9	8.428	1.031
+ 8.2	46.88	25.97	0.945
	50.63	28.66	0.852
	54.38	28.64	0.852
	58.13	29.04	0.844
	61.88	30.78	0.852
	65.63	31.28	0.883
	69.38	32.46	0.899
	76.88	34.91	0.867
	82.50	36.42	0.797
	88.13	36.05	0.859
	93.75	37.69	0.805
	99.38	38.80	0.820
	105.0	40.82	0.774
	110.6	39.82	0.883
	118.1	40.99	0.836
	125.6	42.86	0.797
	133.1	42.94	0.852
	140.6	44.44	0.852
	148.1	46.48	0.820
	157.5	48.09	0.797
	166.9	48.91	0.812
	176.3	49.34	0.836
	189.4	51.26	0.797
	200.6	52.46	0.805
	211.9	53.94	0.797
	234.4	57.13	0.812
	247.5	57.42	0.812
	268.1	60.70	0.774
	283.1	62.47	0.781
	301.9	63.19	0.781
	318.8	63.89	0.805
	335.6	66.33	0.774

TABLE 27 (CONTINUED)

TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
+ 8.2	354.4	68.61	0.766
	390.0	69.88	0.789
	425.6	72.51	0.766
	461.3	74.63	0.774
	496.9	77.74	0.766
	532.5	78.55	0.781
	568.1	81.62	0.742
	603.8	81.82	0.781
	639.4	84.35	0.758
	675.0	85.68	0.758
	710.6	85.77	0.781
+ 1.0	76.88	81.96	0.641
	82.50	85.40	0.679
	88.13	88.71	0.651
	93.75	96.99	0.583
	99.38	98.73	0.595
	105.0	94.37	0.600
	110.6	96.54	0.631
	118.1	100.6	0.658
	125.6	100.9	0.617
	133.1	108.9	0.612
	140.6	107.9	0.585
	148.1	109.6	0.577
	157.5	113.6	0.606
	166.9	116.8	0.606
	176.3	120.9	0.583
	189.4	123.8	0.579
	200.6	122.6	0.545
	211.9	117.7	0.591
	234.4	136.9	0.505
	247.5	134.8	0.524
	268.1	136.8	0.520
	283.1	137.7	0.552
	301.9	141.8	0.519
	318.8	144.0	0.520
	335.6	145.0	0.522
	354.4	150.4	0.548
	390.0	150.0	0.558
	425.6	148.9	0.533
	461.3	155.0	0.493
	496.9	167.9	0.502
	532.5	162.5	0.518
	568.1	161.2	0.496
	603.8	167.7	0.533
	639.4	172.3	0.505
	675.0	174.3	0.475
	710.6	178.4	0.487

TABLE 27 (CONTINUED)

TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
+ 12.6	103.1	16.83	0.914
	106.9	16.68	0.915
	110.6	17.11	0.939
	116.3	17.59	0.935
	121.9	17.78	0.904
	127.5	18.47	0.915
	133.1	18.30	0.967
	138.8	19.12	0.929
	144.4	19.14	0.959
	150.0	19.81	0.913
	155.6	20.29	0.920
	161.3	20.67	0.923
	170.6	21.06	0.932
	178.1	21.45	1.021
	185.6	21.54	0.952
	193.1	22.46	0.908
	200.6	23.10	0.945
	208.1	23.38	0.923
	215.6	23.61	0.920
	223.1	24.06	0.935
	232.5	24.43	0.938
	241.9	26.54	0.910
	251.3	26.11	0.897
	260.6	25.68	0.925
	270.0	26.27	0.926
	279.4	27.14	0.926
	290.6	27.20	0.915
	301.9	28.15	0.931
	313.1	29.23	0.918
	324.4	29.29	0.925
	339.4	29.80	0.918
	352.5	30.78	0.908
	365.6	31.00	0.907
	378.8	31.72	0.896
	403.1	32.49	0.897
	418.1	33.16	0.936
	433.1	33.81	0.906
	453.8	34.54	0.914
	470	35.56	0.923
	48[illegible]	36.34	0.885
	504.4	36.18	0.909
	523.1	37.75	0.885
	541.9	37.77	0.900
	575.6	39.11	0.865
	596.3	39.47	0.907

TABLE 27 (CONTINUED)

TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
+ 12.6	0.625	1.937	0.438
	0.938	2.280	0.569
	1.250	2.387	0.584
	1.563	2.592	0.634
	1.875	2.683	0.696
	2.188	2.895	0.732
	2.500	3.022	0.741
	2.813	3.106	0.744
	3.125	3.236	0.761
	3.438	3.401	0.762
	3.750	3.543	0.754
	4.063	3.633	0.756
	4.375	3.739	0.770
	4.688	3.840	0.775
	5.000	3.943	0.782
	5.313	4.063	0.805
	5.625	4.220	0.799
	5.938	4.303	0.803
	6.250	4.304	0.832
	6.563	4.406	0.840
	6.875	4.552	0.828
	7.188	4.605	0.837
	7.500	4.599	0.863
	7.813	4.680	0.854
	8.125	4.779	0.854
	8.438	4.904	0.857
	8.750	5.036	0.855
	9.063	5.013	0.878
	9.688	5.157	0.867
	10.31	5.364	0.865
	10.94	5.422	0.876
	11.56	5.518	0.881
	12.19	5.638	0.892
	12.81	5.741	0.910
	13.44	5.840	0.908
	14.06	5.988	0.909
	14.69	6.146	0.897
	15.31	6.214	0.915
	15.94	6.292	0.917
	16.56	6.457	0.920
	17.19	6.613	0.899
	17.81	6.640	0.920
	18.44	6.794	0.937
	19.38	6.917	0.939
	20.31	7.070	0.926
	21.25	7.211	0.932
	22.19	7.430	0.922
	23.13	7.576	0.925

TABLE 27 (CONCLUDED)

TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
+ 12.6	24.06	7.798	0.918
	25.00	7 856	0.924
	25.94	7.932	0.938
	26.88	8.150	0.932
	28.44	8.326	0.937
	29.69	8.520	0.944
	30.94	8.661	0.939
	32.19	8 816	0.947
	33.44	8.987	0.943
	34.69	9.180	0.946
	35.94	9.307	0.953
	37.19	9.420	0.948
	38.75	9.627	0.953
	40.31	9.827	0.956
	41.88	9.990	0.956
	43.44	10.19	0.957
	45.00	10.40	0.953
	46.56	10.57	0.943
	48.44	10.72	0.960
	50.31	10.91	0.958
	52.19	11.22	0.954
	54.06	11.26	0.971
	56.56	11.68	0.960
	58.75	11.84	0.966
	60.94	11.99	0.959
	63.13	12.19	0.952
	67.19	12.79	0.944
	69.69	12.87	0.958
	72.19	13.23	0.944
	75.63	13.49	0.950
	78.44	13.79	0.945
	81.25	13.91	0.956
	84.06	14.18	0.957
	87.19	14.38	0.963
	90.31	14.71	0.953
	95.94	15.04	0.964
	99.38	15.45	0.946
	104.7	15.91	0.942
	108.4	16.06	0.963
	113.4	16.51	0.946
	117.5	16.81	0.945

TABLE 28: TEST DATA FOR LABORATORY H (PL DMTA/EXTENSION)

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
POLYMER LABORATORIES DMTA SYSTEM

Polymer Density = 0.046 Lb/in**3
Test Dates: 6-11 July, 1988

SPECIMEN No & CONFIGURATION	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
Test: WP-12	+ 24.0	50	17.46	0.6993
Dual Cantilever		10	11.02	0.4760
Thickness: 2.95 mm		1	7.396	0.2453
Width: 7 mm		0.1	5.902	0.1324
Length: 12 mm				
Date: 19 July 1988				
	+ 30.8	50	10.26	0.4782
		10	7.691	0.2947
		1	6.039	0.1534
		0.1	5.188	0.0933
Test: WP-17	- 0.2	50	179.1	0.6321
Tensile Mode		30	148.6	0.6511
Area: 15.9 mm**2		20	129.4	0.6671
Length: 10 mm		10	98.63	0.6968
Date: 16 Nov 1988		5	72.95	0.7706
		3	59.57	0.7559
		2	50.70	0.7584
		1	36.73	0.7729
		0.3	21.83	0.6947
		0.2	19.01	0.6960
		0.1	14.55	0.6347
Test: WP-17	+ 10.0	50	53.83	0.9324
Tensile Mode		30	42.36	0.9142
Area: 15.9 mm**2		20	35.24	0.9009
Length: 10 mm		10	25.88	0.8673
Date: 16 Nov 1988		5	19.05	0.8496
		3	15.67	0.7764
		2	13.55	0.7178
		1	10.67	0.6329
		0.3	7.586	0.4690
		0.2	6.982	0.4197
		0.1	5.970	0.3436
Test: WP-17	+ 19.8	50	15.28	0.9895
Tensile Mode		30	12.45	0.8881
Area: 15.9 mm**2		20	10.72	0.8025
Length: 10 mm		10	8.690	0.6545
Date: 16 Nov 1988		5	7.295	0.5228
		3	6.531	0.4424
		2	6.039	0.3866

TABLE 28 (CONTINUED)

SPECIMEN No & CONFIGURATION	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
Test: WP-17	+ 19.8	2	6.039	0.3866
Tensile Mode		1	5.370	0.3159
Area: 15.9 mm**2		0.3	4.539	0.2166
Length: 10 mm		0.2	4.385	0.1845
Date: 16 Nov 1988		0.1	4.111	0.1627
Test: WP-17	+ 29.8	50	7.413	0.8086
Tensile Mode		30	6.310	0.6711
Area: 15.9 mm**2		20	5.702	0.5621
Length: 10 mm		10	5.035	0.4014
Date: 16 Nov 1988		5	4.603	0.2885
		3	4.345	0.2333
		2	4.169	0.2010
		1	3.945	0.1637
		0.3	3.565	0.1159
		0.2	3.499	0.0979
		0.1	3.365	0.0945
Test: WP-17	+ 39.8	50	4.875	0.6704
Tensile Mode		30	4.236	0.5285
Area: 15.9 mm**2		20	3.972	0.4174
Length: 10 mm		10	3.681	0.2631
Date: 16 Nov 1988		5	3.532	0.1694
		3	3.428	0.1360
		2	3.357	0.1114
		1	3.251	0.0978
		0.3	3.020	0.0731
		0.2	2.999	0.0600
		0.1	2.911	0.0679
Test: WP-20	+ 20.0	50	17.91	0.8168
Single Cantilever		30	14.83	0.7491
Length: 10.1 mm		20	12.97	0.6766
Width: 4.8 mm		10	10.62	0.5647
Thickness: 2.935 mm		5	8.995	0.4645
Date: 13 Jan 1989		3	8.110	0.3963
		2	7.586	0.3495
		1	6.745	0.2935
		0.3	5.689	0.1967
Test: WP-20	+ 25.0	50	12.13	0.6620
Single Cantilever		30	10.40	0.5933
Length: 10.1 mm		20	9.354	0.5181
Width: 4.8 mm		10	8.035	0.4174
Thickness: 2.935 mm		5	7.112	0.3338
Date: 13 Jan 1989		3	6.607	0.2794
		2	6.252	0.2455
		1	5.636	0.2068
		0.3	5.023	0.1395

TABLE 28 (CONTINUED)

SPECIMEN No & CONFIGURATION	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
Test: WP-20	+ 30.0	50	9.226	0.5232
Single Cantilever		30	8.072	0.4683
Length: 10.1 mm		20	7.430	0.3979
Width: 4.8 mm		10	6.592	0.3151
Thickness: 2.935 mm		5	5.998	0.2512
Date: 13 Jan 1989		3	5.662	0.2106
		2	5.408	0.1804
		1	5.070	0.1624
		0.3	4.581	0.1055
Test: WP-20	+ 35.0	50	7.638	0.4192
Single Cantilever		30	6.792	0.3766
Length: 10.1 mm		20	6.339	0.3132
Width: 4.8 mm		10	5.768	0.2456
Thickness: 2.935 mm		5	5.346	0.1950
Date: 13 Jan 1989		3	5.058	0.1650
		2	4.943	0.1455
		1	4.624	0.1340
		0.3	4.266	0.0839
Test: WP-20	+ 40.0	50	6.427	0.3285
Single Cantilever		30	5.794	0.2959
Length: 10.1 mm		20	5.483	0.2440
Width: 4.8 mm		10	5.070	0.1923
Thickness: 2.935 mm		5	4.764	0.1535
Date: 13 Jan 1989		3	4.571	0.1324
		2	4.487	0.1137
		1	4.227	0.1031
		0.3	3.954	0.0702
Test: WP-20	+ 45.0	50	5.333	0.2369
Single Cantilever		30	4.864	0.2221
Length: 10.1 mm		20	4.656	0.1809
Width: 4.8 mm		10	4.385	0.1405
Thickness: 2.935 mm		5	4.178	0.1092
Date: 13 Jan 1989		3	4.064	0.0961
		2	3.999	0.0888
		1	3.828	0.0920
		0.3	3.556	0.0572
Test: WP-20	+ 50.0	50	4.519	0.1943
Single Cantilever		30	4.150	0.2017
Length: 10.1 mm		20	3.954	0.1532
Width: 4.8 mm		10	3.750	0.1228
Thickness: 2.935 mm		5	3.581	0.1017
Date: 13 Jan 1989		3	3.508	[illegible]
		2	3.404	0.0728
		1	3.327	0.0803
		0.3	3.083	0.0538

TABLE 28 (CONCLUDED)

SPECIMEN No & CONFIGURATION	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
Test: WP-20	+ 55.0	50	3.846	0.1738
Single Cantilever		30	3.516	0.1917
Length: 10.1 mm		20	3.319	0.1398
Width: 4.8 mm		10	3.192	0.1130
Thickness: 2.935 mm		5	3.055	0.0950
Date: 13 Jan 1989		3	2.985	0.0784
		2	2.884	0.0699
		1	2.786	0.0860
		0.3	2.618	0.0496
Test: WP-20	+ 60.0	50	3.357	0.1580
Single Cantilever		30	3.090	0.1853
Length: 10.1 mm		20	2.891	0.1235
Width: 4.8 mm		10	2.799	0.1061
Thickness: 2.935 mm		5	2.685	0.0868
Date: 13 Jan 1989		3	2.612	0.0718
		2	2.600	0.0728
		1	2.393	0.0668
		0.3	2.291	0.0494
Test: WP-20	+ 65.0	50	3.055	0.1453
Single Cantilever		30	2.825	0.1786
Length: 10.1 mm		20	2.636	0.1122
Width: 4.8 mm		10	2.553	0.0979
Thickness: 2.935 mm		5	2.455	0.0865
Date: 13 Jan 1989		3	2.399	0.0671
		2	2.371	0.0763
		1	2.218	0.0734
		0.3	2.099	0.0474
Test: WP-20	+ 69.8	50	2.825	0.1330
Single Cantilever		30	2.612	0.1723
Length: 10.1 mm		20	2.466	0.1112
Width: 4.8 mm		10	2.355	0.0922
Thickness: 2.935 mm		5	2.275	0.0698
Date: 13 Jan 1989		3	2.228	0.0650
		2	2.198	0.0600
		1	2.094	0.0901
		0.3	1.950	0.0421

TABLE 29: TEST DATA FOR LABORATORY H

SHEAR DEFORMATION (SHEAR MODULUS)
POLYMER LABORATORIES DMTA SYSTEM

Polymer Density = 0.046 Lb/in**3
Test Dates: 6-11 July, 1988
Test Mode: Shear

SPECIMEN No & CONFIGURATION	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
Test: WP-1	-0.4	50	37.15	0.261
Diameter: 3 mm		30	31.92	0.391
Thickness:		20	28.12	0.457
		10	22.44	0.530
		5	17.58	0.604
		3	14.55	0.635
		2	12.39	0.659
		1	9.441	0.685
		0.3	5.929	0.682
Test: WP-1	+9.8	50	13.52	0.479
Diameter: 3 mm		30	10.89	0.599
Thickness:		20	9.226	0.648
		10	6.982	0.676
		5	5.284	0.687
		3	4.416	0.650
		2	3.882	0.617
		1	3.155	0.549
		0.3	2.355	0.421
Test: WP-1	+ 19.6	50	5.012	0.503
Diameter: 3 mm		30	4.055	0.573
Thickness:		20	3.499	0.576
		10	2.838	0.526
		5	2.388	0.471
		3	2.143	0.410
		2	1.986	0.369
		1	1.774	0.305
		0.3	1.517	0.219
Test: WP-1	+ 29.6	50	2.661	0.292
Diameter: 3 mm		30	2.223	0.353
Thickness:		20	2.000	0.349
		10	1.742	0.305
		5	1.570	0.273
		3	1.472	0.237
		2	1.413	0.211
		1	1.312	0.181
		0.3	1.186	0.134

TABLE 29 (CONTINUED)

SPECIMEN No & CONFIGURATION	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
Test: WP-1	+ 39.2	50	1.845	0.105
Diameter: 3 mm		30	1.556	0.184
Thickness:		20	1.422	0.195
		10	1.285	0.181
		5	1.194	0.176
		3	1.140	0.154
		2	1.112	0.143
		1	1.052	0.123
		0.3	.9683	0.100
Test: WP-2	- 20.6	50	101.2	0.0862
Diameter: 3 mm		30	98.86	0.1004
Thickness:		20	96.83	0.1076
		10	93.11	0.1203
		5	89.13	0.1371
		3	85.90	0.1490
		2	82.99	0.1599
		1	77.80	0.1803
		0.3	67.76	0.2268
Test: WP-3	- 20.6	50	72.95	0.0657
Diameter: 6 mm		30	71.61	0.0790
Thickness:		10	67.92	0.0983
		5	65.16	0.1149
		3	62.95	0.1273
		2	60.95	0.1388
		1	57.41	0.1618
		0.3	50.12	0.2103
		0.2	47.32	0.2299
		0.1	42.27	0.2680
Test: WP-3	- 10.2	50	53.33	0.1998
Diameter: 6 mm		30	50.12	0.2302
Thickness:		10	41.78	0.2949
		5	36.14	0.3431
		3	31.92	0.3800
		2	29.04	0.4011
		1	24.15	0.4465
		0.3	17.10	0.5099
		0.2	14.89	0.5313
		0.1	12.11	0.5504
Test: WP-3	+ 4.8	50	18.03	0.5348
Diameter: 6 mm		30	15.03	0.5648
Thickness:		10	10.79	0.5817
		5	8.810	0.5885
		3	7.311	0.5983
		2	6.383	0.6094
		1	5.000	0.6165
		0.3	3.342	0.5688
		0.2	2.911	0.5319
		0.1	2.339	0.4583

TABLE 29 (CONTINUED)

SPECIMEN No & CONFIGURATION	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
Test: WP-6 Diameter: 6 mm Thickness:	+19.8	100	5.420	0.6962
		50	4.207	0.6791
		30	3.532	0.6519
		20	3.090	0.6175
		10	2.523	0.5439
		5	2.118	0.4605
		3	1.905	0.3996
		2	1.766	0.3569
		1	1.581	0.2935
		0.3	1.355	0.2086
		0.2	1.306	0.1853
		0.1	1.225	0.1581
		0.03	1.119	0.1258
		0.02	1.086	0.1160
		0.01	1.038	0.1030
Test: WP-6 Diameter: 6 mm Thickness:	+ 29.8	100	2.466	0.6083
		50	2.084	0.5081
		30	1.866	0.4438
		20	1.730	0.3929
		10	1.535	0.3178
		5	1.393	0.2564
		3	1.312	0.2195
		2	1.256	0.1959
		1	1.180	0.1650
		0.3	1.069	0.1212
		0.2	1.045	0.1101
		0.1	1.005	0.1012
		0.03	.9376	0.0848
		0.02	.9183	0.0814
		0.01	.8872	0.0766
Test: WP-6 Diameter: 6 mm Thickness:	+ 39.8	100	1.538	0.3939
		50	1.403	0.3121
		30	1.318	0.2691
		20	1.256	0.2373
		10	1.169	0.1927
		5	1.099	0.1576
		3	1.054	0.1384
		2	1.030	0.1264
		1	0.9795	0.1111
		0.3	0.9141	0.0866
		0.2	0.8995	0.0792
		0.1	0.8690	0.0787
		0.03	0.8204	0.0710
		0.02	0.8054	0.0689
		0.01	0.7816	0.0671

TABLE 29 (CONTINUED)

SPECIMEN No & CONFIGURATION	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
Test: WP-7	+ 19.4	50	3.311	0.6482
Diameter: 6 mm		30	2.831	0.6135
Thickness:		20	2.512	0.5840
		10	2.099	0.5172
		5	1.811	0.4410
		3	1.652	0.3853
		2	1.560	0.3373
		1	1.413	0.2755
		0.3	1.242	0.1964
		0.2	1.199	0.1762
		0.1	1.135	0.1496
Test: WP-7	+ 29.4	50	1.932	0.4987
Diameter: 6 mm		30	1.734	0.4389
Thickness:		20	1.607	0.3932
		10	1.439	0.3193
		5	1.315	0.2568
		3	1.245	0.2196
		2	1.194	0.1950
		1	1.125	0.1616
		0.3	1.030	0.1234
		0.2	1.005	0.1139
		0.1	.9638	0.1033
Test: WP-7	+ 39.4	50	1.365	0.3229
Diameter: 6 mm		30	1.279	0.2760
Thickness:		20	1.222	0.2425
		10	1.138	0.1965
		5	1.074	0.1609
		3	1.033	0.1410
		2	1.002	0.1287
		1	0.9594	0.1118
		0.3	0.8954	0.0928
		0.2	0.8790	0.0882
		0.1	0.8492	0.0837
Test: WP-8	+ 9.8	50	10.72	0.5786
Diameter: 6 mm		30	9.016	0.5921
Thickness:		20	7.962	0.6016
		10	6.383	0.6116
		5	5.164	0.6259
		3	4.305	0.6153
		2	3.767	0.5986
		1	3.034	0.5532
		0.3	2.218	0.4370
		0.2	2.042	0.3953
		0.1	1.795	0.3315

TABLE 29 (CONCLUDED)

SPECIMEN No & CONFIGURATION	TEMP (C)	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR
Test: WP-8	+ 30.0	50	2.328	0.5380
Diameter: 6 mm		30	2.061	0.4759
Thickness:		20	1.884	0.4253
		10	1.660	0.3454
		5	1 493	0.2770
		3	1 400	0.2346
		2	1.334	0.2059
		1	1.247	0.1696
		0.3	1.135	0.1202
		0.2	1 112	0.1069
		0.1	1 067	0.0973
Test: WP-11	+ 69.3	50	0.7244	0.1411
Diameter: 6 mm		30	0.7031	0.1229
Thickness:		20	0.6855	0.1221
		10	0.6561	0.1064
		5	0.6324	0.0904
		3	0.6180	0.0805
		2	0.6039	0.0733
		1	0.5888	0.0731
		0.3	0.5585	0.0559
		0.2	0.5546	0.0491
		0.1	0.5420	0.0562
Test: WP-11	+ 79.8	50	0.6067	0.2305
Diameter: 6 mm		30	0.6138	0.1218
Thickness:		20	0.5984	0.1119
		10	0.5768	0.0975
		5	0.5572	0.0848
		3	0.5445	0.0766
		2	0.5346	0.0687
		1	0.5200	0.0702
		0.3	0.4932	0.0532
		0.2	0.4898	0.0487
		0.1	0.4786	0.0564
Test: WP-11	+ 89.8	50	0.5383	0.1221
Diameter: 6 mm		30	0.5272	0.1195
Thickness:		20	0.5152	0.1118
		10	0.4966	0.0990
		5	0.4786	0.0876
		3	0.4677	0.0788
		2	0.4581	0.0706
		1	0.4446	0.0656
		0.3	0.4217	0.0544
		0.2	0.4207	0.0475
		0.1	0.4083	0.0576

TABLE 30: TEST DATA FOR LABORATORY J (MTS 831.50 SYSTEM/EXTENSION)

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
NON-RESONANT FORCED VIBRATION (MTS 831.50 Elastomer Test System)

Specimen Type: Tensile/ Cylindrical
Specimen Diameter: 25.0 mm
Specimen Height: 12.4 mm
Polymer Density = 0.046 Lb/in**3
Dynamic Displacement: 0.0124 mm (nominal)
Mean Displacement: -0.25 mm
Dwell time at temperature: 30 minutes
Originator's File #:WPTS1, 2 and 3.

