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PORCELAIN ENAMEL MATERIAL TESTING PROCEDURES TO DETERMINE THE DAMPING PROPERTIES AND THE RESULTS OF SELECTED MATERIALS

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This report contains a detailed discussion of methods and procedures used to define the vibration damping properties of high temperature (260°C to 780°C) damping materials. The work was done by the University of Dayton Research Institute, Dayton, Ohio in partial fulfillment of Air Force Contract Number F33615-76-C-5137 for the Materials Laboratory, Wright-Patterson Air Force Base, Ohio. The work described was conducted during the period January 1976 through December 1979.

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FOREWORD

This report contains a detailed discussion of methods and procedures used to define the vibration damping properties of high temperature (260°C to 780°C or 500°F to 1,800°F) damping materials. The work was done by the University of Dayton Research Institute, Dayton, Ohio in partial fulfillment of Air Force Contract Number F33615-79-C-5108 for the Air Force Materials Laboratory, Wright-Patterson Air Force Base, Ohio. Some of the work included here was also done under Air Force Contract Number F33615-76-C-5137. The work described was conducted during the period January 1976 through December 1979 under the general supervision of Mr. Dale H. Whitford, Supervisor of the Aerospace Mechanics Division, and Mr. Michael L. Drake and Mr. Charles M. Cannon, Principal Investigators. The material evaluations were conducted by Mr. David M. Hopkins and Mr. Richard C. Goodman. The results of 62 material evaluations using these techniques are presented in the Appendices.

The authors wish to express their thanks and gratitude to Mr. Cannon and Mr. Goodman for their help in developing the test fixture and the collection of data.

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LIST OF SYMBOLS

C	damping peak curvature parameter
E_D^*	complex Young's modulus
E_D', E_D, E_1	Young's or storage modulus
E_D''	dissipative or loss modulus
f_n	uncoated beam resonant mode frequency
f_c	coated beam resonant mode frequency
Δf_n	half-power bandwidth at n^{th} mode of uncoated beam
Δf_c	half-power bandwidth at n^{th} mode of coated beam
f_r	reduced frequency
$f_{ro\ell}$	damping peak reduced frequency
f_{rom}	storage modulus inflection point reduced frequency
h_b, h_ℓ	uncoated beam thickness
h_D	enamel coating thickness
I	second moment of area of uncoated beam about its centerline
L, ℓ	length of test beam
M_ℓ	storage modulus at lower horizontal asymptote
M_{rom}	storage modulus inflection point
N	storage modulus inflection point curve slope
S_ℓ	asymptote slope for lower reduced frequency
S_h	asymptote slope for higher reduced frequency
T	temperature of specimen
μ_1	mass per unit length of uncoated beam
η	modal damping or loss factor
η_b	loss factor of uncoated beam
η_s	loss factor of coated beam
η_c	effective loss factor of composite beam
η_D	loss factor of enamel coating material
$\eta_{fro\ell}$	damping peak loss factor
ρ_b, ρ_1	uncoated beam density
ρ_D	enamel coating density
ω_n	natural modal frequency of composite beam
ω_{1n}	natural modal frequency of uncoated beam
ξ_n^4	eigen value of n^{th} mode

SUMMARY

High temperature vibration damping technology has evolved to the point where it can be used to reduce resonant associated vibratory stresses. The material properties defined by this testing program show that porcelain enamels can be used as a tool to resolve problems such as high cycle fatigue.

Additional experimental work is indicated to broaden the knowledge of the thermal aging effects on high temperature enamels. It appears that one approach to this problem is controlled compositional changes to glass components.

SECTION I

INTRODUCTION

The use of vibration damping technology to reduce the resonance vibratory stresses in structures has become a common practice [1]. The vibration damping materials currently being used are primarily rubber-like polymers and are generally limited to vibration damping applications below 260°C (500°F). Glass is known to have the potential to extend the temperature range of vibration damping technology to near 1,000°C (1,830°F). One of the major barriers to utilizing damping technology has been the inability to accurately define the vibration damping properties of materials at high temperatures. Reported here is the new high temperature materials property evaluation technique being used by the University of Dayton Research Institute (UDRI) to determine the vibration damping properties of various glasses.

The results of the material evaluations listed in Tables 1 and 2 are presented in the Appendices of this report.

TABLE 1

MATERIALS LISTED BY BEAM NUMBER

Beam Number	Material
01-04-1	O. Hommel R-1199
01-04-2	O. Hommel R-1199
01-19-2	Pemco 79 R 1016
01-32-2	Pemco 79 R 835
01-37-1	O. Hommel R-7007
01-37-2	O. Hommel R-7007
01-38-1	NBS - 418
01-39-1	O. Hommel R-7007
01-40-1	Corning 7570
01-41-1	Corning 8463
01-42-1	Corning 7556
01-43-1	UDRI: Borosilicate + 5% Na_2O + 2% Co_2O_3
01-44-1	UDRI: Borosilicate + 5% Na_2O + 2% Co_2O_3
01-44-2	UDRI: 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 3% Al_2O_3 + 2% Co_2O_3
01-44-3	UDRI: 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 3% Al_2O_3 + 2% Co_2O_3
01-46-1	UDRI: 74.5% SiO_2 + 10.75% CaO + 12.75% Na_2O + 2% Co_2O_3
01-46-2	UDRI: 74.5% SiO_2 + 10.75% CaO + 12.75% Na_2O + 2% Co_2O_3
01-46-3	UDRI: 74.5% SiO_2 + 10.75% CaO + 12.75% Na_2O + 2% Co_2O_3
01-46-4	Pemco 79 R 465
01-46-5	Pemco 79 R 2633

TABLE 1 (Continued)

MATERIALS LISTED BY BEAM NUMBER

Beam Number	Material
01-47-1	UDRI: 70% SiO_2 + 30% Na_2O + 2% Co_2O_3
01-47-2	Pemco 79 R 835 + 20% Alumina
01-47-3	Pemco 79 R 2635
01-48-1	Corning 0010 + 7.5% Al_2O_3 + 1% Co_2O_3
01-48-2	Corning 0010 + [illegible].5% Al_2O_3 + 1% Co_2O_3
01-48-3	Owens Illinois CV-97
01-48-4	Corning 7570 + 2% $KHCO_3$ + 2% Na_2O
01-48-5	Corning 7570 + 2% $KHCO_3$ + 2% Na_2O
01-49-1	Corning 0010 + 7.5% Al_2O_3 + 1% Co_2O_3
01-49-2	Corning 0010 + 7.5% Al_2O_3 + 1% Co_2O_3
01-49-3	Owens Illinois CV-101
01-49-4	Corning 7570 + 6% $KHCO_3$ + 6% Na_2O
01-52-1	Corning 0010 + 10% Al_2O_3 + 1% Co_2O_3
01-53-1	Corning 0010 + 10% Al_2O_3 + 6% Na_2O + 1% Co_2O_3
01-54-1	Corning 0010 + 12.5% Na_2O + 2% Co_2O_3
01-55-2	UDRI: 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 6% Al_2O_3 + 2% Co_2O_3
01-55-3	UDRI: 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 6% Al_2O_3 + 2% Co_2O_3
01-55-4	UDRI: 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 6% Al_2O_3 + 2% Co_2O_3
01-57-1	UDRI: 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
01-57-2	UDRI: 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3

TABLE 1 (Concluded)

MATERIALS LISTED BY BEAM NUMBER

Beam Number	Material
01-57-3	UDRI: 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
01-59-1	Corning 7556
01-59-2	Pemco 79 R 2634
01-60-1	Owens Illinois SG-67-A
01-62-1	Corning 7570 + 4% $KHCO_3$ + 4% Na_2O

TABLE 2

INDEX OF MULTILAYER BEAM TESTS

Beam Number	Layer	Material
01-50-1	1	Corning 0010 + 10% Al_2O_3 + 1% Co_2O_3
	2	Nickle Aluminide
	3	Magnesium Zirconate
01-51-1	1	Corning 0010
	2	Nickle Aluminide
	3	Magnesium Zirconate
01-51-2	1	O. Hommel R-1202
	2	O. Hommel R-1250
01-51-3	1	O. Hommel R-1202
	2	O. Hommel R-1250
01-55-1	1	Corning 0010 + 10% Al_2O_3 + 1% Co_2O_3
	2	Al_2O_3
01-58-1	1	UDRI 74.5% SiO_2 + 10.75% CaO + 12.75% Na_2O + 3% Al_2O_3 + 2% Ca_2O_3
	2	NiCr
01-58-2	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	O. Hommel R-1251
01-58-3	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	O. Hommel R-1251
01-58-4	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	O. Hommel R-1251
01-61-1	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	NiCr

TABLE 2 (Concluded)

INDEX OF MULTILAYER BEAM TESTS

Beam Number	Layer	Material
01-61-2	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	NiCr
01-62-2	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	O. Hommel R-1252
01-62-3	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	O. Hommel R-1252
01-62-4	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	O. Hommel R-1252
01-62-5	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	O. Hommel R-1252
01-63-1	1	O. Hommel R-1202
	2	O. Hommel R-1250
01-63-2	1	O. Hommel R-1202
	2	O. Hommel R-1250

SECTION II

HIGH TEMPERATURE ENAMEL TESTING APPARATUS AND TEST BEAMS

Experiments to measure the dynamic response of specimens at elevated temperatures are difficult and require sophisticated techniques, especially when making measurements using the resonant beam technique. Devices such as high temperature accelerometers to measure the vibrational response are usually large, costly, and in some cases require an external cooling apparatus. The large accelerometers can influence the dynamic response of the test beam. Strain gages can be used but are effective only for measuring one or two modes of vibration because the surface strains of the higher modes of vibration tend to be small. Due to these difficulties, it is usually best if the response can be measured by a device capable of measuring the response over a wide frequency range, mounted outside the furnace in which the beam is being tested. Exciting the beam into resonance at elevated temperatures is also very difficult to accomplish.

A unique apparatus was developed to measure the dynamic response of glass-coated beams at elevated temperatures. The apparatus was designed to determine the response of five to six modes of a cantilever beam over a temperature range of 250°C to 1,000°C (500°F to 1,830°F) and a frequency range from 100 to 10,000 Hz. The complete apparatus and the test beam are explained in the following paragraphs [2].

1. HIGH TEMPERATURE ENAMEL TEST APPARATUS

Standard commerically available electronic equipment is used to produce and monitor the drive transducer input signal. The amplified output of a sine sweep oscillator in series with a dc power supply provides the controlled sine power signal which results in the desired magnetic field from the drive transducer. A cobalt disc on the end of the test beam provides the magnetic couple between the drive transducer and the test beam. By varying the frequency output of the oscillator, resonant vibration is induced in the beam. The motion of the beam is transmitted mechanically through the high temperature cantilever test fixture to a force link. The output of the force link is amplified and provides the signal for the half-power bandwidth measurement needed to determine the material's damping properties. Figure 1 is a block diagram of the high temperature testing apparatus and Table 3 lists the electronic equipment used in this experimental set-up. A description of the unique components designed for this system to allow operation at elevated temperatures follows.

a. Transducer

Available electromagnetic transducers were not adequate for excitation of test structures or specimens at high temperatures (up to 980°C or 1,800°F) because insulation on the coil wire burns off and demagnetization of the permanent magnets occurred. In attempting to satisfy this void, a noncontacting drive transducer using electromagnets and freon cooling was constructed (see Figure 2). Use of a static field electromagnet prevents demagnetization when high level dynamic excitation such as white noise is used.

The transducer body is constructed of mild steel. The end covering the coil and the core is also mild steel but the end cap is nonmagnetic stainless steel. A Teflon bobbin holds the coil in place. When using this type of transducer, a DC current source is required for the static magnetic field. The required dynamic signal is applied to excite the structure under test. The block diagram in Figure 3 shows connection for the transducer.

A standard 4,000 BTU air conditioner is used to cool the transducer by removing the evaporator and connecting the transducer (see Figure 4). With cooling, the transducer will operate at higher temperature and handle more power.

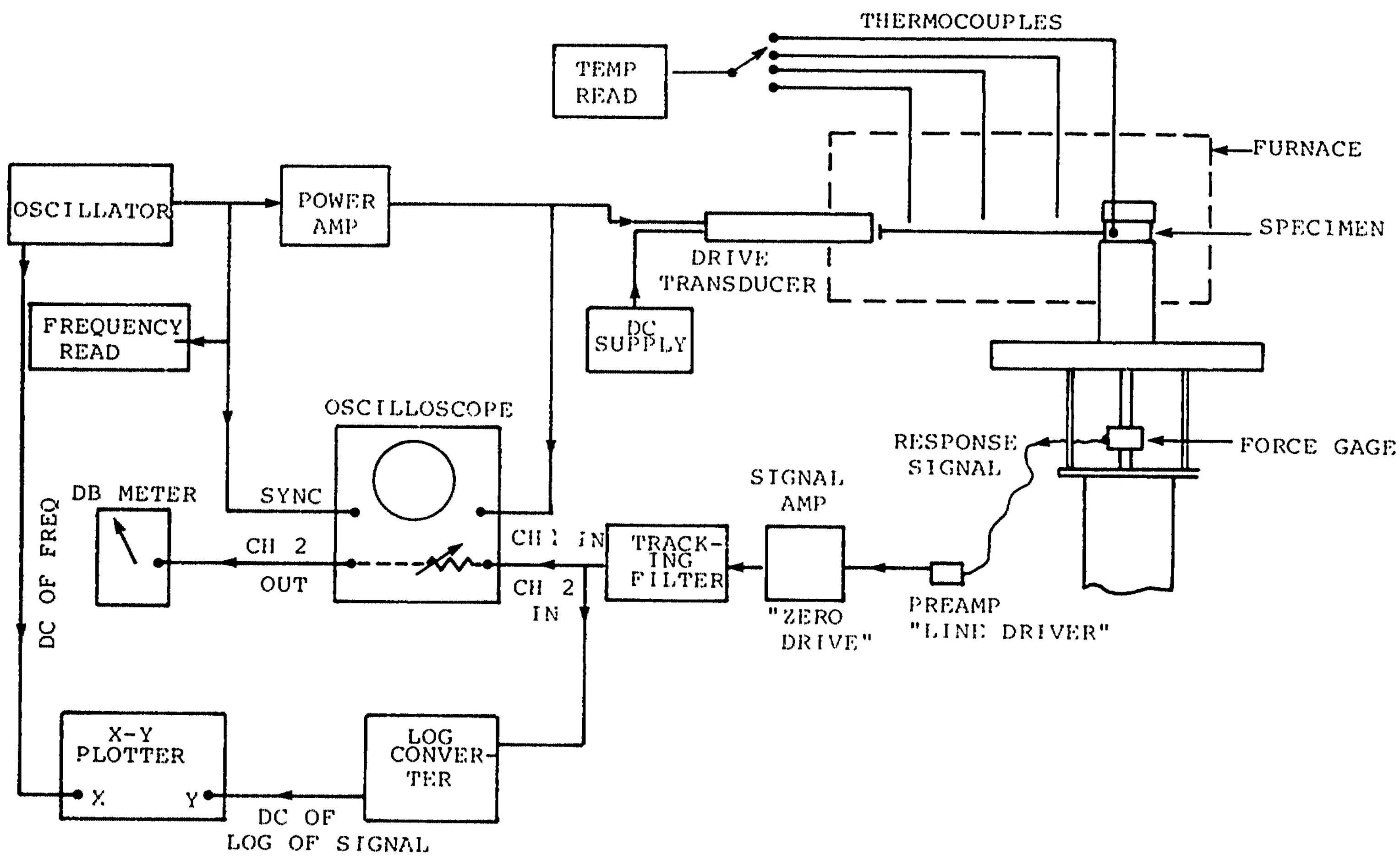


Figure 1. Block Diagram of High Temperature Testing Apparatus.

TABLE 3

LIST OF ELECTRONIC EQUIPMENT

Description	Manufacturer	Model Number
Oscilloscope	Ballantine	1066S
Meter, R. M. S.	Hewlett-Packard	3400A
Amplifier, Power	McIntosh	MC50
Drive Transducer, Freon Cooled	UDRI fabricated	
Refrigeration System, Transducer	UDRI fabricated	
Preamplifier, Precision	MB Electronics	N400
Plotter, Graphic X/Y	Hewlett-Packard	7035B
Force Gage, Axial	PCB	233A
Power Supply, Current Source	Harrison	6203A
Impedence Transformer, Line Driver	UDRI fabricated	
Oscillator	Spectral Dynamics	104-A

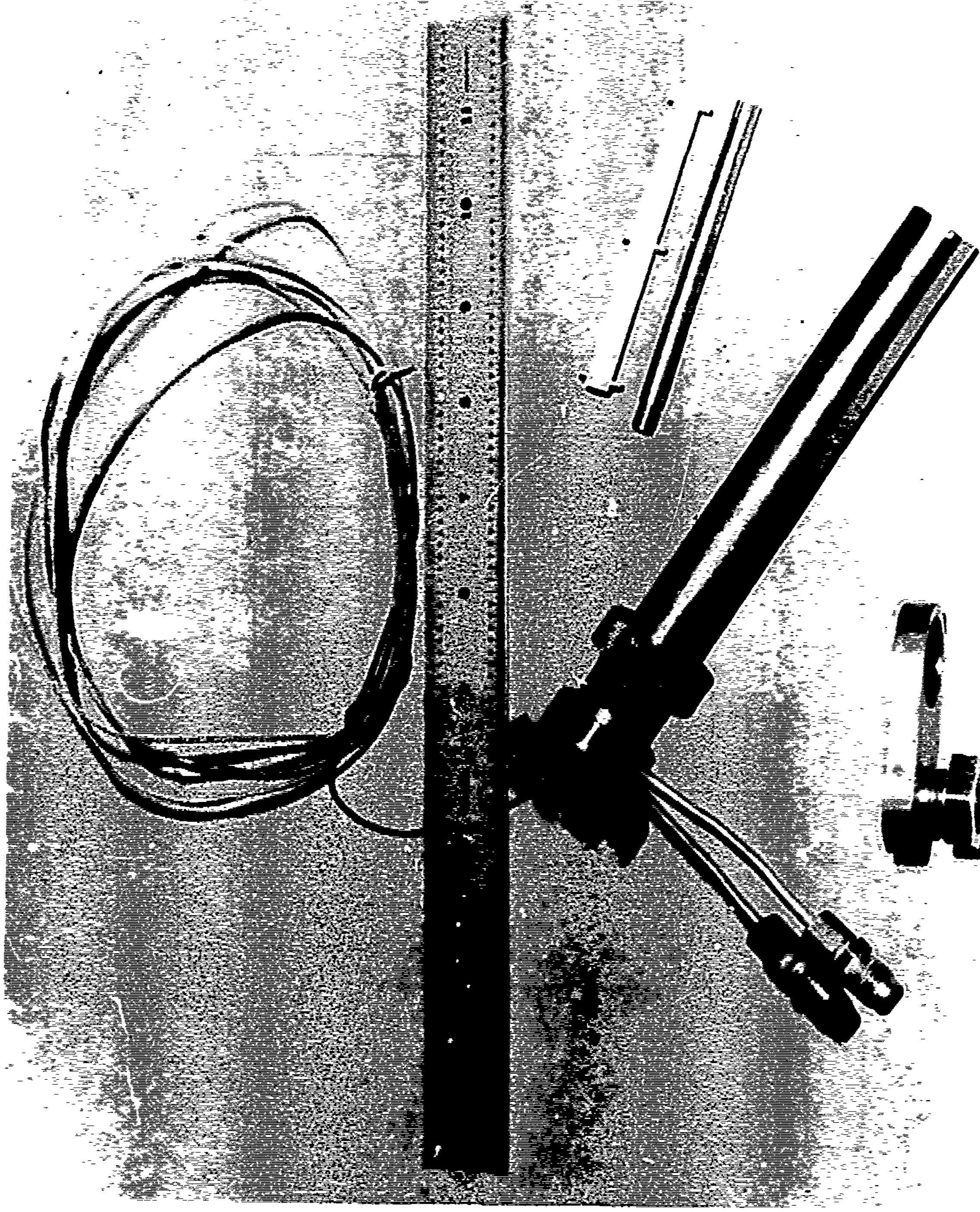


Figure 2. UDRI Fabricated Drive Transducer.

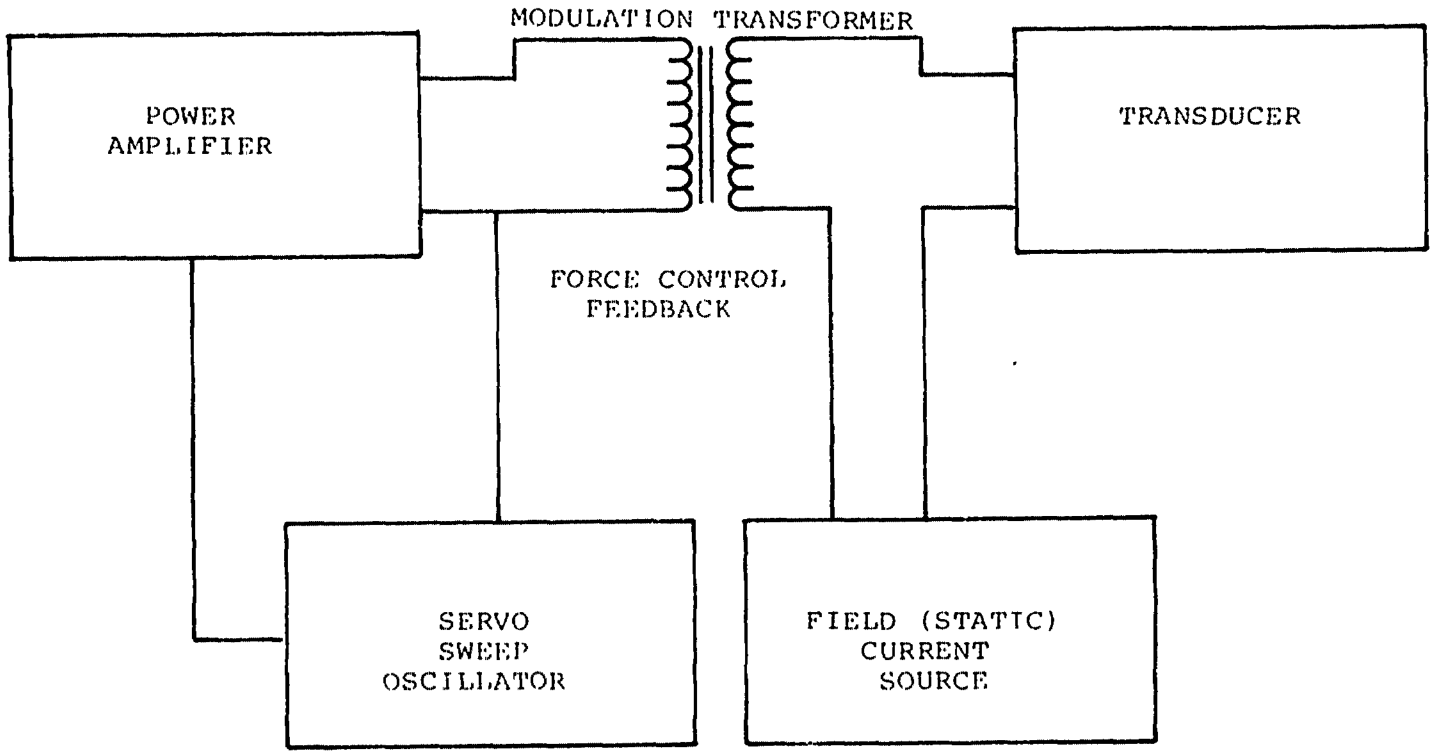
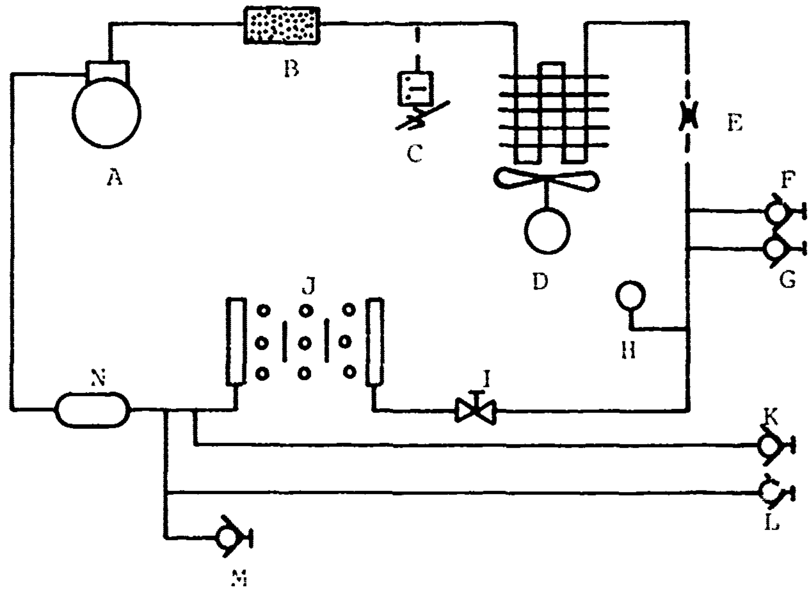


Figure 3. Schematic of the Connection of the Drive Transducer.