TEMP (C)	TEST #	FREQ (Hz)	UNCORRECTED YOUNG'S MODULUS E, MPa	LOSS FACTOR	CORRECTED (LAB J) YOUNG'S MODULUS
+20	WPTS1	10	8.082	0.8790	8.161
+10			19.42	1.2230	19.899
0			85.801	0.9305	95.623
-11			303.601	0.4490	474.697
-20			449.101	0.2327	994.52
-31			467.214	0.1672	1110.56
-40			662.768	0.1471	3260.21
-51			667.35	0.1304	3499.65
-50	WPTS2	10	672.309	0.1338	3577.76
-41			652.102	0.1382	3121.91
-31			615.627	0.1531	2449.94
-20			516.780	0.2151	1383.17
-11			313.51	0.4172	501.078
0			82.762	0.9046	91.912
+10			20.919	1.104	21.479
+19			8.516	0.8305	8.610
+29			5.265	0.4748	5.300
+39			4.132	0.3211	4.156
+49			3.207	0.2223	3.219
+60			2.642	0.2028	2.650
+69			2.370	0.1607	2.377
+79			2.023	0.1934	2.030
+89			1.756	0.1828	1.760
+89	WPTS3	10	1.839	0.1859	1.843
+79			2.125	0.1665	2.129
+69			2.326	0.1872	2.331
+59			2.453	0.2167	2.461
+49			2.960	0.2102	2.971
+40			3.566	0.3062	3.582
+30			4.628	0.4658	4.655
+20			7.604	0.8701	7.676

TABLE 31: TEST DATA FOR LABORATORY J (MTS 831.50 SYSTEM/EXTENSION)

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
NON-RESONANT FORCED VIBRATION (MTS 831.50 Elastomer Test System)

Specimen Type: Tensile
Specimen width: 27.94 mm
Specimen Breadth: 27.94 mm
Specimen Height: 12.7 mm
Polymer Density = 0.046 Lb/in**3
Dynamic Displacement: 0.0124 mm (nominal)
Mean Displacement: -0.25 mm
Dwell time at temperature: 30 minutes
Originator's File #: WPTSA3
Test Date: 8 Nov 1989

UNCORRECTED

TEMP (C)	TEST #	FREQ (Hz)	YOUNG'S MODULUS E, MPa	LOSS FACTOR	PHASE DEGREES
- 34	WPTSA3	10	568.70	0.03957	2.3
- 29			564.08	0.04069	2.3
- 24			555.95	0.04388	2.5
- 18			528.85	0.06041	3.5
- 13			493.76	0.05907	5.1
- 7			440.68	0.1434	8.2
- 2			327.40	0.2862	16.0
+ 3			212.48	0.4698	25.2
+ 9			138.57	0.6263	32.1
+ 14			72.113	0.7976	38.6
+ 21			23.047	0.8496	40.4
+ 26			18.332	0.7679	37.5
+ 32			14.953	0.6892	34.6
+ 37			11.396	0.5262	27.8
+ 42			8.942	0.3426	18.9
+ 49			7.391	0.2673	15.0
+ 55			6.374	0.1945	11.0
+ 59			5.815	0.1623	9.2
+ 64			5.261	0.1215	6.9
+ 21	WP3	0.010	4.687	0.1528	
		0.022	5.575	0.0658	
		0.046	5.450	0.0814	
		0.100	5.743	0.1344	
		0.215	6.001	0.1281	
		0.464	6.302	0.1667	
		1.000	7.025	0.1933	
		2.154	7.522	0.2579	
		4.650	8.452	0.3138	

TABLE 31 (CONCLUDED)

UNCORRECTED

TEMP (C)	TEST #	FREQ (Hz)	YOUNG'S MODULUS E, MPa	LOSS FACTOR	PHASE DEGREES
+ 21	WP3	9.993	9.810	0.3946	
		21.540	11.113	0.5510	
		46.42	13.726	0.6373	
		100.00	17.566	0.7937	
		215.40	23.130	0.9477	
		464.20	33.733	0.9840	
		1000.00	49.714	1.0480	
+ 21	WP4	0.010	4.884	0.0861	
		0.022	5.200	0.0841	
		0.046	5.464	0.0953	
		0.100	5.726	0.1033	
		0.215	6.028	0.1209	
		0.464	6.390	0.1446	
		1.000	6.827	0.1824	
		2.154	7.391	0.2286	
		4.650	8.135	0.2959	
		9.993	9.197	0.3779	
		21.540	10.665	0.4889	
		46.42	12.754	0.6205	
		100.00	16.036	0.7726	
		215.40	20.696	0.8995	
		464.20	21.151	0.8968	
		1000.00	19.338	0.9089	
+ 21	WP5	0.010	4.711	0.0797	
		0.022	5.023	0.0800	
		0.046	5.271	0.0864	
		0.100	5.517	0.0920	
		0.215	5.770	0.1040	
		0.464	6.091	0.1269	
		1.000	6.445	0.1560	
		2.154	6.922	0.1990	
		4.650	7.556	0.2499	
		9.993	8.411	0.3241	
		21.54	9.548	0.4233	
		46.42	11.127	0.5426	
		100.00	13.747	0.6659	
		215.40	17.242	0.8487	
		464.20	17.546	0.8509	
		1000.00	16.401	0.8735	

TABLE 32: CALIBRATION DATA FOR LABORATORY L (TYPICAL)

DIRECT STIFFNESS TEST SYSTEM (FITZGERALD)
Transducer serial No. 20825
Driving plate mass: 33.33 gm.
Begin temperature: 24.3 C
End temperature: 24.9 C
Test Date: 14 May 1991
Transducer constant: 9.7572553E4 gm./Mho.s. (mass/slope)

#	FREQ (Hz)	R12 (Ohms)	X12 (Ohms)	G12 (Mhos)	B12 (Mhos)	wB12 (Mho/s) (x10**2)	w**2 (x10**4)	SLOPE (x10**-4)
1	2	1.1019	8.7461	0.0142	-0.1126	-0.0142	0.016	
2	4	4.6365	18.6170	0.0125	-0.0506	-0.0127	0.063	3.022757
3	10	76.6670	24.3910	0.0118	-0.0038	-0.0034	0.395	3 107132
4	20	14.3750	-32.2670	0.0115	0.0259	0.0325	1.579	2.983282
5	30	4.3714	-19.2430	0.1123	0.0494	0.0932	3.553	3.033187
6	40	2.0742	-13.8800	0.0105	0.0705	0.1771	6.317	3.035506
7	50	1.1110	-10.8880	0.0093	0.0909	0.2856	9.870	3.041537
8	100	0.0234	- 5.2486	0.0008	0.1905	1.1971	39.478	3.069330
9	200	-0.1931	- 2.5502	-0.0295	0.3899	4.8995	157.914	3.111921
10	400	-0.2348	- 1.1605	-0.1675	0.8278	20.8051	631.655	3.296063
11	600	-0.1762	- 0.7653	-0.2858	1.2410	46.7833	1421.223	3.292792
12	800	-0.1642	- 0.5416	-0 5125	1.6910	84.9963	2526.619	3.364614
13	1000	-0.1481	- 0.4105	-0.7780	2.1555	135.4352	3947.842	3.430986
14	1200	-0.1312	- 0.3253	-1.0662	2.6444	199.3826	5684.892	3.507495
15	1400	-0.1217	- 0.2691	-1.3950	3.0854	271.4023	7737.770	3.507690
16	1600	-0.1103	- 0.2228	-1.7847	3.6051	362.4200	10106.475	3.586164
17	1800	-0.1013	- 0.1915	-2.1590	4.0796	461.3939	12791.007	3.607290
18	2000	-0.0944	- 0.1665	-2.5769	4.5465	571.3277	15791.367	3.618068
19	2200	-0.0872	- 0.1458	-3.0225	5.0526	698.4150	19107.553	3.655255
20	2400	-0.0825	- 0.1299	-3.4852	5.4879	827.5492	22739.568	3.639313
21	2600	-0.0779	- 0.1159	-2.9939	5.9410	970.5423	26687.409	3.636760
22	2800	-0.0734	- 0.1045	-4.5032	5.4107	1127.8371	30951.078	3.643982
23	3000	-0.0693	- 0.0946	-5.0423	5.8829	1297.4010	35530.575	3.651547
24	3200	-0.0661	- 0.0861	-5.6125	7.3044	1458.6298	40425.898	3.632930
25	3400	-0.0637	- 0.0790	-6.1398	7.6743	1639.4569	45637.049	3.592414
26	3600	-0.0609	- 0.0725	-6.7964	8.0922	1830.4103	51164.027	3.577563
27	3800	-0.0586	- 0.0664	-7.4702	8.4704	2022.4038	57006.833	3.547677
28	4000	-0.0560	- 0.0609	-8.1776	8.8952	2235.6013	63165.466	3.539301
29	4200	-0.0540	- 0.0561	-8.9115	9.2463	2440.0352	69639.926	3.503813
30	4400	-0.0504	- 0.0528	-9.4527	9.9015	2737.3767	76430.214	3.581557
31	4600	-0.0492	- 0.0493	-10.1364	10.1580	2935.9419	83536.329	3.514587
32	4800	-0.0473	- 0.0465	-10.7439	10.5719	3188.4119	90958.271	3.505373
33	5000	-0.0458	- 0.0430	-11.5986	10.9061	3426.2649	98696.041	3.471547
34	5200	-0.0448	- 0.0403	-12.3343	11.0941	3624.7395	106749.638	3.395566
35	5400	-0.0434	- 0.0375	-13.1924	11.3917	3865.1272	115119.062	3.357517
36	5600	-0.0416	- 0.0348	-14.1474	11.8200	4158.9657	123804.313	3.359318
37	5800	-0.0406	- 0.0325	-15.0196	12.0329	4385.0803	132805.392	3.301895
38	6000	-0.0389	- 0.0304	-15.9598	12.4843	4706.4723	142122.299	3.311575

TABLE 33: TEST DATA FOR LABORATORY L (FITZGERALD SYSTEM/SHEAR)

SHEAR DEFORMATION (SHEAR MODULUS)
DIRECT STIFFNESS TEST SYSTEM (FITZGERALD)
Specimen Type: N/A
Specimen Length: N/A
Specimen Thickness: N/A
Specimen Width: N/A
Sample Constant: 30.427 cm
Sample Mass: 3.5 gm
Driving plate mass: 33.33 gm
Polymer Density = 1.309 g/cm**3 (0.046 Lb/in**3)
Test Dates: 14-29 May 1991

TEMP (C)	FREQ (Hz)	ELECTRICAL IMP R12 (Ohms)	ELECTRICAL IMP X12 (Ohms)	SHEAR WAVE VEL. Cs cm/s	SHEAR WAVE ATTN. cs db/cm	MODULUS MPa	LOSS FACTOR
+20.0	2	0.00055	0.00145	6149	0.00025	3.324	0.2054
	4	0.00145	0.00297	5449	0.00128	2.096	0.4949
	6	0.00184	0.00355	6227	0.00173	2.700	0.5088
	8	0.00205	0.00394	6777	0.00215	3.166	0.5191
	10	0.00295	0.00457	7168	0.00304	3.125	0.6383
	20	0.00468	0.00688	8304	0.00547	4.046	0.6709
	30	0.00593	0.00720	10028	0.00797	4.971	0.8208
	40	0.00679	0.00896	10597	0.00927	6.093	0.7401
	50	0.00666	0.00930	11115	0.01081	6.857	0.7201
	60	0.00764	0.01295	10420	0.01151	7.054	0.5769
	70	0.01047	0.01171	12035	0.01646	6.597	0.8908
	80	0.01267	0.01260	12526	0.01965	6.274	1.0019
	90	0.01341	0.01404	12464	0.02142	6.595	0.9508
	100	0.01413	0.01366	13696	0.02289	7.260	1.0300
	200	0.02125	0.01786	16955	0.04026	9.426	1.1742
	300	0.02784	0.01992	19949	0.05605	10.578	1.3640
	400	0.02915	0.01658	24456	0.06703	11.949	1.6411
	500	0.03426	0.0[illegible]953	26197	0.07845	13.574	1.6513
	600	0.03782	0.02381	26541	0.08847	16.313	1.4946
	700	0.04251	0.02360	29375	0.09853	16.724	1.6720
	800	0.04787	0.02300	31768	0.10934	16.269	1.8681
	900	0.05201	0.01922	36705	0.11562	14.756	2.3289
	1000	0.05420	0.01909	39670	0.12055	15.935	2.4322
	1200	0.06061	0.01723	42875	0.13645	16.585	2.5905
	1400	0.06705	0.01388	48056	0.14704	16.469	2.9397
	1600	0.07388	0.00973	52716	0.15707	16.278	3.2625
	1800	0.08003	0.00373	58632	0.16341	15.554	3.7339
	2000	0.08696	-0.00363	63769	0.17033	14.822	4.1757
	2200	0.09311	-0.01361	71895	0.17083	13.193	5.0129
	2400	0.09666	-0.02644	76746	0.17706	12.062	5.6078
	2600	0.09512	-0.03933	97104	0.15730	8.885	8.3040
	2800	0.09294	-0.05170	108988	0.15288	7.612	10.0810
	3000	0.08863	-0.06247	144949	0.12592	5.074	16.4476

TABLE 33 (CONTINUED)

TEMP (C)	FREQ (Hz)	ELECTRICAL IMP R12 (Ohms)	X12 (Ohms)	SHEAR WAVE VEL. Cs cm/s	ATTN. αs db/cm	MODULUS MPa	LOSS FACTOR
+10	2	0.00091	0.00070	9672	0.00077	2.495	1.3609
	4	0.00054	0.00074	10446	0.00098	5.691	0.7745
	6	0.00083	0.00119	11490	0.00118	7.760	0.6693
	8	0.00125	0.00084	16008	0.00195	5.997	1.4845
	10	0.00101	0.00114	15081	0.00186	10.473	0.8814
	20	0.00169	0.00199	15969	0.00340	12.274	0.8436
	30	0.00217	0.00221	18794	0.00484	14.481	0.9806
	40	0.00256	0.00292	18039	0.00621	15.078	0.8817
	50	0.00257	0.00335	19118	0.00661	19.232	0.7667
	60	0.00428	0.00434	18388	0.00993	13.771	0.9863
	70	0.00401	0.00302	24436	0.01046	16.734	1.3153
	80	0.00368	0.00447	21884	0.00960	24.082	0.8060
	90	0.00438	0.00397	24458	0.01208	21.261	1.1037
	100	0.00398	0.00464	23485	0.01167	26.255	0.8530
	200	0.00656	0.00644	28947	0.02143	33.037	1.0141
	300	0.00863	0.00762	33165	0.03017	37.848	1.1319
	400	0.01162	0.00899	35722	0.04050	36.619	1.2936
	500	0.00950	0.01092	30566	0.04606	42.872	0.8844
	600	0.01271	0.01418	35420	0.04644	59.720	0.8530
	700	0.01451	0.01193	45505	0.05409	63.549	1.2331
	800	0.01683	0.01222	48791	0.06249	59.537	1.4211
	900	0.02047	0.01024	62495	0.06795	42.635	2.3332
	1000	0.01865	0.01029	71037	0.06559	58.886	2.2482
	1200	0.02131	0.01089	68154	0.08076	58.665	2.1504
	1400	0.02294	0.01067	77277	0.08659	60.664	2.4278
	1600	0.02525	0.01095	82149	0.09468	61.970	2.5657
	1800	0.02734	0.01020	92228	0.09905	58.226	3.0045
	2000	0.02966	0.01027	95705	0.10676	59.583	3.0868
	2200	0.03220	0.00937	110448	0.10646	52.942	3.8155
	2400	0.03508	0.00891	108001	0.11795	54.273	3.6300
	2600	0.03619	0.00808	131007	0.10990	49.035	4.7321
	2800	0.04072	0.00708	128944	0.12026	47.484	4.7331
	3000	0.04400	0.00541	196259	0.09071	27.062	9.6256
+ 0.2	2	-0.00049	0.00001	19654	0.00055	-1.419	4.1595
	4	0.00039	0.00024	20289	0.00078	9.231	1.5259
	6	0.00010	0.00016	47582	[illegible]	209.458	0.0195
	8	0.00033	0.00030	30560	0.00087	32.151	1.1315
	10	0.00045	0.00024	39705	0.00115	20.724	2.1021
	20	0.00029	0.00069	29558	0.00060	75.296	0.2427
	30	0.00051	0.00075	31089	0.00222	55.922	0.6834
	40	0.00071	0.00078	38726	0.00293	68.146	0.8927
	50	0.00064	0.00163	29493	0.00144	75.457	0.2310
	60	0.00094	0.00086	36098	0.00533	48.347	1.0664
	70	0.00087	0.00128	36164	0.00447	75.429	0.6862
	80	0.00125	0.00171	34718	0.00551	67.210	0.7161
	90	0.00168	0.00192	35005	0.00714	57.275	0.8686

TABLE 33 (CONTINUED)

TEMP (C)	FREQ (Hz)	ELECTRICAL IMP R12 (Ohms)	X12 (Ohms)	SHEAR WAVE VEL. Cs cm/s	ATTN. cs db/cm	MODULUS MPa	LOSS FACTOR
+ 0.2	90	0.00168	0.00192	35005	0.00714	57.275	0.8686
	100	0.00089	0.00141	43419	0.00466	121.366	0.5855
	200	0.00184	0.00294	42928	0.00985	114.794	0.6163
	300	0.00269	0.00354	49931	0.01428	140.003	0.7098
	400	0.00289	0.00387	54815	0.01709	171.162	0.6972
	500	0.00238	0.00405	49815	0.02240	147.764	0.6576
	600	0.00596	0.00843	43114	0.03194	107.931	0.6802
	700	0.00580	0.00765	57118	0.02654	199.337	0.6341
	800	0.00766	0.00836	63500	0.03401	195.888	0.8356
	900	0.00915	0.00809	75520	0.04119	181.903	1.1988
	1000	0.00845	0.00528	415923	0.01465	38.582	17.1163
	1200	0.00899	0.00615	130759	0.04266	201.836	2.2337
	1400	0.01022	0.00691	126458	0.05055	206.533	2.1233
	1600	0.01114	0.00687	143966	0.05419	186.743	2.5923
	1800	0.01217	0.00673	187941	0.05150	143.839	3.9434
	2000	0.01257	0.00674	228557	0.04892	130.391	5.0703
	2200	0.01356	0.00740	219401	0.05508	152.894	4.4821
	2400	0.01468	0.00764	230990	0.05786	141.205	4.9211
	2600	0.01454	0.00711	387815	0.03977	-106.431	-9.5909
	2800	0.01659	0.00867	100943	0.00677	-938.133	0.0654
	3000	0.01749	0.00894	123004	0.10982	208.550	2.0460
-10.0	2	-0.00002	0.00050	10154	0.00011	9.274	-0.1523
	4	0.00018	0.00033	15101	0.00059	13.693	0.6499
	6	0.00040	0.00010	41957	0.00064	-24.896	-2.0160
	8	0.00017	0.00008	45876	0.00076	34.065	1.8636
	10	0.00022	-0.00018	48913	0.00094	-29.418	-2.1831
	20	0.00028	0.00040	41585	0.00100	108.887	0.6063
	30	0.00018	0.00040	34585	0.00191	72.153	0.6458
	40	0.00067	0.00023	131525	0.00170	-43.901	-5.0276
	50	-0.00030	0.00176	24373	0.00051	54.677	-0.0670
	60	0.00016	0.00160	28477	0.00120	72.919	0.1531
	70	0.00071	0.00059	68513	0.00369	134.882	1.2924
	80	0.00055	0.00120	41906	0.00268	136.318	0.3903
	90	0.00028	0.00119	46719	0.00027	201.672	0.0374
	100	0.00025	0.00165	38291	0.00100	133.934	0.1030
	200	0.00089	0.00205	51636	0.00478	215.474	0.3396
	300	0.00148	0.00255	63572	0.00656	315.002	0.3853
	400	0.00171	0.00233	84589	0.00884	485.618	0.5346
	500	0.00065	0.00169	931091	0.00334	-17.707	56.6035
	600	-0.00007	0.00503	40174	0.02284	121.337	0.4274
	700	0.00293	0.00632	55148	0.01737	238.262	0.3791
	800	0.00520	0.00621	86757	0.01885	481.125	0.6923
	900	0.00602	0.00717	84580	0.02207	452.304	0.6025

TABLE 33 (CONTINUED)

TEMP (C)	FREQ (Hz)	ELECTRICAL IMP R12 (Ohms)	X12 (Ohms)	SHEAR WAVE VEL Cs cm/s	ATTN. cs db/cm	MODULUS MPa	LOSS FACTOR
-10.0	1000	0.00651	[illegible]	81253	0.00615	-597.594	-0.1343
	1200	0.00600	0.00502	221412	0.02493	611.079	2.1664
	1400	0.00636	0.00438	373466	0.02099	339.732	5.1339
	1600	0.00735	0.00563	307400	0.02777	416.860	3.7833
	1800	0.00862	0.00561	758789	0.01462	52.455	26.7937
	2000	0.00890	[illegible]	266487	0.03805	-490.234	-2.9910
	2200	0.00888	[illegible]	441658	0.02876	-277.492	-6.7454
	2400	0.00953	[illegible]	242191	0.03975	-1258.153	-1.5697
	2600	0.00925	[illegible]	170043	0.01208	-2531.054	-0.2139
	2800	0.01073	[illegible]	133616	0.03223	-1338.966	0.4301
	3000	0.01160	[illegible]	128427	0.09385	352.038	1.5746
-10.0	2	-0.00006	[illegible]	12584	0.00021	12.606	-0.3592
	4	0.00032	0.00029	16395	0.00078	10.002	1.0639
	6	0.00005	-0.00002	26412	0.00053	-40.147	0.6881
	8	-0.00001	0.00033	22532	0.00008	46.803	0.0568
	10	0.00023	0.00017	35115	0.00101	37.091	1.2510
	20	0.00007	0.00034	44959	0.00033	177.928	-0.2027
	30	0.00023	0.00029	38900	0.00218	69.191	0.8874
	40	-0.00015	0.00032	305514	0.00081	5.771	-32.5291
	50	0.00034	0.00103	31492	0.00242	74.658	0.4259
	60	-0.00020	0.00041	51996	0.00087	237.785	-0.2044
	70	0.00003	0.00050	72172	0.00156	382.598	-0.4531
	80	0.00022	0.00128	39866	0.00059	145.990	0.0782
	90	0.00086	0.00050	104856	0.00412	108.336	2.4688
	100	0.00083	0.00087	58135	0.00509	143.846	0.9486
	200	0.00094	0.00203	52184	0.00518	214.181	0.3743
	300	0.00139	0.00272	60367	0.00559	301.295	0.3082
	400	0.00228	0.00343	62933	0.01178	270.294	0.5291
	500	0.00104	0.00340	83766	0.00848	542.607	-0.3948
	600	-0.00571	0.00416	41538	0.01206	150.056	-0.2264
	700	0.00342	0.00681	53052	0.02023	211.382	0.4286
	800	0.00491	0.00813	64551	0.01265	351.439	0.2784
	900	0.00616	0.00773	77685	0.02219	403.409	0.5495
	1000	0.00683	0.00254	83099	0.01030	-598.667	-0.2322
	1200	0.00655	0.00508	214725	0.02746	395.804	2.6612
	1400	0.00699	0.00515	271803	0.02746	329.293	3.7630
	1600	0.00786	0.00577	272706	0.03117	343.254	3.6954
	1800	0.00903	0.00588	401755	0.02638	142.457	8.5820
	2000	0.00930	0.00522	327962	0.03404	-274.853	-5.0099
	2200	0.00962	0.00587	1140761	0.01201	- 26.500	-56.6887
	2400	0.01018	0.00602	265319	0.04274	-762.625	-2.3431
	2600	0.01010	0.00652	194984	0.03080	-2194.714	-0.6854
	2800	0.01125	0.00760	128637	0.02301	-1386.350	0.2887
	3000	0.01221	0.00768	125874	0.09652	329.509	1.6005

TABLE 33 (CONTINUED)

TEMP (C)	FREQ (Hz)	ELECTRICAL IMP R12 (Ohms)	X12 (Ohms)	SHEAR WAVE VEL Cs cm/s	ATTN. Cs db/cm	MODULUS MPa	LOSS FACTOR
0.2	2	-0.00008	0.00087	8048	0.00031	5.205	-0.3470
	4	-0.00011	-0.00001	93601	0.00024	15.549	-6.0306
	6	0.00040	0.00035	25095	0.00081	20.719	1.1713
	8	0.00024	0.00054	19921	0.00051	31.799	0.3508
	10	0.00053	0.00053	23432	0.00132	21.753	1.0099
	20	0.00033	0.00068	29744	0.00075	73.242	0.3063
	30	0.00042	0.00098	26597	0.00175	52.810	0.4353
	40	0.00091	0.00128	28761	0.00320	47.874	0.6831
	50	0.00103	0.00142	33297	0.00326	67.591	0.6361
	60	0.00104	0.00023	55794	0.00514	31.782	2.4211
	70	0.00070	0.00158	31852	0.00351	74.872	0.4480
	80	0.00074	0.00149	36438	0.00364	96.225	0.4675
	90	0.00108	0.00280	27554	0.00435	60.025	0.3679
	100	0.00126	0.00171	39497	0.00600	87.839	0.7075
	200	0.00175	0.00313	40392	0.00908	112.072	0.5227
	300	0.00298	0.00398	46546	0.01520	122.581	0.7032
	400	0.00371	0.00425	52582	0.02076	132.368	0.8481
	500	0.00251	0.00399	50282	0.02315	144.850	0.6921
	600	0.00117	0.00612	49160	0.00525	220.025	0.1154
	700	0.00707	0.00793	56592	0.03309	157.364	0.8259
	800	0.00817	0.00793	67346	0.03700	177.530	1.0203
	900	0.00904	0.00865	70280	0.04035	189.445	1.0378
	1000	0.00885	0.00416	185607	0.02901	-138.130	-3.9752
	1200	0.00963	0.00656	118878	0.04593	185.590	2.1033
	1400	0.01077	0.00669	132529	0.05102	167.891	2.5102
	1600	0.01169	0.00663	151430	0.05392	150.485	3.0725
	1800	0.01248	0.00686	180036	0.05335	143.025	3.7828
	2000	0.01293	0.00684	218392	0.05093	128.586	4.8746
	2200	0.01396	0.00753	209055	0.05741	151.002	4.2924
	2400	0.01492	0.00721	266812	0.05192	101.610	6.7340
	2600	0.01565	0.00795	589708	0.02715	34.701	25.6010
	2800	0.01718	0.00844	99926	0.00113	-924.106	-0.0108
	3000	0.01822	0.00870	124775	0.11097	190.619	2.1884
10.4	2	0.00036	0.00012	86028	0.00014	-0.620	-27.9409
	4	0.00095	0.00118	8584	0.00124	3.638	0.8217
	6	0.00100	0.00116	11341	0.00139	6.688	0.8513
	8	0.00123	0.00150	11411	0.00186	6.464	0.8169
	10	0.00124	0.00167	12233	0.00201	8.129	0.7391
	20	0.00200	0.00193	16483	0.00382	10.454	1.0351
	30	0.00227	0.00262	17033	0.00486	13.684	0.8609
	40	0.00262	0.00315	17401	0.00621	14.681	0.8373
	50	0.00260	0.00250	22632	0.00696	19.649	1.0376
	60	0.00251	0.00436	17688	0.00691	20.047	0.5900
	70	0.00377	0.00391	21018	0.00998	18.458	0.9644
	80	0.00427	0.00430	22728	0.01075	20.904	0.9917