A - Compressor
B - Filter/Dryer
C - Pressure Switch
D - Condenser Air Cooled, Finned Fan Forced Air
E - Orifice
F - Schroeder Valve to Drive Transducer
G - Schroeder Valve to Pick-up Transducer
H - Pressure Gage
I - Manually Adjustable Valve
J - Evaporator, Air Cooled, Finned, Static
K - Return Schroeder Valve from Drive Transducer
L - Return Schroeder Valve from Pick-up Transducer
M - Recharge Valve
N - Receiver

Figure 4. Schematic of Air Conditioner Used to Cool UDRI Fabricated Drive Transducer.

b. High Temperature Cantilever Test Fixture

The high temperature enamels cantilever test fixture was developed to maintain a constant clamping force on the test specimen as the temperature is varied over the test range, and to transmit the motion of the test specimen to the force gage located outside the high temperature furnace. The high temperature enamels damping fixture number one is illustrated in Figure 5. The fixture consists of an isolated table, clamping fixture, force couple, force gage, and air cylinder. The table is a platform mounted to a wooden frame by isolation mounts. A metal plate is attached to the table. The clamping fixture is two blocks machined from Inconel Alloy Number 625. Two bolts machined from Inconel Alloy 625 pass through grooves along the side of the blocks and through the table and are attached to the top of a force link. The test specimen is inserted between the blocks and approximately 50 psi applied to the air cylinder providing a constant clamping force to the root of the specimen. The air cylinder is a major innovation for this system. Any bolting system used to apply clamping pressure lost torque at the higher temperatures. The air cylinder takes into account any thermal expansion and this results in a constant clamping pressure over the entire temperature range. Vibrations in the beam are mechanically transmitted to the force link via the fixture block and bolts. Fixture number two (illustrated in Figure 6) is similar, except the blocks and bolts are made of Hastelloy X. Only one bolt is used and it is passed through the center of the block and specimen root. This arrangement reduces background interference as seen by the force link.

c. Temperature Control

To achieve the high temperatures necessary for the evaluation of high temperature vibration damping materials, a three-zone tube furnace was modified to accept the enamels test fixture and the electromagnetic drive transducer. Baffels are used to separate the zones for more precise temperature control. The temperature in each zone is independently controlled by a proportional temperature controller. A control thermocouple provides

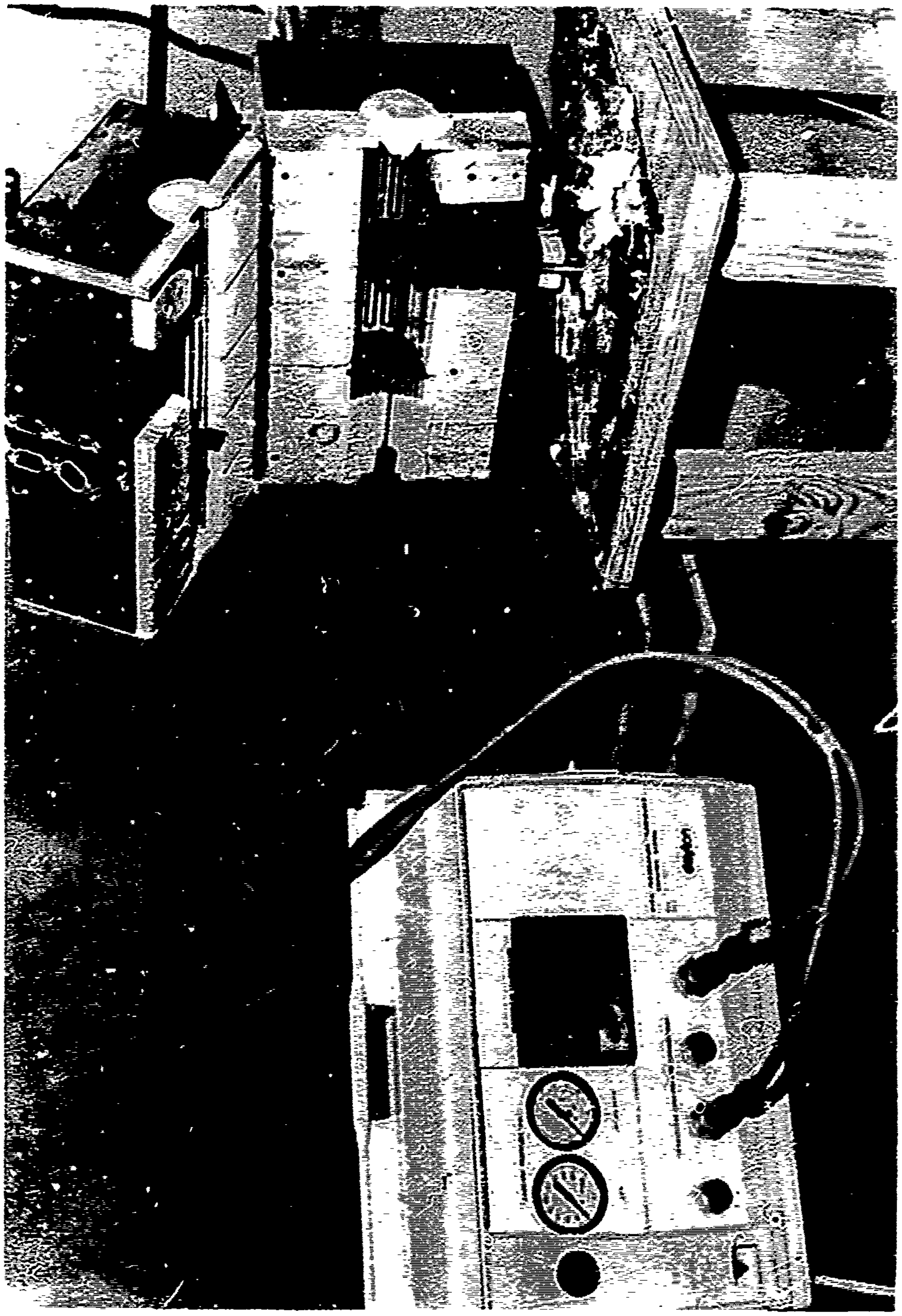


Figure 5. High Temperature Enamels Damping Fixture Number One.

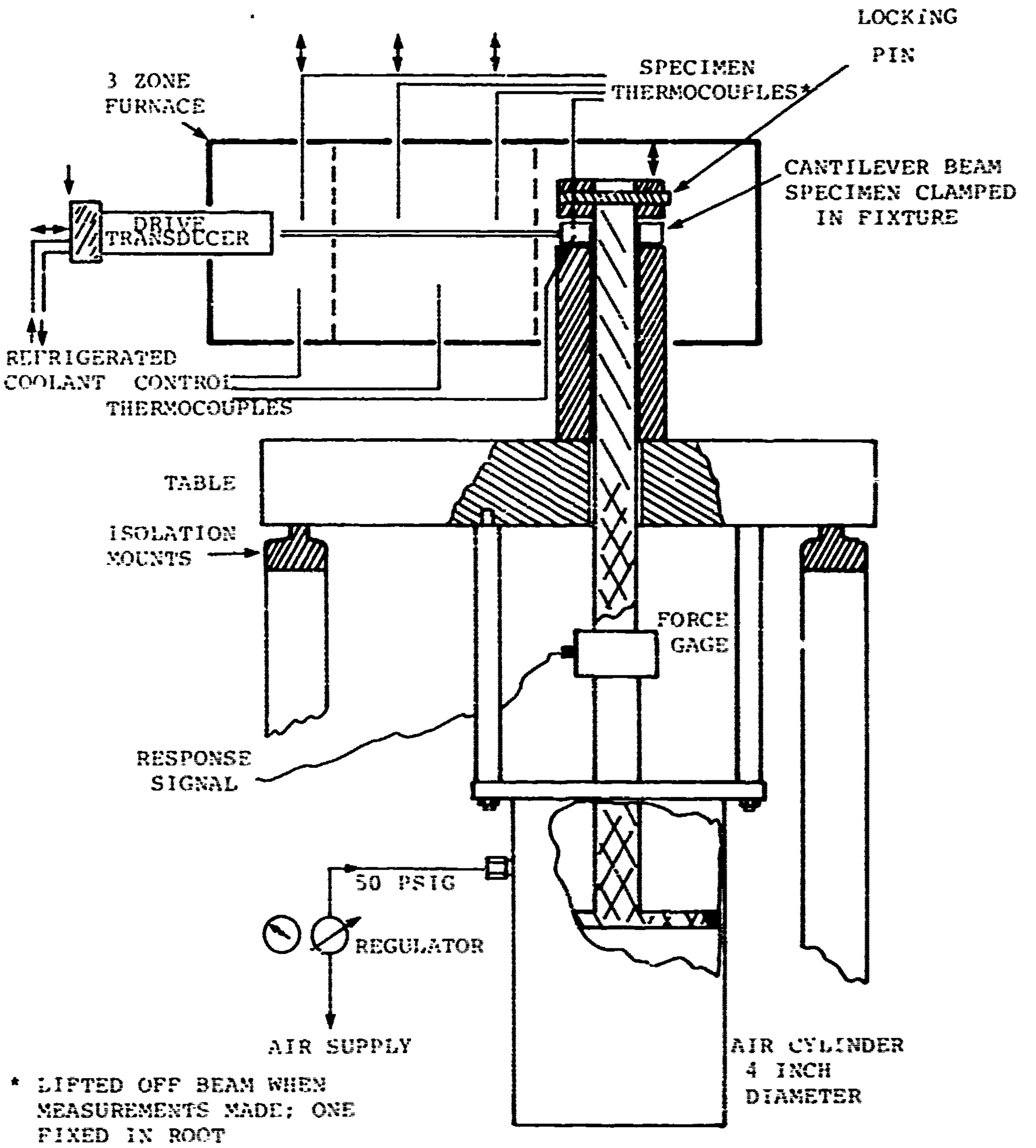


Figure 6. High Temperature Enamels Damping Fixture Number Two.

the signal to the proportional controllers. The controllers are adjusted to achieve the desired temperature as read on monitoring thermocouples. Figure 7 is a schematic of the enamels testing furnace showing the location of the control thermocouples (TC-1, TC-2, and TC-3) and the monitoring thermocouples (TM-1, TM-2A, TM-2B, and TM-3). Zone one (fixture end) thermocouples are inserted into holes in the root of the test specimen. Zones two and three control thermocouples are inserted through the bottom of the furnace to about one-half-inch below the test specimen. Zones two and three monitoring thermocouples are set down onto the surface of the test specimen measuring the temperature of the enamel coating. The temperature is set and allowed to stabilize. When the temperature is at the desired level, the zone two and zone three monitoring thermocouples are lifted and modal damping data is taken. Even with baffels separating the zones, there is considerable interaction between the zones. To achieve more accurate control of the temperature, two monitoring thermocouples are used in zone two. Table 4 shows typical temperature variance between monitoring thermocouples after the temperature is stabilized at the desired temperature. The test temperature is considered stabilized when the variations in Table 4 are maintained for three minutes.

TABLE 4

TEMPERATURE DEVIATION OF MONITOR THERMOCOUPLES

Thermocouple Number	Furnace Zone	Deviation from Set Temperature
TM-1	1	1.7 to 2.8°C
TM-2A	2	-1.7 to 2.8°C
TM-2B	2	1.7 to 2.8°C
TM-3	3	-2.8 to 3.9°C

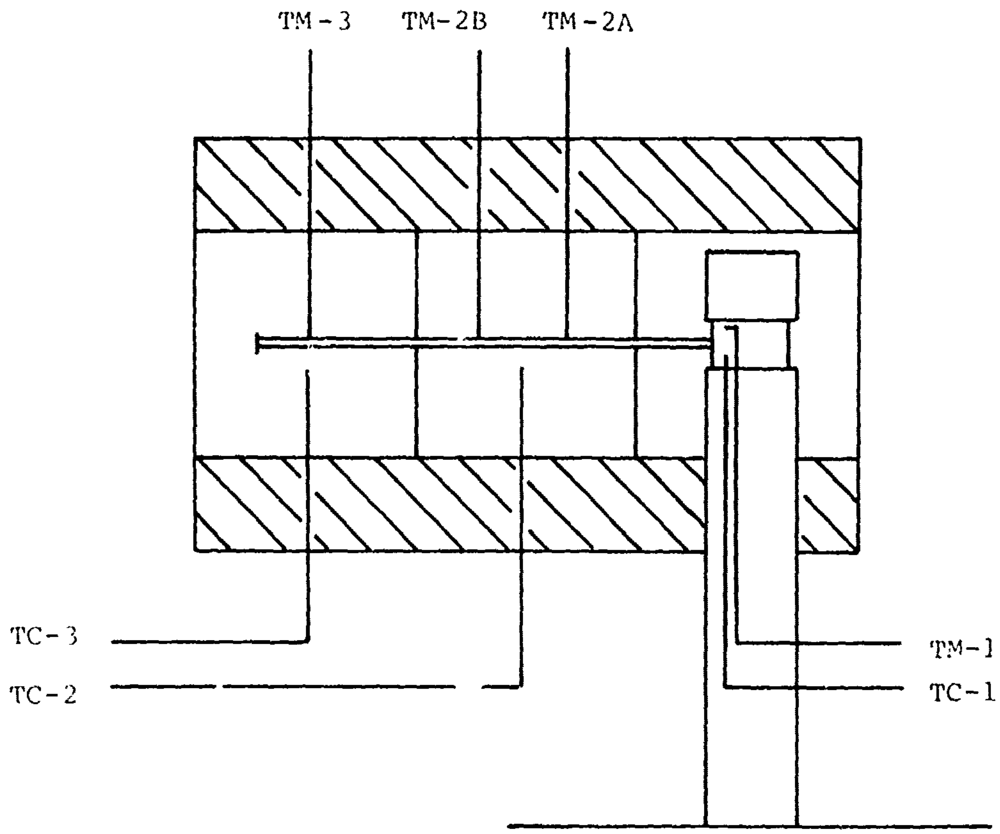


Figure 7. Schematic of the Enamels Testing Furnace Showing the Locations of the Control and Monitoring Thermocouples.

2. TEST SPECIMEN

a. Beam Specimen

The high temperature enamel test specimens are cantilever beams made of Haynes Alloy Number 188, with roots made of Hastelloy X. Figure 8 is a schematic of the test specimens with typical dimensions. The top beam is made to be used in test fixture number one, and the bottom in test fixture number two. Both specimens are identical except a one-half-inch hole is drilled in the root of the beams to be used in fixture number two. The beams are cut from a Haynes Alloy sheet and machined to the required dimensions. The roots are cut from 0.25-inch Hastelloy X sheets and machined to size. An 0.125-inch hole is drilled into each root to allow the high temperature testing furnace's zone one thermocouples to be inserted into the beam. The roots are then welded onto the top and bottom of the test beam. The beams and roots are welded on three sides to ensure adequate clamping. Since Haynes Alloy Number 188 is non-magnetic, a high Curie temperature cobalt disc is welded onto the beam to provide a magnetic couple to the electromagnetic drive transducer.

b. Preparing the Damping Material

The base glasses are in fritted (powdered) form. The required amounts of glass, and in some cases oxide additions, are weighed out on a pan balance. The weighed powders are then mechanically mixed in a V-blender for approximately one hour. The mixed material is then contained in a platinum crucible, heated, and quenched by pouring it into a container of cold water. The quenched glass is then dry-ball milled, using Al_2O_3 grinding media. The milled powder is then screened to obtain various particle size splits. For the test beams prepared the distribution of particle sizes is obtained by passing the powder through a 100-mesh screen and using what remains on a 150-mesh screen.

c. Damping Material Application

Prior to coating, the metal substrate is sandblasted using a 36-mesh silicon carbide grit and an air pressure of 75 psi.

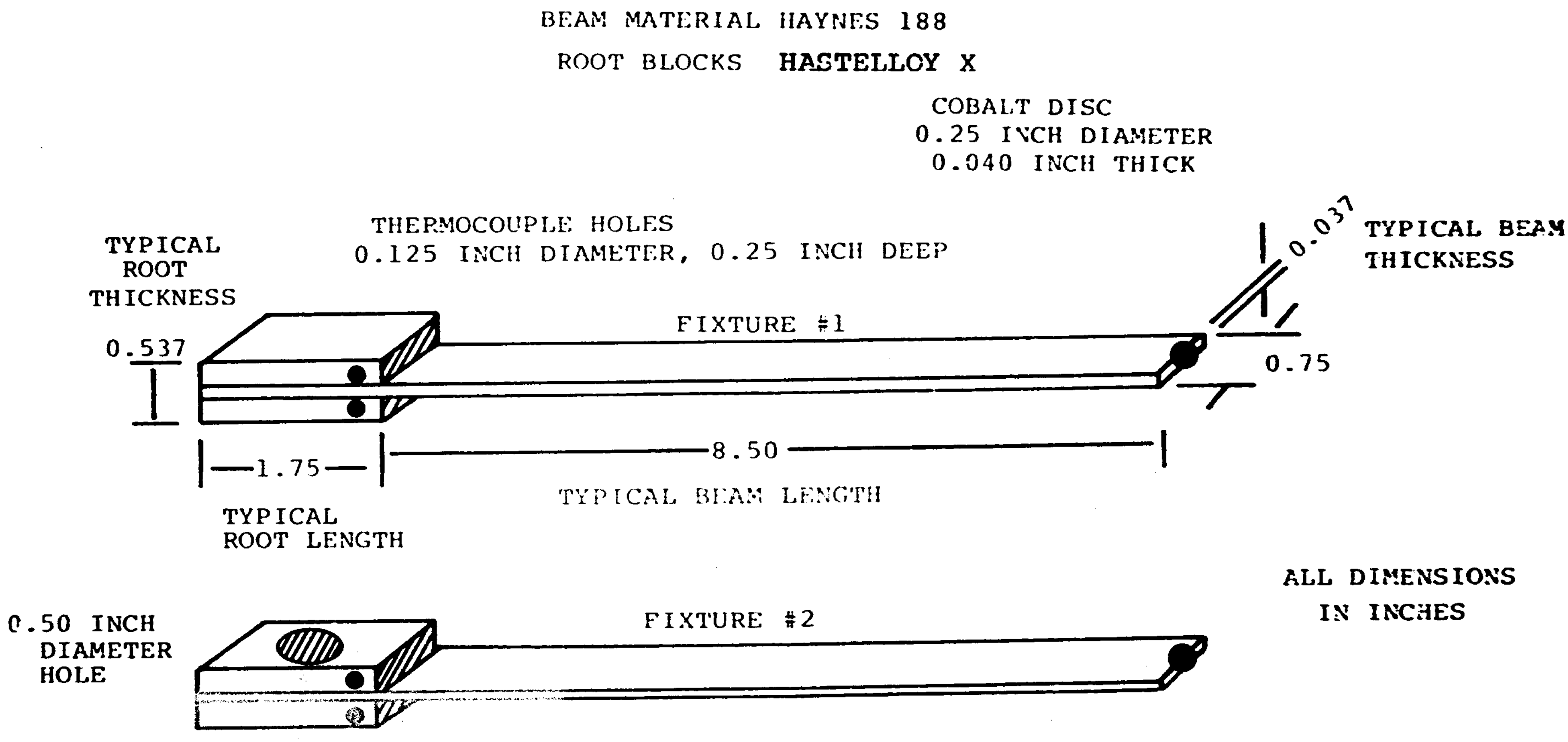


Figure 8. Schematic of the Cantilever Beam Test Specimens with Typical Dimensions.

The powdered damping material is applied to the metal substrate by plasma spraying. A Metco 3MB plasma spray apparatus is operated at 400 amps DC, 75 volts DC at 30,000 watts setting with a gas flow of fifteen scfh H_2 and 80 scfh Ar. A gas mixture of 84.2 percent Ar and 15.7 percent H_2 is used. The coated beam is then fired in a resistance heated furnace for approximately three minutes or until the surface appears to be smooth. Figure 9 illustrates an uncoated specimen and a coated test specimen [2].

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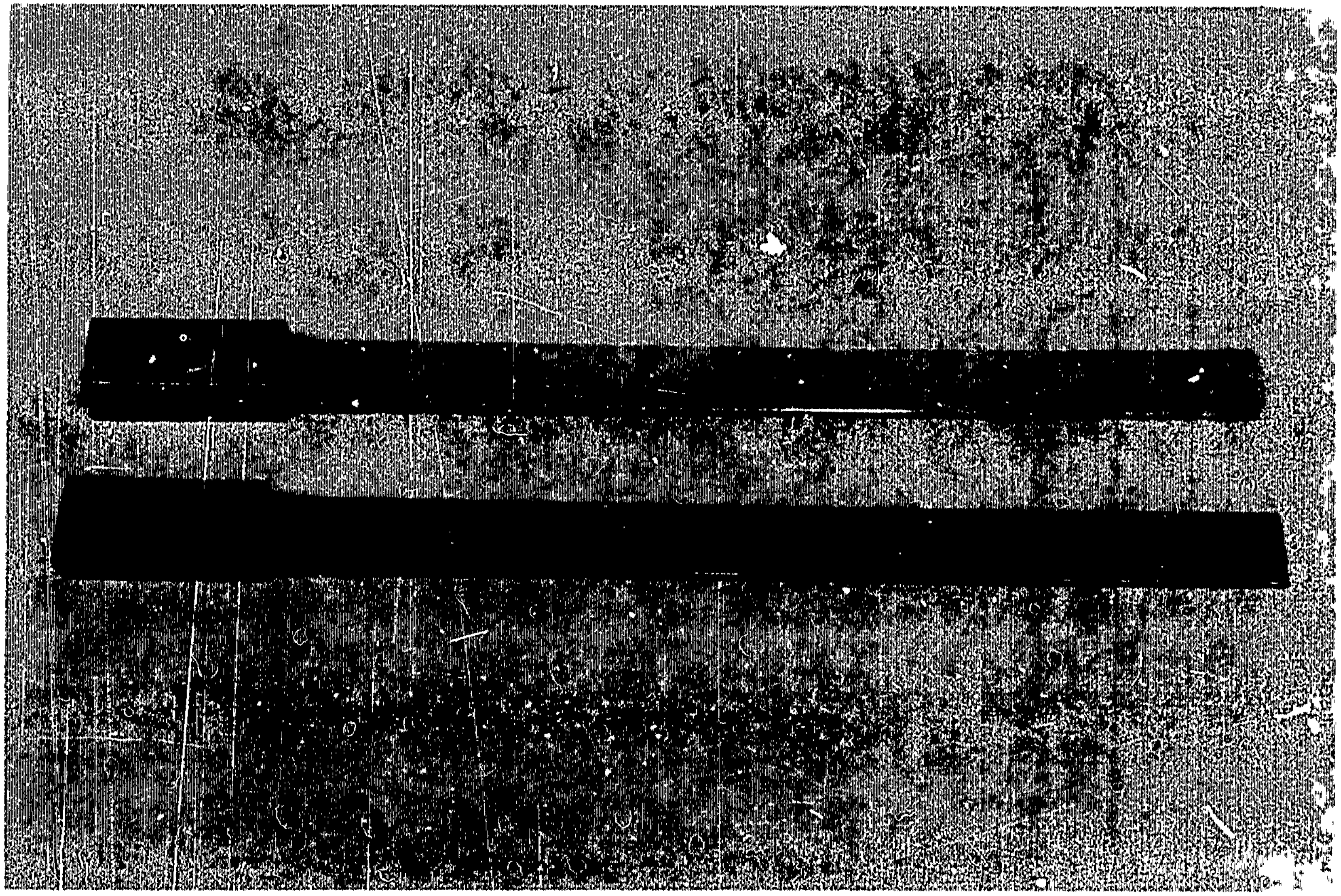


Figure 9. Uncoated (top) and Coated Cantilever Beam Test Specimens (bottom).

SECTION III

DETERMINATION OF MATERIAL PROPERTIES

The definition of vibration damping properties by the Oberst beam testing technique involves four main steps. The damping characteristics of the uncoated beam specimen are determined by the resonant beam technique. After the base line data for the test beam is known, the beam is then coated with the high temperature damping material to be evaluated. The composite beam is then tested to obtain the damping characteristics of the coated specimen. The data from the uncoated and coated beam tests are then combined and entered into a computer program which defines the material's storage modulus, loss modulus, and loss factor for the specific temperatures and modes as determined from the beam tests. A reduced frequency nomograph is developed from these material properties by means of another computer program. This nomograph displays the vibration damping properties of the material as a function of temperature and frequency for a temperature and frequency range which extends beyond that of the test data.

1. BEAM TESTING

The method for determining the loss factor and complex Young's modulus properties for high temperature free layer materials is the Oberst beam test [3]. The frequency response and modal damping as a function of temperature are measured for each undamped test beam. Accurate measurements of the resonant frequencies are necessary because the material damping properties calculated from experimental measurements are very sensitive to errors in the ratio of the coated beam resonant frequency to the uncoated resonant frequency (f_c/f_n), especially for thin coatings.

a. Uncoated Test

The physical dimensions for the uncoated beam are measured and recorded. To determine the material loss factor and complex Young's modulus, the Oberst equations require the uncoated beam thickness (h_b), length (ℓ), and density (ρ_b). All of the beams reported here are made of Haynes Alloy 188 with a density of 9.13 g/cc. (Beam dimensions are illustrated in Figure 8).

The cantilever beam test specimen is placed in the apparatus illustrated in Figure 1. As mentioned previously, this apparatus compensates for the thermal expansion and high temperature creep of the fixture and ensures a constant clamping pressure over the entire temperature range for which the measurements are obtained.

For the uncoated beams, each beam is stabilized at the highest expected test temperature (usually about 1,000°C) and the resonant frequency and modal damping of the second through sixth modes are measured. The temperature is then reduced in 40°C increments, stabilized (refer to Table 4), and the response measurements repeated. This procedure is continued to approximately 300°C. The resonant frequency and modal damping versus temperature for each of the modes are then plotted. The resonant frequency versus temperature curve, as illustrated in Figure 10, for each of the modes of the uncoated specimens tested is a smooth curve, and accurate resonant frequencies could be picked from this curve for any temperature of interest. The modal damping is determined by measuring the half-power bandwidth of each of the modes ($\eta = \Delta f_n/f_n$) and plotted versus temperature as illustrated in Figure 11.

Experience showed it was necessary to heat the specimen to the highest temperature and measure the response of the specimen as it cooled. The resonant frequencies measured on cooling from the highest temperature were higher than the resonant frequencies measured upon heating from room temperature to the highest temperature of interest. Once the specimen was heated to the highest temperature and cooled, the resonant frequencies measured going up in temperature and those measured coming down in temperature were the same, within experimental error, providing the specimen remained in the fixture. Other investigators have also noticed this behavior [4]. It is believed to be caused by the beam "setting in" the fixture and the relief of surface stresses in the beam introduced during fabrication. It is not due to the beam material being

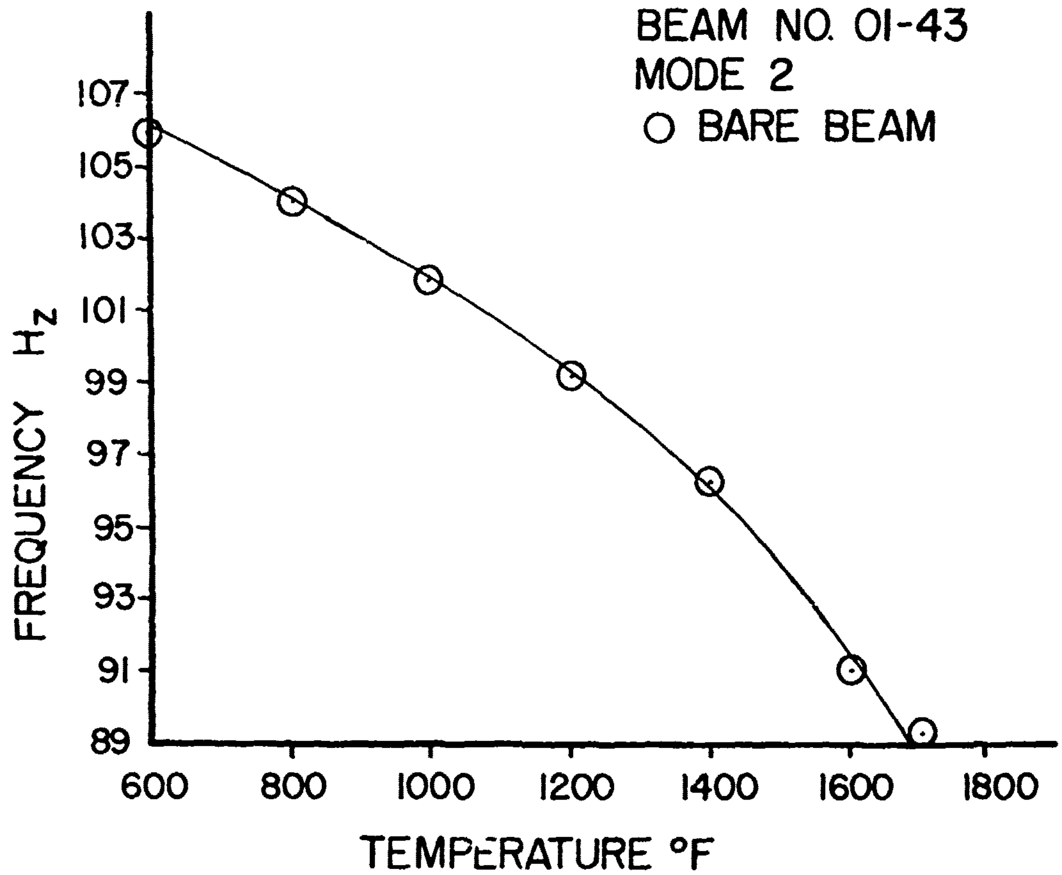


Figure 10. Resonant Frequency Versus Temperature Curve of Modes for Bare (Uncoated) Beam.

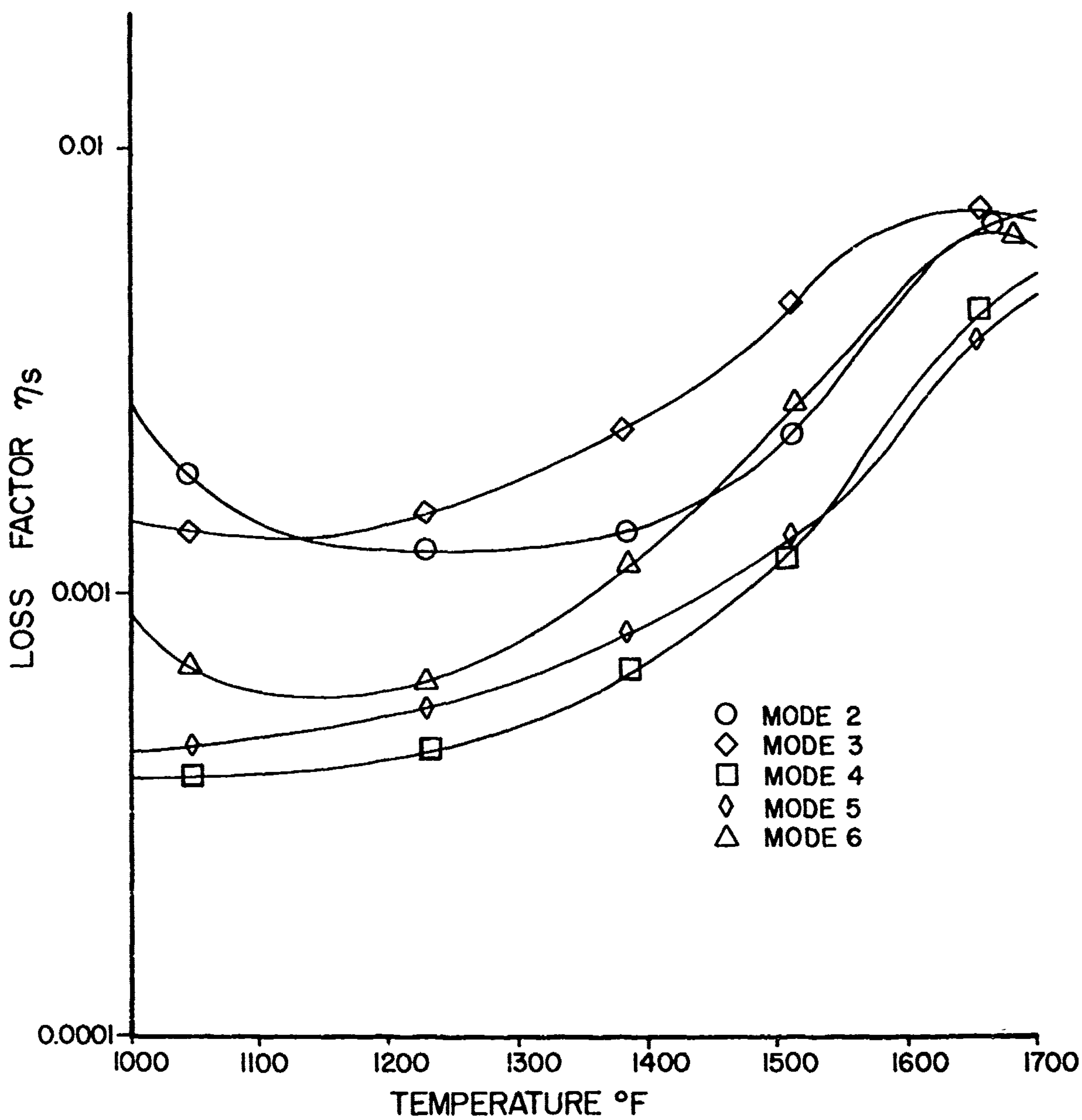


Figure 11. Half-power Bandwidth (Modal Damping) of Each Mode Versus Temperature for Bare (Uncoated) Beam.

annealed. The anneling temperature of the beam material used (Haynes Alloy 188) is greater than 1,100°C.

b. Coated Beam Test

After the uncoated specimen responses are measured, the beam is then coated on one side with a glass. The coated beam is heated to the expected maximum temperature for the particular coating, and the resonant frequencies and modal damping of the second through sixth modes are measured. The temperature is then reduced in steps of 25°C and the response is again measured. If the modal damping decreased upon cooling, the temperature of the specimen is increased above the initial test temperature in 25°C increments until the modal damping decreases for two successive increases in temperature. The specimen is then cooled in 25°C steps and new measurements taken. Figure 12 is a typical plot of coated beam center frequency versus temperature and Figure 13 is a typical plot of modal damping versus temperature.

The measurements made upon heating are not used to calculate the damping properties of the coating for the reasons previously mentioned. Another reason is that a glass is sensitive to its previous thermal history, in particular to the rate at which it is cooled from its firing temperature. The specimens tested are fired and then air quenched. This rapid cooling may have caused large residual stresses and some nonequilibrium structure can be frozen in. Heating the glass above its softening temperature and slowly cooling it allows the residual stresses to be relieved and the glass to maintain equilibrium.

The loss factor of the uncoated beam is subtracted from the measured loss factor of the coated beam to obtain a "corrected" modal damping coefficient. Sridharan [4] has shown that for small modal damping

$$\eta_c = \eta_s - \eta_b$$

where

η_b is the modal damping of the uncoated beam;

η_s is the measured modal damping of the coated specimen;

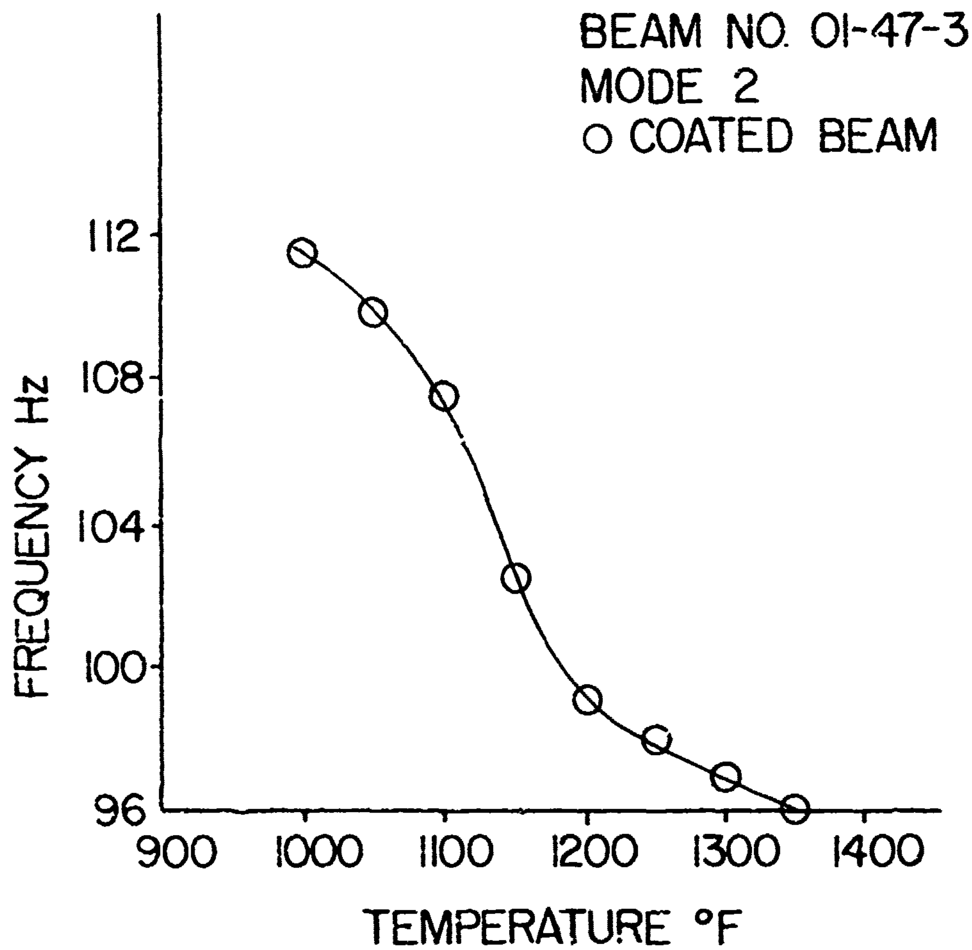


Figure 12. Typical Plot of Coated Beam Center Frequency Versus Temperature.

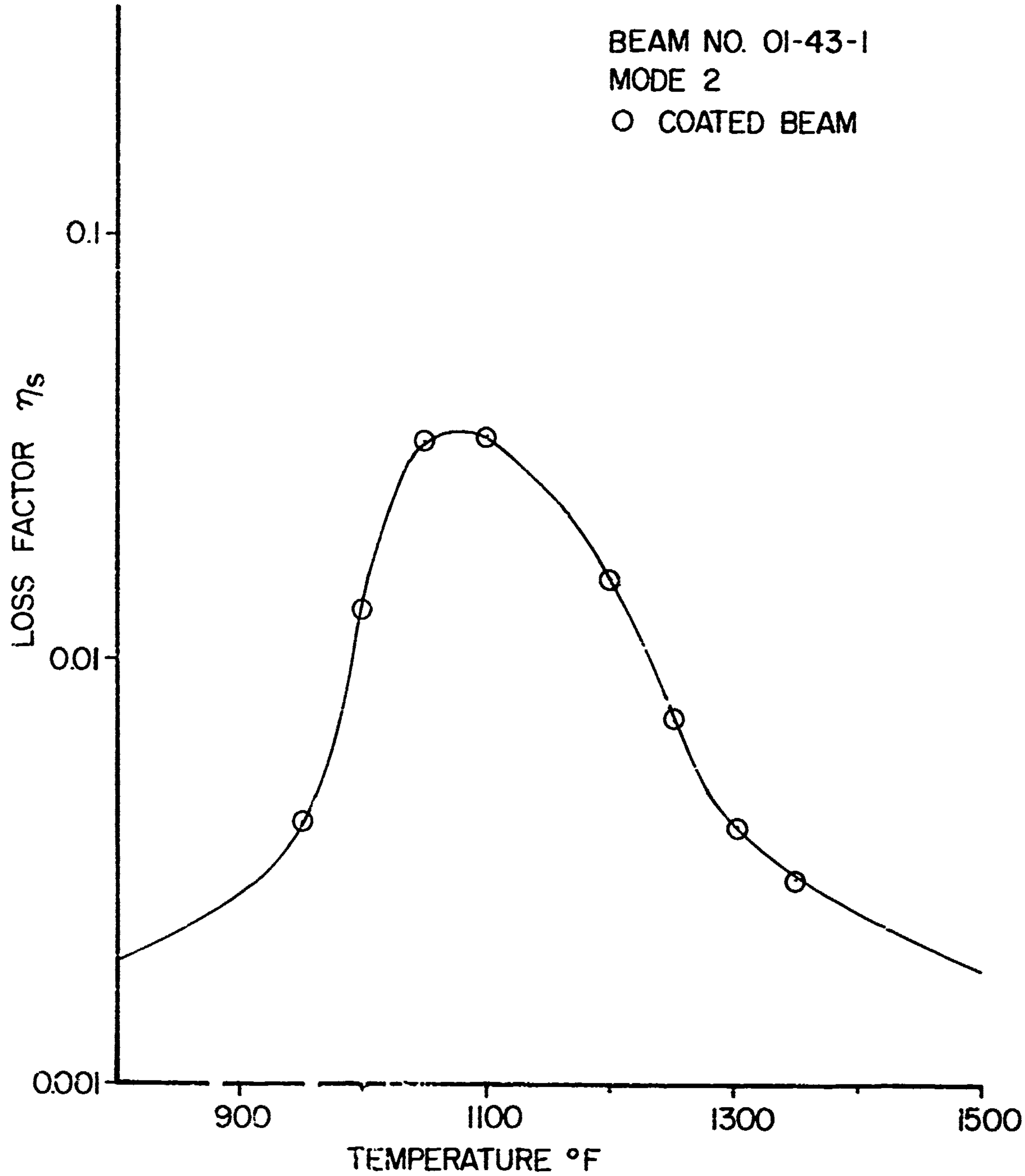


Figure 13. Half-power Bandwidth (Modal Damping) Versus Temperature for Coated Beam.

η_c is the modal damping that would have been observed if the uncoated beam damping was zero.

This correction is usually only necessary for temperatures greater than 650°C (1,200°F). The data recorded for each of the modes and temperatures are:

- T - the temperature of the specimen;
- f_n - the resonant frequency for the n^{th} mode of the uncoated beam;
- f_c - the resonant frequency for the n^{th} mode of the coated beam;
- Δf_n - the half-power bandwidth of the n^{th} mode of the uncoated beam;
- Δf_c - the half-power bandwidth of the n^{th} mode of the coated beam;
- η_s - modal damping of the n^{th} mode of the coated beam;
- η_b - modal damping of the n^{th} mode of the uncoated beam.

2. CALCULATION OF DAMPING PROPERTIES

The damping characteristics of the coatings are determined by measuring the vibration response of a composite cantilever beam at varying temperatures over the viscoelastic range. It is assumed that the enamel is a viscoelastic material; that is, the modulus of the enamel can be treated as a complex quantity

$$E_D^* = E_D' + iE_D'' = E_D\,(1 + i\,\eta_D)$$

$$\eta_D = E_D''/E_D'$$

where E_D' is the storage or Young's modulus of the enamel and η_D is the ratio of the dissipative modulus, E_D'', to the storage modulus.

Consider the metal beam with enamel coating on one side, as shown in Figure 14.

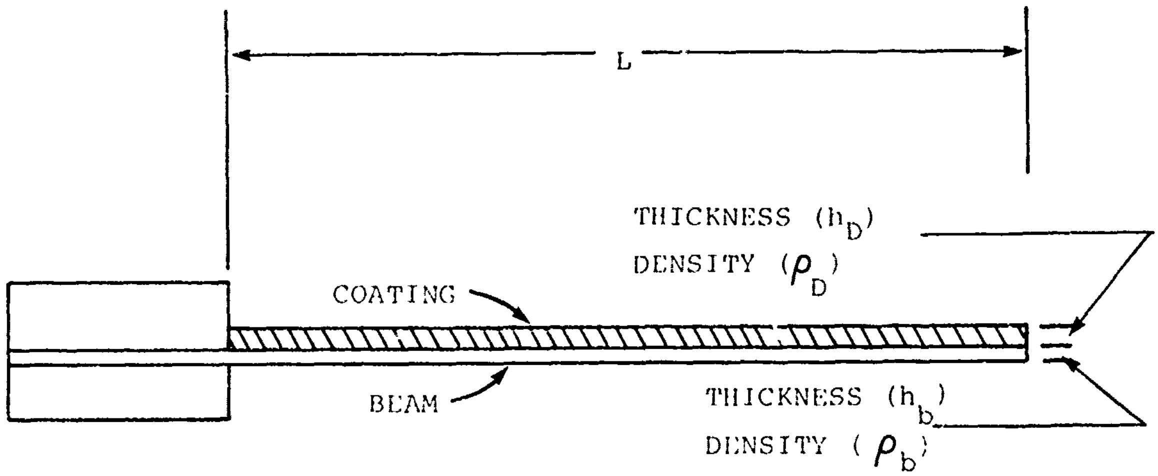


Figure 14. Coated Oberst Test Beam.

The formulas developed by Oberst [3] and used by many other investigators were used to determine the damping properties of the enamel as a function of frequency and temperature. These formulae are:

$$(\omega_n/\omega_{1n})^2(1+h_D\rho_D/h_1\rho_1) = \frac{1+2(E_D/E_1)(H_D/h_1)A+(E_D/E_1)^2(h_D/h_1)^4}{1+(E_D/E_1)(h_D/h_1)} \quad (1)$$

and

$$\frac{\eta_D}{\eta_c} = \frac{(E_D/E_1)(h_D/h_1)[2A+2(E_D/E_1)(h_D/h_1)^3+(E_D/E_1)^2(h_D/h_1)^{-4}-1]}{[1+(E_D/E_1)(h_D/h_1)][1+2A(E_D/E_1)(h_D/h_1)+(E_D/E_1)^2(h_D/h_1)^4]} \quad (2)$$

where

$$A = 2 + 3(h_D/h_1) + 2(h_D/h_1)^2 \quad (3)$$

ω_n = natural frequency of the n^{th} mode of the composite beam, $2\pi f_n$, rad/sec;

ω_{1n} = natural frequency of the n^{th} mode of the metal beam, $2\pi f_{in}$, rad/sec;

h_D = thickness of enamel coating applied to composite beam;

h_1 = thickness of metal beam;
ρ_D = density of enamel coating;
ρ_1 = density of metal beam;
E_D = real part of the modulus of enamel coating;
E_1 = Young's modulus of metal beam;
η_c = effective loss factor of composite beam;
η_D = loss factor of enamel coating.

The quantities of h_D, h_1, ρ_D, and ρ_1 are known and are assumed to remain constant with temperature. The parameters ω_n, ω_{1n}, and η_c are experimentally measured. The value of η_D is determined from

$$\eta_c = \frac{\Delta\omega_n}{\omega_n} = \frac{\Delta f_c}{f_c} \tag{4}$$

where Δf_c is the bandwidth at the half-power points of the response peak for the n^{th} mode. The value of E_1 can be determined from the measured response of the uncoated metal beam using

$$\xi_n^4 = \mu_1 \omega_{1n}^2 \ L^4/E_1 I_1 \tag{5}$$

where:

ξ_n^4 = the eigen value corresponding to the n^{th} mode and is a constant, determined by the boundary conditions;

μ_1 = $\rho_1 b h_1$ = the mass per unit length of the metal beam;

L = the length of the beam;

I = $1/12 \ bh_1^3$ = the second moment of area of the metal beam about its centerline.

The values of ξ_n^4 for beams with classical boundary conditions are well known and can be found in reference [5]. Thus, from the measured resonant frequencies of the coated and bare beams and the measured composite loss factor, the damping properties of the enamel can be determined as a function of temperature and frequency.

The resonant frequencies and modal damping of five to six modes of the coated beam, covering a frequency range of 100 Hz to 1,500 Hz can usually be measured for each temperature. Thus, the damping properties of the vitreous coating over a decade of frequency at a given temperature can be easily and quickly determined.

3. MATERIAL PROPERTIES

A nomograph developed by Jones [6] is used to present both the temperature and frequency dependence of the enamel coating. A computer program developed by King [7], using the technique of Rogers and Nashif [8], is used to plot the properties on the nomograph. There are two graphs for a coating. One plot is the storage modulus and loss modulus versus reduced frequency which is illustrated in Figure 15, and the other plot is the storage modulus and loss factor versus reduced frequency which is shown in Figure 16. These plots readily illustrate the variation of the damping properties of the material with frequency and temperature.

The plot is read by choosing the temperature of interest and following the oblique temperature isotherm until it intersects the horizontal constant frequency line of interest (frequency is the right vertical axis of the plot). Follow a vertical line at that point until it intersects the curve of interest, and read the properties of interest. Figures 17 and 18 illustrate this method to identify the damping properties at 500 Hz and 600°C. By reversing this process, the temperature of peak damping can be determined as illustrated in Figure 19. By defining the effective temperature range of material damping as the range over which material damping is above 0.707 peak damping (Figure 20), a description of the shape of the damping peak can be made. These methods were used to develop the summary of damping properties on the material damping properties evaluation summary sheet used in the data presentation Appendix of this report.