TABLE 33 (CONTINUED)

TEMP (C)	FREQ (Hz)	ELECTRICAL IMP R12 (Ohms)	X12 (Ohms)	SHEAR WAVE VEL. Cs cm/s	ATTN. cs db/cm	MODULUS MPa	LOSS FACTOR
10.4	90	0.00358	0.00453	22240	0.01040	25.511	0.7841
	100	0.00522	0.00505	22824	0.01375	20.119	1.0319
	200	0.00713	0.00696	27792	0.02241	30.250	1.0198
	300	0.00937	0.00837	31496	0.03148	34.766	1.1159
	400	0.01151	0.00896	35774	0.04030	37.036	1.2860
	500	0.00911	0.00812	34846	0.04642	44.366	1.0797
	600	0.01413	0.01293	37999	0.05094	53.031	1.0752
	700	0.01633	0.01176	46374	0.05802	52.495	1.4441
	800	0.01817	0.01314	46467	0.06538	54.545	1.4116
	900	0.02283	0.01353	50504	0.07577	44.645	1.7738
	1000	0.00285	0.00913	78398	0.06518	39.908	3.0898
	1200	0.02244	0.01067	68965	0.08197	52.358	2.3224
	1400	0.02447	0.01048	77666	0.08827	52.930	2.6298
	1600	0.02691	0.01027	84987	0.09499	51.632	2.9360
	1800	0.02928	0.01021	90418	0.10193	52.248	3.1159
	2000	0.03176	0.00958	97575	0.10740	50.024	3.4539
	2200	0.03423	0.00946	106300	0.11043	49.869	3.7825
	2400	0.03647	0.00860	107524	0.11921	50.559	3.8005
	2600	0.03966	0.00757	125467	0.11499	43.796	4.7969
	2800	0.04280	0.00614	129720	0.12065	42.174	5.0597
	3000	0.04634	0.00397	203398	0.08822	22.106	11.0447
20.1	2	0.00069	0.00103	7948	0.00046	4.337	0.5231
	4	0.00132	0.00251	5934	0.00126	2.395	0.5325
	6	0.00200	0.00350	6303	0.00186	2.619	0.5631
	8	0.00239	0.00417	6615	0.00240	2.861	0.5709
	10	0.00277	0.00441	7282	0.00292	3.291	0.6196
	20	0.00504	0.00637	8737	0.00590	3.928	0.7961
	30	0.00648	0.00788	9577	0.00833	4.544	0.8188
	40	0.00827	0.00882	10871	0.01076	5.129	0.9319
	50	0.00891	0.01008	10847	0.01298	5.401	0.8841
	60	0.01060	0.01080	11865	0.01530	5.788	0.9782
	70	0.01080	0.01088	12598	0.01695	6.439	0.9895
	80	0.01175	0.01260	12446	0.01874	6.753	0.9282
	90	0.01347	0.01343	12793	0.02159	6.571	0.9986
	100	0.01369	0.01327	13900	0.02251	7.503	1.0271
	200	0.02119	0.01717	17345	0.04024	9.392	1.2178
	300	0.02775	0.01890	20558	0.05586	10.441	1.4327
	400	0.02973	0.01594	24961	0.06728	11.432	1.7289
	500	0.03317	0.02081	25265	0.07769	14.644	1.5038
	600	0.03745	0.02066	28744	0.08717	15.458	1.7086
	700	0.04188	0.02188	30638	0.09714	16.433	1.7786
	800	0.04628	0.02186	32682	0.10719	16.631	1.9065
	900	0.05204	0.01919	36635	0.11566	14.827	2.3178
	1000	0.05287	0.01741	41610	0.11729	15.511	2.6004
	1200	0.05867	0.01534	45181	0.13214	16.130	2.7828

TABLE 33 (CONTINUED)

TEMP (C)	FREQ (Hz)	ELECTRICAL IMP R12 (Ohms)	X12 (Ohms)	SHEAR WAVE VEL. Cs cm/s	ATTN. cs db/cm	MODULUS MPa	LOSS FACTOR
20.1	1400	0.06526	0.01248	50002	0.14320	16.119	3.1015
	1600	0.07125	0.00778	55959	0.15081	15.479	3.5659
	1800	0.07740	0.00235	61551	0.15771	14.944	4.0089
	2000	0.08338	-0.00471	67403	0.16323	14.165	4.5250
	2200	0.08919	-0.01402	76070	0.16319	12.539	5.4491
	2400	0.09178	-0.02660	82917	0.16615	10.986	6.3601
	2600	0.09090	-0.03806	104463	0.14741	8.139	9.3409
	2800	0.08840	-0.04967	120374	0.13969	6.614	11.9539
	3000	0.08497	-0.05936	162883	0.11275	4.264	20.1674
30.2	2	0.00038	0.00270	3758	0.00044	1.229	0.2252
	4	0.00099	0.00451	4326	0.00068	1.651	0.1981
	6	0.00202	0.00651	4468	0.00148	1.658	0.3023
	8	0.00266	0.00781	4706	0.00207	1.796	0.3354
	10	0.00352	0.00959	4743	0.00280	1.779	0.3675
	20	0.00703	0.01588	5232	0.00608	2.024	0.4460
	30	0.01112	0.02163	5524	0.00985	2.109	0.5166
	40	0.01429	0.02515	5967	0.01318	2.340	0.5661
	50	0.01742	0.02864	6272	0.01661	2.479	0.6058
	60	0.02024	0.03173	6648	0.01923	2.736	0.6220
	70	0.02356	0.03465	6763	0.02367	2.667	0.6777
	80	0.02622	0.03711	7063	0.02654	2.840	0.6976
	90	0.02953	0.03921	7259	0.03069	2.837	0.7470
	100	0.03234	0.04111	7522	0.03393	2.943	0.7766
	200	0.05707	0.05484	9418	0.06507	3.571	0.9960
	300	0.08237	0.06009	11143	0.09545	3.738	1.2503
	400	0.09106	0.04353	14715	0.11436	3.943	1.7372
	500	0.10670	0.05453	15014	0.13375	4.817	1.5734
	600	0.12411	0.05297	16210	0.15379	5.006	1.6897
	700	0.14040	0.04974	17514	0.17046	5.306	1.7914
	800	0.15923	0.03852	19102	0.18819	5.076	2.0352
	900	0.17341	0.02455	20937	0.20109	5.009	2.2747
	1000	0.18561	0.00911	22731	0.21214	4.982	2.4982
	1200	0.20337	-0.03038	25973	0.23294	4.851	2.9268
	1400	0.20349	-0.07875	30546	0.24321	4.352	3.6756
	1600	0.18779	-0.12482	34748	0.25182	4.051	4.3577
	1800	0.15134	-0.16084	40731	0.25012	3.420	5.5890
	2000	0.10843	-0.17681	50766	0.23109	2.528	8.1370
	2200	0.07084	-0.17526	67068	0.19798	1.647	13.3506
	2400	0.04453	-0.16737	107056	0.13855	0.771	31.1778
	2600	0.02405	-0.15958	132983	0.12146	0.568	45.1317
	2800	0.00464	-0.14944	504875	0.03482	0.042	628.4324
	3000	-0.01002	-0.13675	167959	0.11139	-0.401	-67.8513

TABLE 33 (CONTINUED)

TEMP (C)	FREQ (Hz)	ELECTRICAL IMP R12 (Ohms)	ELECTRICAL IMP X12 (Ohms)	SHEAR WAVE VEL. Cs cm/s	SHEAR WAVE ATTN. cs db/cm	MODULUS MPa	LOSS FACTOR
40.2	2	0.00021	0.00300	3775	0.00006	1.317	0.0307
	4	0.00129	0.00658	3542	0.00083	1.106	0.1996
	6	0.00147	0.00877	3755	0.00100	1.260	0.1689
	8	0.00226	0.01141	3825	0.00147	1.295	0 1901
	10	0.00298	0.01386	3867	0.00205	1.309	0.2141
	20	0.00700	0.02507	4083	0.00500	1.406	0.2785
	30	0.01109	0.03543	4214	0.00812	1.464	0.3128
	40	0.01489	0.04486	4337	0.01107	1.531	0.3297
	50	0.01983	0.05091	4581	0.01512	1.637	0.3842
	60	0.02288	0.05983	4598	0.01815	1.648	0.3858
	70	0.03005	0.06801	4708	0.02316	1.654	0.4362
	80	0.03383	0.07416	4836	0.02638	1.727	0.4475
	90	0.03956	0.08094	4920	0.03106	1.735	0.4796
	100	0.04473	0.08704	5019	0.03523	1.767	0.5019
	200	0.10105	0.13467	5866	0.07941	1.970	0 6925
	300	0.18347	0.16323	6638	0.13256	1.904	0 9357
	400	0.20964	0.14456	8069	0.16062	2.372	1 0822
	500	0.28490	0.14614	8637	0 19749	2.448	1.1733
	600	0.36681	0.11670	9283	0.23284	2.497	1 2847
	700	0.44376	0.05196	9963	0.26737	2.493	1.4171
	800	0.49131	-0.06251	10845	0.29948	2.426	1 6089
	900	0.48221	-0.19026	11704	0.32738	2.386	1.7841
	1000	0.41431	-0.29625	12689	0.35156	2.314	1.9973
	1200	0.22533	-0.37725	14581	0.39450	2.123	2.4507
	1400	0 09248	-0.33712	18551	0.40108	1.581	3 7044
	1600	0.02406	-0.28874	21595	0.40903	1.389	4.6324
	1800	-0.00652	-0.24042	30489	0.34696	0.868	8.3440
50.0	2	0.00026	0.00381	3244	0.00015	0.969	0.0660
	4	0.00075	0.00755	3266	0.00043	0.977	0.0945
	6	0.00140	0.01081	3325	0.00091	1.000	0.1360
	8	0.00188	0.01437	3351	0.00112	1.019	0.1257
	10	0.00262	0.01769	3380	0.00157	1.031	0.1432
	20	0.00593	0.03322	3491	0.00371	1.086	0.1748
	30	0.00986	0.04778	3571	0.00630	1.122	0.2027
	40	0.01396	0.06161	3637	0.00906	1.152	0.2232
	50	0.01929	0.07493	3700	0.01255	1.173	0.2524
	60	0.02464	0.08783	3766	0.01573	1.203	0.2691
	70	0.02900	0.10018	3800	0.01917	1.213	0 2840
	80	0.03485	0.11231	3853	0.02284	1.234	0.3011
	90	0.04039	0.12394	3901	0.02654	1.252	0.3154
	100	0.04714	0.13612	3935	0.03091	1.256	0.3346
	200	0.13070	0.24577	4309	0.07771	1.340	0.4721
	300	0.34117	0.33835	4660	0.16001	1.164	0.7509
	400	0.40751	0 35372	5376	0.17904	1.603	0.7210
	500	0.70649	0.32959	5651	0.23223	1.607	0.8054

TABLE 33 (CONTINUED)

TEMP (C)	FREQ (Hz)	ELECTRICAL IMP R12 (Ohms)	ELECTRICAL IMP X12 (Ohms)	SHEAR WAVE VEL. Cs cm/s	SHEAR WAVE ATTN. cs db/cm	MODULUS MPa	LOSS FACTOR
50.0	600	1.01220	0.02129	5903	0.28556	1.604	0.8817
	700	0.91587	-0.55090	6325	0.34999	1.525	1.0433
	800	0.54008	-0.75939	6647	0.40381	1.502	1.1426
	900	0.24647	-0.69877	7049	0.45300	1.493	1.2518
	1000	0.09670	-0.58836	7475	0.50371	1.445	1.3896
	1200	-0.01647	-0.41307	8449	0.60591	1.234	1.7927
	1400	-0.05016	-0.31457	10102	0.67031	0.966	2.5233
	1600	-0.05554	-0.25227	13596	0.63539	0.720	4.0363
	1800	-0.06246	-0.21232	13992	0.69403	0.769	4.0165
59.8	2	0.00037	0.00499	2757	0.00030	0.693	0.1113
	4	0.00103	0.00913	2938	0.00059	0.786	0.1155
	6	0.00115	0.01325	2995	0.00062	0.823	0.0831
	8	0.00187	0.01751	3008	0.00104	0.826	0.1045
	10	0.00257	0.02157	3024	0.00149	0.831	0.1212
	20	0.00561	0.04060	3122	0.00331	0.881	0.1390
	30	0.00887	0.05959	3170	0.00506	0.907	0.1439
	40	0.01253	0.07793	3201	0.00733	0.920	0.1581
	50	0.01614	0.09651	3220	0.00955	0.928	0.1657
	60	0.02180	0.11344	3271	0.01258	0.950	0.1852
	70	0.02736	0.13026	3305	0.01594	0.961	0.2035
	80	0.03256	0.14760	3326	0.01903	0.968	0.2142
	90	0.03926	0.16515	3351	0.02261	0.976	0.2282
	100	0.04601	0.18240	3373	0.02640	0.981	0.2418
	200	0.14735	0.36917	3551	0.07040	1.016	0.3443
	300	0.61734	0.46696	3958	0.20278	0.770	0.8258
	400	0.75849	0.72283	4140	0.17720	1.177	0.5229
	500	1.86550	0.26533	4277	0.23679	1.177	0.5861
	600	1.29280	-1.26270	4401	0.30973	1.135	0.6719
	700	0.31879	-1.14380	4549	0.37740	1.125	0.73837
	800	0.04508	-0.82373	4698	0.45098	1.098	0.8149
	900	-0.03578	-0.63194	4848	0.53819	1.034	0.9205
	1000	-0.06780	-0.50656	4989	0.62118	0.983	1.0125
	1200	-0.07872	-0.35646	5509	0.83028	0.759	1.4213
	1400	-0.07982	-0.27504	7019	0.96379	0.469	2.5145
	1600	-0.07738	-0.22987	7839	0.99821	0.543	2.6192
	1800	-0.07652	-0.19047	8166	1.14693	0.373	3.3421
70.0	2	-0.00022	0.00539	2655	0.00006	0.652	-0.0211
	4	0.00065	0.01049	2734	0.00028	0.690	0.0505
	6	0.00125	0.01517	2765	0.00069	0.702	0.0847
	8	0.00202	0.01970	2808	0.00108	0.721	0.1017
	10	0.00225	0.02408	2841	0.00121	0.739	0.0920
	20	0.00546	0.04664	2893	0.00293	0.762	0.1138
	30	0.00889	0.06361	2928	0.00474	0.779	0.1243
	40	0.01241	0.09030	2947	0.00683	0.786	0.1353

TABLE 33 (CONTINUED)

TEMP (C)	FREQ (Hz)	ELECTRICAL IMP R12 (Ohms)	X12 (Ohms)	SHEAR WAVE VEL. Cs cm/s	ATTN. cs db/cm	MODULUS MPa	LOSS FACTOR
70.0	50	0.01514	0.11132	2974	0.00834	0.801	0.1333
	60	0.02343	0.13230	3004	0.01265	0.806	0.1707
	70	0.02715	0.15305	3022	0.01476	0.815	0.1719
	80	0.03281	0.17350	3046	0.01773	0.824	0.1821
	90	0.03853	0.19494	3061	0.02057	0.830	0.1889
	100	0.04493	0.21609	3079	0.02372	0.837	0.1974
	200	0.15828	0.46809	3184	0.06559	0.851	0.2851
	300	0.65249	0.39678	4131	0.21801	0.711	0.9669
	400	1.33000	1.19010	3581	0.16916	0.968	0.4229
	500	2.64770	-1.60680	3652	0.22927	0.962	0.4723
	600	0.40049	-1.56720	3686	0.30751	0.916	0.5408
	700	0.00157	-0.99677	3758	0.38041	0.903	0.5918
	800	-0.07621	-0.71634	3730	0.48364	0.821	0.6656
	900	-0.09561	-0.55345	3843	0.57757	0.798	0.7435
	1000	-0.10028	-0.45095	3883	0.69510	0.733	0.8356
	1200	-0.08991	-0.32712	4272	1.05098	0.480	1.3736
	1400	-0.08121	-0.25673	8172	0.96151	0.157	5.2218
	1600	-0.08216	-0.21440	5423	1.38616	0.329	2.3035
	1800	-0.07739	-0.17903	7706	1.35669	0.074	7.2056
79.7	2	0.00015	0.00599	2518	0.00005	-0.587	0.0171
	4	0.00117	0.01110	2620	0.00055	-0.628	0.0969
	6	0.00144	0.01704	2586	0.00067	-0.614	0.0777
	8	0.00169	0.02209	2620	0.00081	-0.631	0.0712
	10	0.00237	0.02782	2602	0.00123	-0.621	0.0856
	20	0.00545	0.05302	2666	0.00287	-0.650	0.1026
	30	0.00933	0.07877	2678	0.00494	-0.652	0.1184
	40	0.01295	0.10324	2692	0.00710	-0.657	0.1285
	50	0.01341	0.12860	2695	0.01002	-0.655	0.1453
	60	0.02151	0.14936	2724	0.01242	-0.668	0.1518
	70	0.02838	0.17515	2716	0.01600	-0.660	0.1674
	80	0.03519	0.19969	2708	0.02013	-0.651	0.1839
	90	0.04017	0.22490	2695	0.02318	-0.644	0.1874
	100	0.04790	0.25019	2680	0.02801	-0.632	0.2030
	200	0.17506	0.56572	2297	0.12653	-0.405	0.4045
	300	0.65023	0.49799	7142	0.24676	-0.048	8.2998
	400	2.62720	1.57730	2486	0.09389	0.555	-0.1572
	500	1.04380	-2.42960	3841	0.02457	1.361	0.0506
	600	0.05075	-1.22340	5019	0.05800	2.283	0.1304
	700	-0.08631	-0.85654	6262	0.07881	3.472	0.1904
	800	-0.10924	-0.63394	7463	0.09349	4.817	0.2367
	900	-0.11026	-0.50249	8665	0.10343	6.361	0.2714
	1000	-0.10766	-0.41668	9869	0.11320	8.065	0.3059
	1200	-0.09269	-0.30896	12293	0.12207	12.169	0.3445
	1400	-0.08001	-0.24890	14670	0.13173	16.813	0.3827

TABLE 33 (CONCLUDED)

TEMP (C)	FREQ (Hz)	ELECTRICAL IMP R12 (Ohms)	X12 (Ohms)	SHEAR WAVE VEL. Cs cm/s	ATTN. cs db/cm	MODULUS MPa	LOSS FACTOR
79.7	1600	-0.08278	-0.20480	17215	0.14769	21.915	0.4457
	1800	-0.07469	-0.17398	19722	0.15366	27.987	0.4751
	2000	-0.07027	-0.14748	22420	0.16120	34.819	0.5142
	2200	-0.06596	-0.12899	25047	0.16858	41.833	0.5507
	2400	-0.06084	-0.11423	27645	0.17323	49.701	0.5760
	2600	-0.05744	-0.10273	30119	0.18019	57.073	0.6071
	2800	-0.05394	-0.09278	32828	0.18399	66.057	0.6312
	3000	-0.05147	-0.08446	35629	0.18816	75.511	0.6585

TABLE 34: TEST DATA FOR LABORATORY M (VISCOELASTICIMETRE/EXTENSION)

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
DIRECT STIFFNESS TEST SYSTEM
METRAVIB VISCOELASTICIMETRE MVCX900I
Specimen Type: Cylindrical button
Specimen Length: 31.28 mm
Specimen Breadth: 19.54 mm
Specimen Width: 22.88 mm
Polymer Density = 0.046 Lb/in**3
Stabilization time: 45 minutes
Test Date: 7/19/90
Originator's File #: Round Robin A5

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	E N/m**2	LOSS FACTOR
+16.0	5.0	-9.9	1.5	10.8	1.41E5	28.1	8.22E6	0.534
	8.4	-11.0	1.8	10.9	1.64	31.4	9.25	0.610
	14.1	-11.4	2.1	10.8	1.95	34.6	1.06E7	0.690
	23.8	-12.1	2.6	10.9	2.40	37.9	1.25	0.778
	40.0	-12.5	3.2	10.8	2.98	40.5	1.50	0.855
	67.3	-13.1	4.2	10.8	3.83	43.1	1.85	0.936
	113.3	-13.4	5.4	10.9	4.93	45.0	2.31	1.00
	190.5	-14.4	7.4	10.9	6.81	50.8	2.85	1.23
	320.4	-17.0	9.6	10.9	8.85	45.9	4.08	1.03
	539.0	-15.3	12.4	10.8	1.14E6	45.8	5.27	1.03
+ 7.0	5.0	-29.5	2.4	11.0	2.16E5	35.1	1.17E7	0.704
	8.4	-29.5	2.9	10.8	2.71	38.2	1.41	0.787
	14.1	-28.4	3.7	10.8	3.39	40.5	1.71	0.853
	23.8	-28.0	4.8	10.8	4.46	42.6	2.17	0.919
	40.0	-27.6	6.2	10.9	5.68	43.8	2.72	0.958
	67.3	-27.9	8.0	10.9	7.40	44.7	3.49	0.988
	113.3	-29.2	10.6	10.9	9.72	45.0	4.55	0.998
	190.5	-29.9	14.9	10.9	1.37E6	44.3	6.47	0.977
	320.4	-32.2	18.3	10.9	1.68	43.4	8.08	0.946
	539.0	-30.9	23.8	10.9	2.19	42.1	1.07E8	0.904
- 1.0	5.0	-43.9	7.3	10.9	6.71E5	41.5	3.33E7	0.884
	8.4	-43.8	9.4	10.8	8.65	41.7	4.28	0.891
	14.1	-43.2	12.3	10.9	1.12E6	41.4	5.58	0.882
	23.8	-42.4	15.3	10.7	1.43	40.7	7.17	0.861
	40.0	-42.0	19.4	10.9	1.77	39.8	9.03	0.832
	67.3	-42.4	24.4	11.0	2.23	38.5	1.15E8	0.795
	113.3	-43.5	30.0	11.0	2.74	36.9	1.45	0.752
	190.5	-44.6	39.1	11.0	3.55	32.3	1.99	0.632
	320.4	-45.8	46.1	11.1	4.14	33.4	2.29	0.660
	539.0	-45.0	53.2	10.[illegible]	5.02	30.9	2.85	0.599

TABLE 34 (CONTINUED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	E N/m**2	LOSS FACTOR
- 9.0	5.0	-56.2	22.1	10.8	2.04E6	36.5	1.09E8	0.740
	8.4	-55.2	27.6	10.9	2.53	34.8	1.37	0.695
	14.1	-55.7	33.3	10.9	3.07	33.0	1.70	0.650
	23.8	-56.0	40.9	10.9	3.76	30.8	2.14	0.597
	40.0	-56.4	48.7	10.9	4.46	28.8	2.59	0.550
	67.3	-56.3	57.0	10.9	5.23	26.6	3.09	0.501
	113.3	-56.2	66.4	11.0	6.03	24.5	3.63	0.456
	190.5	-56.3	78.1	11.0	7.08	19.8	4.41	0.360
	320.4	-57.2	87.7	11.2	7.84	22.3	4.80	0.411
	539.0	-57.4	100.2	11.3	8.88	19.8	5.53	0.360
-19.0	5.0	-69.2	58.4	10.9	5.35E6	24.5	3.22E8	0.456
	8.4	-68.1	65.2	10.6	6.16	22.4	3.77	0.412
	14.1	-67.3	74.1	10.9	6.81	20.9	4.22	0.382
	23.8	-66.3	80.7	10.8	7.50	19.1	4.69	0.347
	40.0	-66.7	89.9	10.8	8.35	17.2	5.28	0.310
	67.3	-68.0	97.9	10.7	9.12	15.5	5.82	0.277
	113.3	-69.0	101.2	10.3	9.83	14.0	6.32	0.250
	190.5	-69.7	119.5	10.8	1.11E7	9.9	7.25	0.175
	320.4	-70.1	127.2	10.9	1.17	13.0	7.54	0.230
	539.0	-70.0	144.3	11.1	1.30	11.3	8.42	0.199
-29.0	5.0	-80.3	105.7	10.6	9.99E6	12.8	6.45E8	0.227
	8.4	-79.2	112.8	10.4	1.08E7	11.1	7.02	0.196
	14.1	-78.7	120.1	10.5	1.14	10.1	7.45	0.178
	23.8	-79.0	125.5	10.5	1.20	9.0	7.84	0.159
	40.0	-79.6	130.7	10.5	1.25	8.2	8.18	0.144
	67.3	-80.6	136.0	10.4	1.30	7.4	8.55	0.130
	113.3	-80.8	140.8	10.4	1.35	6.8	8.87	0.120
	190.5	-80.3	155.8	10.6	1.47	4.1	9.71	0.0721
	320.4	-79.8	159.9	10.7	1.50	7.2	9.82	0.127
	539.0	-79.7	178.0	10.9	1.64	6.5	1.08E9	0.114
-38.0	5.0	-89.4	136.4	10.3	1.32E7	6.7	8.69E8	0.118
	8.4	-87.1	138.2	10.3	1.34	6.4	8.80	0.113
	14.1	-86.8	141.2	10.2	1.38	5.9	9.10	0.102
	23.8	-87.7	144.8	10.2	1.42	5.2	9.38	0.091
	40.0	-88.2	149.7	10.2	1.46	4.7	9.65	0.0825
	67.3	-87.8	152.6	10.2	1.50	4.4	9.88	0.0769
	113.3	-88.6	156.0	10.2	1.53	4.2	1.01E9	0.0743
	190.5	-88.0	158.8	9.6	1.65	2.1	1.09	0.0361
	320.4	-87.8	176.0	10.6	1.67	5.0	1.10	0.0869
	539.0	-88.1	193.3	10.7	1.81	5.0	1.19	0.0874