It can easily be seen from the nomographs that the data in this format is amenable to the development of analytical equations

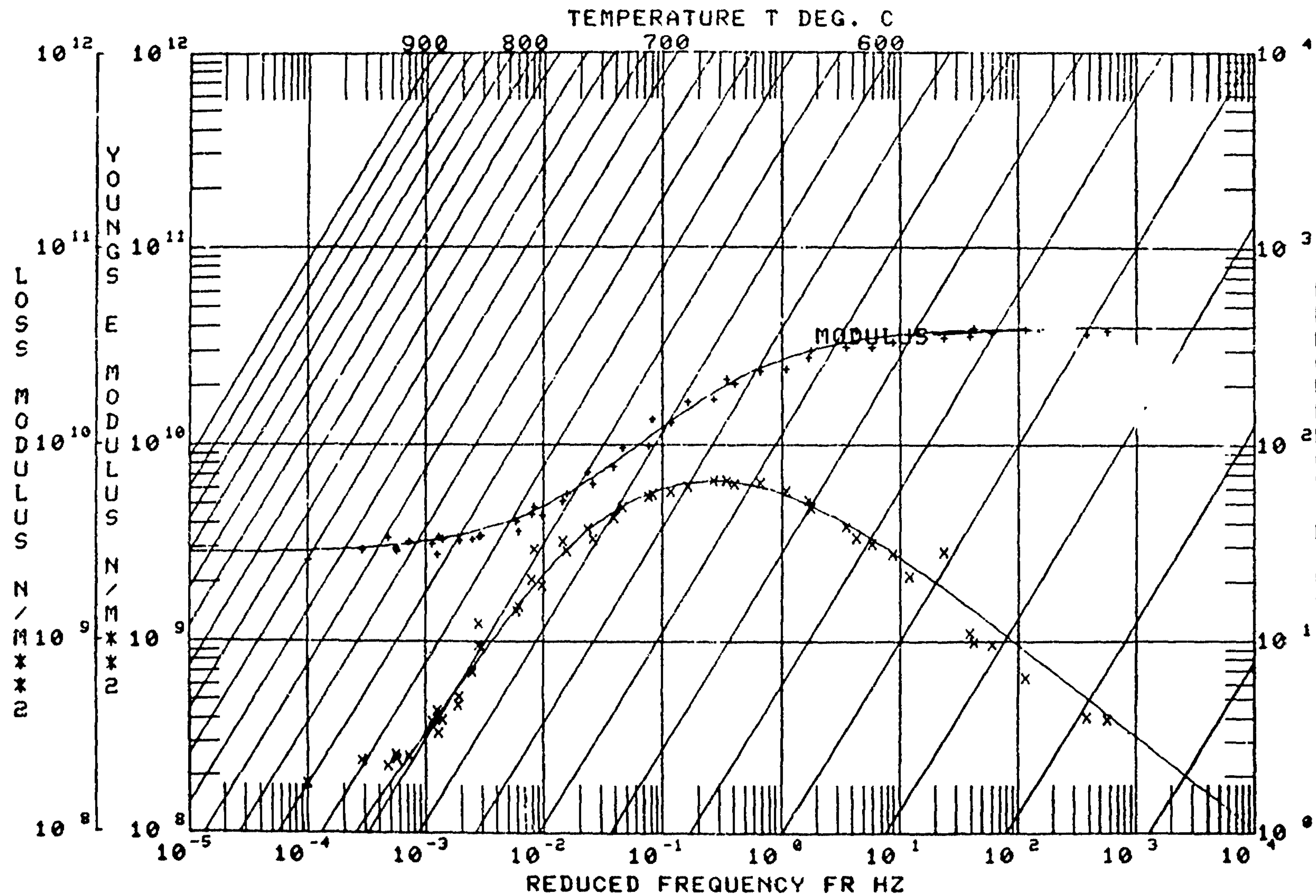


Figure 15. Storage Modulus and Loss Modulus Versus Reduced Frequency.

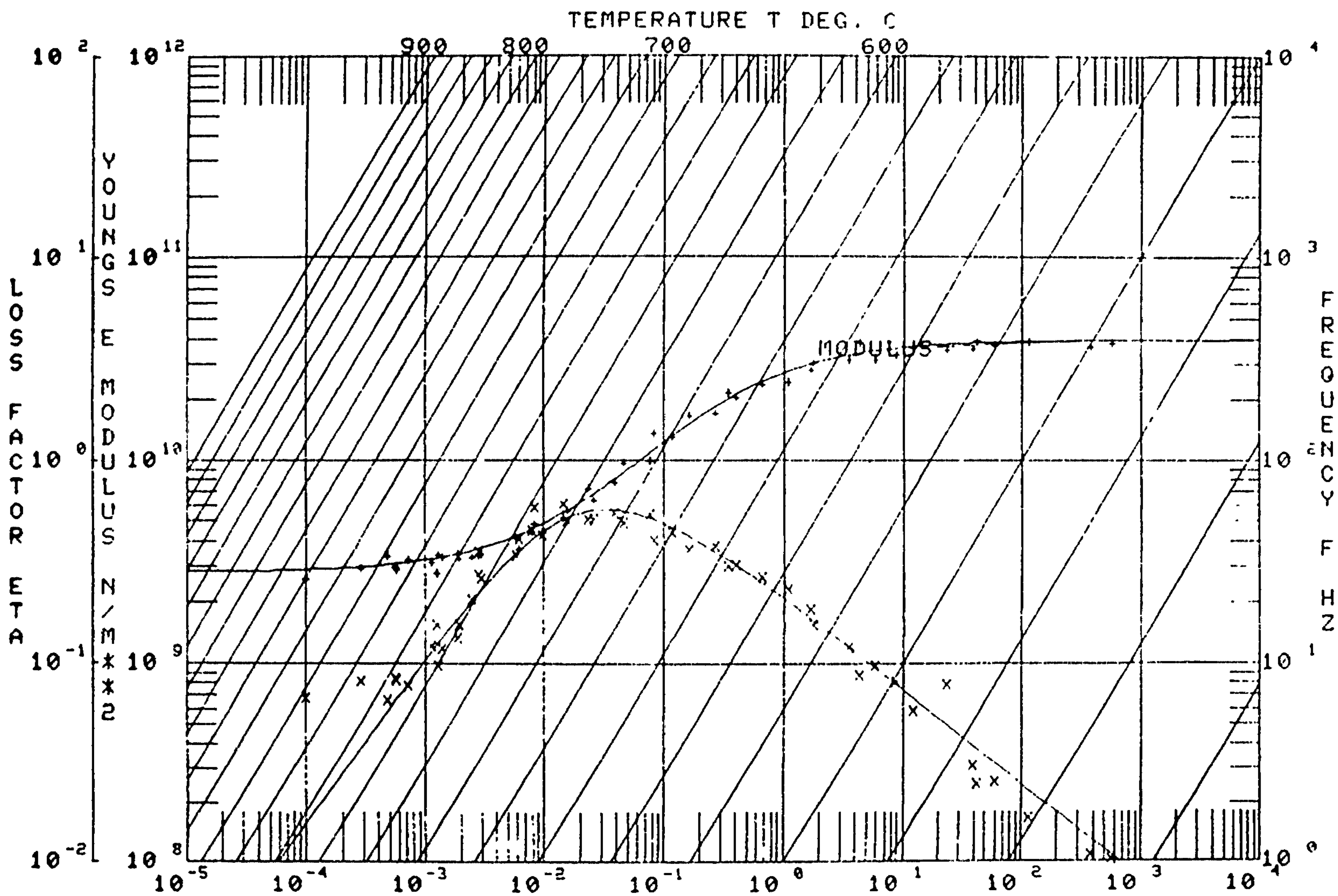


Figure 16. Storage Modulus and Loss Factor Versus Reduced Frequency.

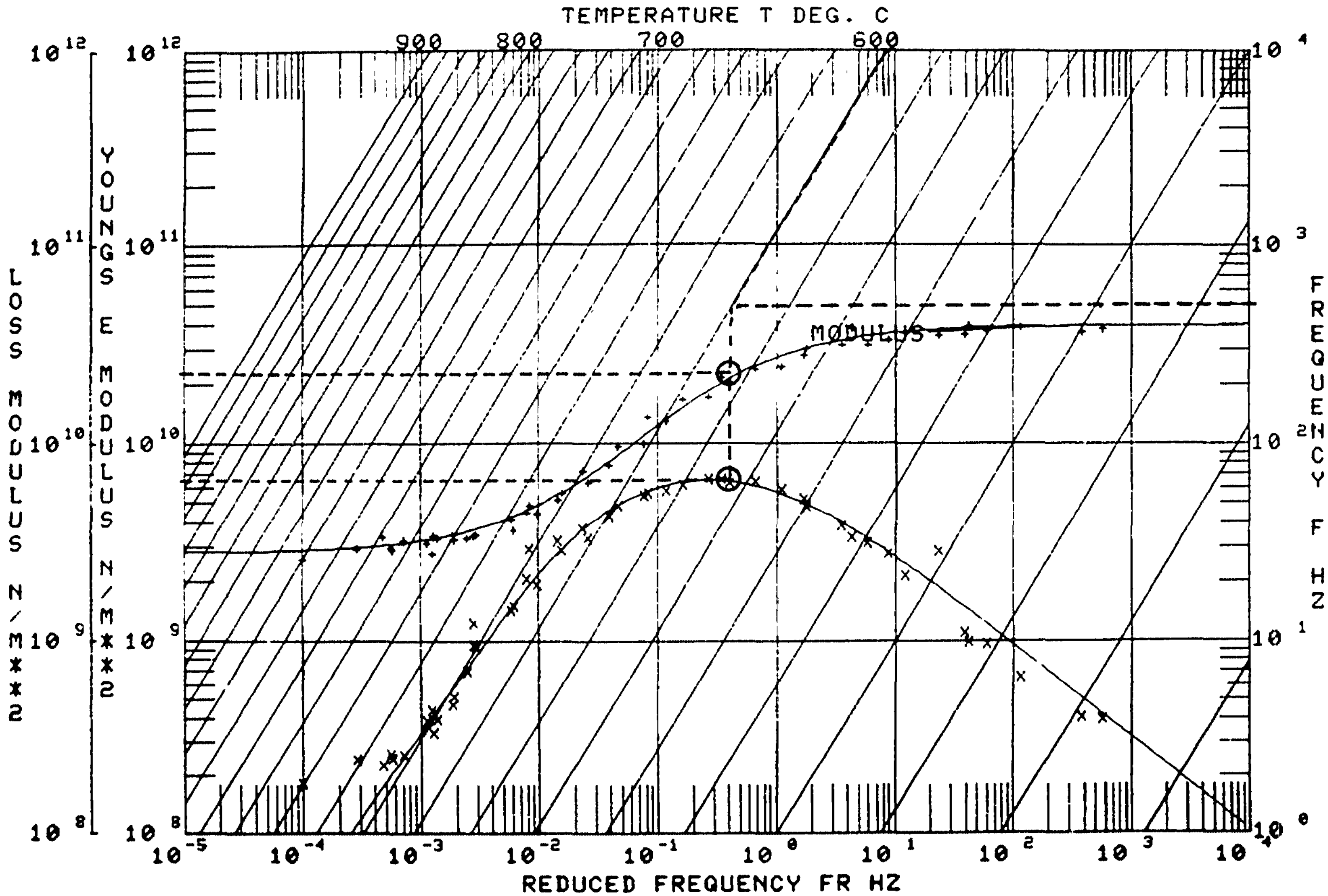


Figure 17. Example for Determining Loss Factor and Storage Modulus at 500 Hz and 600°C.

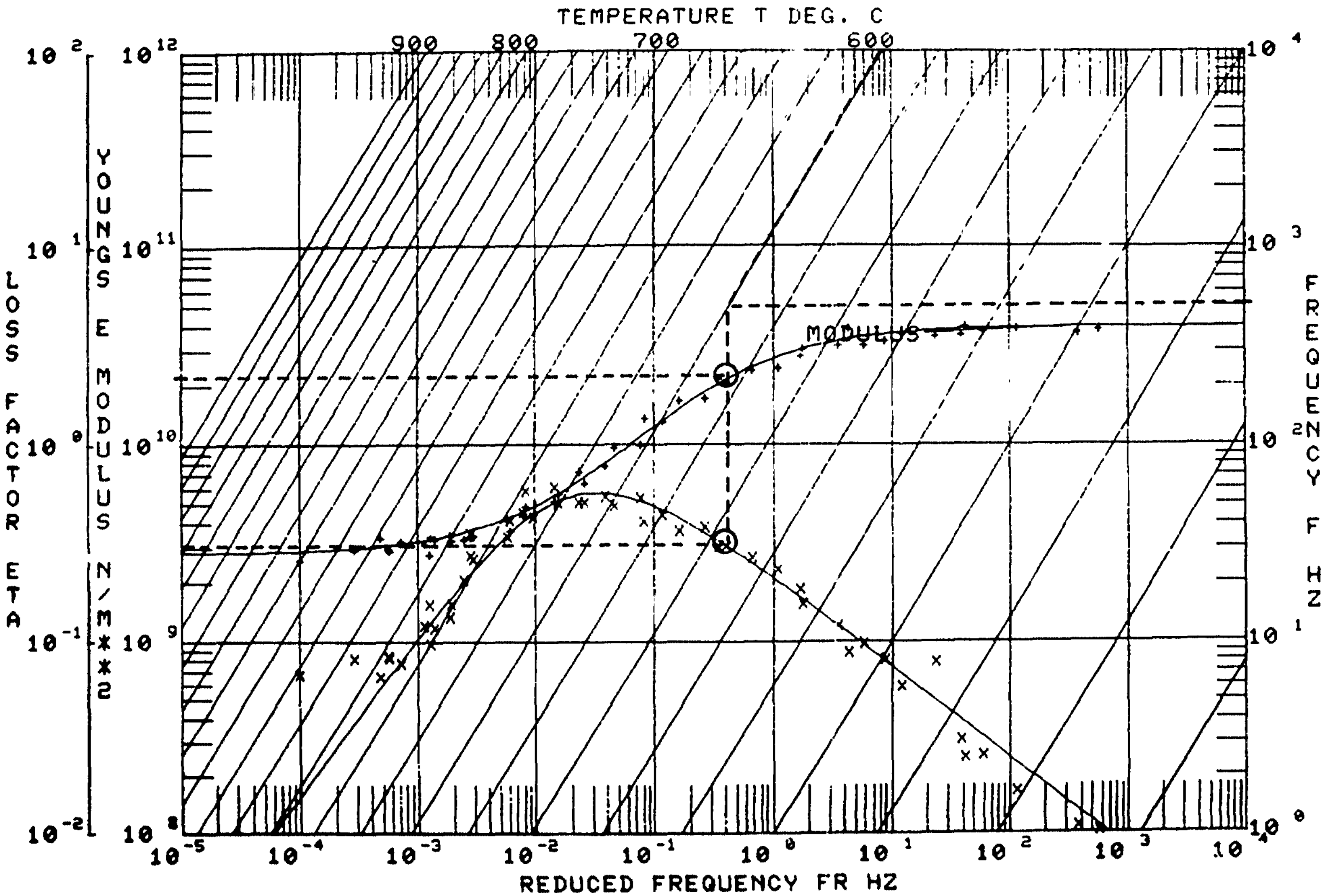


Figure 18. Example for Determining Loss Modulus and Storage Modulus at 500 Hz and 600°C.

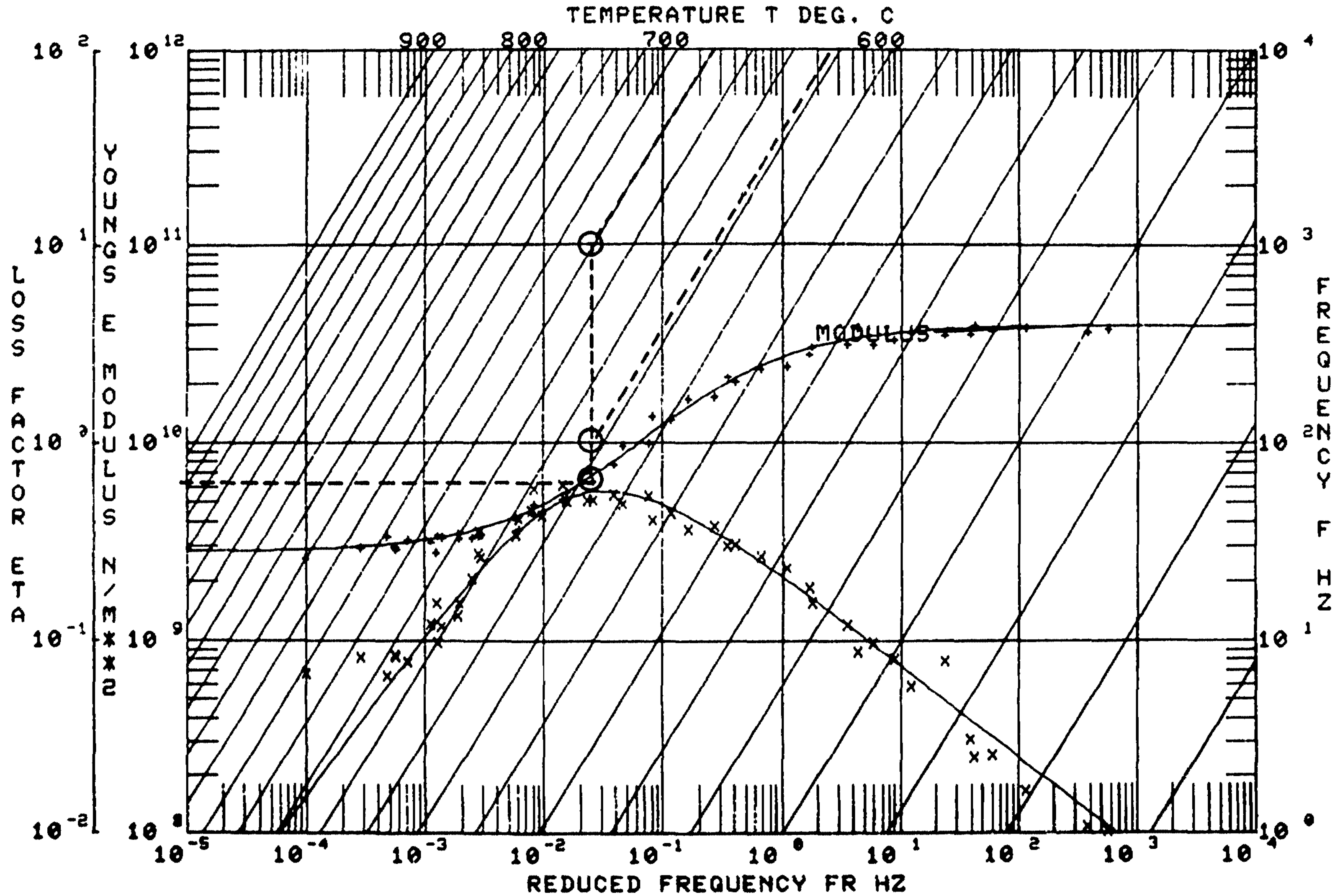


Figure 19. Example for Determining Peak Damping Temperature for 100 and 1,000 Hz.

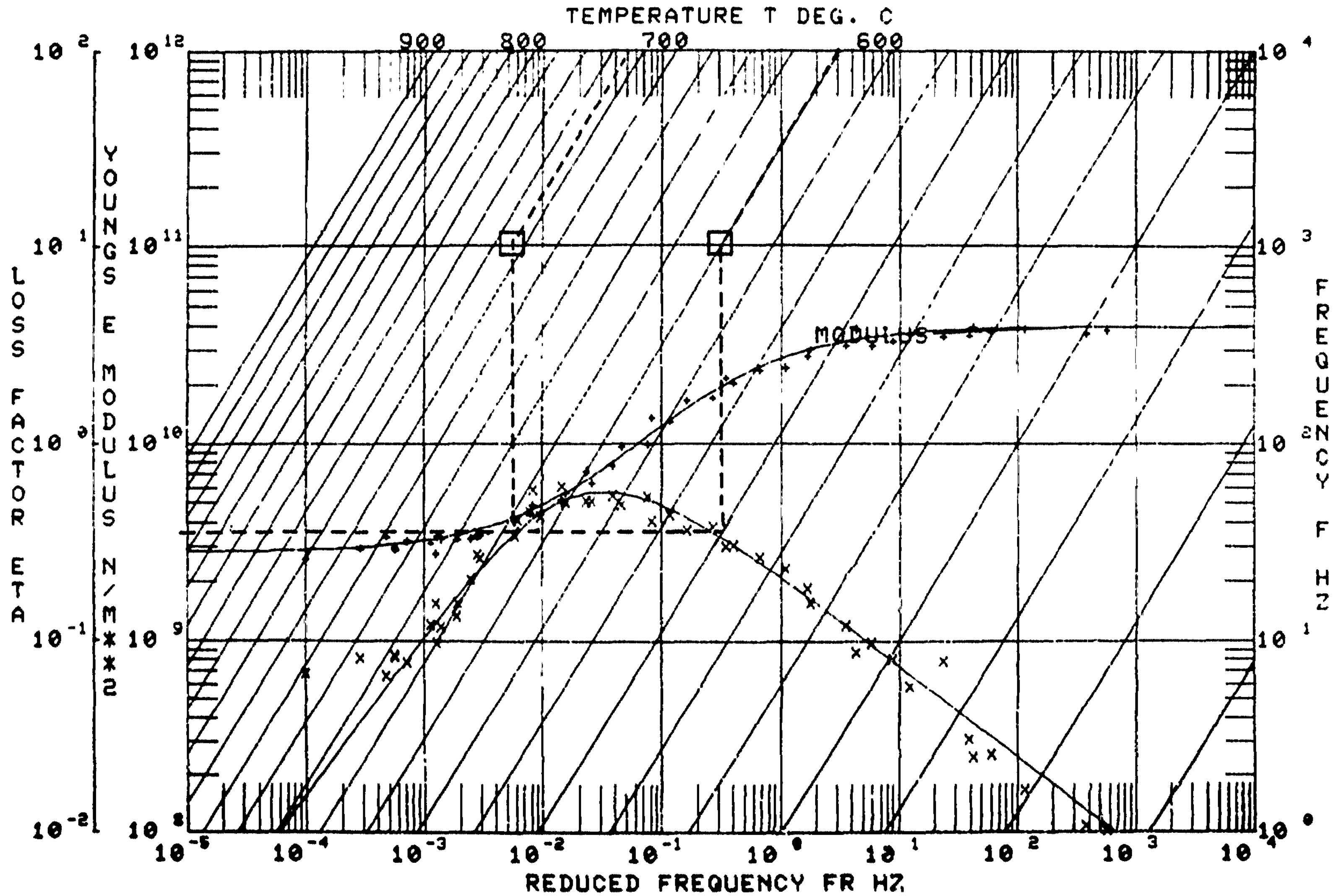


Figure 20. Example for Determining Material Damping Temperature Range at 1,000 Hz.

which would represent the data. The equations used to fit the material properties are those suggested by Rogers in reference [8].

The ability to represent the dynamic material properties in equation form greatly facilitates the use of this data in analytical structural design. A short discussion of the equations and parameters used in the curve fitting routine follows. More detailed information is in references [7] and [8].

The curves fitted to the data on the nomographs were calculated by the computer program mentioned previously in this Section. The basic form for these equations are as follows:

Storage Modulus

$$\log_{10}(E_D') = \log 10(M_f) + \frac{2 \log_{10}\left(\frac{M_{rom}}{M_\ell}\right)}{1 + \left(\frac{f_{rom}}{f_r}\right)^N} \tag{6}$$

where:

E_D' is the material storage modulus;

f_r is the reduced frequency;

M_{rom} is the inflection point of the storage modulus curve as read on the Young's modulus scale;

f_{rom} is the reduced frequency value of this inflection point;

N is the slope of the curve at the inflection point;

M_ℓ is the Young's modulus value of the lower horizontal asymptope of this curve.

Figure 21 illustrates the curve fit parameters M_{rom}, f_{rom}, N, and M_ℓ.

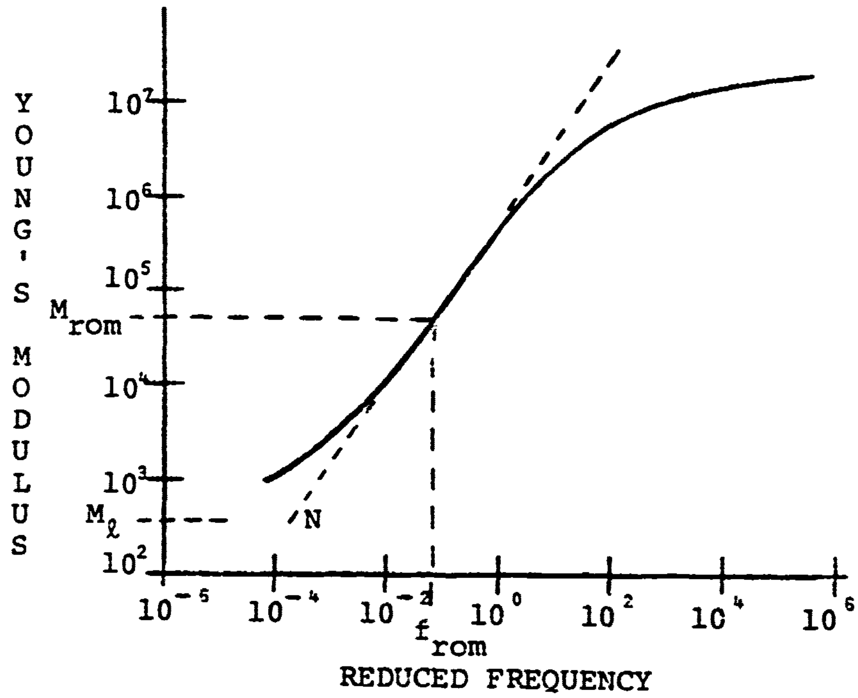


Figure 21. Curve Fit Parameters for Storage Modulus.

Loss Factor

$$\log_{10}(\eta) = \log_{10}(\eta_{fro\ell}) + \frac{C}{2}\left[\left(\frac{S_\ell + S_h}{C}\right)\log_{10}\left(\frac{f_\ell}{f_{ro\ell}}\right) + (S_\ell + S_h)\left(1 - \sqrt{1 + \left(\frac{\log_{10}\left(\frac{f_r}{f_{ro\ell}}\right)}{C}\right)^2}\right)\right] \qquad (7)$$

where:

η is the loss factor;

f_r is the reduced frequency;

$\eta_{fro\ell}$ is the loss factor value of the damping peak;

$f_{ro\ell}$ is the reduced frequency value of the damping peak;

S_ℓ is the slope of asymptotic line for low values reduced frequency;

S_h is the slope of asymptotic line for high values of reduced frequency;

C is a parameter which defines the curvature of the damping peak.

Figure 22 illustrates the curve fit parameters $\eta_{fro\ell}$, $f_{fo\ell}$, S_ℓ, S_h, and C.

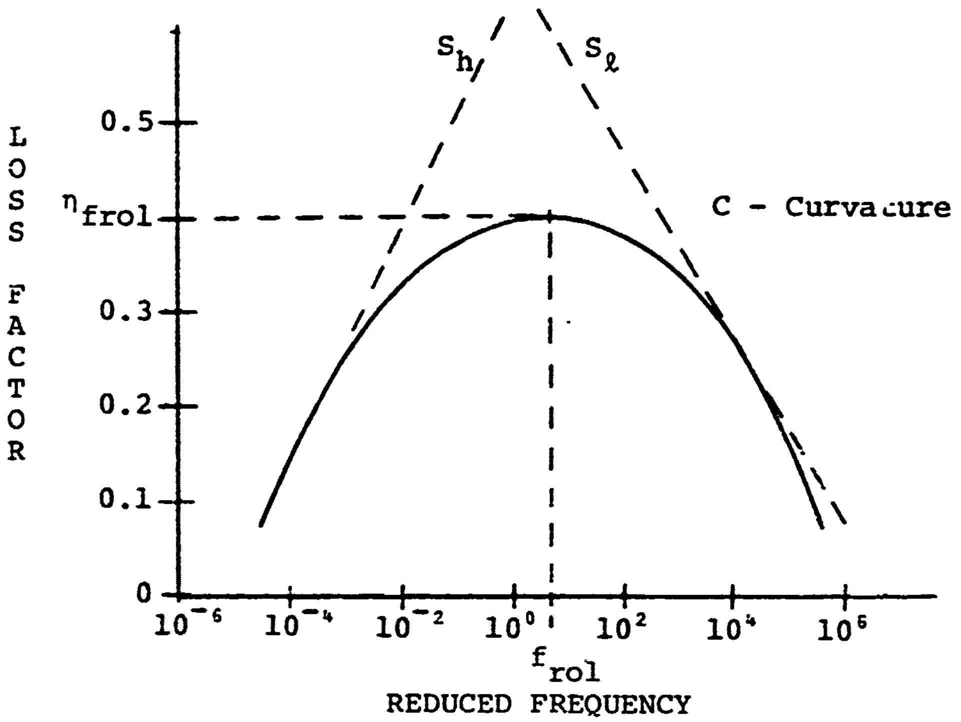


Figure 22. Curve Fit Parameters for Loss Factor.

The curve fit equations for each material are included in the materials damping properties evaluation summary sheets.

SECTION IV

THERMAL AGING

As porcelain enamels are exposed to temperatures in or above the vibration damping range, the material loss factor changes with time. To evaluate the effect of thermal aging, several test specimens were placed in an oven at the completion of the vibrating beam test. After approximately 100 hours the specimens were removed and retested. Figure 23 shows the change in loss factors for O. Hommel 7007 glass after 120 hours at 600°C. The loss factor has decreased slightly and the peak damping temperature for 100 Hz has shifted to a higher temperature. The effects of thermal aging is not consistent for different glasses. Figure 24 is a plot for a borosilicate glass. The loss factor and temperature for peak damping have increased.

The work done by Graves, Cannon, and Kumar [2] has shown that the vibration damping properties of a glass can be adjusted by selectively altering the composition of the glass. Compositional variations also appear to have the potential to control the rate of change of damping properties with thermal aging. Figure 25 shows the change in damping properties with time for a base glass compared to a modified glass. The rate of change of loss factor has been effected by these modifications.

Table 5 lists the materials tested for thermal aging. Appendix D provides a comparison of the vibration damping properties for these materials.

Extensive research is indicated before any specific conclusions can be made. The effect of thermal aging on material properties needs to be defined, and methods for controlling the changes of damping characteristics need to be developed.

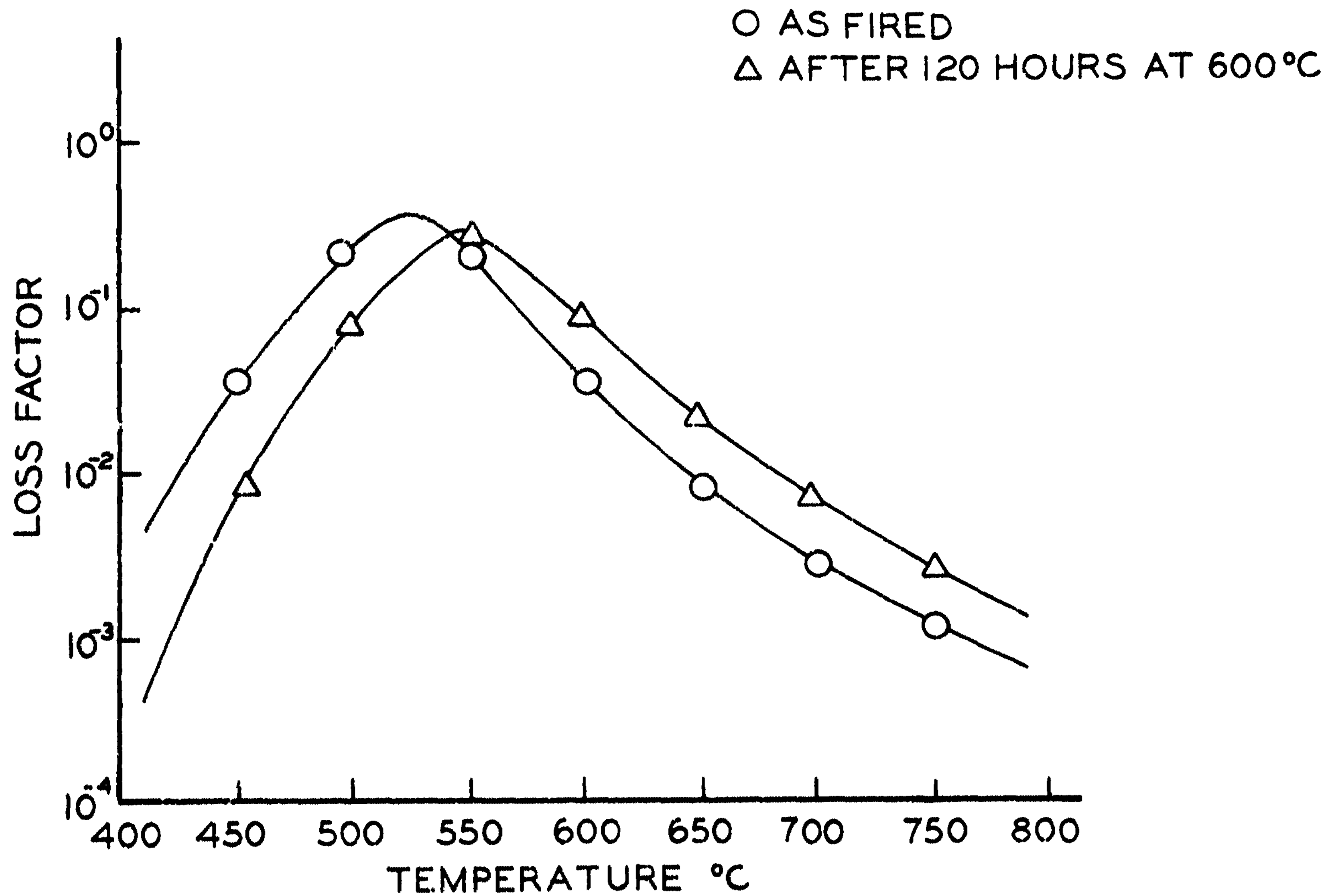


Figure 23. Change in Loss Factors for C. Hommel 7007 Glass after 120 Hours at 600°C.

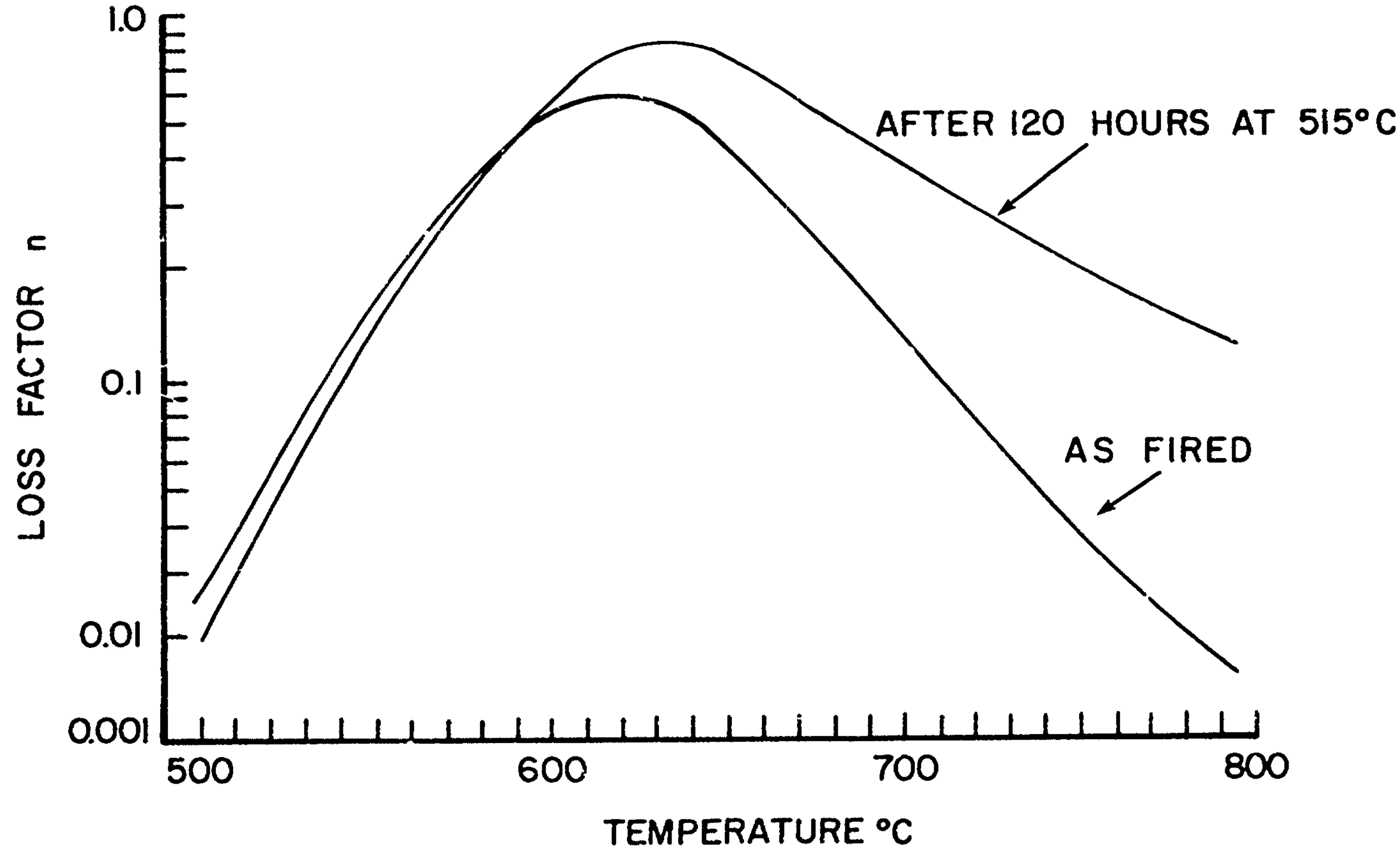


Figure 24. Increased Loss Factor and Temperature for Peak Damping of a Thermally Aged Borosilicate Glass.

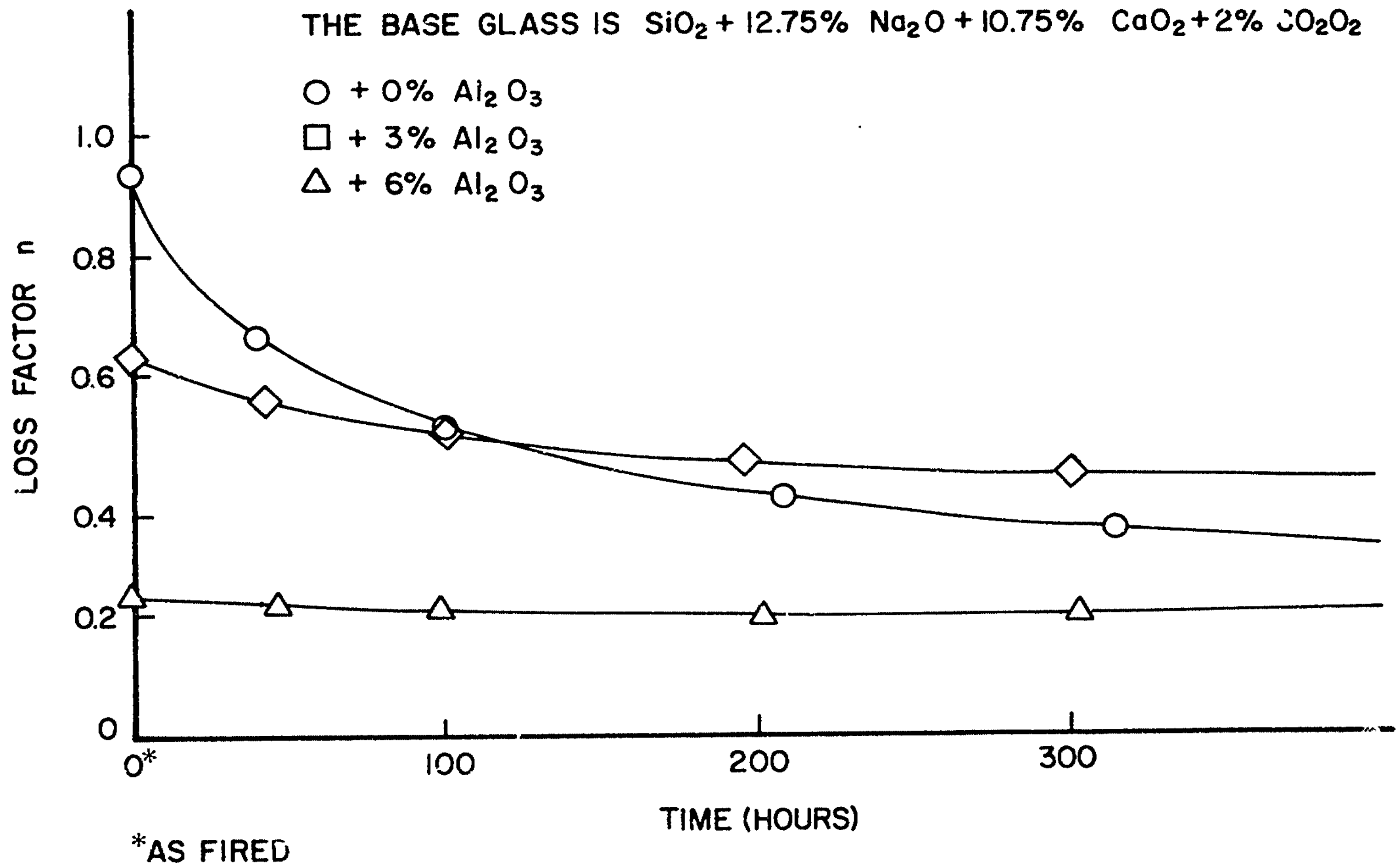


Figure 25. Change in Damping Properties with Time for a Base Glass Compared to a Modified Glass.

TABLE 5

INDEX OF MATERIALS THERMALLY AGED

Material	Beam Number	Temperature °C	Time Hours
O. Hommel 7007	01-37-1	*	*
	01-39-1	600	120
Corning 0010 + 7.5% Al_2O_3 + 1% Co_2O_3	01-48-1	*	*
	01-48-2	760	166.5
	01-49-1	*	*
	01-49-2	760	1[illegible]0
Corning 7570 + 2% Na_2O + 2% $KHCO_3$	01-48-4	*	*
	01-48-5	480	121
SiO_2 + 12.75% Na_2O + 10.75% CaO + 2% Co_2O_3	01-46-1	*	*
	01-46-2	760	100
	01-46-3	760	314
SiO_2 + 12.75% Na_2O + 10.75% CaO + 3% Al_2O_3 + 2% Co_2O_3	01-44-2	*	*
	01-44-3	750	98
SiO_2 + 12.75% Na_2O + 10.75% CaO + 6% Al_2O + 2% Co_2O_3	01-55-2	*	*
	01-55-3	815	100
	01-55-4	815	300
SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3	01-57-1	*	*
	01-57-2	815	112
	01-57-3	815	308
Borosilicate + 5% Na_2O + 2% Co_2O_3	01-43-1	*	*
	01-44-1	515	120

* As fired

SECTION V

MULTILAYER PORCELAIN ENAMEL DAMPING SYSTEMS

Experiments were performed to evaluate the potential of a constrained layer damping treatment for the 300°C to 800°C temperature range. These experiments were conducted by applying a higher melting material over a porcelain enamel. Conclusions from these experiments appear to show that coating applied in this manner acts as a free layer damper up to a certain temperature and as a constrained layer damper above this temperature. The effective temperature range of a multilayer system is much broader than the effective temperature range of the single porcelain enamel. The multilayer damping approach appears to have other positive side effects, such as greater durability by protecting the base glass from weathering, erosion, and corrosion.

Appendix E presents the results of the multilayer beam tests in the same format as the material properties in Appendix A. It is essential to understand that this data is valid only for the specific coating geometry as applied to the individual beam test. The data was reduced as a single free layer damping material. The data listed in Appendix E does not show general material properties. It does show general damping trends of multilayer coatings.

The constrained layer method of utilizing porcelain enamels as vibration damping materials is very promising and should be very thoroughly investigated.

SECTION VI

DATA APPENDICES

The results of this testing program are presented in five Appendices. Appendix A provides examples of the formats used to present the data in the other four Appendices. Sample calculations are included in a line-by-line break down of the forms used in the presentation of data.

The Appendices are as follows:

Appendix A: Data Formats and Sample Calculations
Appendix B: Material Data Evaluations
Appendix C: Uncoated Beam Test Results
Appendix D: Thermal Aging
Appendix E: Multilayer Damping

REFERENCES

1. Sharp, Jeffry D., "Enhanced Structural Durability Through Additive Damping Treatments," presented at AIAA/SAE Joint Propulsion Conference, Orlando, Florida, 1977.

2. Graves, G. A., Jr., Cannon, C., and Kumar, B., A Study to Determine the Effect of Glass Compositional Variations on Vibration Damping Properties, UDR-TR-80-27, AFWAL-TR-80-4061, University of Dayton Research Institute, Dayton, Ohio, May 1980.

3. Oberst, H. and Frankenfeld, K., "Uber die Dampfung dunner Bleche durch festhaltende Belage," Acoustics, 1952, Vol. 2, pp. 181-184.

4. Sridharan, R. I., Damping in Porcelain Enamel Coatings, AFWAL-TR-74-191, Materials Laboratory, Wright-Patterson Air Force Base, Ohio, 1976 (also published as Ph.D. dissertation, University of Minnesota, 1975).

5. Bishop, R. E. D. and Johnson, V., Final Report, United States Air Force Contract Number F33615-72-C-1315 (1974).

6. Jones, D. I. G., "A Reduced Temperature Nomogram for Characterization of Damping Material Behavior," Shock and Vibration Bulletin 48, Part 2, 1978.

7. King, C. S., Jr., Computerized Processing and Graphic Representation of Viscoelastic Material Property Data, AFWAL-TR-79-4099, Materials Laboratory, Wright-Patterson Air Force Base, Ohio, 1979.

8. Rogers, L. C. and Nashif, A. D., "Computerized Processing and Empirical Representation of Viscoelastic Material Property Data and Preliminary Constrained Layer Damping Treatment Designs," Shock and Vibration Bulletin 48, 1978.

APPENDIX A

DATA FORMS

The vibrating beam test data listed in Appendix B for high temperature damping materials and the data listed in Appendix E for multilayer damping systems is in the following format.

Each beam test has a summary, raw data, and reduced property data tables. Included for each material of Appendices B and E are two reduced frequency nomographs which display material storage modulus, loss modulus, and loss factor. Vibrating beam test number 01-43-1 is the example used to illustrate this format.

Beam Number - each vibrating beam test is identified by an individual five digit number as follows.

XX-YY-Z

The substrate (bare beam) material is identified by the material code "XX." All of the materials testing listed in this report was conducted using Haynes Alloy Number 188 as the substrate. The material code for Haynes 188 is "01." Each beam made of Haynes 188 was given an individual number as it was fabricated and is indicated by "YY." The test number "Z" is the chronological number for each test of a specific beam, e.g., a beam number of 01-43-1 would indicate the first vibrating beam test for beam number 43 which is made of Haynes Alloy Number 188.

Summary Sheet - Figure 1-A is the summary sheet for beam test number 01-43-1. The form serves as a cover sheet for the test data and provides a brief summary of the beam test as follows.

- (a) Beam Number: beam test number.
- (b) The date of the beam test.
- (c) Damping Material: the material which was evaluated for damping properties.
- (d) Damping Material Thickness: an average of random thicknesses as read with a micrometer.

Beam No. ____(a)____

Date ____(b)____

Damping Material ____________(c)____________

____

Material Thickness ____(d)____ cm   Material Density ____(e)____ g/cc

Fixture No. ____(f)____   Beam Thickness ____(g)____ cm

Beam Density ____(h)____ g/cc   Beam Length ____(i)____ cm

Temperature Test Range: Between ____(j)____ °C and ________ °C

Frequency Test Range: Between ____(k)____ Hz and ________ Hz

Loss Factor η_D:

Peak	100 Hz	η_D ____(l)____	Temperature	________ °C	
	1000 Hz	η_D ________	Temperature	________ °C	
Range	100 Hz	____(m)____ °C	________ °C		
	1000 Hz	________ °C	________ °C		

Complex Modulus: E_D''

Peak	100 Hz	____(n)____ PAS	Temperature	________ °C	
	1000 Hz	________ PAS	Temperature	________ °C	
Range	100 Hz	____(o)____ °C	________ °C		
	1000 Hz	________ °C	________ °C		

NOMOGRAPH CURVE FIT EQUATION: (p)

Remarks: (q) ____

____

____

____

____

Figure 1-A. Beam Test Summary Sheet.

$h_D = h_C - h_B$

where h_D is damping coating thickness, h_C is is coated beam thickness, and h_B is bare beam thickness (h_D).

(e) Material Density: density of the damping material (ρ_D).

(f) Fixture Number: fixture used for the beam test (see Section 2.1.2 of this report).

(g) Beam Thickness: A random average of bare beam thickness as measured with a micrometer (h_B).

(h) Beam Density: Density of substrate. Density of Haynes 188 = 9.13 g/cc (ρ_B).

(i) Beam Length: Average length of the specimen from the root to the end of the beam as measured with a scale (ℓ).

(j) Temperature Test Range: the upper and lower temperatures at which modal damping was measured (see Section 2.1.3 of this report) (T).