TABLE 34 (CONTINUED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	E N/m**2	LOSS FACTOR
-48.0	5.0	-100.0	140.1	9.2	1.52E7	3.9	1.00E9	0.0681
	8.4	-99.4	143.2	9.3	1.55	3.4	1.02	0.0597
	14.1	-98.0	145.4	9.2	1.57	3.2	1.04	0.0554
	23.8	-97.4	148.5	9.4	1.59	3.0	1.05	0.0518
	40.0	-96.7	151.0	9.4	1.61	2.9	1.06	0.0511
	67.3	-97.5	124.8	7.7	1.63	2.9	1.08	0.0500
	113.3	-98.1	155.4	9.5	1.64	2.9	1.08	0.0511
	190.5	-98.3	158.8	8.9	1.78	0.8	1.18	0.0139
	320.4	-97.7	174.9	9.8	1.78	3.7	1.18	0.0652
	539.0	-96.3	203.8	10.6	1.93	4.2	1.27	0.0732
-38.0	5.0	-75.6	111.5	10.2	1.09E7	10.1	7.13E8	0.179
	8.4	-74.1	120.1	10.5	1.14	9.3	7.44	0.164
	14.1	-74.1	125.3	10.4	1.20	8.4	7.87	0.148
	23.8	-74.8	130.0	10.4	1.25	7.6	8.18	0.134
	40.0	-75.4	136.3	10.4	1.31	6.8	8.61	0.119
	67.3	-75.2	139.6	10.4	1.34	6.4	8.84	0.112
	113.3	-74.7	143.4	10.4	1.38	6.1	9.05	0.107
	190.5	-74.1	157.2	10.6	1.49	3.8	9.83	0.0671
	320.4	-74.2	162.1	10.7	1.52	6.7	1.00E9	0.118
	539.0	-75.0	180.5	10.9	1.66	6.3	1.09	0.111
-28.0	5.0	-61.0	77.0	10.8	7.13E6	17.7	4.60E8	0.319
	8.4	-60.6	83.9	10.9	7.71	16.5	4.90	0.296
	14.1	-60.8	90.9	10.7	8.48	14.9	5.42	0.266
	23.8	-61.3	98.2	10.6	9.26	13.3	5.96	0.237
	40.0	-61.5	105.8	10.6	9.93	12.1	6.43	0.215
	67.3	-61.9	112.7	10.7	1.06E7	11.1	6.87	0.195
	113.3	-62.4	118.8	10.7	1.11	10.3	7.24	0.182
	190.5	-63.0	131.2	10.7	1.23	6.8	8.09	0.119
	320.4	-62.8	135.0	10.5	1.28	10.1	8.35	0.178
	539.0	-62.6	154.9	11.0	1.41	9.1	9.21	0.161
-18.0	5.0	-52.3	30.7	10.8	2.84E6	32.5	1.58E8	0.638
	8.4	-53.0	35.2	10.4	3.38	31.0	1.92	0.601
	14.1	-53.1	43.3	10.8	4.03	29.2	2.33	0.558
	23.8	-53.2	51.3	10.7	4.78	27.0	2.82	0.510
	40.0	-53.1	60.8	10.8	5.61	24.7	3.37	0.460
	67.3	-53.6	70.2	10.9	6.43	22.6	3.93	0.415
	113.3	-54.0	78.6	10.9	7.21	20.7	4.47	0.377
	190.5	-54.1	89.8	11.0	8.16	16.5	5.18	0.296
	320.4	-54.5	99.4	11.0	9.06	18.9	5.68	0.343
	539.0	-54.8	108.2	10.6	1.02E7	16.5	6.48	0.297

TABLE 34 (CONTINUED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	E N/m**2	LOSS FACTOR
- 9.0	5.0	-43.2	13.9	10.9	1.28E6	39.2	6.57E7	0.615
	8.4	-42.4	17.3	[illegible]	1.59	38.4	8.23	0.793
	14.1	-41.7	21.2	10.9	1.94	37.4	1.02E8	0.765
	23.8	-41.7	26.0	10.9	2.38	36.1	1.27	0.730
	40.0	-42.4	32.3	10.9	2.96	34.3	1.62	0.682
	67.3	-43.4	39.1	10.9	3.58	32.4	2.00	0.635
	113.3	-44.0	46.3	10.8	4.29	30.3	2.45	0.584
	190.5	-43.9	56.7	11.1	5.12	25.5	3.06	0.478
	320.4	-44.9	68.1	11.3	6.02	26.9	3.55	0.508
	539.0	-46.3	74.4	10.6	7.03	24.8	4.23	0.462
0.0	5.0	-27.3	4.9	11.0	4.43E5	40.2	2.24E7	0.846
	8.4	-27.4	6.1	10.8	5.67	41.4	2.82	0.880
	14.1	-27.3	8.0	10.8	7.42	41.9	3.66	0.898
	23.8	-27.1	10.1	10.8	9.40	42.0	4.62	0.902
	40.0	-27.7	13.3	10.9	1.21E6	41.6	6.00	0.888
	67.3	-27.9	16.7	10.9	1.53	40.9	7.67	0.866
	113.3	-28.5	21.3	10.9	1.95	39.9	9.91	0.837
	190.5	-29.0	28.0	11.0	2.55	35.7	1.37E8	0.718
	320.4	-30.4	34.1	11.0	3.09	36.7	1.64	0.746
	539.0	-29.2	40.4	10.7	3.77	34.6	2.06	0.690
+10.0	5.0	-14.0	2.1	11.0	1.93E5	33.7	1.06E7	0.666
	8.4	-13.4	2.5	10.7	2.32	36.4	1.23	0.738
	14.1	-13.7	3.1	10.8	2.90	39.0	1.49	0.810
	23.8	-13.6	3.9	10.9	3.62	41.3	1.80	0.878
	40.0	-14.4	5.1	10.9	4.67	42.9	2.27	0.929
	67.3	-14.9	6.5	10.8	5.99	44.2	2.85	0.973
	[illegible]	-16.4	8.5	11.0	7.78	45.1	3.64	1.00
	190.5	-16.7	11.5	10.9	1.06E6	45.0	4.94	1.00
	320.4	-18.5	14.8	10.9	1.36	44.3	6.43	0.977
	539.0	-17.5	18.8	10.6	1.78	42.7	8.64	0.922
+19.0	5.0	7.4	1.2	10.7	1.10E5	23.4	6.66E6	0.433
	8.4	7.8	1.4	10.9	1.24	26.5	7.38	0.498
	14.1	5.9	1.6	10.8	1.48	30.1	8.46	0.580
	23.8	6.2	1.8	10.4	1.77	33.8	9.76	0.670
	40.0	6.1	2.3	10.7	2.18	37.1	1.15E7	0.757
	67.3	5.4	2.9	10.7	2.68	40.2	1.36	0.845
	113.3	5.3	3.8	10.8	3.49	45.2	1.69	0.938
	190.5	4.6	5.4	10.9	4.93	50.5	2.08	1.21
	320.4	3.1	6.6	10.4	6.28	45.3	2.93	1.01
	539.0	4.2	8.8	10.8	8.16	44.8	3.84	0.992

TABLE 34 (CONTINUED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	E N/m**2	LOSS FACTOR
+41.0	5.0	24.3	0.7	10.6	6.55E4	10.2	4.27E6	0.180
	8.4	24.3	0.7	10.3	6.60	11.3	4.29	0.200
	14.1	23.6	0.8	10.8	7.13	12.5	4.61	0.221
	23.8	24.5	0.8	10.5	7.51	14.8	4.81	0.264
	40.0	24.7	0.8	10.3	8.16	17.3	5.16	0.311
	67.3	21.7	1.0	10.9	8.96	21.3	5.53	0.391
	113.3	21.9	1.0	10.9	9.34	23.8	5.66	0.442
	190.5	22.7	1.2	10.5	1.15E5	70.8	2.50	2.88
	320.4	19.5	1.8	10.9	1.63	33.3	9.02	0.656
	539.0	22.5	1.6	10.8	1.48	38.4	7.65	0.794
+50.0	5.0	35.1	0.3	10.2	3.15E4	6.9	2.07E6	0.121
	8.4	35.3	0.5	10.1	5.12	7.4	3.36	0.130
	14.1	34.5	0.5	9.8	5.33	8.4	3.49	0.147
	23.8	34.2	0.5	9.8	5.55	9.2	3.63	0.162
	40.0	34.0	0.6	10.2	5.77	11.0	3.75	0.195
	67.3	33.1	0.7	10.8	6.02	13.0	3.89	0.232
	113.3	31.8	0.7	10.8	6.31	16.5	4.01	0.297
	190.5	32.4	1.0	10.9	9.59	52.9	3.83	1.32
	320.4	30.3	1.2	10.9	1.12E5	23.5	6.82	0.435
	539.0	32.2	0.5	10.8	5.04E4	28.3	2.94	0.539
+59.0	5.0	50.1	0.4	10.2	4.10E4	6.1	2.70E6	0.107
	8.4	51.3	0.4	10.2	4.18	6.2	2.75	0.109
	14.1	51.1	0.4	10.0	4.34	6.8	2.85	0.120
	23.8	51.6	0.5	10.2	4.52	7.4	2.96	0.130
	40.0	49.9	0.5	10.9	4.70	8.9	3.07	0.156
	67.3	49.2	0.5	10.6	4.70	10.0	3.06	0.176
	113.3	47.5	0.5	10.9	4.82	11.9	3.12	0.211
	190.5	47.1	0.9	10.9	8.42	58.4	2.92	1.62
	320.4	44.9	1.0	10.9	8.93	18.7	5.60	0.339
	539.0	47.6	0.3	10.8	2.33	15.9	1.48	0.285
+70.0	5.0	69.8	0.3	9.7	3.58E4	5.2	2.36E6	0.0904
	8.4	69.9	0.4	9.7	3.64	4.7	2.40	0.0826
	14.1	70.4	0.4	9.6	3.76	5.8	2.48	0.101
	23.8	72.0	0.4	9.8	3.90	6.1	2.57	0.106
	40.0	72.0	0.5	12.8	3.95	7.6	2.59	0.133
	67.3	71.0	0.4	10.0	4.00	7.8	2.62	0.136
	113.3	69.9	0.4	10.8	4.02	9.5	2.62	0.167
	190.5	70.0	0.9	10.8	7.91	60.8	2.56	1.79
	320.4	65.5	0.8	10.9	7.62	14.5	4.89	0.258
	539.0	69.2	0.1	10.8	1.18	-13.3	-	-

TABLE 34 (CONTINUED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	E N/m**2	LOSS FACTOR
+79.0	5.0	88.9	0.3	10.0	3.09E4	4.4	2.04E6	0.0766
	8.4	88.7	0.4	12.5	3.17	4.8	2.09	0.0845
	14.1	89.7	0.3	10.5	3.27	4.1	2.16	0.0712
	23.8	90.0	0.4	10.9	3.39	5.7	2.23	0.100
	40.0	88.8	0.3	9.1	3.48	6.2	2.29	0.108
	67.3	88.9	0.4	10.6	3.45	6.6	2.27	0.115
	113.3	88.0	0.4	10.6	3.44	8.1	2.26	0.143
	190.5	86.9	0.8	10.8	7.43	64.8	2.09	2.12
	320.4	85.1	0.7	10.9	6.82	12.9	4.40	0.229
	539.0	88.3	0.1	10.8	5.52E3	-44.4	-	-
+90.0	5.0	90.1	0.3	9.8	2.63E4	4.6	1.74E6	0.0804
	8.4	89.7	0.3	9.7	2.70	4.9	1.78	0.0866
	14.1	90.3	0.3	9.7	2.80	5.5	1.84	0.0969
	23.8	90.2	0.3	10.0	2.90	5.8	1.91	0.102
	40.0	90.0	0.3	10.0	2.99	6.0	1.97	0.106
	67.3	88.1	0.3	10.1	2.91	6.1	1.92	0.106
	113.3	87.3	0.3	10.9	2.89	7.9	1.90	0.138
	190.5	87.4	0.8	10.9	7.02	68.9	1.67	2.60
	320.4	83.1	0.7	10.9	6.14	12.2	3.97	0.216
	539.0	86.6	0.0	10.8	3.25E3	-117.3	-	-
+81.0	5.0	69.8	0.3	11.1	2.91E4	4.5	1.92E6	0.0795
	8.4	69.9	0.3	11.1	2.99	5.1	1.97	0.0892
	14.1	69.1	0.3	11.0	3.10	5.5	2.04	0.0964
	23.8	68.0	0.3	9.3	3.22	5.9	2.12	0.103
	40.0	67.6	0.3	9.5	3.33	6.3	2.19	0.110
	67.3	66.8	0.3	10.5	3.26	6.6	2.14	0.115
	113.3	65.5	0.3	10.5	3.25	8.3	2.13	0.145
	190.5	65.9	0.8	10.9	7.39	64.9	2.07	2.13
	320.4	61.3	0.7	10.9	6.54	13.0	4.22	0.231
	539.0	66.8	0.1	10.8	6.57	23.9	3.98	0.444
+70.0	5.0	46.2	0.3	10.3	3.24E4	5.1	2.14E6	0.0900
	8.4	47.2	0.3	10.3	3.32	5.6	2.19	0.0972
	14.1	46.4	0.3	10.1	3.44	6.1	2.27	0.107
	23.8	46.3	0.4	12.3	3.58	6.7	2.36	0.117
	40.0	45.4	0.4	11.0	3.72	7.5	2.44	0.132
	67.3	44.5	0.4	10.9	3.68	8.1	2.41	0.142
	113.3	43.7	0.4	10.7	3.73	9.9	2.43	0.175
	190.5	43.1	0.9	10.9	8.26	59.2	2.80	1.68
	320.4	40.5	0.8	10.9	7.13	15.4	4.55	0.275
	539.0	43.7	0.2	10.8	1.47	29.6	8.46E5	0.568

TABLE 34 (CONTINUED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	E N/m**2	LOSS FACTOR
+60.0	5.0	25.3	0.3	9.6	3.57E4	5.6	2.35E6	0.0983
	8.4	25.4	0.4	9.5	3.68	6.4	2.42	0.111
	14.1	25.0	0.4	11.0	3.83	7.1	2.52	0.125
	23.8	26.3	0.4	9.5	4.01	7.9	2.63	0.140
	40.0	26.4	0.4	9.8	4.18	8.7	2.74	0.153
	67.3	24.2	0.4	9.9	4.20	10.7	2.73	0.189
	113.3	23.9	0.5	10.9	4.32	12.9	2.79	0.229
	190.5	22.9	1.0	10.8	9.25	56.3	3.40	1.50
	320.4	19.2	0.9	10.9	8.02	17.7	5.06	0.320
	539.0	23.1	0.3	10.8	2.87	36.4	1.53	0.737
+50.0	5.0	3.7	0.4	10.3	4.00E4	7.1	2.63E6	0.124
	8.4	4.6	0.4	10.2	4.17	8.0	2.73	0.141
	14.1	5.4	0.4	9.9	4.38	9.2	2.86	0.162
	23.8	5.6	0.5	9.9	4.62	10.5	3.01	0.186
	40.0	5.3	0.5	10.1	4.89	12.1	3.17	0.214
	67.3	4.0	0.5	10.1	5.02	15.1	3.21	0.270
	113.3	4.8	0.6	10.6	5.36	18.4	3.37	0.333
	190.5	4.0	1.1	10.9	1.05E5	55.3	3.95	1.45
	320.4	0.6	1.1	10.9	9.73E4	23.6	5.90	0.436
	539.0	3.1	0.6	10.8	5.56	42.8	2.70	0.928
+40.0	5.0	-17.0	0.5	10.4	4.73E4	10.1	3.08E6	0.178
	8.4	-17.8	0.5	10.1	5.01	11.7	3.25	0.207
	14.1	-18.6	0.6	10.9	5.37	13.9	3.45	0.247
	23.8	-16.9	0.6	10.5	5.83	16.5	3.70	0.295
	40.0	-18.0	0.6	10.2	6.37	19.8	3.97	0.360
	67.3	-18.5	0.7	10.0	6.91	23.7	4.19	0.440
	113.3	-18.3	0.9	10.7	7.95	29.0	4.61	0.554
	190.5	-18.0	1.7	10.9	1.52E5	56.0	5.64	1.48
	320.4	-21.9	1.6	10.9	1.45	35.2	7.85	0.705
	539.0	-19.0	1.7	10.8	1.54	37.0	8.14	0.755
+29.0	5.0	-30.7	0.6	10.1	5.79E4	15.3	3.70E6	0.274
	8.4	-31.1	0.7	10.6	6.30	18.1	3.96	0.326
	14.1	-31.7	0.7	10.6	7.02	21.5	4.33	0.394
	23.8	-31.9	0.8	10.6	7.97	25.5	4.77	0.476
	40.0	-32.0	1.0	10.9	9.33	29.9	5.35	0.574
	67.3	-33.7	1.2	10.5	1.11E5	35.1	6.01	0.702
	113.3	-34.3	1.5	10.9	1.38	40.1	6.99	0.842
	190.5	-35.1	2.2	10.7	2.06	68.3	5.05	2.51
	320.4	-36.5	2.9	10.9	2.64	43.9	1.26E7	0.963
	539.0	-32.9	3.2	10.8	2.92	52.3	1.18	1.30

TABLE 34 (CONCLUDED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	E N/m**2	LOSS FACTOR
+19.0	5.0	-50.0	0.8	10.4	8.05E4	24.5	4.85E6	0.456
	8.4	-49.5	1.0	10.7	9.42	28.8	5.47	0.550
	14.1	-49.9	1.2	10.4	1.13E5	33.1	6.27	0.651
	23.8	-49.6	1.5	10.7	1.39	37.4	7.33	0.765
	40.0	-48.7	1.9	10.5	1.79	41.4	8.87	0.883
	67.3	-50.0	2.5	10.6	2.33	45.3	1.08E7	1.01
	113.3	-51.2	3.4	10.9	3.07	48.2	1.36	1.12
	190.5	-50.7	4.7	10.8	4.31	57.9	1.52	1.59
	320.4	-52.9	6.2	10.9	5.71	49.4	2.46	1.17
	539.0	-52.0	8.1	10.8	7.45	50.2	3.15	1.20

TABLE 35: TEST DATA FOR LABORATORY M (VISCOELASTICIMETRE/SHEAR)

SHEAR DEFORMATION (SHEAR MODULUS)
DIRECT STIFFNESS TEST SYSTEM
METRAVIB VISCOELASTICIMETRE MVCX900A
Specimen Type: Double lap shear
Specimen Length: 14.93 mm
Specimen Thickness: 1.00 mm
Specimen Width: 8.00 mm
Polymer Density = 0.046 Lb/in**3
Stabilization time: 45 minutes
Test Date: 7/12/90
Originator's File #: Round Robin A4

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	G N/m*2	LOSS FACTOR
+20.0	5.0	-1.6	0.3	0.8	3.13E5	14.7	1.27E6	0.263
	7.2	-1.9	0.4	1.0	3.77	14.0	1.53	0.249
	10.4	-1.9	0.5	1.2	3.96	16.1	1.59	0.289
	15.1	-1.8	0.4	0.9	4.22	17.9	1.68	0.324
	21.8	-1.8	0.5	1.0	4.54	20.1	1.79	0.366
	31.5	-1.9	0.5	0.9	4.96	22.4	1.92	0.413
	45.6	-2.0	0.5	1.0	5.42	24.2	2.07	0.450
	65.8	-1.9	0.6	0.9	6.03	27.8	2.23	0.528
	95.2	-2.0	0.7	1.0	6.78	30.6	2.44	0.592
	137.5	-1.9	0.7	1.0	7.74	32.9	2.72	0.648
	198.3	-2.1	0.9	1.0	8.95	37.5	2.97	0.768
	287.3	-2.3	1.0	1.0	1.07E6	37.6	3.56	0.770
	415.2	-2.5	1.3	1.0	1.27	38.4	4.16	0.793
	600.0	-2.5	1.5	1.0	1.54	42.9	4.74	0.930
+10.0	5.0	-16.8	0.4	0.8	4.48E5	18.7	1.78E6	0.338
	7.2	-17.0	0.5	1.0	4.86	20.9	1.90	0.382
	10.4	-17.1	0.5	0.9	5.31	23.0	2.05	0.425
	15.1	-17.4	0.6	0.9	5.87	25.4	2.22	0.474
	21.8	-17.1	0.6	1.0	6.54	27.8	2.42	0.527
	31.5	-17.1	0.7	1.0	7.43	30.3	2.68	0.584
	45.6	-17.0	0.8	0.9	8.46	32.3	2.99	0.631
	65.8	-17.1	0.9	1.0	9.65	34.8	3.32	0.694
	95.2	-16.9	1.1	1.0	1.13E6	36.2	3.81	0.732
	137.5	-17.0	1.3	1.0	1.33	38.5	4.35	0.794
	198.8	-17.3	1.6	1.0	1.59	40.1	5.09	0.842
	287.3	-17.2	1.8	1.0	1.87	39.8	6.01	0.833
	415.2	-17.4	2.2	1.0	2.25	39.7	7.25	0.830
	600.0	-17.5	2.7	1.0	2.77	40.4	8.83	0.850

TABLE 35 (CONTINUED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	G N/m**2	LOSS FACTOR
+ 1.0	5.0	-32.3	0.6	0.9	6.72E5	27.0	2.50E6	0.510
	7.2	-32.3	0.7	1.0	7.53	29.1	2.75	0.558
	10.4	-32.6	0.8	0.9	8.54	31.2	3.06	0.604
	15.1	-32.8	1.0	1.0	9.85	33.0	3.46	0.650
	21.8	-32.7	1.1	1.0	1.14E6	34.7	3.92	0.694
	31.5	-32.6	1.3	1.0	1.33	36.2	4.50	0.731
	45.6	-32.4	1.5	1.0	1.54	37.1	5.15	0.757
	65.8	-32.4	1.8	1.0	1.81	37.8	5.99	0.776
	95.2	-32.1	2.1	1.0	2.10	38.2	6.90	0.786
	137.5	-32.3	2.4	1.0	2.48	38.3	8.16	0.789
	198.8	-32.2	2.8	0.9	2.95	37.6	9.77	0.771
	287.3	-32.3	3.3	1.0	3.37	36.2	1.14E7	0.732
	415.2	-32.6	3.9	1.0	3.95	34.8	1.36	0.695
	600.0	-32.9	4.6	1.0	4.64	32.8	1.63	0.644
- 8.0	5.0	-48.0	1.3	1.1	1.24E6	34.0	4.30E6	0.675
	7.2	-48.6	1.4	1.0	1.45	35.0	4.97	0.701
	10.4	-48.4	1.7	1.0	1.70	35.7	5.78	0.719
	15.1	-48.3	2.0	1.0	1.95	35.8	6.61	0.721
	21.8	-47.7	2.2	1.0	2.25	35.9	7.62	0.725
	31.5	-47.7	2.5	1.0	2.58	35.6	8.78	0.715
	45.6	-47.6	2.9	1.0	2.93	34.5	1.01E7	0.688
	65.8	-47.5	3.3	1.0	3.29	33.6	1.15	0.665
	95.2	-47.3	3.7	1.0	3.67	32.5	1.30	0.637
	137.5	-47.0	4.3	1.0	4.37	31.7	1.55	0.619
	198.8	-37.5	4.9	0.9	5.17	30.5	1.86	0.589
	287.3	-39.2	5.7	1.0	5.89	31.4	2.10	0.610
	415.2	-39.7	6.5	1.0	6.84	28.2	2.52	0.535
	600.0	-39.9	7.1	1.0	7.26	24.8	2.76	0.462
-19.0	5.0	-54.4	2.5	1.0	2.57E6	33.9	8.94E6	0.671
	7.2	-54.0	2.8	1.0	2.92	33.0	1.03E7	0.650
	10.4	-53.6	3.3	1.0	3.28	32.0	1.17	0.624
	15.1	-53.4	3.7	1.0	3.68	30.7	1.33	0.593
	21.8	-53.1	4.1	1.0	4.06	29.1	1.48	0.558
	31.5	-53.3	4.4	1.0	4.46	27.6	[illegible]	0.522
	45.6	-53.6	4.9	1.0	4.84	25.8	[illegible]	0.484
	65.8	-53.9	5.1	1.0	5.19	24.0	[illegible]	0.444
	95.2	-54.2	5.5	1.0	5.47	22.7	2.11	0.419
	137.5	-42.6	5.4	0.8	6.90	23.4	2.65	0.433
	198.8	-42.5	5.7	0.7	7.85	21.6	3.06	0.396
	287.3	-48.2	7.5	0.9	8.14	27.6	3.02	0.522
	415.2	-49.8	8.9	1.0	8.96	29.8	3.26	0.572
	600.0	-49.1	9.9	1.0	9.90	22.2	3.84	0.408

TABLE 35 (CONTINUED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	G N/m**2	LOSS FACTOR
-29.0	5.0	-61.7	4.8	1.0	4.76E6	27.9	1.76E7	0.530
	7.2	-62.7	5.3	1.0	5.23	25.8	1.97	0.482
	10.4	-62.8	5.7	1.0	5.71	24.1	2.18	0.447
	15.1	-62.2	6.3	1.0	6.12	23.1	2.36	0.426
	21.8	-62.0	6.7	1.0	6.54	21.8	2.54	0.400
	31.5	-61.5	6.7	1.0	6.96	20.8	2.73	0.379
	45.6	-61.4	7.3	1.0	7.22	20.3	2.84	0.369
	65.8	-61.2	7.5	1.0	7.24	21.3	2.82	0.390
	95.2	-24.6	5.5	0.7	7.82	16.7	3.14	0.300
	137.5	-21.6	5.9	0.6	9.91	16.0	3.99	0.287
	198.8	-22.3	6.7	0.6	1.12E7	16.3	4.52	0.293
	287.3	-30.3	7.1	0.6	1.10	18.3	4.38	0.332
	415.2	-33.4	9.1	1.0	9.41E6	36.6	3.16	0.744
	600.0	-31.6	10.4	1.1	9.59	28.2	3.54	0.535
-39.0	5.0	-38.7	2.7	0.3	7.94E6	16.2	3.19E7	0.291
	7.2	-43.1	3.0	0.3	8.70	15.5	3.51	0.277
	10.4	-39.9	3.0	0.3	9.23	14.7	3.74	0.263
	15.1	22.5	3.0	0.3	9.59	13.9	3.90	0.247
	21.8	8.1	3.0	0.3	9.61	13.6	3.91	0.242
	31.5	-26.3	3.0	0.3	9.96	12.4	4.07	0.219
	45.6	-40.2	3.4	0.3	1.08E7	10.9	4.42	0.193
	65.8	-39.2	4.2	0.4	1.08	11.7	4.44	0.206
	95.2	-25.1	4.8	0.4	1.16	12.3	4.74	0.218
	137.5	-20.0	6.0	0.4	1.44	12.5	5.88	0.222
	198.8	-21.7	7.2	0.5	1.45	11.8	5.96	0.210
	287.3	-25.0	7.3	0.6	1.29	16.0	5.20	0.286
	415.2	-35.2	8.4	0.7	1.13	36.6	3.79	0.742
	600.0	-30.8	8.5	1.0	8.69E6	39.1	2.82	0.812
-48.0	5.0	-32.4	3.3	0.3	1.02E7	11.7	4.17E7	0.206
	7.2	-38.7	3.0	0.3	1.05	9.9	4.33	0.175
	10.4	-37.4	3.0	0.3	1.10	9.6	4.55	0.170
	15.1	-32.3	3.0	0.3	1.15	9.2	4.75	0.163
	21.8	6.3	3.0	0.2	1.26	9.4	5.20	0.165
	31.5	-21.9	3.0	0.2	1.23	8.9	5.10	0.157
	45.6	-33.3	4.2	0.4	1.15	9.9	4.76	0.174
	65.8	-32.5	4.2	0.4	1.18	9.4	4.89	0.166
	95.2	-31.6	5.0	0.4	1.21	10.3	4.99	0.182
	137.5	-18.1	6.2	0.4	1.56	10.6	6.43	0.187
	198.8	-18.2	7.1	0.5	1.55	11.1	6.35	0.196
	287.3	-23.7	7.4	0.6	1.25	17.9	4.96	0.324
	415.2	-29.7	9.1	0.8	1.22	35.2	4.16	0.705
	600.0	-25.8	9.7	1.0	9.69E6	46.9	2.77	1.070

TABLE 35 (CONTINUED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	G N/m**2	LOSS FACTOR
-38.0	5.0	-12.1	5.6	0.7	7.64E6	23.6	2.93E7	0.436
	7.2	- 3.6	3.5	0.6	5.70	15.4	2.30	0.275
	10.4	1.8	3.5	0.5	7.05	18.6	2.80	0.336
	15.1	- 4.9	3.6	0.5	7.56	17.5	3.02	0.315
	21.8	-25.8	3.0	0.3	1.02E7	19.7	4.01	0.359
	31.5	- 1.6	4.2	0.5	8.98E6	18.8	3.56	0.341
	45.6	- 1.2	4.4	0.5	9.70	19.2	3.84	0.348
	65.8	- 2.0	4.2	0.4	1.04E7	18.7	4.11	0.339
	95.2	- 1.1	4.9	0.5	1.02	22.0	3.97	0.403
	137.5	- 0.3	5.3	0.4	1.44	21.7	5.60	0.399
	198.8	17.7	8.3	0.6	1.34	28.7	4.90	0.549
	287.3	13.4	8.8	1.0	9.22E6	48.9	2.54	1.15
	415.2	-11.0	8.9	0.9	9.95	43.1	3.04	0.937
	600.0	- 8.4	8.8	1.0	9.12	46.6	2.63	1.06
-28.0	5.0	3.1	4.6	1.0	4.65E6	31.3	1.67E7	0.608
	7.2	2.8	5.1	1.0	5.14	31.0	1.85	0.601
	10.4	29.6	3.5	0.5	6.44	28.6	2.37	0.545
	15.1	26.3	3.4	0.5	6.98	26.9	2.60	0.507
	21.8	21.5	3.5	0.5	7.48	25.9	2.82	0.487
	31.5	22.0	4.5	0.6	8.10	26.7	3.03	0.504
	45.6	18.7	4.4	0.5	8.64	26.4	3.24	0.497
	65.8	14.8	4.2	0.5	8.91	26.5	3.34	0.498
	95.2	16.9	4.3	0.4	9.97	24.4	3.80	0.453
	137.5	20.5	5.2	0.4	1.32E7	20.1	5.18	0.367
	198.8	21.2	6.4	0.4	1.43	18.6	5.68	0.337
	287.3	17.4	7.1	0.8	9.25E6	43.9	2.79	0.963
	415.2	- 0.7	7.2	0.7	1.06E7	36.7	3.54	0.746
	600.0	6.2	8.1	1.0	8.10E6	56.3	1.88	1.50
-18.0	5.0	20.6	2.7	1.0	2.64E6	36.2	8.92E6	0.731
	7.2	20.9	3.0	1.0	3.03	35.9	1.03E7	0.723
	10.4	21.2	3.5	1.0	3.41	35.5	1.16	0.712
	15.1	20.9	3.9	1.0	3.83	34.6	1.32	0.690
	21.8	20.7	4.3	1.0	4.34	33.5	1.51	0.661
	31.5	20.2	4.6	1.0	4.61	35.0	1.58	0.701
	45.6	20.1	4.9	1.0	4.74	41.6	1.49	0.887
	65.8	33.2	4.9	1.0	5.20	36.3	1.75	0.734
	95.2	30.4	4.2	0.5	7.76	28.0	2.87	0.532
	137.5	32.9	5.3	0.9	5.66	45.6	1.66	1.02
	198.8	31.2	5.6	0.6	8.81	32.8	3.10	0.644
	287.3	17.9	5.8	0.9	6.32	48.0	1.74	1.14
	415.2	9.7	7.5	0.9	8.20	41.1	2.59	0.373
	600.0	19.4	7.2	1.0	6.96	46.7	2.00	1.06

TABLE 35 (CONTINUED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	G N/m**2	LOSS FACTOR
- 9.0	5.0	30.0	1.4	1.0	1.43E6	36.5	4.83E6	0.739
	7.2	30.4	1.7	1.0	1.64	37.0	5.49	0.754
	10.4	30.8	1.9	1.0	1.92	37.5	6.36	0.767
	15.1	30.9	2.2	1.0	2.23	37.8	7.38	0.777
	21.8	31.1	2.6	1.0	2.59	37.9	8.55	0.778
	31.5	31.2	3.0	1.0	2.99	37.6	9.92	0.769
	45.6	31.0	3.5	1.0	3.43	36.5	1.15E7	0.741
	65.8	30.7	3.7	0.9	3.93	35.9	1.33	0.723
	95.2	30.2	4.1	1.0	4.20	37.0	1.40	0.753
	137.5	30.4	4.8	1.0	4.69	38.7	1.53	0.803
	198.8	29.8	5.5	1.0	5.68	35.5	1.94	0.713
	287.3	21.0	5.3	0.9	5.61	39.5	1.81	0.826
	415.2	19.8	6.6	1.0	6.86	38.1	2.26	0.785
	600.0	22.8	6.9	1.0	6.97	38.1	2.29	0.785
0.0	5.0	37.7	0.7	1.0	7.34E5	32.8	2.58E6	0.644
	7.2	37.4	0.8	1.0	8.50	33.8	2.96	0.671
	10.4	36.8	0.9	0.9	9.85	34.8	3.39	0.695
	15.1	36.2	1.1	0.9	1.13E6	36.7	3.81	0.744
	21.8	36.6	1.3	1.0	1.31	37.4	4.35	0.765
	31.5	36.2	1.6	1.0	1.55	38.3	5.07	0.791
	45.6	36.1	1.8	1.0	1.81	41.6	5.67	0.886
	65.8	36.2	2.1	1.0	2.11	38.7	6.88	0.803
	95.2	36.1	2.5	1.0	2.45	37.9	8.10	0.779
	137.5	36.2	2.9	1.0	2.91	39.6	9.40	0.826
	198.8	35.8	3.5	1.0	3.49	35.0	1.19E7	0.701
	287.3	35.8	3.9	1.0	3.88	39.8	1.25	0.834
	415.2	35.6	4.7	1.0	4.55	38.8	1.49	0.803
	600.0	35.3	5.3	1.0	5.38	34.4	1.86	0.684
+10.0	5.0	48.3	0.4	0.9	3.73E5	29.8	1.35E6	0.572
	7.2	48.2	0.5	0.9	5.22	34.4	1.80	0.684
	10.4	48.0	0.5	0.9	5.86	37.6	1.94	0.770
	15.1	48.0	0.7	1.0	7.46	39.6	2.41	0.827
	21.8	48.0	0.7	1.0	7.64	35.4	2.61	0.711
	31.5	47.6	0.8	0.9	8.47	37.5	2.81	0.766
	45.6	47.7	0.9	1.0	9.46	38.8	3.09	0.804
	65.8	47.7	1.1	1.0	1.14E6	38.4	3.75	0.793
	95.2	47.9	1.3	1.0	1.31	39.3	4.24	0.818
	137.5	47.9	1.6	1.0	1.57	41.7	4.92	0.889
	198.8	48.0	1.8	1.0	1.90	39.4	6.15	0.820
	287.3	47.1	2.1	1.0	2.20	40.7	6.97	0.861
	415.2	45.8	2.6	1.0	2.64	40.5	8.41	0.855
	600.0	45.7	3.2	1.0	3.24	38.5	1.06E7	0.795

TABLE 35 (CONTINUED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	G N/m**2	LOSS FACTOR
+20.0	5.0	59.0	0.3	1.0	3.40E5	31.7	1.21E6	0.617
	7.2	58.9	0.4	0.9	3.83	34.7	1.32	0.693
	10.4	58.9	0.4	0.9	4.23	31.4	1.51	0.611
	15.1	58.9	0.5	1.0	4.65	32.8	1.64	0.644
	21.8	59.0	0.5	0.9	5.28	32.1	1.87	0.627
	31.5	58.8	0.2	1.0	1.60	17.4	6.39E5	0.314
	45.6	58.8	0.6	0.9	6.93	28.5	2.55E6	0.543
	65.8	58.6	0.6	0.9	6.97	33.7	2.43	0.666
	95.2	58.4	0.7	0.9	7.90	38.6	2.58	0.798
	137.5	58.3	0.8	1.0	8.46	39.6	2.73	0.827
	198.8	57.9	1.0	0.9	1.08E6	40.0	3.46	0.839
	287.3	58.1	1.2	1.0	1.21	40.7	3.83	0.861
	415.2	57.5	1.5	1.0	1.51	40.0	4.83	0.838
	600.0	57.6	1.9	1.0	1.90	39.7	6.11	0.829
+29.0	5.0	72.8	0.3	0.9	3.33E5	33.1	1.17E6	0.652
	7.2	72.8	0.3	0.9	3.25	34.0	1.13	0.674
	10.4	72.7	0.3	0.9	3.68	28.1	1.36	0.534
	15.1	72.8	0.4	1.0	3.95	26.5	1.48	0.498
	21.8	72.7	0.5	1.2	4.09	25.1	1.55	0.468
	31.5	72.6	0.4	0.9	4.30	27.1	1.60	0.512
	45.6	72.7	0.5	0.9	5.80	30.7	2.09	0.594
	65.8	72.7	0.5	1.0	4.76	26.6	1.78	0.500
	95.2	72.5	0.5	1.0	5.40	25.4	2.04	0.474
	137.5	72.3	0.6	1.0	6.27	33.2	2.20	0.654
	198.8	72.0	0.7	0.9	7.52	34.2	2.60	0.680
	287.3	71.9	0.8	1.0	8.00	34.5	2.76	0.687
	415.2	71.5	0.9	1.0	9.44	36.3	3.19	0.735
	600.0	71.4	1.2	1.0	1.21E6	38.2	3.97	0.786
+40.0	5.0	66.3	0.2	0.8	2.72E5	32.7	9.56E5	0.642
	7.2	66.4	0.2	0.8	2.85	30.8	1.03E6	0.597
	10.4	66.3	0.2	0.8	2.92	24.9	1.11	0.464
	15.1	66.3	0.3	1.0	3.14	20.9	1.23	0.382
	21.8	66.3	0.3	1.0	3.23	19.2	1.28	0.348
	31.5	66.0	0.3	1.0	3.33	20.9	1.30	0.382
	45.6	66.0	0.3	0.9	3.56	19.4	1.41	0.352
	65.8	66.0	0.3	1.0	3.55	19.5	1.40	0.354
	95.2	65.8	0.3	0.8	3.77	21.3	1.47	0.391
	137.5	66.1	0.3	0.9	3.66	19.9	1.44	0.361
	198.8	65.7	0.4	0.9	4.20	28.9	1.54	0.553
	287.3	65.4	0.5	1.0	4.78	26.2	1.80	0.493
	415.2	65.0	0.5	1.0	5.34	29.2	1.95	0.558
	600.0	65.1	0.7	1.0	7.00	35.0	2.40	0.700

TABLE 35 (CONTINUED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	G N/m**2	LOSS FACTOR
+49.0	5.0	85.2	0.2	1.0	2.01E5	48.1	5.62E5	1.11
	7.2	85.3	0.2	1.0	2.38	50.8	6.31	1.23
	10.4	85.2	0.2	0.9	2.36	41.2	7.43	0.876
	15.1	84.8	0.2	0.9	2.51	37.6	8.32	0.771
	21.8	85.0	0.2	0.9	2.60	35.1	8.90	0.704
	31.5	84.9	0.2	0.9	2.74	31.4	9.79	0.610
	45.6	84.6	0.3	0.9	3.29	27.7	1.22E6	0.526
	65.8	84.7	0.3	1.0	2.73	21.4	1.06	0.391
	95.2	84.5	0.2	0.9	2.67	21.4	1.04	0.392
	137.5	84.4	0.2	1.0	2.25	10.2	9.26E5	0.180
	198.8	84.1	0.3	0.9	2.69	15.1	1.09E6	0.270
	287.3	84.0	0.3	1.0	3.33	20.0	1.31	0.365
	415.2	83.4	0.4	1.0	3.65	21.1	1.43	0.386
	600.0	83.3	0.5	1.0	4.71	30.5	1.70	0.590
+59.0	5.0	102.5	0.1	0.7	1.59E5	59.5	3.38E5	1.70
	7.2	102.6	0.2	0.7	2.29	56.0	5.37	1.48
	10.4	102.3	0.2	0.7	2.36	45.0	6.99	1.00
	15.1	102.5	0.2	0.7	2.36	39.7	7.60	0.830
	21.8	102.5	0.2	0.7	2.35	32.4	8.32	0.634
	31.5	102.5	0.2	0.7	2.34	29.3	8.53	0.562
	45.6	102.6	0.2	0.7	2.16	14.2	8.75	0.254
	65.8	101.9	0.2	0.8	2.28	16.9	9.14	0.305
	95.2	28.0	0.1	0.5	2.23	20.6	8.75	0.377
	137.5	28.1	0.2	1.0	1.90	12.9	7.77	0.229
	198.8	27.8	0.2	1.0	2.17	22.0	8.42	0.403
	287.3	27.5	0.3	1.0	2.69	17.5	1.07E6	0.315
	415.2	26.5	0.3	1.0	3.16	18.4	1.26	0.334
	600.0	26.7	0.2	1.0	1.85	25.0	7.02E5	0.466
+70.0	5.0	47.8	0.1	0.8	1.10E5	23.1	4.25E5	0.427
	7.2	47.8	0.2	0.8	2.33	28.3	8.58	0.539
	10.4	47.9	0.2	0.8	2.26	17.9	9.02	0.323
	15.1	47.6	0.1	0.8	1.62	20.0	6.37	0.364
	21.8	47.9	0.1	0.8	1.88	14.6	7.61	0.260
	31.5	47.3	0.2	0.8	1.92	14.5	7.76	0.258
	45.6	48.0	0.1	0.9	1.57	29.0	5.76	0.555
	65.8	47.5	0.2	1.0	1.84	11.0	7.58	0.194
	95.2	46.9	0.1	0.7	1.85	10.8	7.63	0.192
	137.5	46.8	0.2	0.8	1.87	13.2	7.62	0.235
	198.8	46.5	0.2	0.9	1.78	18.0	7.10	0.324
	287.3	46.1	0.2	1.0	2.26	14.4	9.18	0.258
	415.2	45.3	0.2	1.0	2.35	14.0	9.54	0.250
	600.0	45.0	0.3	1.0	2.90	18.8	1.15E6	0.341

TABLE 35 (CONTINUED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	G N/m**2	LOSS FACTOR
+80.0	5.0	61.9	0.1	0.9	1.53E5	58.4	3.36E5	1.63
	7.2	61.7	0.2	0.9	1.66	63.9	3.07	2.04
	10.4	61.7	0.2	0.9	1.66	49.6	4.51	1.17
	15.1	61.7	0.1	0.9	1.10	47.3	3.12	1.08
	21.8	62.5	0.2	0.9	1.66	34.3	5.73	0.683
	31.5	62.4	0.2	0.9	1.67	33.7	5.80	0.668
	45.6	62.2	0.2	1.0	1.76	13.8	7.17	0.245
	65.8	62.3	0.1	0.6	1.52	23.9	5.83	0.443
	95.2	62.1	0.1	0.7	2.04	-10.9	-	-
	137.5	61.7	0.1	0.8	1.31	14.6	5.29	0.260
	198.8	61.1	0.1	1.0	1.43	20.3	5.62	0.369
	287.3	60.4	0.2	1.0	1.87	6.1	7.78	0.107
	415.2	59.8	0.2	1.0	1.94	10.5	7.99	0.185
	600.0	59.6	0.2	1.0	2.38	19.5	9.37	0.354
+93.0	5.0	-0.3	0.1	0.7	1.93E5	21.5	7.52E5	0.393
	7.2	-0.9	0.1	0.7	1.99	33.0	7.01	0.649
	10.4	-1.0	0.1	0.7	1.99	20.2	7.83	0.369
	15.1	-1.0	0.1	0.7	1.80	21.5	7.01	0.394
	21.8	-1.2	0.1	0.7	2.07	0.6	8.64	0.010
	31.5	-1.4	0.2	0.7	2.40	-4.9	-	-
	45.6	-1.4	0.3	0.7	4.35	45.5	1.28E6	1.02
	65.8	-1.8	0.1	0.8	6.89E4	-8.5	-	-
	95.2	-1.6	0.4	1.0	3.81E5	34.9	1.31	0.698
	137.5	-1.5	0.1	0.9	1.44	34.9	4.93E5	0.697
	198.8	-1.8	0.2	1.0	1.65	36.6	5.55	0.743
	287.3	-1.8	0.4	1.0	3.77	22.9	1.45E6	0.422
	415.2	-2.1	0.3	1.0	2.86	18.5	1.14	0.335
	600.0	-1.6	0.3	1.0	3.53	34.4	1.22	0.684
+82.0	5.0	-7.0	0.2	0.7	2.36E5	17.0	9.46E5	0.305
	7.2	-7.4	0.1	0.7	2.11	9.4	8.72	0.166
	10.4	-7.9	0.1	0.7	2.13	14.2	8.65	0.253
	15.1	-8.1	0.2	1.0	2.16	8.7	8.94	0.153
	21.8	-8.1	0.2	1.0	2.05	11.5	8.41	0.203
	31.5	-8.3	0.2	1.0	2.12	18.5	8.44	0.334
	45.6	-9.1	0.2	1.0	2.23	12.1	9.11	0.214
	65.8	-8.6	0.1	0.7	2.03	-33.0	-	-
	95.2	-7.9	0.2	0.8	2.32	38.0	7.66	0.780
	137.5	-7.8	0.3	0.9	2.99	37.9	9.88	0.779
	198.8	-8.0	0.3	1.0	3.38	38.4	1.11E6	0.793
	287.3	-8.1	0.2	1.0	2.47	26.0	9.31E5	0.487
	415.2	-8.5	0.2	1.0	2.20	28.8	8.08	0.551
	600.0	-8.1	0.4	1.0	4.24	32.9	1.49E6	0.647

TABLE 35 (CONTINUED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPLT MICRON	STIFFNESS (N/m)	PHASE (DEG)	G N/m**2	LOSS FACTOR
+69.0	5.0	-17.0	0.2	1.0	2.04E5	9.1	8.42E5	0.159
	7.2	-17.9	0.2	1.0	2.12	9.1	8.77	0.161
	10.4	-17.5	0.2	1.0	2.21	10.5	9.08	0.186
	15.1	-16.8	0.3	1.3	2.30	11.6	9.44	0.205
	21.8	-16.7	0.2	0.9	2.38	12.7	9.72	0.226
	31.5	-16.7	0.2	0.9	2.52	14.3	1.02E6	0.254
	45.6	-16.4	0.2	0.9	2.65	15.9	1.07	0.284
	65.8	-16.3	0.3	0.9	2.81	18.1	1.12	0.327
	95.2	-16.4	0.2	0.7	3.01	20.2	1.18	0.369
	137.5	-16.8	0.3	0.9	3.24	23.4	1.24	0.433
	198.8	-17.2	0.3	0.9	3.59	25.9	1.35	0.486
	287.3	-17.3	0.4	1.0	4.02	28.8	1.47	0.549
	415.2	-18.2	0.5	1.0	4.59	31.9	1.63	0.622
	600.0	-18.4	0.5	1.0	5.29	37.4	1.76	0.765
+59.0	5.0	-24.9	0.2	1.0	2.19E5	9.5	9.06E5	0.168
	7.2	-24.8	0.3	1.3	2.29	10.8	9.42	0.190
	10.4	-25.0	0.2	0.9	2.40	11.9	9.81	0.211
	15.1	-24.8	0.2	0.9	2.50	13.2	1.02E6	0.234
	21.8	-24.3	0.2	0.8	2.63	14.7	1.06	0.263
	31.5	-24.3	0.2	0.8	2.78	16.6	1.12	0.298
	45.6	-24.1	0.2	0.8	2.96	18.5	1.18	0.335
	65.8	-23.5	0.3	0.8	3.17	20.7	1.24	0.378
	95.2	-23.8	0.3	0.9	3.45	23.4	1.32	0.434
	137.5	-23.9	0.3	0.8	3.76	26.7	1.41	0.503
	198.8	-24.0	0.4	1.0	4.20	29.3	1.53	0.562
	287.3	-24.3	0.5	1.0	4.82	32.3	1.70	0.633
	415.2	-25.1	0.6	1.0	5.63	35.3	1.92	0.708
	600.0	-25.8	0.7	1.0	6.67	39.9	2.14	0.835
+49.0	5.0	-31.7	0.2	0.9	2.38E5	10.2	9.79E5	0.181
	7.2	-31.6	0.2	0.9	2.48	12.3	1.02E6	0.218
	10.4	-31.6	0.2	0.8	2.62	13.8	1.06	0.245
	15.1	-31.8	0.2	0.8	2.77	15.4	1.12	0.275
	21.8	-31.2	0.3	1.0	2.94	17.1	1.18	0.309
	31.5	-31.5	0.4	1.2	3.14	19.4	1.24	0.353
	45.6	-31.1	0.3	0.9	3.40	21.6	1.32	0.397
	65.8	-31.0	0.3	0.9	3.71	24.3	1.42	0.452
	95.2	-31.3	0.4	0.9	4.09	27.2	1.52	0.514
	137.5	-31.2	0.4	0.[illegible]	4.55	30.4	1.64	0.587
	198.8	-31.2	0.5	1.0	5.13	32.9	1.80	0.647
	287.3	-31.3	0.6	1.0	6.00	35.9	2.04	0.724
	415.2	-32.0	0.7	1.0	7.10	38.4	2.33	0.791
	600.0	-32.0	0.9	1.0	8.61	42.1	2.68	0.903

TABLE 35 (CONCLUDED)