(k) Frequency Test Range: upper and lower frequencies measured during the test.

(l) Loss Factor Peak: magnitude and temperature of peak damping for 100 Hz and 1,000 Hz as read off the reduced frequency nomograph (Figure 2-A).

(m) Loss Factor Range: the high and low temperatures for a 0.707 decrease in the magnitude of peak damping at 100 Hz and 1,000 Hz as read off the reduced frequency nomograph (Figure 3-A).

(n) Complex Modulus Peak: magnitude and temperature of peak loss modulus for 100 Hz and 1,000 Hz as read off the reduced frequency nomograph (Figure 4-A).

(o) Loss Modulus Range: the high and low temperatures for 0.707 peak damping at 100 Hz and 1,000 Hz as read off of the nomograph (Figure 5-A).

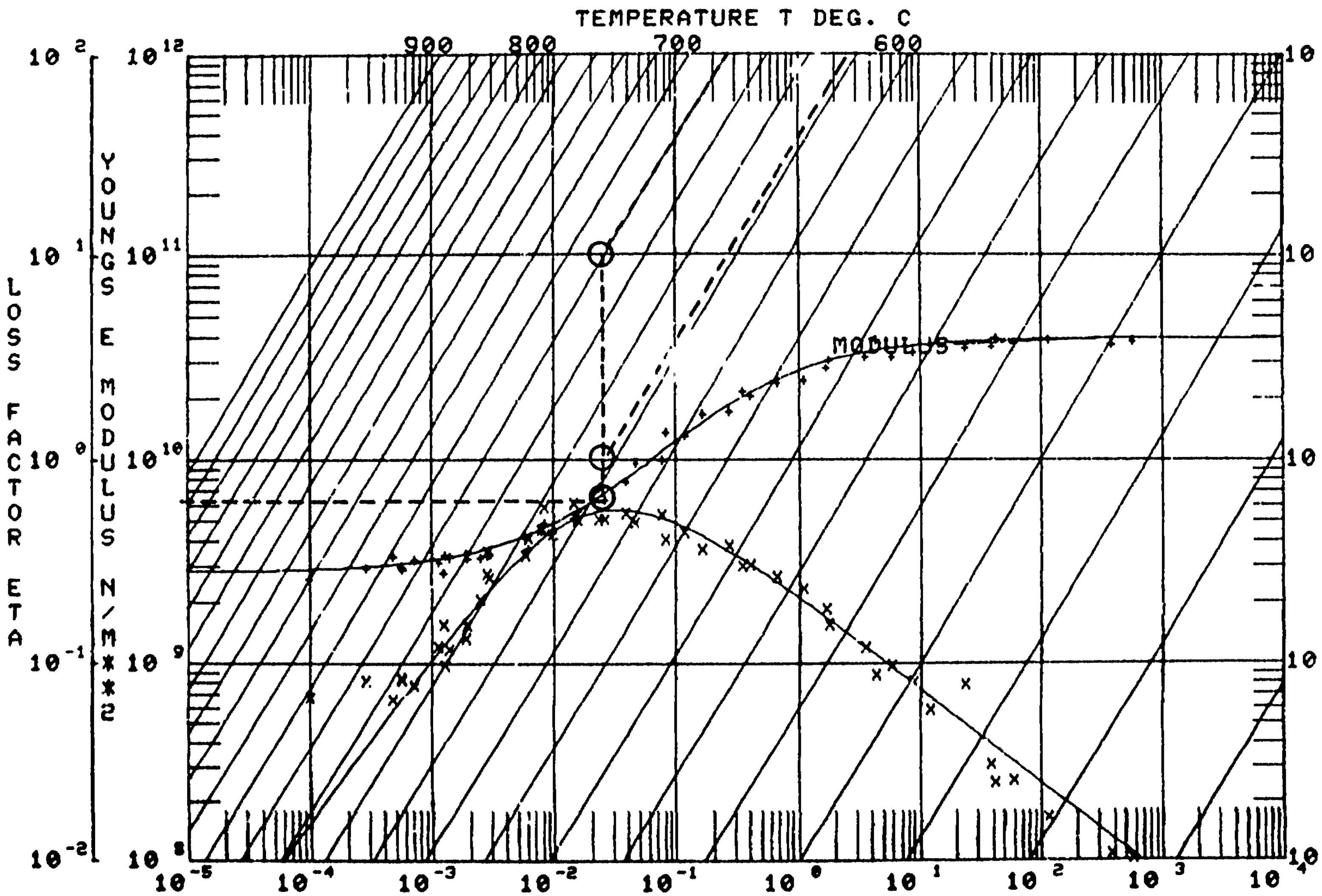


Figure 2-A. Example for Determining P'ak Damping Temperature for 100 and 1,000 Hz.

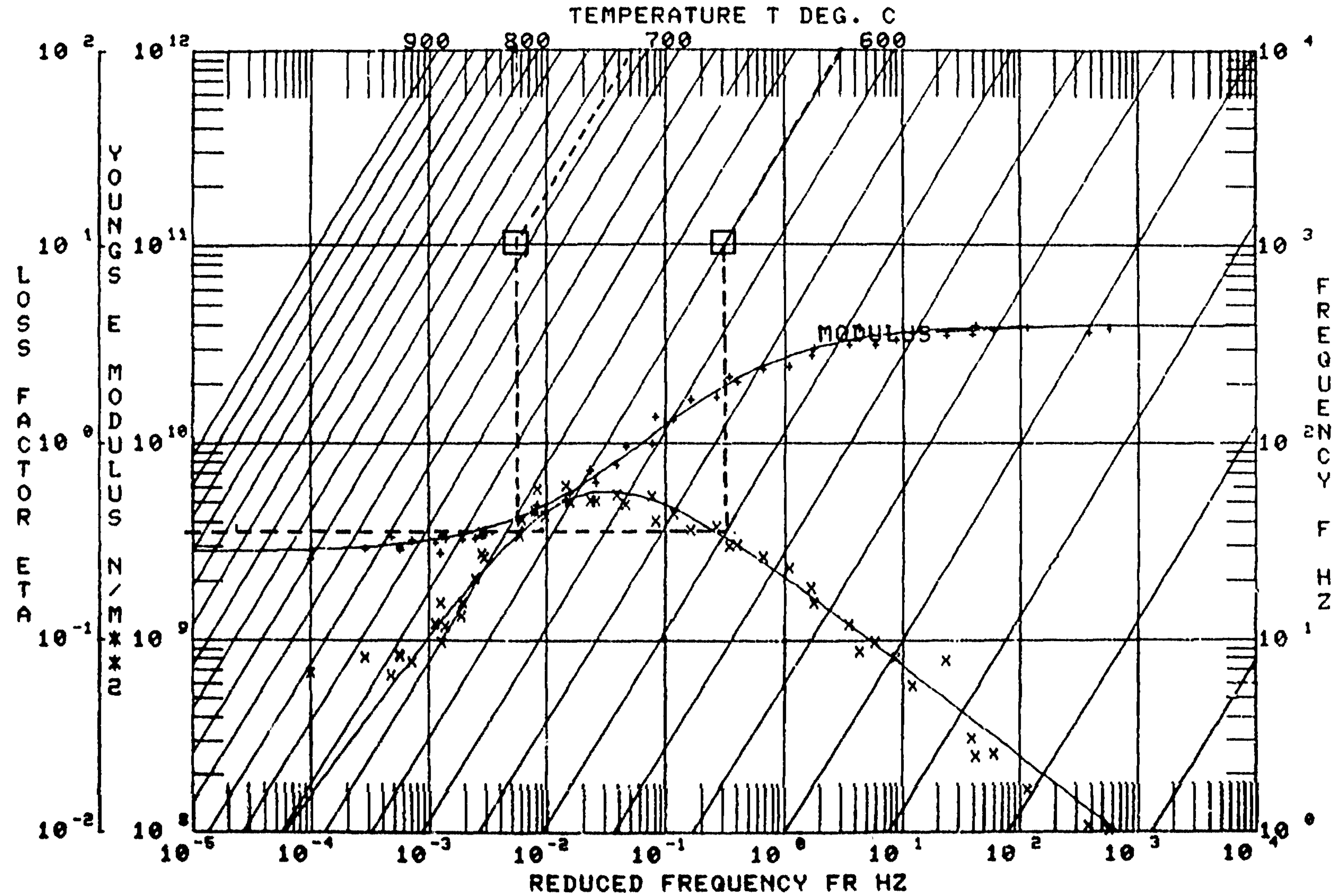


Figure 3-A. Example for Determining Material Damping Temperature Range at 1,000 Hz.

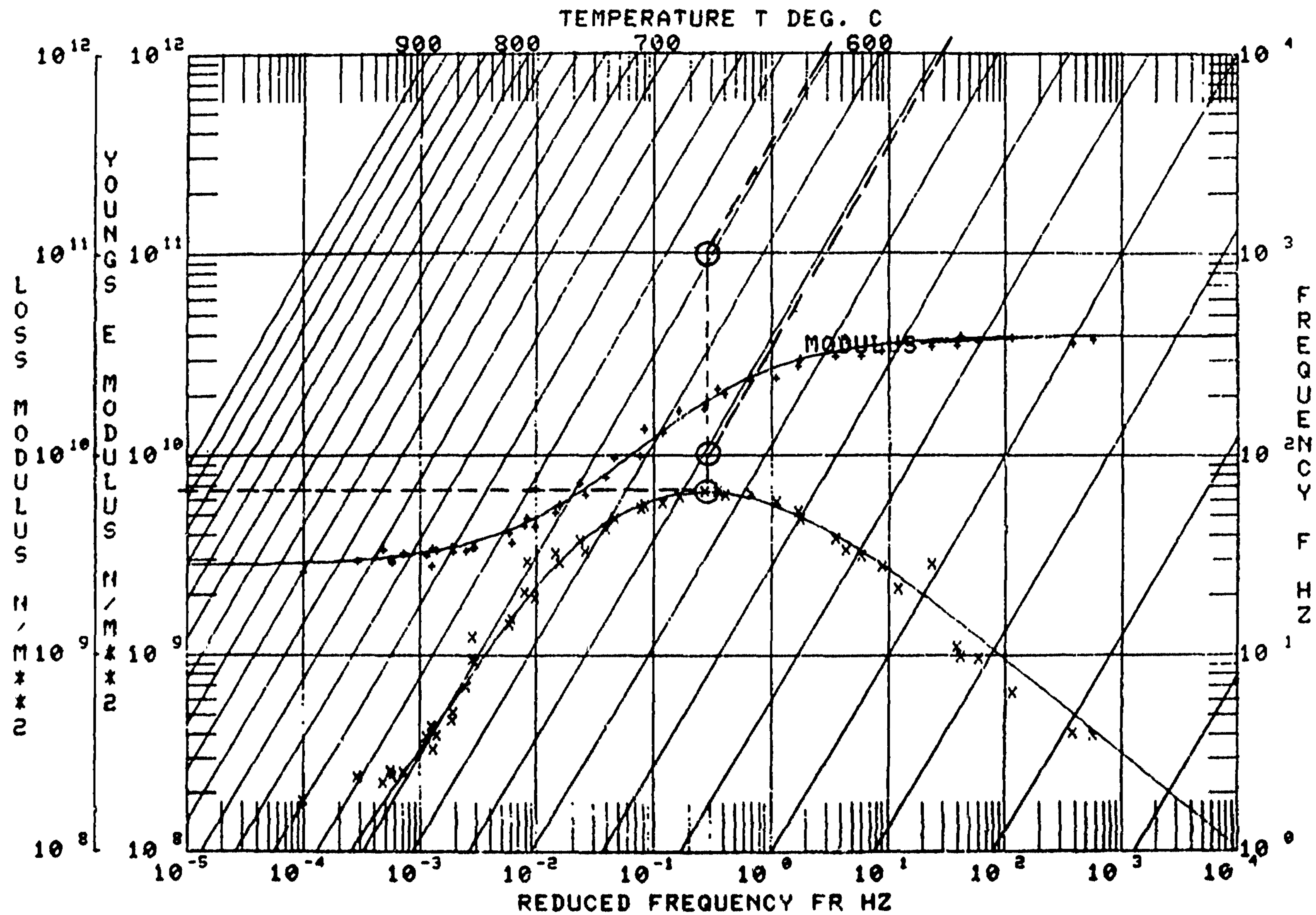


Figure 4-A. Loss Modulus Peak.

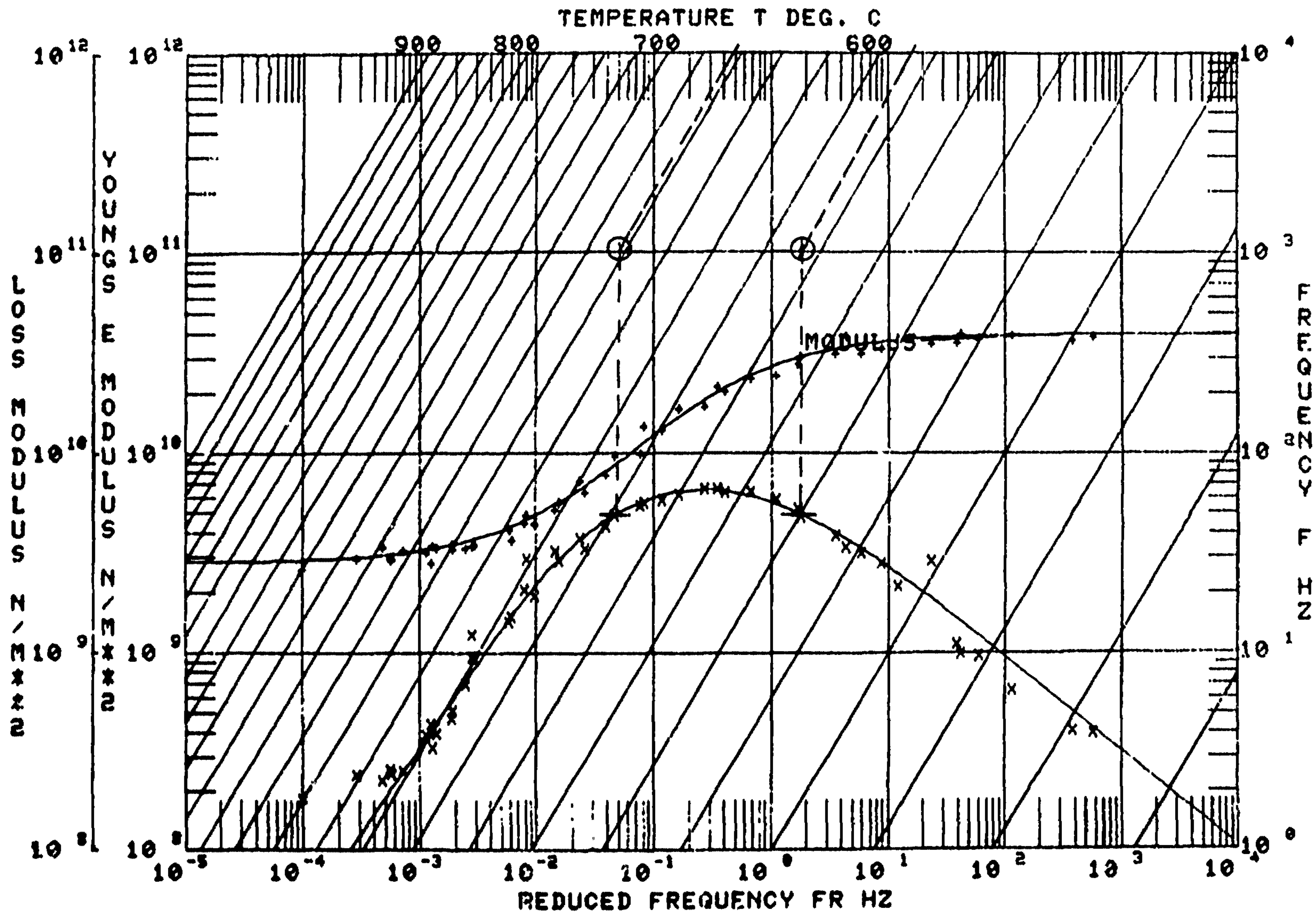


Figure 5-A. Loss Modulus Range.

(p) Curve Fit Equations: equations for computer curve fit of data on reduced temperature nomograph (see Section 3.3 of this report).

(q) Remarks: pertinent remarks made during the material evaluation.

Raw Data Sheet - Figure 6-A is the format for recording the modal half-power bandwidth measurements during coated beam testing as follows.

(a) Beam Number: beam test number.

(b) Temperature: the temperature at which the modal half-power bandwidth measurement was taken.

(c) Mode: the bending mode number for the data point.

(d) f_C: center frequency of the modal resonance peak for the composite beam.

(e) f_n: center frequency of the modal resonance peak for the bare beam from data in Appendix C.

(f) f_L: lower frequency of a 3dB decrease in magnitude of the resonance peak amplitude.

(g) f_R: upper frequency of a 3dB decrease in the magnitude of resonance peak amplitude.

(h) Δf: half-power bandwidth

$$\Delta f = f_R - f_L$$

(i) η_s: composite beam modal damping

$$\eta_s = \frac{f_R - f_L}{f_c} = \frac{\Delta f}{f_c}$$

(j) η_c: corrected modal damping

$$\eta_c = \eta_s - \eta_b$$

η_b is bare beam damping from Appendix C.

(k) 1dB: due to background interference, some modal damping measurements were taken for a 1dB decrease in the magnitudes of the resonance peak. For these cases: $\Delta f = 1.9652\ (f_R - f_L)$.

Beam No. ______ (a)

°F		f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
Temp.	Mode								
(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)

Figure 6-A. Raw Data Sheet.

<u>Reduced Data Sheet</u> - Figure 7-A is a listing of the computer input and output of the data reduction program.

(a) The damping material storage (real) modulus.

(b) The damping material loss factor.

(c) The temperature at which the data point was taken.

(d) Composite beam center frequency (f_c) from raw data sheet.

(e) Mode number of the bending mode for the test specimen.

(f) Bare beam modulus is the storage modulus for the uncoated specimen.

(g) Composite loss factor is η_c from the raw data sheet.

(h) Bare beam frequency, the center frequency of the uncoated beam as read from plots of the data as in Appendix C.

(i) Loss modulus is the damping material imaginary modulus.

<u>Reduced Frequency Nomographs</u> - Reduced frequency nomographs are graphical representations of the dynamic modulus properties of the damping material. Figure 2-A is an example of a nomograph displaying storage modulus and loss factor. Figure 3-A is an example of the nomograph displaying storage and loss modulus of the damping material.

EXPERIMENTAL CODE : 83
MATERIAL :01-51-2 A
DATA SOURCES
MANUFACTURER :O'HOMMEL R-1250/O'HOMMEL 1202
AFML :UDRI BEAM COATED ONE SIDE JUNE 15
OTHER :N

NO.	MODULUS LB/IN**2	LOSS FACTOR	TEMP. DEG. F	FREQ. HZ	MODE NO.	BEAM MOD. LB/IN**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. LB/IN**2
1	1.76867E+06	.5382	1200.0	276.5	3.	2.75127E+07	.0525	279.7	9.51873E+05
2	1.91063E+06	.3972	1200.0	545.6	4.	2.76936E+07	.0412	549.9	7.58844E+05
3	2.68618E+06	.3977	1200.0	922.6	5.	2.78384E+07	.0545	911.4	1.06827E+06
4	9.13861E+05	.4216	1200.0	1314.5	6.	2.80092E+07	.0224	1363.1	3.85317E+05
5	1.15853E+06	.8122	1200.0	97.3	2.	2.76274E+07	.0543	100.1	9.40990E+05
6	2.15276E+06	.4465	1200.0	279.4	3.	2.75127E+07	.0515	279.7	9.61239E+05
7	2.25643E+06	.3890	1200.0	550.7	4.	2.76936E+07	.0464	549.9	8.77827E+05
8	1.07564E+06	.9274	1200.0	883.2	5.	2.78384E+07	.0575	911.4	9.97579E+05
9	7.33606E+05	.9153	1200.0	874.4	5.	2.78384E+07	.0398	911.4	6.71453E+05
10	3.81835E+06	.1825	1150.0	953.4	5.	2.81865E+07	.0325	917.1	6.96849E+05
11	3.46088E+06	.2201	1150.0	570.9	4.	2.80695E+07	.0365	553.6	7.61632E+05
12	3.21479E+06	.2688	1150.0	288.9	3.	2.79036E+07	.0423	281.7	8.64182E+05
13	2.52478E+06	.3659	1150.0	101.5	2.	2.79596E+07	.0475	100.7	9.23812E+05
14	4.55269E+06	.1438	1100.0	974.9	5.	2.85825E+07	.0288	923.5	6.54567E+05
15	5.02039E+06	.1467	1100.0	1472.4	6.	2.87830E+07	.0313	1381.8	7.36736E+05
16	5.88570E+06	.0840	1050.0	1505.7	6.	2.91256E+07	.0197	1390.0	4.94194E+05
17	5.60557E+06	.0977	1050.0	1001.7	5.	2.89364E+07	.0223	929.2	5.47801E+05
18	5.30919E+06	.1172	1050.0	602.0	4.	2.89051E+07	.0259	561.8	6.22175E+05
19	5.12331E+06	.1247	1050.0	305.1	3.	2.86756E+07	.0270	285.5	6.39111E+05
20	4.69091E+06	.1382	1050.0	108.0	2.	2.86862E+07	.0282	102.0	6.48324E+05
21	5.53931E+06	.1061	1000.0	110.5	2.	2.90699E+07	.0240	102.7	5.87908E+05
22	6.19705E+06	.0787	1000.0	312.9	3.	2.89272E+07	.0192	286.8	4.87628E+05
23	6.12632E+06	.0691	1000.0	614.3	4.	2.91836E+07	.0166	564.5	4.23110E+05
24	6.22590E+06	.0585	1000.0	1019.0	5.	2.92994E+07	.0142	935.0	3.64049E+05
25	6.33983E+06	.0537	1000.0	1526.9	6.	2.95125E+07	.0131	1399.2	3.40657E+05
26	6.96872E+06	.0273	950.0	1551.5	6.	2.98424E+07	.0070	1407.0	1.90579E+05
27	6.91625E+06	.0275	950.0	1036.4	5.	2.96004E+07	.0071	939.8	1.90153E+05
28	6.83937E+06	.0321	950.0	625.2	4.	2.94947E+07	.0082	567.5	2.19634E+05
29	6.75301E+06	.0375	950.0	318.2	3.	2.94133E+07	.0095	289.2	2.53477E+05
30	6.57159E+06	.0479	950.0	113.1	2.	2.93196E+07	.0120	103.1	3.15073E+05
31	7.04797E+06	.0259	900.0	114.6	2.	2.96275E+07	.0067	103.7	1.82202E+05
32	7.17344E+06	.0203	900.0	322.2	3.	2.97806E+07	.0053	291.0	1.4544[illegible]E+05
33	7.22285E+06	.0181	900.0	632.0	4.	2.97969E+07	.0048	570.4	1.30512E+05
34	7.27928E+06	.0166	900.0	1047.2	5.	2.98972E+07	.0044	944.5	1.20968E+05
35	7.[illegible]8751E+06	.0127	850.0	1580.4	6.	3.04393E+07	.0034	1421.0	9.62482E+04
36	2.74125E+06	.0142	850.0	637.3	5.	1.10075E+07	.0038	573.1	3.87946E+04
37	3.37552E+06	.0124	850.0	1055.2	6.	1.35791E+07	.0033	949.1	4.20023E+04
38	1.92638E+06	.0116	850.0	325.0	4.	7.85152E+06	.0031	292.8	2.24094E+04
39	7.31308E+06	.0161	850.0	115.6	2.	2.99312E+07	.0042	104.2	1.17402E+05
40	9.64582E+05	.4296	1200.0	1316.5	6.	2.80092E+07	.0240	1363.1	4.14369E+05
41	4.02948E+06	.1743	1100.0	296.3	3.	2.83252E+07	.0322	283.8	7.02458E+05
42	4.33153E+06	.1525	1100.0	585.8	4.	2.84542E+07	.0296	557.4	6.60746E+05
43	3.65983E+06	.2059	1100.0	105.0	2.	2.83609E+07	.0353	101.4	7.53483E+05
44	3.65983E+06	.2059	1100.0	105.0	2.	2.83609E+07	.0353	101.4	7.53483E+05

Figure 7-A. Reduced Data Sheet.

APPENDIX B

MATERIAL DATA EVALUATIONS

Presented here are the results of the vibration damping material evaluations in the format shown in Section V of this report. A step-by-step breakdown of the data presentation format is shown in Appendix A. Each material evaluation is assigned a section in this Appendix in beam number order. Each beam test was assigned a number and includes a two digit beam material code followed by a two digit specimen number and the chronological test run numbers of the specimen. An example of this system follows.

01	01	1
Material code for Haynes 188	Specimen number (first beam made of Haynes 188)	First coated beam test of specimen 01-01

The bare beam tests are indicated using this same method except a test run number of Ø is used.