TEMP (C)	FREQ (Hz)	PRE-DEF MICRON	FORCE (N)	DISPL MICRON	STIFFNESS (N/m)	PHASE (DEG)	G N/m**2	LOSS FACTOR
+40.0	5.0	-37.0	0.2	0.8	2.74E5	14.1	1.11E6	0.251
	7.2	-37.1	0.2	0.8	2.81	14.7	1.14	0.262
	10.4	-36.9	0.3	1.0	2.92	15.8	1.18	0.284
	15.1	-36.9	0.3	1.0	3.04	17.7	1.21	0.319
	21.8	-37.1	0.3	0.9	3.28	19.7	1.29	0.357
	31.5	-36.7	0.3	0.8	3.49	22.0	1.36	0.404
	45.6	-36.6	0.4	1.0	3.86	24.8	1.47	0.462
	65.8	-36.1	0.4	1.0	4.22	27.7	1.56	0.525
	95.2	-35.8	0.5	1.0	4.70	29.9	1.70	0.575
	137.5	-35.6	0.5	0.9	5.24	32.9	1.84	0.647
	198.8	-35.4	0.6	1.0	5.99	35.4	2.04	0.710
	287.3	-35.6	0.7	1.0	7.06	37.9	2.33	0.778
	415.2	-36.6	0.9	1.0	8.56	40.3	2.73	0.847
	600.0	-37.0	1.1	1.0	1.06E6	43.3	3.22	0.944
+30.0	5.0	-44.0	0.3	1.0	3.07E5	17.4	1.23E6	0.313
	7.2	-43.8	0.3	1.0	3.13	18.2	1.25	0.329
	10.4	-43.9	0.3	0.9	3.33	19.3	1.32	0.351
	15.1	-43.5	0.3	0.9	3.49	21.3	1.36	0.390
	21.8	-43.2	0.4	1.0	3.79	23.3	1.46	0.432
	31.5	-42.9	0.4	0.9	4.17	26.1	1.57	0.490
	45.6	-43.0	0.5	1.0	4.63	28.4	1.70	0.540
	65.8	-43.0	0.5	0.9	5.22	31.3	1.87	0.608
	95.2	-42.9	0.6	1.0	5.95	34.0	2.07	0.675
	137.5	-43.2	0.6	0.9	6.87	37.0	2.30	0.754
	198.8	-43.7	0.8	1.0	8.14	39.2	2.64	0.815
	287.3	-43.7	1.0	1.0	9.71	41.1	3.07	0.872
	415.2	-44.3	1.2	1.0	1.18E6	42.5	3.65	0.915
	600.0	-44.3	1.5	1.0	1.47	44.2	4.42	0.973
+23.0	5.0	-47.6	0.3	1.0	3.10E5	17.3	1.24E6	0.312
	7.2	-47.5	0.3	0.9	3.31	18.5	1.32	0.336
	10.4	-47.3	0.3	0.8	3.55	21.1	1.38	0.385
	15.1	-47.2	0.4	1.0	3.88	22.9	1.50	0.423
	21.8	-47.0	0.4	0.9	4.22	25.5	1.60	0.477
	31.5	-46.9	0.5	1.0	4.68	28.6	1.72	0.546
	45.6	-47.1	0.5	0.9	5.29	31.2	1.89	0.605
	65.8	-46.9	0.6	0.9	6.02	33.4	2.10	0.660
	95.2	-47.1	0.7	1.0	6.98	36.0	2.36	0.726
	137.5	-47.4	0.8	1.0	8.13	38.6	2.66	0.799
	198.8	-47.8	0.9	0.9	9.69	40.5	3.08	0.855
	287.3	-48.1	1.1	1.0	1.18E6	42.0	3.66	0.901
	415.2	-49.0	1.4	1.0	1.43	43.0	4.38	0.933
	600.0	-49.1	1.8	1.0	1.79	44.2	5.39	0.971

TABLE 36: TEST DATA FOR LABORATORY N (DIRECT STIFFNESS/SHEAR)

SHEAR DEFORMATION (SHEAR MODULUS)
DIRECT STIFFNESS TEST SYSTEM
Specimen Type: N/A
Specimen Length: N/A
Specimen Thickness: N/A
Specimen Width: N/A
Polymer Density = 0.046 Lb/in**3
Test Dates: 5 December 1990

TEMP (C)	FREQ (Hz)	SHEAR MODULUS (MPa)	LOSS FACTOR	STRAIN (%)
+20.0	0.1	1.30	0.12	1.0
	0.3	1.44	0.17	1.0
	1.0	1.63	0.25	1.0
	3.2	1.98	0.34	0.51
	10.0	2.47	0.50	0.52
	31.6	3.40	0.68	0.49
	100.0	5.77	0.86	0.52
+10.0	0.1	1.76	0.26	1.0
	0.3	2.12	0.37	1.0
	1.0	2.64	0.50	1.0
	3.2	3.76	0.67	0.50
	10.0	5.54	0.78	1.0
	31.6	9.35	0.89	1.0
	100.0	18.2	0.93	0.37
0.0	0.1	3.35	0.56	0.50
	0.3	4.80	0.67	0.10
	1.0	7.46	0.78	0.10
	3.2	12.1	0.84	0.10
	10.0	20.6	0.86	0.10
	31.6	35.7	0.78	0.052
	100.0	67.3	0.70	0.053
-10.0	0.1	13.2	0.78	0.20
	0.3	22.7	0.77	0.20
	1.0	37.6	0.72	0.20
	3.2	58.8	0.62	0.051
	10.0	91.7	0.56	0.050
	31.6	136.0	0.45	0.052
	100.0	211.0	0.38	0.051
-20.0	0.1	75.2	0.58	0.050
	0.3	112.0	0.48	0.050
	1.0	154.0	0.41	0.049
	3.2	199.0	0.32	0.052
	10.0	259.[illegible]	0.25	0.054
	31.6	311.[illegible]	0.20	0.053
	100.0	401.0	0.17	0.055

TABLE 36 (CONTINUED)

TEMP (C)	FREQ (Hz)	SHEAR MODULUS (MPa)	LOSS FACTOR	STRAIN (%)
-10.0	0.1	13.2	0.79	0.20
	0.3	21.5	0.78	0.20
	1.0	34.5	0.73	0.20
	3.2	58.9	0.63	0.052
	10.0	91.9	0.56	0.052
	31.6	135.0	0.46	0.054
	100.0	209.0	0.38	0.053
0.0	0.1	3.30	0.56	0.50
	0.3	4.80	0.69	0.50
	1.0	7.36	0.79	0.10
	3.2	12.0	0.84	0.10
	10.0	21.3	0.82	0.10
	31.6	36.1	0.77	0.049
	100.0	68.2	0.69	0.050
+10.0	0.1	1.72	0.25	1.0
	0.3	2.08	0.36	1.0
	1.0	2.68	0.51	1.0
	3.2	3.68	0.66	0.51
	10.0	5.51	0.79	0.10
	31.6	9.16	0.89	0.10
	100.0	17.6	0.93	0.10
+20.0	0.1	1.32	0.12	1.0
	0.3	1.45	0.17	1.0
	1.0	1.63	0.24	1.0
	3.2	1.97	0.35	0.51
	10.0	2.49	0.50	0.51
	31.6	3.45	0.64	0.10
	100.0	5.87	0.84	0.10
+30.0	0.1	1.15	0.075	1.0
	0.3	1.21	0.096	1.0
	1.0	1.30	0.13	1.0
	3.2	1.45	0.18	1.0
	10.0	1.67	0.26	0.51
	31.6	1.97	0.39	0.50
	100.0	2.82	0.60	0.50
+40.0	0.1	1.00	0.056	1.0
	0.3	1.04	0.069	1.0
	1.0	1.08	0.083	1.0
	3.2	1.16	0.11	1.0
	10.0	1.24	0.15	1.0
	31.6	1.40	0.23	1.0
	100.0	1.82	0.36	0.51

TABLE 36 (CONTINUED)

TEMP (C)	FREQ (Hz)	SHEAR MODULUS (MPa)	LOSS FACTOR	STRAIN (%)
+50.0	0.1	0.776	0.055	2.0
	0.3	0.805	0.061	2.0
	1.0	0.839	0.070	2.1
	3.2	0.884	0.087	2.0
	10.0	0.919	0.11	1.0
	31.6	1.03	0.15	1.0
	100.0	1.33	0.24	1.0
+60.0	0.1	0.603	0.054	2.0
	0.3	0.632	0.058	2.0
	1.0	0.661	0.063	2.0
	3.2	0.686	0.078	2.0
	10.0	0.751	0.093	2.0
	31.6	0.804	0.12	2.0
	100.0	1.00	0.19	1.0
+70.0	0.1	0.522	0.053	2.1
	0.3	0.541	0.054	2.0
	1.0	0.563	0.060	2.0
	3.2	0.587	0.071	2.0
	10.0	0.616	0.085	2.1
	31.6	0.678	0.10	2.0
	100.0	0.842	0.16	1.0
+80.0	0.1	0.449	0.054	2.0
	0.3	0.470	0.054	2.0
	1.0	0.491	0.058	2.0
	3.2	0.518	0.066	2.0
	10.0	0.542	0.079	2.0
	31.6	0.586	0.095	2.0
	100.0	0.722	0.15	2.1
+90.0	0.1	0.381	0.053	2.0
	0.3	0.397	0.057	2.1
	1.0	0.413	0.064	2.0
	3.2	0.440	0.069	2.1
	10.0	0.470	0.078	2.0
	31.6	0.498	0.098	2.1
	100.0	0.620	0.16	2.1
+80.0	0.1	0.428	0.050	2.1
	0.3	0.442	0.051	2.0
	1.0	0.459	0.057	2.1
	3.2	0.479	0.073	2.1
	10.0	0.509	0.083	2.0
	31.6	0.550	0.10	2.0
	100.0	0.690	0.16	2.1

TABLE 36 (CONCLUDED)

TEMP (C)	FREQ (Hz)	SHEAR MODULUS (MPa)	LOSS FACTOR	STRAIN (%)
+70.0	0.1	0.468	0.048	2.0
	0.3	0.486	0.054	2.0
	1.0	0.506	0.063	2.1
	3.2	0.537	0.074	2.0
	10.0	0.582	0.088	2.0
	31.6	0.619	0.11	2.0
	100.0	0.772	0.18	1.0
+60.0	0.1	0.541	0.048	2.0
	0.3	0.560	0.055	2.0
	1.0	0.583	0.066	2.0
	3.2	0.624	0.078	2.0
	10.0	0.683	0.098	2.1
	31.6	0.720	0.13	2.1
	100.0	0.896	0.21	1.0
+50.0	0.1	0.584	0.056	2.1
	0.3	0.611	0.066	2.0
	1.0	0.644	0.081	2.1
	3.2	0.694	0.10	2.0
	10.0	0.754	0.12	1.0
	31.6	0.837	0.18	1.0
	100.0	1.06	0.29	1.0
+40.0	0.1	0.639	0.070	2.0
	0.3	0.678	0.087	2.0
	1.0	0.722	0.10	2.0
	3.2	0.803	0.14	1.0
	10.0	0.901	0.19	1.0
	31.6	0.999	0.28	1.0
	100.0	1.37	0.45	1.0
+30.0	0.1	0.714	0.096	2.5
	0.3	0.764	0.12	2.5
	1.0	0.838	0.16	1.0
	3.2	0.971	0.22	1.0
	10.0	1.09	0.34	1.0
	31.6	1.36	0.50	1.0
	100.0	2.06	0.76	1.0
+20.0	0.1	0.836	0.15	1.0
	0.3	0.938	0.21	1.0
	1.0	1.08	0.31	1.0
	3.2	1.34	0.46	1.0
	10.0	1.75	0.68	0.50
	31.6	2.63	0.92	0.51
	100.0	4.86	1.10	0.51

TABLE 37: TEST DATA FOR LABORATORY O (RHEOVIBRON DDV-III-C/EXTENSION)

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
RHEOVIBRON DDV-III-C

Heating Rate: 1 degree C / Minute
Polymer Density = 0.046 Lb/in**3
Specimen Length: 14.80 mm (3.5 Hz) and 16.52 mm (110 Hz)
Specimen Width: 7.96 mm (3.5 Hz) and 7.91 mm (110 Hz)
Specimen Thickness: 3.08 mm (3.5 and 110 Hz)

TEMP (C)	FREQ Hz	YOUNG'S MODULUS MPa	LOSS FACTOR	TEMP (C)	FREQ Hz	YOUNG'S MODULUS MPa	LOSS FACTOR
-96.6	3.5	1835.0	0.01158	-100.4	110	1840.0	0.01155
-95.9		1847.0	0.01962	-98.7		1838.0	0.01303
-94.1		1861.0	0.01151	-97.2		1838.0	0.01187
-92.2		1831.0	0.02934	-95.5		1836.0	0.01153
-90.3		1830.0	0.02574	-94.0		1834.0	0.02062
-88.5		1831.0	0.02024	-92.3		1833.0	0.01229
-86.6		1838.0	0.01967	-90.0		1831.0	0.01163
-84.8		1825.0	0.01813	-89.5		1828.0	0.01898
-82.9		1844.0	0.01215	-88.1		1826.0	0.01839
-81.1		1831.0	0.02270	-86.8		1827.0	0.01256
-79.4		1838.0	0.01125	-85.6		1829.0	0.03082
-77.6		1830.0	0.01512	-84.3		1820.0	0.03189
-75.9		1831.0	0.01787	-83.0		1817.0	0.02581
-74.3		1818.0	0.01627	-81.9		1834.0	0.00948
-72.6		1811.0	0.01639	-80.6		1824.0	0.01842
-71.2		1805.0	0.01390	-79.4		1814.0	0.02440
-69.6		1794.0	0.01326	-78.3		1814.0	0.00643
-68.2		1785.0	0.01936	-77.2		1817.0	0.01623
-65.5		1784.0	0.01448	-76.1		1818.0	0.01652
-64.1		1779.0	0.02382	-74.9		1801.0	0.01509
-62.7		1774.0	0.01753	-73.9		1801.0	0.01570
-61.4		1772.0	0.01815	-72.7		1804.0	0.01571
-60.1		1771.0	0.02442	-71.7		1807.0	0.01689
-58.8		1772.0	0.02347	-70.7		1807.0	0.02001
-57.5		1752.0	0.02548	-69.6		1807.0	0.01898
-56.3		1747.0	0.02123	-68.6		1795.0	0.01876
-55.2		1745.0	0.02236	-67.6		1789.0	0.02383
-54.0		1748.0	0.02878	-66.7		1800.0	0.01974
-52.8		1739.0	0.03003	-65.6		1793.0	0.01820
-51.7		1728.0	0.02713	-64.7		1796.0	0.02011
-50.6		1725.0	0.02870	-63.7		1801.0	0.01930
-49.6		1711.0	0.03892	-62.8		1774.0	0.01835
-48.4		1708.0	0.03518	-61.9		1779.0	0.02020
-47.4		1702.0	0.04165	-61.0		1772.0	0.01938
-46.3		1691.0	0.04630	-60.1		1770.0	0.01822
-45.2		1698.0	0.04020	-59.2		1767.0	0.01920
-44.4		1697.0	0.04566	-58.3		1773.0	0.01941

TABLE 37 (CONTINUED)

TEMP (C)	FREQ Hz	YOUNG'S MODULUS MPa	LOSS FACTOR	TEMP (C)	FREQ Hz	YOUNG'S MODULUS MPa	LOSS FACTOR
-43.3	3.5	1688.0	0.04688	-57.4	110	1764.0	0.01960
-42.3		1689.0	0.05043	-56.6		1773.0	0.02164
-41.4		1678.0	0.05478	-55.7		1756.0	0.02132
-40.3		1675.0	0.05694	-54.9		1769.0	0.02147
-39.3		1663.0	0.05335	-54.0		1765.0	0.02115
-38.3		1642.0	0.05538	-53.2		1763.0	0.01804
-37.2		1634.0	0.05777	-52.4		1755.0	0.02316
-36.2		1609.0	0.06849	-51.7		1758.0	0.02192
-35.1		1588.0	0.07494	-50.8		1741.0	0.02246
-34.2		1553.0	0.07875	-50.0		1747.0	0.02403
-33.3		1529.0	0.08712	-49.2		1755.0	0.02515
-32.4		1504.0	0.09269	-48.4		1752.0	0.02500
-31.5		1480.0	0.09284	-47.6		1746.0	0.02599
-30.5		1432.0	0.09902	-46.9		1746.0	0.02610
-29.6		1393.0	0.11328	-46.1		1748.0	0.02742
-28.7		1368.0	0.11681	-45.3		1735.0	0.02704
-27.8		1327.0	0.13075	-44.6		1733.0	0.02775
-26.9		1273.0	0.14635	-43.9		1730.0	0.02865
-25.9		1237.0	0.15125	-42.9		1738.0	0.02713
-25.2		1182.0	0.16303	-42.0		1718.0	0.02862
-24.2		1131.0	0.18187	-41.1		1724.0	0.02665
-23.3		1090.0	0.19495	-40.1		1714.0	0.03066
-22.5		1043.0	0.20988	-39.0		1712.0	0.04477
-21.6		987.5	0.22977	-38.1		1705.0	0.03570
-20.7		927.5	0.24766	-37.1		1700.0	0.03735
-19.8		876.6	0.26694	-36.2		1687.0	0.03453
-19.0		829.0	0.28492	-35.2		1676.0	0.04165
-18.1		777.8	0.30535	-34.3		1665.0	0.03959
-17.1		725.9	0.32746	-33.4		1653.0	0.04393
-16.3		673.2	0.34730	-32.5		1634.0	0.04458
-15.4		620.8	0.36904	-31.6		1628.0	0.05106
-14.5		570.7	0.39355	-30.7		1606.0	0.05435
-13.7		524.3	0.4[illegible]560	-29.9		1580.0	0.04750
-12.8		481.9	0.43681	-28.8		1363.0	0.06204
-11.9		438.9	0.46320	-28.0		1544.0	0.06697
-11.1		398.5	0.49194	-27.1		1524.0	0.07474
-10.1		359.5	0.51210	-26.2		1490.0	0.07859
- 9.4		325.1	0.53584	-25.3		1465.0	0.08635
- 8.4		291.9	0.56458	-24.5		1438.0	0.08825
- 7.6		260.9	0.58988	-23.6		1409.0	0.09674
- 6.7		232.0	0.61681	-22.7		1380.0	0.09870
- 5.9		208.0	0.63942	-21.9		1351.0	0.11295
- 5.1		185.5	0.65876	-21.0		1311.0	0.12502
- 4.3		166.1	0.67851	-20.0		1274.0	0.13014
- 3.5		148.3	0.70465	-19.2		1238.0	0.14208

TABLE 37 (CONTINUED)

TEMP (C)	FREQ Hz	YOUNG'S MODULUS MPa	LOSS FACTOR	TEMP (C)	FREQ Hz	YOUNG'S MODULUS MPa	LOSS FACTOR
- 2.7	3.5	131.7	0.72612	-18.3	110	1200.0	0.15517
- 1.8		119.4	0.74215	-17.4		1157.0	0.16681
- 1.0		104.8	0.74886	-16.6		1117.0	0.17923
- 0.2		92.84	0.77531	-15.7		1074.0	0.19190
0.7		82.78	0.79162	-14.9		1030.0	0.20777
1.7		73.28	0.79817	-14.0		984.1	0.22711
2.9		62.35	0.80882	-13.1		940.0	0.23904
4.5		51.79	0.82526	-12.0		883.4	0.26319
6.1		41.26	0.83446	-11.2		836.9	0.27805
7.7		34.11	0.84316	-10.4		790.9	0.30004
9.2		28.62	0.79769	- 9.5		744.0	0.32164
10.6		23.72	0.79680	- 8.7		701.4	0.34118
12.1		20.54	0.80575	- 7.9		661.3	0.36035
13.1		18.45	0.77507	- 7.1		619.9	0.3[illegible]06
13.9		16.51	0.71956	- 6.3		578.1	0.40564
14.9		15.80	0.71198	- 5.5		539.1	0.42571
15.7		13.87	0.66734	- 4.7		499.9	0.44929
16.5		13.63	0.63375	- 3.8		463.8	0.47154
17.3		12.17	0.66853	- 3.1		430.2	0.49558
18.1		11.54	0.55979	- 2.2		396.0	0.51919
18.7		10.73	0.61035	- 1.4		364.2	0.54476
19.5		10.53	0.50057	- 0.6		335.1	0.56640
20.5		10.13	0.52103	0.3		308.7	0.59087
21.4		8.721	0.51347	1.2		282.2	0.61481
22.2		8.935	0.41276	2.4		254.5	0.64244
23.1		8.412	0.50059	3.8		224.5	0.67394
24.1		8.282	0.47778	5.6		190.8	0.71593
25.1		8.352	0.38781	7.3		161.3	0.75636
26.2		7.116	0.38280	8.9		137.3	0.78514
27.0		7.751	0.31067	10.3		116.5	0.83099
28.1		7.155	0.38994	11.7		101.4	0.85168
29.0		6.679	0.29316	12.9		87.49	0.88662
30.1		6.625	0.24030	13.9		75.91	0.91187
31.1		6.978	0.23001	14.9		64.86	1.01526
32.1		6.109	0.21509	15.7		59.58	0.93924
33.0		6.114	0.32336	16.6		52.27	0.95600
34.0		5.647	0.30051	17.4		46.86	0.96458
34.9		6.174	0.19469	18.2		41.88	0.97111
35.7		5.920	0.24814	19.0		38.08	0.97505
36.8		5.220	0.24521	19.8		34.46	0.98317
37.7		5.449	0.27216	20.6		31.51	0.98540
38.6		5.132	0.26033	21.3		28.77	0.98401
39.4		5.373	0.25926	22.1		26.33	0.97949
40.5		5.286	0.25104	22.9		23.79	0.97184
41.5		5.026	0.06942	23.8		21.67	0.96354
42.4		5.286	0.21529	24.6		19.76	0.94636

TABLE 37 (CONTINUED)

TEMP (C)	FREQ Hz	YOUNG'S MODULUS MPa	LOSS FACTOR	TEMP (C)	FREQ Hz	YOUNG'S MODULUS MPa	LOSS FACTOR
43.3	3.5	4.749	0.21626	25.7	110	17.92	0.93750
44.3		4.666	0.21475	26.6		16.35	0.90887
45.3		4.735	0.02634	27.7		15.06	0.88977
46.6		4.475	0.26369	28.7		13.80	0.86739
47.6		4.925	0.02081	29.9		12.84	0.83723
48.6		4.724	0.03673	31.1		11.91	0.81696
49.9		4.338	0.30429	32.2		11.13	0.78518
50.6		4.329	0.20347	33.3		10.45	0.75943
51.1		4.382	0.00582	34.2		9.925	0.73320
51.8		4.483	0.03917	35.2		9.349	0.70029
52.6		4.137	0.15359	36.1		8.847	0.68882
53.5		3.819	0.08369	36.9		8.466	0.66277
54.2		4.377	0.16397	37.7		8.130	0.63801
54.9		4.320	0.05919	38.6		7.778	0.61957
56.1		3.877	0.25672	39.4		7.413	0.60637
57.5		4.412	0.06015	40.4		7.135	0.58360
58.4		3.511	0.19086	41.3		6.930	0.55584
59.2		3.381	0.20248	42.3		6.691	0.53445
60.3		3.553	0.21353	43.1		6.484	0.51280
61.2		3.672	0.20112	44.1		6.263	0.48811
62.2		3.010	0.16781	45.1		6.024	0.47128
62.8		3.321	0.01564	46.0		5.961	0.43986
64.3		3.281	0.09808	47.0		5.705	0.43348
65.4		3.487	0.14408	48.0		5.513	0.42101
66.4		3.132	0.07152	49.1		5.406	0.40215
67.4		2.908	0.02005	50.2		5.128	0.38105
68.4		2.924	0.00604	51.1		4.981	0.38045
69.5		2.703	0.03714	52.2		4.895	0.35587
70.1		2.461	0.14876	53.3		4.731	0.34200
70.7		2.447	0.13764	54.4		4.542	0.34764
71.4		2.307	0.34768	55.2		4.486	0.33995
71.9		2.587	0.13251	56.1		4.354	0.32706
72.8		2.405	0.38283	57.0		4.183	0.32704
73.7		2.827	0.17110	58.0		4.070	0.30786
74.5		2.482	0.22986	58.8		3.957	0.33182
75.4		2.521	0.23737	59.6		3.807	0.31337
76.5		2.592	0.20039	60.6		3.696	0.29816
77.6		1.882	0.08135	61.5		3.502	0.29840
79.1		2.168	0.41342	62.4		3.467	0.29795
80.4		2.137	0.28175	64.1		3.234	0.31107
81.5		1.567	0.02698	65.1		3.242	0.30747
82.9		1.995	0.12578	66.1		3.056	0.29607
84.0		1.772	0.36005	67.0		2.927	0.27919
84.6		2.243	0.14338	67.8		2.876	0.29037
85.3		1.817	0.43803	68.8		2.737	0.27530

TABLE 37 (CONCLUDED)

TEMP (C)	FREQ Hz	YOUNG'S MODULUS MPa	LOSS FACTOR	TEMP (C)	FREQ Hz	YOUNG'S MODULUS MPa	LOSS FACTOR
86.0	3.5	1.800	0.23656	69.7	110	2.617	0.30375
86.8		1.925	0.39382	70.7		2.515	0.30294
87.4		2.091	0.21028	71.6		2.435	0.28813
88.0		1.827	0.18177	72.6		2.364	0.31874
89.1		1.715	0.42980	73.8		2.326	0.31376
90.4		2.095	0.14563	74.9		2.307	0.28769
91.4		1.685	0.46558	76.1		2.165	0.33358
92.4		2.094	0.30884	77.2		2.151	0.32734
81.0	110	2.029	0.30148	78.1		2.147	0.34131
82.1		2.016	0.30446	78.5		2.103	0.33096
83.0		1.970	0.32528	79.9		2.084	0.32394
84.1		2.011	0.30189	93.1		1.714	0.31348
85.2		1.882	0.34841	94.0		1.584	0.36717
86.0		1.915	0.35379	95.1		1.608	0.36928
86.7		1.831	0.33266	96.1		1.584	0.37046
87.5		1.821	0.34196	97.3		1.546	0.35589
88.3		1.867	0.34912	98.3		1.540	0.35208
89.3		1.788	0.32360	99.2		1.497	0.37001
89.7		1.739	0.29690	100.2		1.494	0.33494
90.8		1.770	0.31797	101.0		1.499	0.33929
91.8		1.759	0.31046	101.9		1.418	0.32913

TABLE 38: TEST DATA FOR LABORATORY O (RHEOMETRICS RDA II/SHEAR)

SHEAR DEFORMATION (SHEAR MODULUS)
RHEOMETRICS RDA II

Operating Mode: Dynamic Mechanical Analysis
Polymer Density = 0.046 Lb/in**3
Specimen Dimensions: 3.95 mm radius by 3.08 mm gap
Test Date: 13 July 1990
Originator's code: RECAP III
Operator: RAS

TEMP (C)	EXP'T NO.	CMD % STRAIN	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR	TORQUE g.cm	% STRAIN
+20.0	5	0.040	1	0.0159	0.7163	0.0702	0.2779	0.03920
			2	0.0200	0.7528	0.1092	0.2932	0.03922
			3	0.0252	0.7199	0.1382	0.2811	0.03919
			4	0.0318	0.7647	0.0923	0.2973	0.03922
			5	0.0400	0.7946	0.1009	0.3093	0.03923
			6	0.0503	0.8293	0.0936	0.3221	0.03917
			7	0.0634	0.8280	0.1340	0.3227	0.03914
			8	0.0798	0.8477	0.1366	0.3308	0.03916
			9	0.1004	0.8556	0.1392	0.3340	0.03916
			10	0.1264	0.8818	0.1508	0.3445	0.03913
			11	0.1591	0.9040	0.1565	0.3537	0.03916
			12	0.2004	0.9415	0.1541	0.3680	0.03914
			13	0.2523	0.9628	0.1687	0.3772	0.03914
			14	0.3175	0.9783	0.1997	0.3855	0.03914
			15	0.3998	1.018	0.1875	0.4021	0.03933
			16	0.5032	0.9978	0.2109	0.3950	0.03924
			17	0.6334	1.060	0.2663	0.4233	0.03910
			18	0.7975	1.075	0.2599	0.4298	0.03920
			19	1.0039	1.113	0.2875	0.4489	0.03925
			20	1.2640	1.172	0.2932	0.4732	0.03926
			21	1.5912	1.192	0.3253	0.4852	0.03922
			22	2.0038	1.251	0.3635	0.5152	0.03922
			23	2.5226	1.308	0.3753	0.5422	0.03932
			24	3.1751	1.370	0.4353	0.5796	0.03930
			25	3.9964	1.430	0.4466	0.6081	0.03932
			26	5.0309	1.511	0.4809	0.6506	0.03931
			27	6.3344	1.580	0.4960	0.6847	0.03932
			28	7.9737	1.656	0.5511	0.7343	0.03933
			29	10.0395	1.750	0.5673	0.7806	0.03930
			30	12.6385	1.888	0.6212	0.8592	0.03915
			31	15.9155	2.034	0.6503	0.9322	0.03892

TABLE 38 (CONTINUED)

TEMP (C)	EXP'T NO.	CMD % STRAIN	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR	TORQUE g.cm	% STRAIN
+20.0	6	0.080	1	0.0159	0.7584	0.0987	0.6004	0.07980
			2	0.0200	0.7659	0.1125	0.6071	0.07980
			3	0.0252	0.8128	0.1176	0.6445	0.07977
			4	0.0318	0.8238	0.1186	0.6533	0.07978
			5	0.0400	0.8421	0.1414	0.6699	0.07979
			6	0.0503	0.8539	0.1386	0.6788	0.07977
			7	0.0634	0.8712	0.1416	0.6930	0.07979
			8	0.0798	0.8908	0.1540	0.7097	0.07977
			9	0.1004	0.9055	0.1644	0.7230	0.07981
			10	0.1264	0.9267	0.1740	0.7407	0.07977
			11	0.1591	0.9516	0.1790	0.7616	0.07981
			12	0.2004	0.9696	0.1883	0.7772	0.07979
			13	0.2523	1.003	0.2006	0.8053	0.07974
			14	0.3175	1.023	0.2218	0.8251	0.07973
			15	0.3998	1.034	0.2224	0.8354	0.07988
			16	0.5032	1.077	0.2422	0.8730	0.07979
			17	0.6334	1.107	0.2675	0.9013	0.07967
			18	0.7975	1.139	0.2707	0.9283	0.07971
			19	1.0039	1.190	0.2995	0.9787	0.07981
			20	1.2640	1.224	0.3230	1.013	0.07978
			21	1.5912	1.263	0.3495	1.054	0.07987
			22	2.0038	1.310	0.3736	1.102	0.07981
			23	2.5226	1.374	0.3965	1.167	0.08000
			24	3.1751	1.438	0.4310	1.236	0.07995
			25	3.9964	1.502	0.4596	1.306	0.08001
			26	5.0309	1.588	0.4878	1.394	0.07996
			27	6.3344	1.672	0.5258	1.493	0.08003
			28	7.9737	1.772	0.5568	1.603	0.08005
			29	10.0395	1.876	0.5987	1.725	0.07996
			30	12.6385	1.999	0.6361	1.869	0.07990
			31	15.9155	2.122	0.6782	2.013	0.07951
+10.0	7	0.040	1	0.0159	0.8107	0.1649	0.3177	.03916
			2	0.0200	0.8397	0.1810	0.3298	.03916
			3	0.0252	0.9114	0.2005	0.3592	.03914
			4	0.0318	0.8922	0.1902	0.3507	.03912
			5	0.0400	0.9161	0.2239	0.3624	.03910
			6	0.0503	0.9895	0.2347	0.3927	.03914
			7	0.0634	0.9855	0.2390	0.3915	.03914
			8	0.0798	0.9970	0.2640	0.3985	.03914
			9	0.1004	1.058	0.2777	0.4243	.03914
			10	0.1264	1.079	0.3238	0.4384	.03914
			11	0.1591	1.147	0.3339	0.4670	.03911
			12	0.2004	1.158	0.3436	0.4730	.03914
			13	0.2523	1.216	0.3837	0.5031	.03911
			14	0.3175	1.309	0.4098	0.5458	.03909
			15	0.3998	1.378	0.4392	0.5816	.03916

TABLE 38 (CONTINUED)

TEMP (C)	EXP'T NO.	CMD % STRAIN	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR	TORQUE g.cm	% STRAIN
+10.0	7	0.040	16	0.5032	1.394	0.4838	0.5967	0.03904
			17	0.6334	1.521	0.5129	0.6585	0.03903
			18	0.7975	1.597	0.5385	0.6996	0.03909
			19	1.0039	1.691	0.5627	0.7504	0.03917
			20	1.2640	1.820	0.5859	0.8143	0.03911
			21	1.5912	1.928	0.6249	0.8778	0.03912
			22	2.0038	2.080	0.6523	0.9592	0.03912
			23	2.5226	2.203	0.6814	1.031	0.03920
			24	3.1751	2.400	0.7181	1.141	0.03911
			25	3.9964	2.626	0.7385	1.261	0.03912
			26	5.0309	2.846	0.7635	1.385	0.03918
			27	6.3344	3.080	0.8051	1.530	0.03921
			28	7.9737	3.363	0.8411	1.695	0.03908
			29	10.0395	3.728	0.8464	1.893	0.03906
			30	12.6385	4.114	0.8630	2.085	0.03888
			31	15.9155	4.549	0.9002	2.333	0.03861
+10.0	8	0.080	1	0.0159	0.8279	0.2030	0.6655	0.07980
			2	0.0200	0.8616	0.2009	0.6920	0.07977
			3	0.0252	0.8808	0.2111	0.7087	0.07976
			4	0.0318	0.9011	0.2114	0.7251	0.07976
			5	0.0400	0.9936	0.2380	0.7555	0.07976
			6	0.0503	0.9540	0.2511	0.7745	0.07977
			7	0.0634	0.9835	0.2677	0.8014	0.07974
			8	0.0798	1.018	0.2937	0.8356	0.07976
			9	0.1004	1.051	0.3120	0.8663	0.07971
			10	0.1264	1.099	0.3300	0.9107	0.07972
			11	0.1591	1.155	0.3536	0.9634	0.07968
			[illegible]	0.2004	1.198	0.3786	1.008	0.07973
			13	0.2523	1.252	0.4006	1.061	0.07970
			14	0.3175	1.304	0.4242	1.113	0.07961
			15	0.3998	1.370	0.4572	1.186	0.07976
			16	0.5032	1.447	0.4951	1.270	0.07969
			17	0.6334	1.524	0.5147	1.347	0.07964
			18	0.7975	1.611	0.5461	1.442	0.07960
			19	1.0039	1.727	0.5763	1.567	0.07962
			20	1.2640	1.827	0.6035	1.678	0.07963
			21	1.5912	1.966	0.6482	1.842	0.07965
			22	2.0038	2.111	0.6747	2.001	0.07957
			23	2.5226	2.262	0.7058	2.177	0.07963
			24	3.1751	2.452	0.7349	2.392	0.07963
			25	3.9964	2.660	0.7603	2.627	0.07964
			26	5.0309	2.877	0.7937	2.885	0.07958
			27	6.3344	3.172	0.8088	3.204	0.07956
			28	7.9737	3.444	0.8402	3.528	0.07947
			29	10.0395	3.790	0.8634	3.925	0.07941
			30	12.6385	4.152	0.8904	4.347	0.07921
			31	15.9155	4.577	0.9054	4.807	0.07886

TABLE 38 (CONTINUED)

TEMP (C)	EXP'T NO.	CMD % STRAIN	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR	TORQUE g.cm	% STRAIN
+ 0.0	9	0.040	1	0.0159	1.210	0.3656	0.4976	0.03912
			2	0.0200	1.285	0.3950	0.5331	0.03909
			3	0.0252	1.350	0.4432	0.5705	0.03913
			4	0.0318	1.367	0.4712	0.5830	0.03907
			5	0.0400	1.500	0.4707	0.6388	0.03903
			6	0.0503	1.549	0.5164	0.6723	0.03906
			7	0.0634	1.631	0.5570	0.7197	0.03905
			8	0.0798	1.752	0.5626	0.7738	0.03899
			9	0.1004	1.864	0.5817	0.8301	0.03899
			10	0.1264	2.014	0.6031	0.9051	0.03897
			11	0.1591	2.171	0.6276	0.9862	0.03898
			12	0.2004	2.344	0.6415	1.072	0.03898
			13	0.2523	2.492	0.6839	1.161	0.03895
			14	0.3175	2.746	0.7000	1.286	0.03887
			15	0.3998	2.995	0.7200	1.415	0.03882
			16	0.5032	3.295	0.7215	1.564	0.03899
			17	0.6334	3.537	0.7541	1.696	0.03879
			18	0.7975	3.875	0.7709	1.875	0.03883
			19	1.0039	4.309	0.7760	2.086	0.03875
			20	1.2640	4.738	0.7986	2.316	0.03869
			21	1.5912	5.212	0.8090	2.559	0.03867
			22	2.0038	5.719	0.8181	2.823	0.03870
			23	2.5226	6.380	0.8155	3.124	0.03843
			24	3.1751	6.966	0.8341	3.450	0.03853
			25	3.9964	7.692	0.8441	3.825	0.03850
			26	5.0309	8.570	0.8451	4.248	0.03836
			27	6.3344	9.543	0.8474	4.727	0.03828
			28	7.9737	10.65	0.8491	5.257	0.03812
			29	10.0395	11.84	0.8422	5.796	0.03793
			30	12.6385	13.12	0.8407	6.384	0.03774
			31	15.9155	14.54	0.8344	6.975	0.03731
+ 0.0	10	0.080	1	0.0159	1.161	0.4174	0.9895	0.07970
			2	0.0200	1.196	0.4697	1.039	0.07971
			3	0.0252	1.299	0.4207	1.109	0.07969
			4	0.0318	1.363	0.4874	1.192	0.07964
			5	0.0400	1.435	0.4993	1.261	0.07961
			6	0.0503	1.521	0.5334	1.355	0.07961
			7	0.0634	1.635	0.5475	1.464	0.07957
			8	0.0798	1.732	0.5793	1.572	0.07953
			9	0.1004	1.864	0.5889	1.696	0.07944
			10	0.1264	2.001	0.6276	1.854	0.07950
			11	0.1591	2.145	0.6447	2.001	0.07944
			12	0.2004	2.289	0.6717	2.162	0.07942
			13	0.2523	2.471	0.6871	2.348	0.07934
			14	0.3175	2.684	0.7159	2.584	0.07930
			15	0.3998	2.915	0.7374	2.836	0.07932

TABLE 38 (CONTINUED)

TEMP (C)	EXP'T NO.	CMD % STRAIN	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR	TORQUE g.cm	% STRAIN
+ 0.0	10	0.080	16	0.5032	3.197	0.7457	3.114	0.07910
			17	0.6334	3.496	0.7654	3.436	0.07905
			18	0.7975	3.809	0.7847	3.776	0.07901
			19	1.0039	4.173	0.8062	4.180	0.07901
			20	1.2640	4.607	0.8138	4.626	0.07890
			21	1.5912	5.062	0.8233	5.100	0.07879
			22	2.0038	5.568	0.8393	5.646	0.07868
			23	2.5226	6.155	0.8412	6.239	0.07859
			24	3.1751	6.765	0.8524	6.886	0.07847
			25	3.9964	7.487	0.8558	7.622	0.07835
			26	5.0309	8.301	0.8557	8.422	0.07809
			27	6.3344	9.171	0.8577	9.300	0.07798
			28	7.9737	10.15	0.8621	10.28	0.07767
			29	10.0395	11.33	0.8553	11.37	0.07726
			30	12.6385	12.52	0.8576	12.53	0.07699
			31	15.9155	13.94	0.8535	13.81	0.07632
-10.0	11	0.030	1	0.0159	3.262	0.6463	1.133	0.02956
			2	0.0200	3.468	0.6850	1.226	0.02955
			3	0.0252	3.755	0.6656	1.314	0.02951
			4	0.0318	4.081	0.6722	1.430	0.02946
			5	0.0400	4.529	0.6910	1.603	0.02950
			6	0.0503	4.806	0.6878	1.694	0.02942
			7	0.0634	5.351	0.6988	1.891	0.02935
			8	0.0798	5.865	0.7253	2.096	0.02931
			9	0.1004	6.377	0.7305	2.282	0.02926
			10	0.1264	6.933	0.7476	2.496	0.02921
			11	0.1591	7.660	0.7439	2.748	0.02916
			12	0.2004	8.339	0.7520	2.991	0.02904
			13	0.2523	9.093	0.7486	3.250	0.02898
			14	0.3175	9.984	0.7471	3.556	0.02891
			15	0.3998	11.07	0.7558	3.929	0.02869
			16	0.5032	12.13	0.7574	4.319	0.02875
			17	0.6334	13.48	0.7497	4.764	0.02864
			18	0.7975	14.85	0.7491	5.205	0.02841
			19	1.0039	16.30	0.7394	5.677	0.02837
			20	1.2640	17.90	0.7355	6.191	0.02822
			21	1.5912	19.68	0.7316	6.757	0.02808
			22	2.0038	21.74	0.7162	7.364	0.02789
			23	2.5226	23.96	0.7099	8.026	0.02767
			24	3.1751	26.36	0.6940	8.728	0.02755
			25	3.9964	29.04	0.6848	9.471	0.02726
			26	5.0309	31.72	0.6724	10.24	0.02713
			27	6.3344	34.88	0.6639	11.07	0.02680
			28	7.9737	38.38	0.6468	11.95	0.02647
			29	10.0395	42.33	0.6244	12.84	0.02607
			30	12.6385	46.06	0.6157	13.75	0.02575
			31	15.9155	50.44	0.5975	14.67	0.02530

TABLE 38 (CONTINUED)

TEMP (C)	EXP'T NO.	CMD % STRAIN	INDEX No	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR	TORQUE g cm	% STRAIN
-10.0	12	0.060	1	0.0159	3.083	0.6445	2.140	0.05910
			2	0.0200	3.314	0.6887	2.343	0.05899
			3	0.0252	3.533	0.7020	2.515	0.05902
			4	0.0318	3.954	0.7060	2.815	0.05892
			5	0.0400	4.261	0.7080	3.034	0.05888
			6	0.0503	4.735	0.7076	3.365	0.05876
			7	0.0634	5.053	0.7316	3.629	0.05871
			8	0.0798	5.593	0.7319	4.010	0.05861
			9	0.1004	6.002	0.7508	4.336	0.05852
			10	0.1264	6.623	0.7547	4.787	0.05839
			11	0.1591	7.331	0.7575	5.292	0.05829
			12	0.2004	7.894	0.7602	5.686	0.05808
			13	0.2523	8.627	0.7617	6.211	0.05802
			14	0.3175	9.561	0.7645	6.870	0.05782
			15	0.3998	10.70	0.7704	7.657	0.05745
			16	0.5032	11.80	0.7640	8.439	0.05755
			17	0.6334	13.00	0.7656	9.229	0.05711
			18	0.7975	14.20	0.7630	10.04	0.05696
			19	1.0039	15.71	0.7543	11.02	0.05673
			20	1.2640	17.48	0.7469	12.13	0.05630
			21	1.5912	19.34	0.7386	13.29	0.05599
			22	2.0030	21.25	0.7305	14.47	0.05572
			23	2.5226	23.25	0.7220	15.70	0.05545
			24	3.1751	25.40	0.7122	16.95	0.05508
			25	3.9964	27.76	0.7000	18.29	0.05466
			26	5.0309	30.32	0.6893	19.74	0.05430
			27	6.3344	33.30	0.6754	21.31	0.05374
			28	7.9737	36.53	0.6592	23.01	0.05326
			29	10.0395	40.01	0.6469	24.74	0.05261
			30	12.6385	43.86	0.6269	26.53	0.05191
			31	15.9155	47.97	0.6121	28.30	0.05099
-20.0	13	0.030	1	0.0159	15.09	0.7139	5.208	0.02846
			2	0.0200	16.51	0.7004	5.633	0.02830
			3	0.0252	17.99	0.6951	6.092	0.02817
			4	0.0318	20.40	0.6602	6.735	0.02791
			5	0.0400	21.93	0.6614	7.218	0.02781
			6	0.0503	24.03	0.6550	7.833	0.02763
			7	0.0634	25.99	0.6450	8.391	0.02748
			8	0.0798	28.68	0.6340	9.131	0.02724
			9	0.1004	30.44	0.6285	9.612	0.02708
			10	0.1264	33.95	0.6113	10.52	0.02677
			11	0.1591	36.61	0.6048	11.21	0.02654
			12	0.2004	39.83	0.5934	12.02	0.02630
			13	0.2523	43.27	0.5804	12.86	0.02603
			14	0.3175	47.18	0.5653	13.78	0.02575
			15	0.3998	51.24	0.5490	14.70	0.02547

TABLE 38 (CONCLUDED)

TEMP (C)	EXP'T NO.	CMD % STRAIN	INDEX No.	FREQ (Hz)	MODULUS (MPa)	LOSS FACTOR	TORQUE g.cm	% STRAIN
-20.0	13	0.030	16	0.5032	55.57	0.5459	15.56	0.02490
			17	0.6334	59.98	0.5247	16.45	0.02460
			18	0.7975	64.77	0.5093	17.48	0.02437
			19	1.0039	70.13	0.4965	18.56	0.02401
			20	1.2640	75.55	0.4807	19.62	0.02371
			21	1.5912	80.64	0.4709	20.56	0.02336
			22	2.0038	85.94	0.4557	21.50	0.02306
			23	2.5226	91.80	0.4415	22.49	0.02270
			24	3.1751	97.93	0.4287	23.57	0.02241
			25	3.9964	105.6	0.4089	24.71	0.02194
			26	5.0309	111.5	0.4049	25.80	0.02173
			27	6.3344	119.8	0.3813	26.83	0.02119
			28	7.9737	126.9	0.3655	27.76	0.02081
			29	10.0395	132.9	0.3573	28.65	0.02057
			30	12.6385	141.2	0.3374	29.43	0.02001
			31	15.9155	147.8	0.3191	30.08	0.01964
-20.0	14	0.060	1	0.0159	14.79	0.6936	10.10	0.05682
			2	0.0200	15.93	0.6927	10.84	0.05663
			3	0.0252	17.65	0.6767	11.84	0.05627
			4	0.0318	19.24	0.6804	12.86	0.05599
			5	0.0400	20.97	0.6715	13.88	0.05565
			6	0.0503	22.76	0.6724	14.99	0.05535
			7	0.0634	24.81	0.6611	16.14	0.05499
			8	0.0798	26.93	0.6511	17.32	0.05459
			9	0.1004	29.57	0.6394	18.78	0.05419
			10	0.1264	32.28	0.6299	20.22	0.05369
			11	0.1591	35.21	0.6191	21.75	0.05319
			12	0.2004	38.39	0.6087	23.37	0.05268
			13	0.2523	41.61	0.5961	24.93	0.05214
			14	0.3175	44.93	0.5830	26.52	0.05165
			15	0.3998	48.65	0.5681	28.22	0.05110
			16	0.5032	53.45	0.5548	30.31	0.05024
			17	0.6334	58.33	0.5408	32.48	0.04961
			18	0.7975	63.04	0.5243	34.47	0.04905
			19	1.0039	67.63	0.5089	36.27	0.04843
			20	1.2640	72.45	0.4986	38.09	0.04766
			21	1.5912	77.62	0.4839	40.06	0.04706
			22	2.0038	83.54	0.4673	42.17	0.04633
			23	2.5226	89.35	0.4536	44.28	0.04572
			24	3.1751	95.89	0.4351	46.36	0.04490
			25	3.9964	102.4	0.4215	48.40	0.04414
			26	5.0309	108.9	0.4069	50.36	0.04341
			27	6.3344	115.4	0.3922	52.25	0.04269
			28	7.9737	122.1	0.3756	54.07	0.04199
			29	10.0395	128.7	0.3620	55.87	0.04135
			30	12.6385	136.3	0.3449	57.53	0.04043
			31	15.9155	143.2	0.3301	58.91	0.03956

TABLE 39: TEST DATA FOR LABORATORY P (RHEOMETRICS RDA II/SHEAR)

SHEAR DEFORMATION (SHEAR MODULUS)
RHEOMETRICS RDA II TEST SYSTEM
Specimen Type: Lap shear
Specimen Diameter: 25 or 8 mm
Specimen Thickness: 0.0625 in
Polymer Density = 0.046 Lb/in**3
Adhesive: Magic Super Glue (Cyanoacrylate)

TEMP (C)	pplate mm	No.	FREQ (Hz)	TORQUE g.cm	SHEAR MODULUS G, MPa	LOSS FACTOR
+50.0	25	1	0.0080	21.47	0.9258	0.06847
		2	0.0126	21.74	0.9432	0.06712
		3	0.0184	22.01	0.9522	0.06344
		4	0.0317	22.19	0.9667	0.06540
		5	0.0502	22.44	0.9815	0.06246
		6	0.0796	22.81	1.001	0.06847
		7	0.1261	23.08	1.022	0.06050
		8	0.1999	23.40	1.038	0.06577
		9	0.3169	23.71	1.053	0.06454
		10	0.5021	24.13	1.076	0.07294
		11	0.7958	24.46	1.097	0.07687
		12	1.2613	24.93	1.120	0.07509
		13	1.9990	25.37	1.140	0.08326
		14	3.1688	26.04	1.173	0.08553
		15	5.0213	26.64	1.197	0.09390
		16	7.9577	27.22	1.231	0.09144
		17	12.6130	27.34	1.277	0.09249
		18	19.9899	26.25	1.336	0.08265
		19	31.6877	22.69	1.395	0.06087
		20	50.2134	18.27	1.473	0.07813
		21	79.5775	12.79	1.561	0.00000
+30.0	25	1	0.0080	25.10	1.120	0.07626
		2	0.0126	25.56	1.145	0.07810
		3	0.0184	25.88	1.165	0.08185
		4	0.0317	26.32	1.190	0.08658
		5	0.0502	26.70	1.217	0.09193
		6	0.0796	27.18	1.247	0.09304
		7	0.1261	27.67	1.278	0.09969
		8	0.1999	28.16	1.310	0.1067
		9	0.3169	28.79	1.344	0.1234
		10	0.5021	29.59	1.390	0.1367
		11	0.7958	30.39	1.440	0.1475
		12	1.2613	31.30	1.499	0.1676
		13	1.9990	32.56	1.567	0.1949
		14	3.1688	33.95	1.644	0.2184
		15	5.0213	35.64	1.749	0.2381
		16	7.9577	37.44	1.872	0.2632
		17	12.6130	38.77	2.044	0.2851

TABLE 39 (CONTINUED)

TEMP (C)	pplate mm	No.	FREQ (Hz)	TORQUE g.cm	SHEAR MODULUS G, MPa	LOSS FACTOR
+30.0	25	18	19.9899	38.05	2.272	0.2995
		19	31.6877	33.96	2.607	0.2776
		20	50.2134	27.56	3.078	0.1990
		21	79.5775	19.51	3.925	0.04251
+20.0	25	1	0.0080	26.81	1.212	0.1113
		2	0.0126	27.39	1.248	0.1059
		3	0.0184	28.08	1.288	0.1113
		4	0.0317	28.60	1.324	0.1185
		5	0.0502	29.17	1.365	0.1314
		6	0.0796	30.08	1.416	0.1477
		7	0.1261	30.83	1.466	0.1623
		8	0.1999	31.90	1.528	0.1813
		9	0.3169	32.93	1.601	0.2060
		10	0.5021	34.21	1.688	0.2287
		11	0.7958	35.81	1.785	0.2630
		12	1.2613	37.70	1.912	0.2931
		13	1.9990	40.07	2.063	0.3420
		14	3.1688	42.66	2.241	0.3830
		15	5.0213	45.85	2.477	0.4223
		16	7.9577	49.20	2.807	0.4503
		17	12.6130	51.81	3.245	0.4661
		18	19.9899	51.10	3.894	0.4444
		19	31.6877	45.01	4.852	0.3825
		20	50.2134	35.73	6.528	0.1969
		21	79.5775	24.42	8.533	0.0000
+10.0	25	1	0.0080	29.64	1.371	0.1553
		2	0.0126	30.54	1.438	0.1630
		3	0.0184	31.51	1.498	0.1759
		4	0.0317	32.69	1.581	0.1963
		5	0.0502	33.91	1.662	0.2222
		6	0.0796	35.25	1.751	0.2509
		7	0.1261	37.05	1.875	0.2790
		8	0.1999	38.83	1.999	0.3161
		9	0.3169	41.08	2.161	0.3599
		10	0.5021	43.69	2.363	0.4052
		11	0.7958	46.71	2.621	0.4445
		12	1.2613	50.02	2.901	0.4890
		13	1.9990	53.99	3.311	0.5342
		14	3.1688	57.99	3.788	0.5706
		15	5.0213	62.18	4.399	0.5982
		16	7.9577	66.18	5.221	0.6135
		17	12.6130	68.25	6.502	0.5833
		18	19.9899	65.78	8.516	0.4916
		19	31.6877	55.28	12.00	0.3060
		20	50.2134	42.43	16.57	0.0000
		21	79.5775	27.81	9.379	0.0000

TABLE 39 (CONTINUED)

TEMP (C)	pplate mm	No.	FREQ (Hz)	TORQUE g.cm	SHEAR MODULUS G, MPa	LOSS FACTOR
+ 0.0	25	1	0.0080	33.68	1.739	0.2701
		2	0.0126	35.57	1.884	0.2921
		3	0.0184	37.37	2.029	0.3175
		4	0.0317	39.53	2.191	0.3578
		5	0.0502	41.81	2.406	0.3974
		6	0.0796	44.70	2.654	0.4433
		7	0.1261	47.61	2.956	0.4831
		8	0.1999	51.01	3.343	0.5279
		9	0.3169	54.28	3.778	0.5660
		10	0.5021	57.83	4.344	0.6082
		11	0.7958	61.67	5.011	0.6552
		12	1.2613	65.29	5.891	0.6784
		13	1.9990	68.86	6.978	0.7033
		14	3.1688	72.33	8.501	0.7287
		15	5.0213	75.31	10.14	0.7363
		16	7.9577	77.75	13.26	0.6917
		17	12.6130	77.65	17.75	0.6221
		18	19.9899	72.01	26.53	0.4151
		19	31.6877	59.02	40.96	0.0000
		20	50.2134	44.07	12.85	0.0000
		21	79.5775	27.99	0.00	--
+ 0.0	8	1	0.0080	2.604	3.080	0.3334
		2	0.0126	2.844	3.325	0.3730
		3	0.0184	3.163	3.660	0.4061
		4	0.0317	3.550	4.039	0.4569
		5	0.0502	4.007	4.533	0.4795
		6	0.0796	4.571	5.066	0.5323
		7	0.1261	5.261	5.736	0.5740
		8	0.1999	6.191	6.667	0.6085
		9	0.3169	7.277	7.740	0.6450
		10	0.5021	8.650	9.067	0.6817
		11	0.7958	10.36	10.76	0.7111
		12	1.2613	12.42	12.85	0.7306
		13	1.9990	14.93	15.43	0.7420
		14	3.1688	18.01	18.73	0.7429
		15	5.0213	21.64	22.80	0.7323
		16	7.9577	25.86	27.95	0.7089
		17	12.6130	30.38	34.42	0.6734
		18	19.9899	34.21	42.59	0.6206
		19	31.6877	35.77	53.04	0.5463
		20	50.2134	34.00	66.49	0.4409
		21	79.5775	31.44	83.94	0.2859

TABLE 39 (CONCLUDED)

TEMP (C)	pplate mm	No.	FREQ (Hz)	TORQUE g.cm	SHEAR MODULUS G, MPa	LOSS FACTOR
-20.0	8	1	0.0080	14.17	20.69	0.7067
		2	0.0126	16.99	25.41	0.6863
		3	0.0184	19.74	30.06	0.6800
		4	0.0317	23.19	36.20	0.6655
		5	0.0502	27.05	43.75	0.6390
		6	0.0796	31.09	52.16	0.6138
		7	0.1261	35.63	62.33	0.5892
		8	0.1999	40.18	73.37	0.5634
		9	0.3169	44.99	85.87	0.5364
		10	0.5021	49.73	99.35	0.5091
		11	0.7958	54.68	115.1	0.4747
		12	1.2613	59.78	132.3	0.4431
		13	1.9990	64.70	150.5	0.4114
		14	3.1688	69.76	170.7	0.3750
		15	5.0213	74.43	192.1	0.3341
		16	7.9577	78.48	214.6	0.2890
		17	12.6130	80.68	238.0	0.2359
		18	19.9899	78.48	262.3	0.1672
		19	31.6877	69.65	286.5	0.07546
		20	50.2134	54.38	308.3	0.00000
		21	79.5775	41.17	317.3	0.00000
-40.0	8	1	0.0080	67.82	226.7	0.3263
		2	0.0126	70.08	242.7	0.3013
		3	0.0184	72.83	264.9	0.2761
		4	0.0317	75.24	284.2	0.2516
		5	0.0502	77.41	303.9	0.2332
		6	0.0796	79.46	323.2	0.2133
		7	0.1261	81.51	342.5	0.1918
		8	0.1999	83.26	361.6	0.1748
		9	0.3169	84.66	376.8	0.1570
		10	0.5021	86.01	393.3	0.1439
		11	0.7958	87.38	405.5	0.1301
		12	1.2613	88.77	420.3	0.1150
		13	1.9990	90.14	433.8	0.09366
		14	3.1688	91.47	445.5	0.07956
		15	5.0213	92.63	459.6	0.05719
		16	7.9577	93.17	470.3	0.02698
		17	12.6130	91.66	480.0	0.0000
		18	19.9899	85.01	486.0	0.0000
		19	31.6877	71.14	483.0	0.0000
		20	50.2134	52.20	464.4	0.0000
		21	79.5775	37.22	383.0	0.0000

TABLE 40: TEST DATA FOR LABORATORY Q (TA Instruments DMA 983)

FLEXURAL DEFORMATION (YOUNG'S MODULUS)
DUPONT DMA 983 TEST SYSTEM

Specimen Type: Flexural
Specimen Length: 30.81 mm
Specimen Thickness: 3.005 mm
Specimen Width: 13.5 mm
Polymer Density = 0.046 Lb/in**3
Test Dates: 8-9 January 1991
Originator's File #: A:ROUNDROB.007 and .008
Shear Distortion: 1.50
Oscillation Amplitude: 0.15 mm and 0.25 mm
Length Correction: 0.0 mm
Clamping Distance: 8.00 mm
Moment of Inertia: 2.690 g m**2
Parallel Stiffness: 0.3560 N.m (storage)
0.1920 N.m (Loss at 17.75 Hz)
Series Compliance: 0.8990 um/N (storage)
0.0140 um/N (Loss at 93.47 Hz)
C prime: 0.0207 mm/(mV.sec**2)

STRAIN (%)	FREQUENCY (Hz)	TEMP (C)	YOUNG'S MODULUS E, MPa	LOSS FACTOR
0.05	0.10	19.99	0.5191	18.95
		9.97	1.260	8.192
		0.03	4.398	2.486
		-10.00	6.950	2.452
		-19.90	54.51	1.198
		-30.03	548.1	0.5295
		-39.67	1964.0	0.1771
		-49.97	2860.0	0.07358
		-40.06	1823.0	0.1932
		-29.35	659.6	0.4660
		-20.09	69.30	1.113
		- 9.81	10.95	1.990
		0.01	3.330	3.800
		10.01	1.548	6.734
		20.20	1.908	5.211
		30.10	0.2838	34.46
		39.94	0.3155	30.93
		50.00	1.309	7.451
		60.01	-	-
		80.00	-	-
		69.94	0.1355	71.73
		50.06	0.2467	40.75
		29.98	0.2561	38.55
		19.88	1.372	7.298

TABLE 40 (CONCLUDED)

STRAIN (%)	FREQUENCY (Hz)	TEMP (C)	YOUNG'S MODULUS E, MPa	LOSS FACTOR
0.09	0.10	20.15	0.8093	12.38
		9.92	1.376	7.523
		0.08	2.820	4.060
		-10.09	8.037	2.217
		-19.81	55.44	1.176
		-30.19	561.0	0.5246
		-39.99	1815.0	0.2041
		-50.05	2861.0	0.07065
		-40.82	1931.0	0.1812
		-29.84	478.0	0.5550
		-19.67	48.54	1.224
		-10.00	7.365	2.288
		-0.03	2.933	3.874
		9.97	1.452	7.083
		19.84	0.8706	11.46
		29.94	0.5218	18.99
		39.99	0.3021	32.46
		50.01	0.1760	55.71
		59.99	0.3416	28.41
		69.98	0.7536	12.98
		79.99	-	-
		90.00	-	-
		59.96	-	-
		50.05	0.0683	142.7
		29.91	0.4341	22.87
		19.85	0.6564	15.12

TABLE 41: TEST DATA FOR LABORATORY R (TA INSTRUMENTS DMA 983)

FLEXURAL DEFORMATION (YOUNG'S MODULUS)
DUPONT DMA 983 TEST SYSTEM

Specimen Type: Flexural
Specimen Length: 21.01 mm
Specimen Thickness: 3.04 mm
Specimen Width: 10.5 mm
Polymer Density = 0.046 Lb/in**3
Test Date: 12 July 1990
Originator's File #: A:EAR.03
Shear Distortion: 1.50
Oscillation Amplitude: 0.5 mm
Length Correction: 0.0 mm
Clamping Distance: 8.00 mm
Moment of Inertia: 2.450 g.m**2
Parallel Stiffness: 0.3280 N.m (storage)
0.2590 N.m (Loss at 19.73 Hz)
Series Compliance: 1.434 um/N (storage)
0.049 um/N (Loss at 73.03 Hz)
C prime: 0.0222 mm/(mV.sec**2)

TEMP (C)	FREQUENCY (Hz)	YOUNG'S MODULUS E, MPa	LOSS FACTOR
-80	0.1	3565	0.0256
	0.2	3589	0.0234
-75	0.5	3498	0.0259
	1.0	3528	0.0241
	0.1	3545	0.0229
	0.2	3569	0.0215
-70	0.5	3398	0.0333
	1.0	3432	0.0312
	0.1	3467	0.0273
	0.2	3494	0.0250
-65	0.5	3274	0.0433
	1.0	3335	0.0377
	0.1	3374	0.0322
	0.2	3408	0.0281
-60	0.5	3056	0.0593
	1.0	3114	0.0559
	0.1	3178	0.0461
	0.2	3210	0.0419
-55	0.5	2757	0.0895
	1.0	2844	0.0797
	0.1	2919	0.0680
	0.2	2987	0.0604
-50	0.5	2497	0.1203
	1.0	2610	0.1049
	0.1	2735	0.0881
	0.2	2818	0.0774

TABLE 41 (CONCLUDED)

TEMP (C)	FREQUENCY (Hz)	YOUNG'S MODULUS E, MPa	LOSS FACTOR
-45	0.5	1914	0.2030
	1.0	2007	0.1819
	0.1	2163	0.1564
	0.2	2270	0.1399
-40	0.5	1322	0.3005
	1.0	1533	0.2585
	0.1	1763	0.2182
	0.2	1936	0.1900
-35	0.5	791	0.4349
	1.0	961	0.3847
	0.1	1176	0.3318
	0.2	1361	0.2914
-30	0.5	364	0.5972
	1.0	460	0.5512
	0.1	612	0.4940
	0.2	753	0.4473
-25	0.5	105	0.7894
	1.0	145	0.7603
	0.1	206	0.7197
	0.2	284	0.6707
-20	0.5	62	0.8053
	1.0	81	0.7948
	0.1	121	0.7667
	0.2	156	0.7489
-15	0.5	32	0.8680
	1.0	34	0.8946
	0.1	41	0.9039
	0.2	51	0.9124

TABLE 42: TEST DATA FOR LABORATORY R (NON RESONANT FORCED VIBRATION)

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
NON-RESONANT FORCED VIBRATION

Specimen Type: (A) Tensile excitation of rectangular strip
(B) Compression of a sheet
Specimen Length: (A) 26 61 mm, (B) 16.0 mm
Specimen Thickness: (A) 11.80 mm, (B) 3.03 mm
Specimen Width: (A) 3.08 mm, (B) 16.0 mm
Polymer Density = 0.046 Lb/in**3
Test Date: 12 July 1990
Originator's File #: A:EAR.03

	(A) TENSILE EXCITATION OF RECT. STRIP			(B) COMPRESSION OF A SHEET		
TEMP (C)	FREQ (Hz)	YOUNG'S MODULUS E, MPa	LOSS FACTOR	FREQ (Hz)	YOUNG'S MODULUS E, MPa	LOSS FACTOR
+23	11.55	6.01	0.499	54.64	6.54	0.571
	12.23	6.16	0.512	57.88	6.91	0.581
	12.96	5.97	0.566	61.31	7.21	0.619
	13.72	6.29	0.534	64.94	7.45	0.680
	14.54	6.54	0.483	68.79	7.65	0.754
	15.40	6.80	0.466	72.86	7.86	0.829
	16.31	6.71	0.523	77.18	8.11	0.892
	17.28	6.97	0.516	81.75	8.43	0.938
	18.30	6.97	0.554	86.60	8.84	0.964
	19.39	7.01	0.573	91.73	9.33	0.972
	20.54	7.09	0.603	97.16	9.87	0.965
	21.75	7.26	0.608	102.92	10.45	0.947
	23.04	7.38	0.587	109.02	11.02	0.925
	24.41	7.46	0.591	115.48	11.57	0.903
	25.85	7.52	0.608	122.32	12.06	0.884
	27.38	7.62	0.622	129.57	12.51	0.872
	29.01	7.79	0.637	137.25	12.90	0.869
	30.73	8.02	0.632	145.38	13.27	0.874
	32.55	8.14	0.644	153.99	13.61	0.888
	34.47	8.11	0.677	163.12	13.95	0.907
	36.52	8.31	0.682	172.78	14.30	0.929
	38.68	8.53	0.687	183.02	14.69	0.950
	40.97	8.65	0.703	193.86	15.12	0.968
	43.40	8.85	0.708	205.35	15.58	0.983
	45.97	8.97	0.711	217.52	16.05	0.993
	48.70	9.13	0.724	230.41	16.52	1.002
	51.58	9.30	0.737	244.06	16.98	1.009
	54.64	9.50	0.743	258.52	17.45	1.015
	57.88	9.73	0.756	273.84	17.96	1.018
	61.31	9.88	0.759	290.07	18.50	1.020
	64.94	10.11	0.776	307.25	19.09	1.018
	68.79	10.27	0.794	325.46	19.67	1.018

TABLE 42 (CONTINUED)

(A) TENSILE EXCITATION OF RECT. STRIP (B) COMPRESSION OF A SHEET

TEMP (C)	(A) FREQ (Hz)	(A) YOUNG'S MODULUS E, MPa	(A) LOSS FACTOR	(B) FREQ (Hz)	(B) YOUNG'S MODULUS E, MPa	(B) LOSS FACTOR
+23	72.86	10.47	0.798	344.75	20.21	1.024
	77.18	10.67	0.810	365.17	20.75	1.037
	81.75	10.94	0.818	386.81	21.35	1.057
	86.60	11.13	0.827	409.73	22.14	1.076
	91.73	11.55	0.836	434.01	23.19	1.084
	97.16	11.81	0.845	459.73	24.49	1.076
	102.92	12.10	0.851	486.97	25.91	1.049
	109.02	12.34	0.857	515.82	27.27	1.010
	115.48	12.63	0.866	546.38	28.40	0.968
	122.32	12.92	0.872	578.76	29.25	0.931
	129.57	13.25	0.882	613.05	29.83	0.906
	137.25	13.52	0.894	649.38	30.23	0.894
	145.38	13.92	0.904	687.86	30.56	0.895
	153.99	14.22	0.910	728.62	30.90	0.905
	163.12	14.59	0.916	771.79	31.32	0.921
	172.78	14.99	0.926	817.52	31.82	0.940
	183.02	15.39	0.923	865.96	32.41	0.959
	193.86	15.62	0.929	917.27	33.09	0.978
	205.35	16.12	0.939	971.62	33.88	0.994
	217.52	16.56	0.949	1029.20	34.81	1.007
	230.41	17.07	0.952	1090.18	35.92	1.016
	244.06	17.60	0.956	1154.78	37.25	1.019
	258.52	18.04	0.962	1223.20	38.77	1.018
	273.84	18.65	0.966	1295.68	40.40	1.013
	290.07	19.[illegible]6	0.969	1372.46	42.04	1.006
	307.25	19.71	0.976	1453.78	43.60	0.997
	325.46	20.42	0.979	1539.92	45.01	0.989
	344.75	21.07	0.983	1631.17	46.29	0.984
	365.17	21.92	0.983	1727.82	47.54	0.980
	386.81	22.82	0.976	1830.20	48.88	0.979
	409.73	24.05	0.956	1938.65	50.39	0.979
	434.01	25.52	0.907	2053.52	52.15	0.978
	459.73	26.12	0.851	2175.20	54.13	0.977
	486.97	25.14	0.897	2304.08	56.26	0.974
	515.82	25.07	0.962	2440.61	58.44	0.970
	546.38	25.82	1.000	2585.23	60.62	0.966
	578.76	26.91	1.014	2738.41	62.83	0.963
	613.05	28.15	1.011	2900.67	65.17	0.959
	649.38	29.64	0.993	3072.55	67.79	0.955
	687.86	30.96	0.983	3254.61	70.82	0.948
	728.62	32.11	0.966	3447.45	74.35	0.938
	771.79	33.41	0.956	3651.73	78.35	0.926
	817.52	34.80	0.949	3868.11	82.73	0.912

TABLE 42 (CONCLUDED)

(A) TENSILE EXCITATION OF RECT STRIP				(B) COMPRESSION OF A SHEET		
TEMP (C)	FREQ (Hz)	YOUNG'S MODULUS E, MPa	LOSS FACTOR	FREQ (Hz)	YOUNG'S MODULUS E, MPa	LOSS FACTOR
+23	865.96	36.24	0.939	4097.31	87.30	0.899
	917.27	37.94	0.929	4340.09	91.94	0.890
	971.62	40.27	0.891	4597.25	96.65	0.887
	1029.20	41.21	0.866	4869.66	101.76	0.890
	1090.18	43.05	0.875	5158.20	107.73	0.896
	1154.78	44.31	0.866	5463.85	114.87	0.900
	1223.20	47.31	0.848	5787.60	123.21	0.900
	1295.68	48.42	0.795	6130.54	131.94	0.896
	1372.46	50.31	0.816	6493.79	141.44	0.891
	1453.78	51.03	0.863	6878.57	153.68	0.893
	1539.92	51.48	0.821	7286.16	171.01	0.907
	1631.17	54.18	0.827			

TABLE 43: TEST DATA FOR LABORATORY T (PL DMTA/EXTENSION)

EXTENSIONAL DEFORMATION (YOUNG'S MODULUS)
POLYMER LABORATORIES DMTA
Specimen Type: Single cantilever
Specimen thickness: 3.94 mm
Specimen length: 4.26 mm
Specimen width: 8.68 mm
Polymer density: 0.046 lb/in**3
Test date: 21 Jan 1992
Originator's file #: T0801B, Test 5
Operator: SK
Adhesive: Hardman's Orange epoxy (#04007)
Bond thickness: less than 50 m, average
Relative humidity in laboratory: 37 %.

TEMP (C)	FREQUENCY (Hz)	YOUNG'S MODULUS (MPa)	LOSS FACTOR
-19	0.3	568.9	0.248
	1.0	671.4	0.186
	2.0	724.4	0.157
	3.0	753.4	0.143
	5.0	787.0	0.127
	10.0	826.0	0.109
	20.0	861.0	0.095
	30.0	881.0	0.090
- 9	0.3	154.5	0.662
	1.0	244.3	0.532
	2.0	307.6	0.462
	3.0	347.5	0.424
	5.0	399.0	0.379
	10.0	467.7	0.326
	20.0	533.3	0.277
	30.0	575.4	0.254
+ 1	0.3	20.61	0.947
	1.0	36.73	0.957
	2.0	51.64	0.927
	3.0	61.94	0.904
	5.0	77.27	0.868
	10.0	105.2	0.807
	20.0	145.2	0.726
	30.0	177.4	0.672
+11	0.3	6.166	0.543
	1.0	8.690	0.746
	2.0	11.04	0.854
	3.0	12.94	0.909
	5.0	15.89	0.966
	10.0	21.58	1.016
	20.0	29.65	1.037
	30.0	36.06	1.038

TABLE 43 (CONTINUED)

TEMP (C)	FREQUENCY (Hz)	YOUNG'S MODULUS (MPa)	LOSS FACTOR
+21	0.3	3.715	0.238
	1.0	4.375	0.353
	2.0	4.955	0.438
	3.0	5.383	0.499
	5.0	6.067	0.585
	10.0	7.362	0.714
	20.0	9.162	0.845
	30.0	10.54	0.918
+31	0.3	2.825	0.128
	1.0	3.119	0.181
	2.0	3.342	0.217
	3.0	3.491	0.247
	5.0	3.724	0.296
	10.0	4.130	0.378
	20.0	4.699	0.482
	30.0	5.105	0.554
+41	0.3	2.234	0.089
	1.0	2.404	0.118
	2.0	2.512	0.130
	3.0	2.588	0.144
	5.0	2.692	0.169
	10.0	2.864	0.211
	20.0	3.105	0.267
	30.0	3.251	0.309
+51	0.3	1.950	0.070
	1.0	2.065	0.092
	2.0	2.128	0.094
	3.0	2.178	0.101
	5.0	2.249	0.118
	10.0	2.350	0.141
	20.0	2.472	0.172
	30.0	2.570	0.198
+61	0.3	1.738	0.060
	1.0	1.824	0.077
	2.0	1.879	0.076
	3.0	1.919	0.080
	5.0	1.963	0.091
	10.0	2.037	0.110
	20.0	.138	0.127
	30.0	2.183	0.147

TABLE 43 (CONCLUDED)

TEMP (C)	FREQUENCY (Hz)	YOUNG'S MODULUS (MPa)	LOSS FACTOR
+71	0.3	1.567	0.055
	1.0	1.637	0.072
	2.0	1.683	0.067
	3.0	1.706	0.070
	5.0	1.746	0.079
	10.0	1.799	0.095
	20.0	1.854	0.103
	30.0	1.923	0.123
+81	0.3	1.422	0.053
	1.0	1.493	0.070
	2.0	1.521	0.060
	3.0	1.545	0.065
	5.0	1 574	0.074
	10.0	1.622	0.087
	20 0	1.652	0.101
	30.0	1.714	0.111
+91	0.3	1.279	0.055
	1.0	1.340	0.070
	2.0	1.368	0.062
	3.0	1.387	0.064
	5.0	1.416	0.074
	10.0	1.459	0.085
	20.0	1.528	0.108
	30.0	1.545	0.107

TABLE 44. LOG SHIFT FACTOR ESTIMATES FOR ALL LABORATORIES

TEMP(C)	LABORATORY								
	H	D	E	F	T	US-POC SHEAR	US-POC SHEAR	US-POC EXT'N	AVG
-50	11.59*	9.97	8.60	-	-	-	8.00	9.40	-
	7.56**	10.93	8.03	-	-	-	8.00	9.40	8.78
-40	10.10	7.82	7.16	-	-	6.70	7.70	7.30	-
	6.07	8.78	6.59	-	-	6.70	7.70	7.30	7.19
-30	8.79	5.89	5.84	-	-	-	6.48	7.00	-
	4.76	6.85	5.27	-	-	-	6.48	7.00	6.07
-20	7.62	4.17	4.62	-	4.20	4.70	5.00	5.70	-
	3.59	5.13	4.05	-	5.60	4.70	5.00	5.70	4.82
-10	6.58	2.64	3.49	-	3.10	-	3.60	3.08	-
	2.55	3.60	2.92	-	4.50	-	3.60	3.08	3.38
0	5.64	1.29	2.44	2.00	1.20	2.00	2.30	2.70	-
	1.61	2.25	1.87	2.70	2.60	2.00	2.30	2.70	2.25
10	4.80	0.09	1.47	0.65	0	-	1.08	-	-
	0.77	1.05	0.90	1.35	1.40	-	1.08	-	1.09
20	4.03	-0.96	0.57	-0.70	-1.40	0	0	0	-
	0	0	0	0	0	0	0	0	0
30	3.33	-1.89	-0.28	-1.60	-2.40	-	-0.70	-1.00	-
	-0.70	-0.93	-0.85	-0.90	-1.00	-	-0.70	-1.00	-0.87
40	2.68	-2.70	-1.07	-2.20	-3.30	-1.52	-1.40	-1.70	-
	-1.35	-1.74	-1.64	-1.50	-1.90	-1.52	-1.40	-1.70	-1.59
50	2.09	-3.42	-1.81	-2.50	-4.00	-	-2.00	-2.10	-
	-1.94	-2.46	-2.38	-1.80	-2.60	-	-2.00	-2.10	-2.18

* - First number is as provided
**- Second number is corrected to reference temperature of 20 C

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