Table 1-B indexes the materials included here by beam number. Table 2-B indexes the commerically available materials by manufacturers. Table 3-B indexes the materials listed in this Appendix by the peak loss modulus temperature at 100 Hz.

TABLE 1-B

MATERIALS LISTED BY BEAM NUMBER

Beam Number	Material
01-04-1	O. Hommel R-1199
01-04-2	O. Hommel R-1199
01-19-2	Pemco 79 R 1016
01-32-2	Pemco 79 R 835
01-37-1	O. Hommel R-7007
01-37-2	O. Hommel R-7007
01-38-1	NBS - 418
01-39-1	O. Hommel R-7007
01-40-1	Corning 7570
01-41-1	Corning 8463
01-42-1	Corning 7556
01-43-1	UDRI: Borosilicate + 5% Na_2O + 2% Co_2O_3
01-44-1	UDRI: Borosilicate + 5% Na_2O + 2% Co_2O_3
01-44-2	UDRI: 74.5% Si_2O + 12.75% Na_2O + 10.75% CaO + 3% Al_2O_3 + 2% Co_2O_3
01-44-3	UDRI: 74.5% SiO_2 + 12.75% CaO + 10.75% Na_2O 3% Al_2O_3 + 2% Co_2O_3
01-46-1	UDRI: 74.5% Si_2O + 10.75% CaO + 12.75% Na_2O + 2% Co_2O_3
01-46-3	UDRI: 74.5% Si_2O + 10.75% CaO + 12.75% Na_2O + 2% Co_2O_3
01-46-4	Pemco 79 R 465
01-46-5	Pemco 79 R 2633
01-47-1	UDRI: 70% SiO_2 + 30% Na_2O + 2% Co_2O_3

TABLE 1-B (Continued)

MATERIALS LISTED BY BEAM NUMBER

Beam Number	Material
01-47-2	Pemco 79 R 835 + 20% Alumina
01-47-3	Pemco 79 R 2635
01-48-1	Corning 0010 + 7.5% Al_2O_3 + 1% Co_2O_3
01-48-2	Corning 0010 + 7.5% Al_2O_3 + 1% Co_2O_3
01-48-3	Owens Illinois CV-97
01-48-4	Corning 7570 + 2% $KHCO_3$ + 2% Na_2O
01-48-5	Corning 7570 + 2% $KHCO_3$ + 2% Na_2O
01-49-1	Corning 0010 + 7.5% Al_2O_3 + 1% Co_2O_3
01-49-2	Corning 0010 + 7.5% Al_2O_3 + 1% Co_2O_3
01-49-3	Owens Illinois CV-101
01-49-4	Corning 7570 + 6% $KHCO_3$ + 6% Na_2O
01-52-1	Corning 0010 + 10% Al_2O_3 + 1% Co_2O_3
01-53-1	Corning 0010 + 10% Al_2O_3 + 6% Na_2O + 1% Co_2O_3
01-54-1	Corning 0010 + 12.5% Na_2O + 2% Co_2O_3
01-55-2	UDRI: 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 6% Al_2O_3 + 2% Co_2O_3
01-55-3	UDRI: 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 6% Al_2O_3 + 2% Co_2O_3
01-55-4	UDRI: 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 6% Al_2O_3 + 2% Co_2O_3
01-57-1	UDRI: 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
01-57-2	UDRI: 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3

TABLE 1-B (Concluded)

MATERIALS LISTED BY BEAM NUMBER

Beam Number	Material
01-57-3	UDRI: 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
01-59-1	Corning 7556
01-59-2	Pemco 79 R 2634
01-60-1	Owens Illinois SG-67-A
01-62-1	Corning 7570 + 4% $KHCO_3$ + 4% Na_2O

TABLE 2-B

MATERIALS LISTED BY MANUFACTURER

Manufacturer	Material Code	Beam Number	Additions
Corning	0010	01-48-1	7.5% Al_2O_3, 1% Co_2O_3
Corning	0010	01-48-2	7.5% Al_2O_3, 1% Co_2O_3
Corning	0010	01-49-1	7.5% Al_2O_3, 1% Co_2O_3
Corning	0010	01-49-2	7.5% Al_2O_3, 1% Co_2O_3
Corning	0010	01-52-1	10% Al_2O_3, 1% Co_2O_3
Corning	0010	01-53-1	10% Al_2O_3, 6% Na_2O, 1% Co_2O_3
Corning	0010	01-54-1	12.5% Al_2O_3, 2% Co_2O_3
Corning	7556	01-42-1	
Corning	7556	01-59-1	
Corning	7570	01-40-1	
Corning	7570	01-48-1	2% $KHCO_3$, 2% Na_2O
Corning	7570	01-48-5	2% $KHCO_3$, 2% Na_2O
Corning	7570	01-62-1	4% $KHCO_3$, 4% Na_2O
Corning	7570	01-49-4	6% $KHCO_3$, 6% Na_2O
Corning	8463	01-41-1	
National Bureau of Standards	418	01-38-1	
O. Hommel	1199	01-04-1	
O. Hommel	1199	01-04-2	
O. Hommel	7007	01-37-1	
O. Hommel	7007	01-37-2	
O. Hommel	7007	01-39-1	
Owens Illinois	SG-67-A	01-67-1	
Owens Illinois	CV-97	01-48-3	

TABLE 2-B (Concluded)

MATERIALS LISTED BY MANUFACTURER

Material Manufacturer	Code	Beam Number	Additions
Owens Illinois	CV-101	01-49-3	
Pemco	79 R 465	01-46-4	
Pemco	79 R 835	01-32-2	
Pemco	79 R 835	01-47-2	20% Alumina
Pemco	79 R 1016	01-19-2	
Pemco	79 R 2633	01-46-5	
Pemco	79 R 2634	01-59-2	
Pemco	79 R 2635	01-47-3	

TABLE 3-B

MATERIALS LISTED BY TEMPERATURE OF PEAK LOSS MODULUS (E_D'')

Temperature °C	Beam Number	Material	$E_D'' \times 10^9$ Pascals	η_D	Thermal Age Time Hours	Thermal Age Temperature °C
355	01-6-21	Corning 7570 + 4% $KHCO_3$ + 4% Na_2O	6.2	0.24		
370	01-48-5	Corning 7570 + 2% $KHCO_3$ + 2% Na_2O	1.4	0.60	121	480
405	01-48-4	Corning 7570 + 2% $KHCO_3$ + 2% Na_2O	5.0	0.50		
425	01-60-1	Owens Illinois SG-67-A	6.9	0.51		
465	01-40-1	Corning 7570	6.2	0.40		
475	01-04-1	O. Hommel R-1199	7.0	0.42		
490	01-41-1	Corning 8463	7.2	0.32		
490	01-59-1	Corning 7556	5.9	0.20		
495	01-42-1	Corning 7556	6.2	0.40		
495	01-49-3	Owens Illinois CV-101	1.6			
495	01-04-2	O. Hommel R-1199	6.3	0.26		
505	01-37-2	O. Hommel R-7007	12.0	0.40		
520	01-37-1	O. Hommel R-7007	9.7	0.52		
535	01-39-1	O. Hommel R-7007	5.2	0.28		

TABLE 3-B (Continued)

MATERIALS LISTED BY TEMPERATURE OF PEAK LOSS MODULUS (E_D'')

Temperature °C	Beam Number	Material	$E_D'' \times 10^9$ Pascals	η_D	Thermal Age Time Hours	Thermal Age Temperature °C
555	01-47-1	UDRI: 70% SiO_2 + 30% Na_2O + 2% Co_2O_3	12.0	0.84		
565	01-43-1	UDRI: Borosilicate + 5% Na_2O + 2% Co_2O_3	6.6	0.55		
565	01-19-2	Pemco 79 R 1016	6.2	0.80		
570	01-46-5	Pemco 79 R 2633	9.0	0.50		
585	01-32-2	Pemco 79 R 835	8.0	0.85		
590	01-44-1	UDRI: Borosilicate + 5% Na_2O + 2% Co_2O_3	7.6	0.90	120	515
590	01-47-3	Pemco 79 R 2635	8.5	0.82		
595	01-47-2	Pemco 79 R 835 + 20% Alumina	5.9	0.50		
605	01-59-2	Pemco 79 R 2634	0.5	0.15		
630	01-46-3	UDRI: 74.5% SiO_2 + 10.75% CaO + 12.75% Na_2O + 2% Co_2O_3	6.9	0.35	314	760
635	01-46-2	UDRI: 7'.5% SiO_2 + 10.75% CaO + 12.75% Na_2O + 2% Co_2O_3	7.6	0.51	100	760
645	01-46-4	Pemco 79 R 465	10.0	0.09		
650	01-46-1	UDRI: 74.5% SiO_2 + 10.75% CaO + 12.75% Na_2O + 2% Co_2O_3	9.0	0.93		

TABLE 3-B (Continued)

MATERIALS LISTED BY TEMPERATURE OF PEAK LOSS MODULUS (E_D'')

Temperature °C	Beam Number	Material	$E_D'' \times 10^9$ Pascals	η_D	Thermal Age Time Hours	Thermal Age Temperature °C
650	01-44-2	UDRI: 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 3% Al_2O_3 + 2% Co_2O_3	8.3	0.25		
675	01-44-3	UDRI: 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 3% Al_2O_3 + 2% Co_2O_3	8.2	0.22	98	750
680	01-48-2	Corning 0010 + 7.5% Al_2O_3 + 1% Co_2O_3	8.3	0.50	166.5	760
710	01-53-1	Corning 0010 + 10% Al_2O_3 + 6% Na_2O + 1% Co_2O_3	6.3	0.50		
720	01-49-1	Corning 0010 + 7.5% Al_2O_3 1% Co_2O_3	9.0	0.62		
720	01-49-2	Corning 0010 + 7.5% Al_2O_3 1% Co_2O_3	10.0	0.63	100	769
720	01-57-2	UDRI: 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3	6.8	0.20	112	815
720	01-57-3	UDRI: 74.5% SiO_2 + 10.75% CaC + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3			308	815
720	01-55-4	UDRI: 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 6% Al_2O_3 + 2% Co_2O_3	14.0	0.51	300	815

TABLE 3-B (Concluded)

MATERIALS LISTED BY TEMPERATURE OR PEAK LOSS MODULUS (E_D'')

Temperature °C	Beam Number	Material	$E_D \times 10^9$ Pascals	η_D	Thermal Age Time Hours	Thermal Age Temperature °C
730	01-48-1	Corning 0010 + 7.5% Al_2O_3 + 1% Co_2O_3	7.6	0.60		
745	01-55-3	UDRI: 74.5% SiO_2 + 10.75% CaO + 12.75% Na_2O + 6% Al_2O_3 + 2% Co_2O_3	12.0	0.60	100	815
750	01-57-1	UDRI: 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6% Na_2O + 2% Co_2O_3	6.9	0.28		
755	01-55-2	UDRI: 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 6% Al_2O_3 + 2% Co_2O_3	13.0	0.73		
760	01-38-1	NBS-418	7.0	0.40		
765	01-55-4	UDRI: 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 6% Al_2O_3 + 2% Co_2O_3	7.6	0.50		
*	01-48-3	Owens Illinois CV-97				
*	01-49-4	Corning 7570 + 6% $KHCO_3$ + 6% Na_2O				
*	01-54-1	Corning 0010 + 12.5% Na_2O + 2% Co_2O_3				

* Coating deteriorated at temperatures tested.

Beam No. 01-04-1

Date 7/22/77

Damping Material O. Hommel R-1199

Material Thickness 0.0147 cm Material Density 2.89 g/cc

Fixture No. 1 Beam Thickness 0.0960 cm

Beam Density 9.13 g/cc Beam Length 21.745 cm

Temperature Test Range: Between 565 °C and 440 °C

Frequency Test Range: Between 14 Hz and 1,390 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.42		Temperature	485 °C
	1,000 Hz	η_D 0.42		Temperature	525 °C
Range	100 Hz	505 °C	475 °C		
	1,000 Hz	545 °C	520 °C		

Complex Modulus E_D'':

Peak	100 Hz	7×10^9 PAS		Temperature	475 °C
	1,000 Hz	7×10^9 PAS		Temperature	520 °C
Range	100 Hz	495 °C	455 °C		
	1,000 Hz	535 °C	495 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-04-1 O`Hommel R-1199
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM          N          ML
               A1            A2           A3         A4
   425.0  8.0000E-01  1.4000E+10   1.000  5.3000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH        FROL        C
            B1       B2        B3         B4         B5
   425.0    .433     .702     -.799  8.6000E-01     .468
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Beam coated both sides

TABLE 4-B

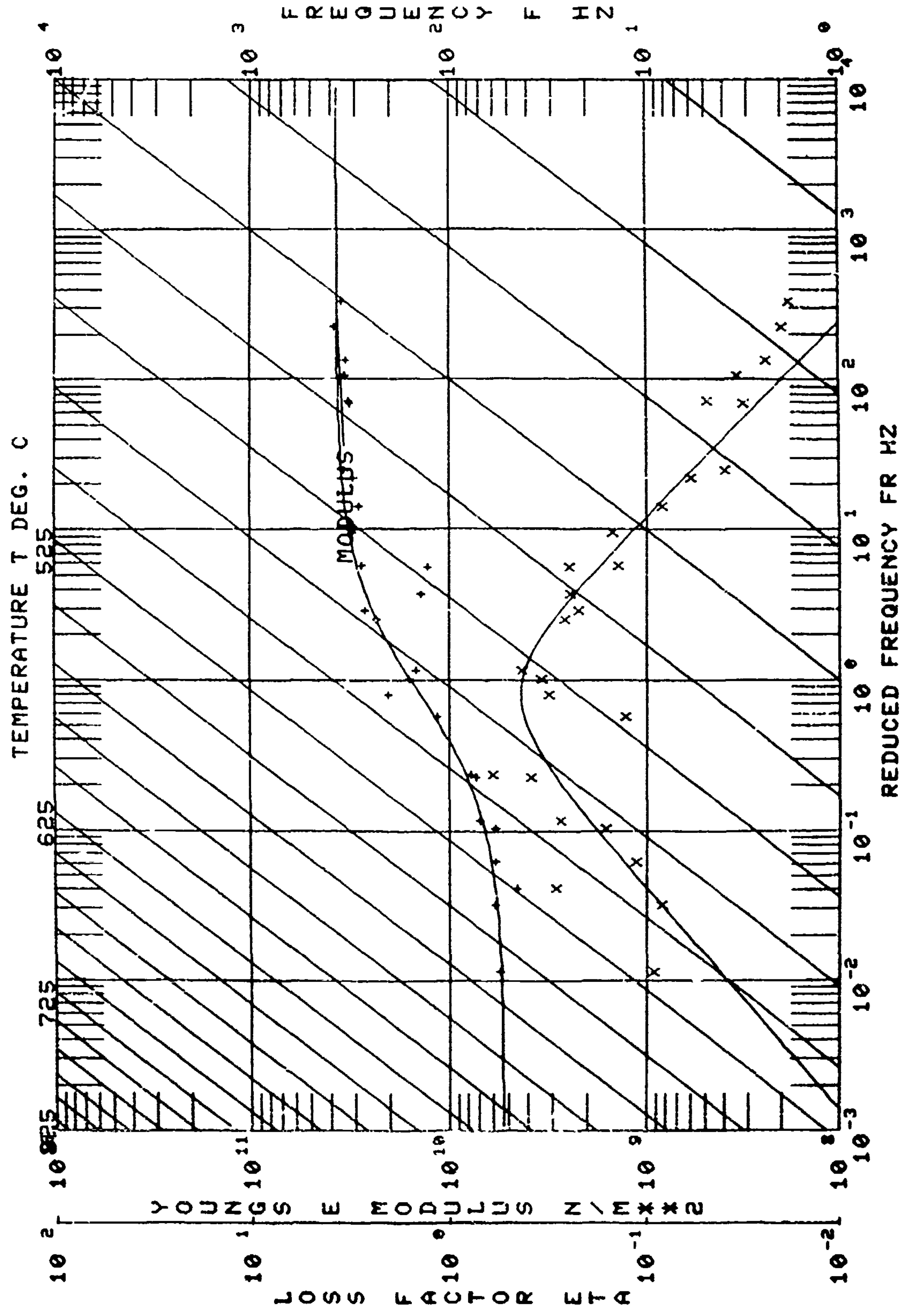
Beam No. 01-04-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1050	1	14.93	15.77	14.90	14.98	0.078	0.00523	0.00043	
1050	2	92.69	95.40	92.52	92.93	0.413	0.00445	0.00325	
1050	3	259.10	266.40	258.69	259.65	0.954	0.00368	0.00312	
1050	4	507.90	522.20	506.79	509.11	2.32	0.00457	0.00421	
1050	5	840.60	864.40	837.52	842.82	5.30	0.00630	0.00600	
1050	6	1263.60	1292.10	1260.90	1266.10	11.01	0.00863	0.00663	X
1000	1	15.06	15.62	15.01	15.11	0.10	0.00662	0.00202	
1000	2	93.41	96.48	93.09	93.96	0.87	0.00932	0.00814	
1000	3	261.50	268.00	260.00	263.26	3.26	0.01250	0.01200	
1000	4	513.10	525.50	508.47	517.47	[illegible].01	0.01750	0.01720	
1000	6	1283.90	1298.40	1282.70	1289.00	12.38	0.00954	0.00894	X
975	1	15.31	15.67	15.24	15.37	0.127	0.00827	0.00377	
975	3	262.80	268.75	258.40	266.09	7.69	0.02930	0.02870	
975	5	883.80	871.50	[illegible]65.13	897.75	32.62	0.03691	0.03660	
975	6	1300.70	1303.45	1281.89	1330.49	48.61	0.03737	0.03680	
950	1	15.21	15.71	15.11	15.34	0.23	0.01493	0.01[illegible]	
950	3	269.10	269.50	267.32	271.62	8.45	0.03115	0.03060	X
950	4	528.90	528.20	519.32	536.28	17.04	0.03200	0.03170	
950	6	1333.90	1305.30	1324.68	1348.25	46.31	0.03447	0.03390	X
925	1	15.48	15.63	15.24	15.71	0.467	0.03017	0.02580	
925	5	872.30	876.56	863.56	881.06	17.50	0.02010	0.01980	
925	6	1297.00	1307.50	1285.35	1309.93	24.58	0.01895	0.01840	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
900	1	15.61	15.55	15.48	16.08	0.594	0.03800	0.03370	
900	3	279.40	270.90	277.09	281.77	9.20	0.03260	0.03210	X
900	4	549.00	531.00	542.80	554.48	11.70	0.02127	0.02100	
900	5	915.70	878.80	902.69	925.24	22.55	0.02460	0.02430	
900	6	1358.00	1311.90	1349.20	1366.87	17.70	0.01304	0.01270	
850	1	16.29	1578.20	16.13	16.46	0.332	0.02040	0.01620	
850	3	283.40	272.30	282.43	285.43	2.85	0.01010	0.00959	
850	5	923.00	883.[illegible]	925.67	929.73	7.98	0.00864	0.00834	X
850	6	1382.70	1318.30	1377.80	1386.77	9.00	0.00650	0.00600	
825	1	16.53	15.90	16.44	16.64	0.203	0.01225	0.00815	
825	2	102.50	97.72	102.23	103.02	0.80	0.00776	0.00690	
825	3	284.90	272.95	284.16	285.80	1.60	0.00576	0.00530	
825	4	560.10	534.80	558.20	561.30	2.48	0.00440	0.00412	
825	5	938.50	885.25	926.53	930.32	3.80	0.00408	0.00380	
825	6	1389.70	1321.40	1386.	1392.18	5.20	0.03750	0.00327	

EXPERIMENTAL CODE :143
MATERIAL :01-04-1 O'Hommel R-1199
DATA SOURCES
MANUFACTURER :None
AFML :UDRI Beam coated both sides 11\29\79
OTHER :Tested: 7\22\77

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	5.68689E+09	.0944	565.6	92.7	2.	1.96585E+11	.0033	95.4	5.37047E+08
2	5.99601E+09	.0857	565.6	259.1	3.	1.95523E+11	.0031	266.4	5.13840E+08
3	6.00601E+09	.1155	565.6	507.9	4.	1.95644E+11	.0042	522.2	6.93811E+08
4	5.97144E+09	.1660	565.6	840.6	5.	1.96173E+11	.0060	864.4	9.91170E+08
5	3.33140E+09	.1039	537.8	15.1	1.	2.06976E+11	.0020	15.6	3.46974E+08
6	4.63101E+09	.2950	537.8	93.4	2.	2.01061E+11	.0081	96.5	1.36698E+09
7	7.14931E+09	.2816	537.8	261.5	3.	1.97879E+11	.0126	268.0	2.01309E+09
8	7.38448E+09	.3918	537.8	513.1	4.	1.98125E+11	.0172	525.5	2.89291E+09
9	1.17505E+10	.1319	537.8	1283.9	6.	1.99088E+11	.0089	1298.4	1.54966E+09
10	7.98946E+09	.0835	523.9	15.3	1.	2.08303E+11	.0038	15.7	6.67512E+08
11	7.92120E+09	.6139	523.9	262.8	3.	1.98988E+11	.0287	268.7	4.86264E+09
12	2.07607E+10	.3219	523.9	883.8	5.	1.99409E+11	.0366	871.5	6.68355E+09
13	1.50572E+10	.4348	523.9	1300.7	6.	2.00640E+11	.0368	1303.4	6.54695E+09
14	1.62457E+10	.3487	510.0	528.9	4.	2.00166E+11	.0317	528.2	5.66512E+09
15	2.37925E+10	.2666	510.0	1333.9	6.	2.01210E+11	.0339	1305.3	6.34284E+09
16	1.28054E+10	.3647	496.1	15.5	1.	2.07241E+11	.0258	15.6	4.67013E+09
17	1.41545E+10	.2488	496.1	872.3	5.	2.01731E+11	.0192	876.6	3.52221E+09
18	1.30329E+10	.2497	496.1	1297.0	6.	2.01888E+11	.0184	1307.5	3.25488E+09
19	1.75759E+10	.3528	482.2	15.6	1.	2.05125E+11	.0337	15.5	6.20301E+09
20	2.74071E+10	.2243	482.2	279.4	3.	2.02185E+11	.0321	270.9	6.14747E+09
21	2.83600E+10	.1426	482.2	549.0	4.	2.02294E+11	.0210	531.6	4.04359E+09
22	3.14581E+10	.1514	482.2	915.7	5.	2.02763E+11	.0243	878.8	4.76355E+09
23	2.86589E+10	.0850	482.2	1358.0	6.	2.03250E+11	.0127	1311.9	2.46287E+09
24	3.12294E+10	.0605	454.4	283.4	3.	2.04280E+11	.0096	272.3	1.88955E+09
25	3.30193E+10	.0503	454.4	923.0	5.	2.04706E+11	.0083	883.0	1.66107E+09
26	3.44640E+10	.0350	454.4	1382.7	6.	2.05237E+11	.0060	1318.3	1.20627E+09
27	3.23326E+10	.0520	440.6	16.5	1.	2.14463E+11	.0082	15.9	1.68217E+09
28	3.46610E+10	.0402	440.6	102.5	2.	2.06263E+11	.0069	97.7	1.39431E+09
29	3.25281E+10	.0324	440.6	284.9	3.	2.05256E+11	.0053	273.0	1.05536E+09
30	3.38665E+10	.0244	440.6	560.1	4.	2.05200E+11	.0041	534.8	8.25717E+08
31	3.89170E+10	.0201	440.6	938.5	5.	2.05750E+11	.0038	885.2	7.82474E+08
32	3.57205E+10	.0186	440.6	1389.7	6.	2.06204E+11	.0033	1321.4	6.64091E+08
33	4.81982E+09	.3807	510.0	15.2	1.	2.09368E+11	.0105	15.7	1.83491E+09
34	2.90002E+10	.1120	454.4	16.3	1.	2.11238E+11	.0162	15.8	3.24731E+09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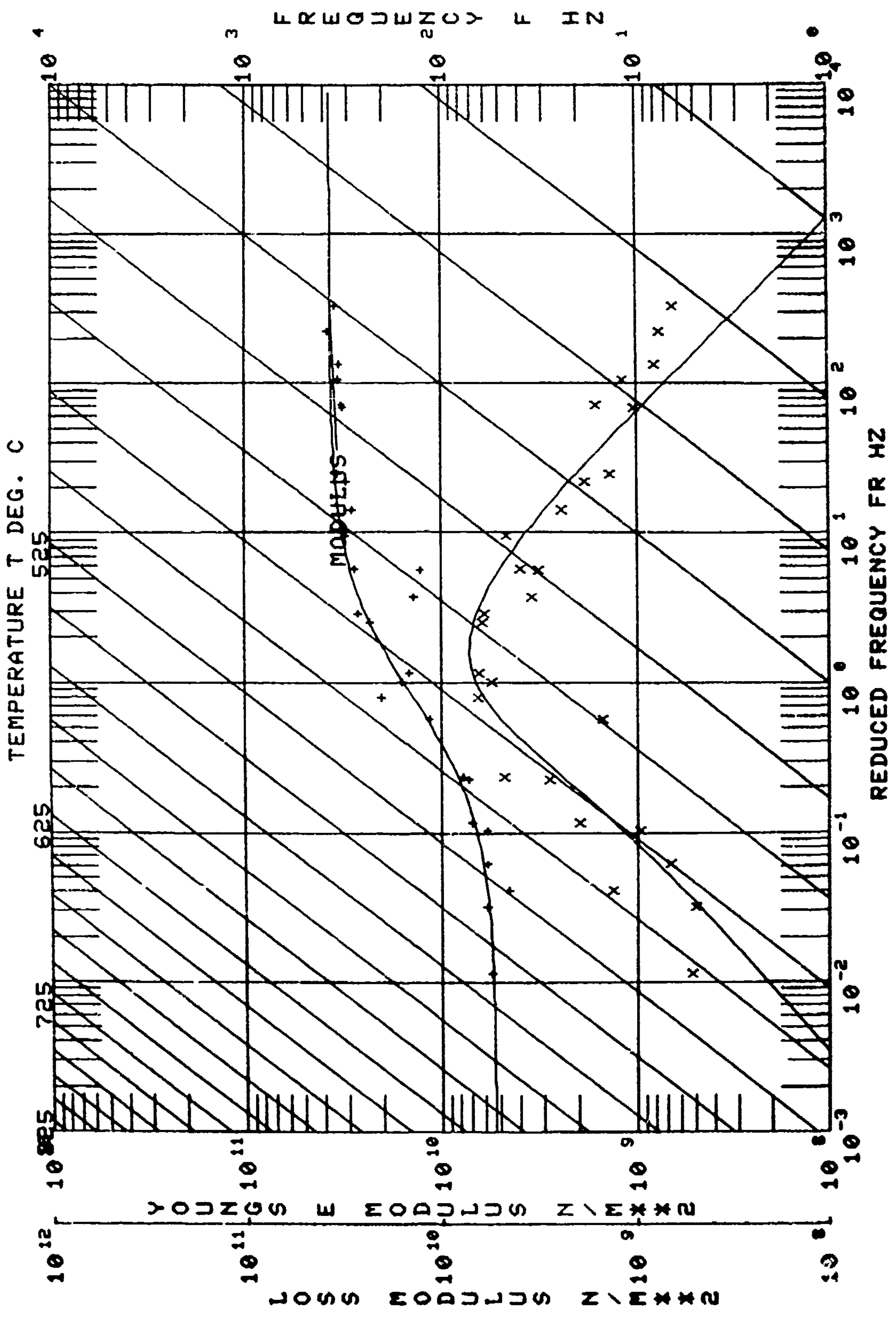
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS



TEMPERATURE T DEG. C
525
625
725
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-04-2

Date 3/6/78

Damping Material O. Hommel R-1199

Material Thickness 0.0191 cm   Material Density 2.89 g/cc

Fixture No. 1   Beam Thickness 0.0960 cm

Beam Density 9.13 g/cc   Beam Length 21.745 cm

Temperature Test Range: Between 565 °C and 495 °C

Frequency Test Range: Between 92.76 Hz and 1,340 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.26		Temperature	500 °C
	1,000 Hz	η_D 0.26		Temperature	540 °C
Range	100 Hz	530 °C	480 °C		
	1,000 Hz	575 °C	515 °C		

Complex Modulus E_D'':

Peak	100 Hz	6.3×10^9 PAS		Temperature	495 °C
	1,000 Hz	6.3×10^9 PAS		Temperature	530 °C
Range	100 Hz	475 °C	515 °C		
	1,000 Hz	505 °C	555 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-04-2 O`Hommel R-1199
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0        FROM        MROM        N        ML
            A1          A2          A3       A4
  450.0  1.8245E+00  1.2277E+10   .700  5.9529E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0    ETAFROL    SL       SH       FROL        C
          B1       B2       B3       B4          B5
  450.0   .270    .401    -.663   2.1254E+00   .500
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Beam coated both sides. At conclusion of test the surface of the beam was very rough with some pulling away at the root.

TABLE 5-B

Beam No. 01-04-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1050	2	92.76	95.40	92.47	93.13	0.65	0.00706	0.00590	
1050	3	259.20	266.40	258.08	260.22	2.14	0.00824	0.00770	
1050	4	508.30	522.20	505.97	511.48	5.51	0.01080	0.01050	
1050	5	845.20	864.40	838.43	850.27	11.83	0.01400	0.01370	
1050	6	1267.70	1292.10	1258.02	1276.81	18.80	0.01482	0.01420	
1000	2	93.80	96.48	93.22	94.36	1.13	0.01210	0.01030	
1000	3	262.30	268.00	259.96	264.12	4.17	0.01590	0.01540	
1000	4	517.40	525.50	512.61	522.88	10.27	0.01980	0.01950	
1000	4	514.90	525.50	510.73	520.29	9.60	0.01860	0.01820	
1000	4	542.80	525.50	538.82	546.93	8.10	0.01490	0.01460	
1000	6	1287.20	1283.90	1270.73	1301.90	31.19	0.02420	0.02360	
950	2	95.61	96.48	94.59	96.91	2.32	0.02430	0.02310	
950	3	264.30	270.00	261.71	267.23	5.52	0.02090	0.02040	
950	4	530.60	528.90	524.63	537.75	13.12	0.02470	0.02440	
950	5	885.30	880.00	879.66	891.98	12.32	0.01390	0.01360	
950	6	1325.00	1305.30	1309.77	1336.36	27.39	0.02060	0.02000	
900	2	98.40	97.00	97.45	99.53	2.09	0.02120	0.02010	
900	2	98.77	97.00	97.90	99.94	2.04	0.02070	0.01960	
900	3	276.20	270.90	274.11	278.78	4.68	0.01693	0.01640	
900	4	543.50	531.00	540.28	547.11	6.83	0.01260	0.01230	
900	4	542.70	531.00	539.20	546.66	7.46	0.01374	0.01340	
900	5	904.20	878.80	894.61	905.22	10.60	0.01173	0.01140	

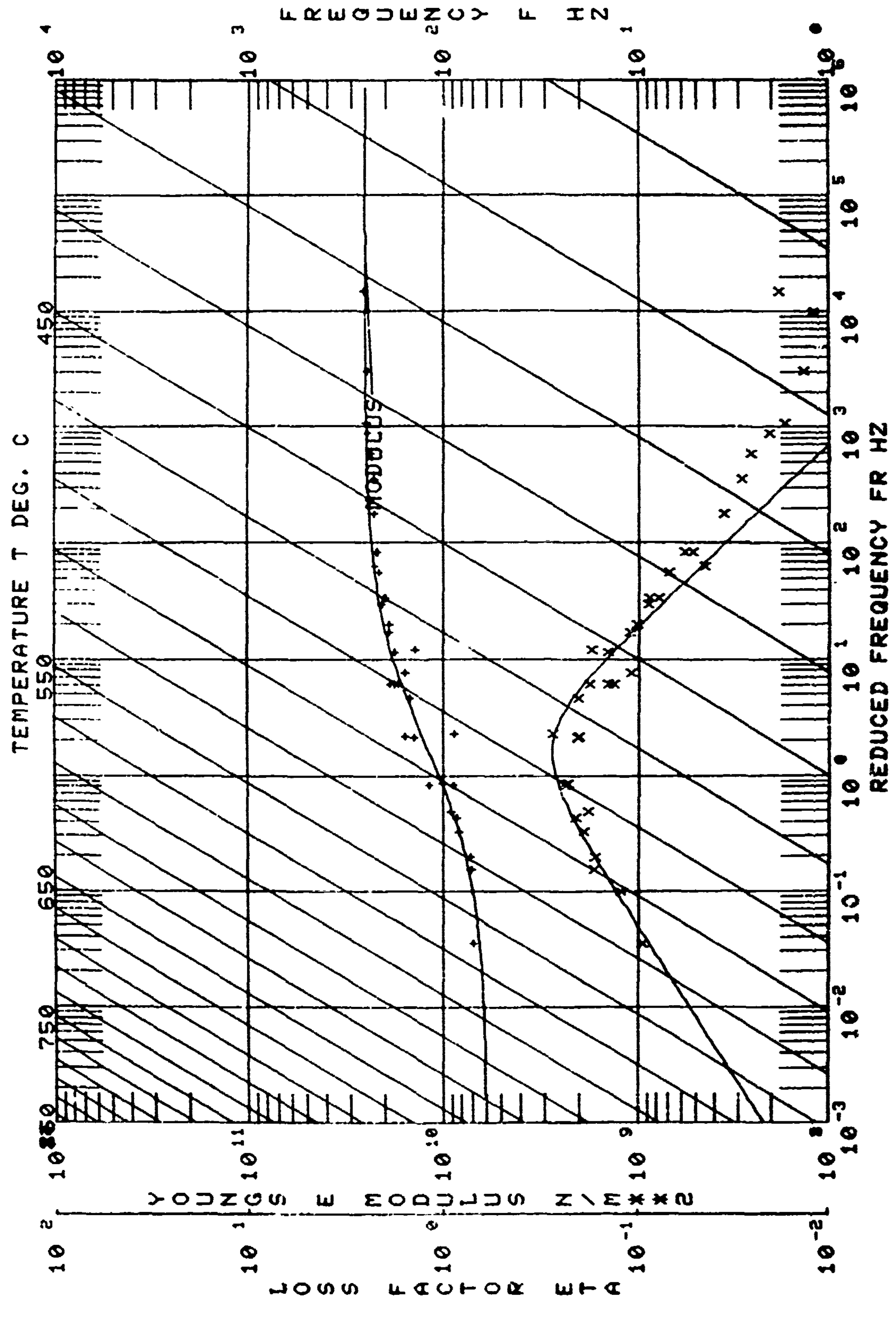
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
900	6	1350.40	1311.90	1343.36	1356.85	13.50	0.00999	0.00947	
900	6	1352.40	1311.90	1346.10	1358.70	12.60	0.00930	0.00880	
850	2	100.59	97.48	100.19	101.05	0.87	0.00861	0.00761	
850	3	281.10	272.30	280.27	282.14	1.87	0.00660	0.00610	
850	4	551.20	533.60	549.81	552.72	2.90	0.00526	0.00497	
850	5	914.50	883.00	912.08	916.51	4.43	0.00484	0.00454	
850	6	1369.90	1318.30	1367.10	1372.90	5.81	0.00425	0.00375	
800	2	101.81	97.95	101.61	102.01	0.40	0.00389	0.00311	
800	3	284.10	273.60	283.74	284.55	0.82	0.00287	0.00242	
800	4	556.60	536.00	555.86	557.48	1.61	0.00289	0.00260	
800	5	923.40	887.50	922.34	924.64	2.30	0.00250	0.00220	
800	6	1381.00	1324.50	1378.70	1384.10	5.34	0.00387	0.00340	
925	2	97.35	96.74	96.26	98.82	2.57	0.02640	0.02530	
925	3	273.40	270.10	271.73	275.18	6.78	0.02460	0.02410	X
925	4	538.10	539.50	533.36	543.69	10.30	0.01920	0.01890	
925	5	893.61	876.30	885.32	899.85	14.03	0.01570	0.01510	
925	6	1340.50	1307.50	1329.46	1349.35	19.38	0.01460	0.01410	

EXPERIMENTAL CODE :144
MATERIAL :01-04-2 O'Hommel R-1199

DATA SOURCES

MANUFACTURER :None
AFML :UDRI Beam coated both sides 11\29\79
OTHER :Tested 3\6\78

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	7.15204E+09	.0979	565.6	92.8	2.	1.92484E+11	.0059	95.4	7.00406E+08
2	7.27032E+09	.1252	565.6	259.2	3.	1.91444E+11	.0077	266.4	9.10359E+08
3	7.37431E+09	.1686	565.6	508.3	4.	1.91563E+11	.0105	522.2	1.24321E+09
4	8.47144E+09	.1937	565.6	845.2	5.	1.92080E+11	.0137	864.4	1.64123E+09
5	9.33509E+09	.1844	565.6	1267.7	6.	1.93048E+11	.0142	1292.1	1.72136E+09
6	7.28877E+09	.1715	537.8	93.8	2.	1.96867E+11	.0103	96.5	1.25031E+09
7	8.77840E+09	.2124	537.8	262.3	3.	1.93751E+11	.0154	268.0	1.86453E+09
8	1.02440E+10	.2335	537.8	517.4	4.	1.93992E+11	.0195	525.5	2.39223E+09
9	9.06135E+09	.2440	537.8	514.9	4.	1.93992E+11	.0182	525.5	2.21123E+09
10	1.45088E+10	.2085	537.8	1287.2	6.	1.90605E+11	.0242	1283.9	3.02453E+09
11	1.20187E+10	.2424	510.0	95.6	2.	1.96867E+11	.0231	96.5	2.91337E+09
12	8.94950E+09	.2802	510.0	264.3	3.	1.96654E+11	.0204	270.0	2.50770E+09
13	1.51238E+10	.2082	510.0	530.6	4.	1.96510E+11	.0244	528.9	3.14804E+09
14	1.60541E+10	.1113	510.0	885.3	5.	1.99076E+11	.0136	880.0	1.[illegible]8752E+09
15	1.82436E+10	.1452	510.0	1325.0	6.	1.97012E+11	.0200	1305.3	2.64857E+09
16	1.82534E+10	.1471	482.2	98.4	2.	1.98995E+11	.0201	97.0	2.63511E+09
17	1.92600E+10	.1370	482.2	98.8	2.	1.98995E+11	.0196	97.0	2.63[illegible]95E+09
18	1.95070E+10	.1129	482.2	276.2	3.	1.97967E+11	.0164	270.9	2.20162E+09
19	2.05673E+10	.0810	482.2	543.5	4.	1.98074E+11	.0123	531.0	1.66502E+09
20	2.01690E+10	.0897	482.2	542.7	4.	1.98074E+11	.0134	531.0	1.80859E+09
21	2.20404E+10	.0709	482.2	904.2	5.	1.98533E+11	.0114	878.6	1.56302E+09
22	2.22118E+10	.0586	482.2	1350.4	6.	1.99010E+11	.0095	1311.9	1.30264E+09
23	2.26196E+10	.0537	482.2	1352.4	6.	1.99010E+11	.0088	1311.9	1.21407E+09
24	2.31216E+10	.0459	454.4	100.6	2.	2.00969E+11	.0076	97.5	1.06236E+09
25	2.3[illegible]35E+10	.0367	454.4	281.1	3.	2.00018E+11	.0061	272.3	8.48210E+08
26	2.33031E+10	.0297	454.4	551.2	4.	2.00018E+11	.0050	533.6	6.91975E+08
27	2.40794E+10	.0264	454.4	914.5	5.	2.00436E+11	.0045	883.0	6.36729E+08
28	2.50850E+10	.0212	454.4	1369.9	6.	2.00956E+11	.0038	1318.3	5.30835E+08
29	2.54026E+10	.0175	426.7	101.8	2.	2.02912E+11	.0031	97.9	4.44752E+08
30	2.49978E+10	.0138	426.7	284.1	3.	2.01933E+11	.0024	273.6	3.43724E+08
31	2.56354E+10	.0123	426.7	923.4	5.	2.02484E+11	.0022	887.5	3.14582E+08
32	2.62902E+10	.0186	426.7	1381.0	6.	2.02851E+11	.0034	1324.5	4.89121E+08
33	1.60351E+10	.2063	496.1	97.4	2.	1.97930E+11	.0253	96.7	3.30803E+09
34	1.74756E+10	.1814	496.1	273.4	3.	1.96799E+11	.0241	270.1	3.17005E+09
35	1.41859E+10	.1768	496.1	538.1	4.	2.04466E+11	.0189	539.5	2.50786E+09
36	1.95014E+10	.1037	496.1	893.6	5.	1.97405E+11	.0151	[illegible]	2.02211E+09
37	2.09748E+10	.0911	496.1	1340.5	6.	1.97677E+11	.0141	1307.5	1.91119E+09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450
550
650
750
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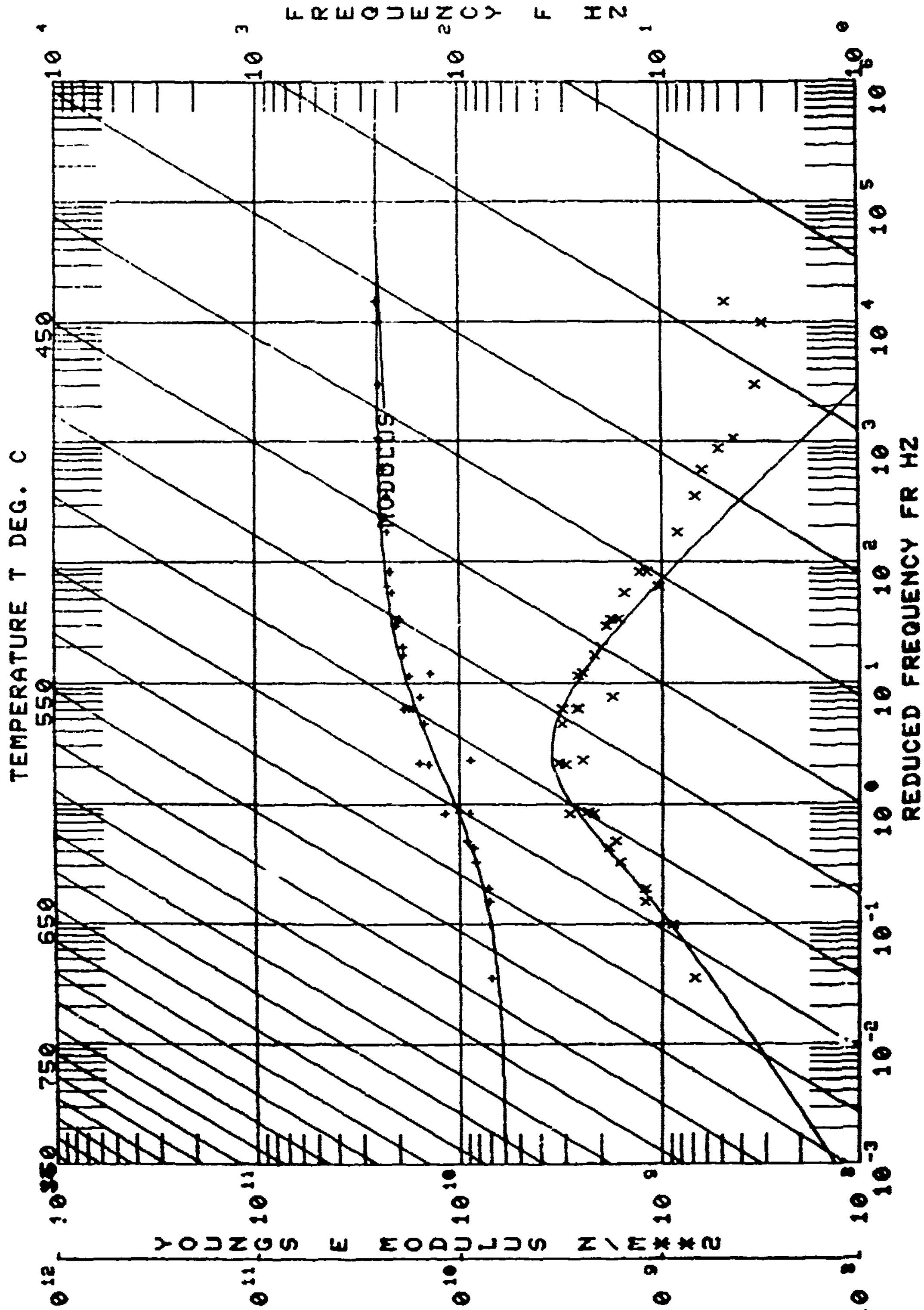
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS


TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-19-2

Date 4/79

Damping Material PEMCL 79 R-1016

Material Thickness 0.01839 cm Material Density 2.50 g/cc

Fixture No. 1 Beam Thickness 0.09652 cm

Beam Density 9.13 g/cc Beam Length 21.775 cm

Temperature Test Range: Between 760 °C and ______ °C

Frequency Test Range: Between 84 Hz and 1,400 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.80		Temperature	635 °C
	1,000 Hz	η_D 0.80		Temperature	650 °C
Range	100 Hz	610 °C	670 °C		
	1,000 Hz	680 °C	720 °C		

Complex Modulus E_D":

Peak	100 Hz	6.2×10^9 PAS		Temperature	565 °C
	1,000 Hz	6.2×10^9 PAS		Temperature	620 °C
Range	100 Hz	540 °C	600 °C		
	1,000 Hz	590 °C	660 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-16  INITIAL TEST
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0         FROM         MROM         N          ML
              A1           A2          A3         A4
   450.0 10.0000E-03  1.1000E+10   1.000  2.0000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0    ETAFROL     SL        SH         FROL        C
          B1        B2        B3          B4         B5
   450.0    .800     .600    -.600  2.2000E-03     .300
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS:

TABLE 6-B

Beam No. 01-19-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1400	2	84.60	88.75	84.20	84.80	0.60	0.00709	0.00489	
1400	3	239.19	248.00	238.64	239.84	1.20	0.00502	0.00392	
1400	4	470.56	487.00	469.34	471.70	2.36	0.00501	0.00421	
1400	5	778.07	808.00	775.96	780.31	4.35	0.00559	0.00439	
1400	6	1164.82	1210.00	1160.67	1169.71	9.04	0.00776	0.00465	
1350	2	85.39	89.50	85.14	85.59	0.45	0.00527	0.00327	
1350	3	241.23	249.80	240.49	241.79	1.30	0.00539	0.00445	
1350	4	473.93	490.50	472.66	475.86	3.20	0.00675	0.00607	
1350	5	784.51	814.00	780.97	787.38	6.41	0.00817	0.00707	
1350	6	1173.80	1218.00	1168.68	1181.16	12.48	0.01063	0.01009	
1300	2	86.14	90.20	85.83	86.43	0.60	0.00696	0.00511	
1300	3	243.49	251.60	241.69	245.08	3.39	0.01392	0.01310	
1300	4	478.60	494.00	475.51	482.41	6.90	0.00871	0.00813	
1300	5	792.16	820.00	784.84	798.21	13.37	0.01688	0.01591	
1300	6	1190.89	1226.00	1176.33	1204.52	28.19	0.02366	0.02319	
1250	2	87.15	90.90	86.69	87.80	1.11	0.01274	0.01114	
1250	3	246.15	253.30	243.73	248.61	4.88	0.01982	0.01908	
1250	4	485.97	497.50	479.50	494.49	14.99	0.03084	0.02993	
1250	5	801.90	826.00	781.50	814.41	32.91	0.04104	0.04014	
1200	2	88.32	91.60	86.96	89.39	2.43	0.02751	0.02591	
1200	3	250.95	255.30	245.58	256.07	0.49	0.01952	0.01273	
1200	4	501.23	501.00	488.46	515.04	26.56	0.05303	0.05253	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1200	5	835.92	831.00	820.29	846.89	26.60	0.03182	0.03099	
1150	2	89.54	92.30	88.15	90.42	2.27	0.02535	0.02385	
1150	3	263.13	257.00	256.05	270.56	14.51	0.05514	0.05452	
1150	4	525.19	503.50	511.34	539.87	25.85	0.05432	0.05383	
1150	5	874.70	837.00	855.58	888.28	32.70	0.03738	0.03660	
1150	6	1314.90	1251.00	1293.12	1349.35	56.23	0.04276	0.04239	
1100	2	96.00	94.20	94.12	97.52	3.40	0.03542	0.03397	
1100	3	277.99	258.80	274.90	279.58	4.68	0.01683	0.01625	
1100	4	539.63	507.50	533.17	547.80	14.63	0.02711	0.02664	
1100	5	896.25	842.00	887.80	905.75	17.95	0.02002	0.01930	
1100	6	1344.77	1258.00	1334.90	1355.60	20.70	0.01539	0.01503	
1050	2	98.79	93.60	97.73	99.64	1.91	0.01933	0.01793	
1050	3	280.23	260.50	277.15	282.26	5.11	0.01823	0.01768	
1050	4	548.74	511.00	545.45	552.30	6.85	0.01248	0.01202	
1050	5	910.56	847.00	906.72	931.90	7.18	0.00788	0.00720	
1050	6	1361.65	1266.00	1356.65	1367.20	19.55	0.01435	0.01401	
1000	4	558.37	514.00	556.82	559.24	2.42	0.00433		
1000	5	923.88	853.00	921.67	925.40	3.73	0.00404		
1000	6	1381.33	1274.00	1377.83	1383.85	6.02	0.00435		
950	2		94.90						
950	3		263.90						
950	4	563.53	517.50	562.37	564.40	2.03	0.00360		

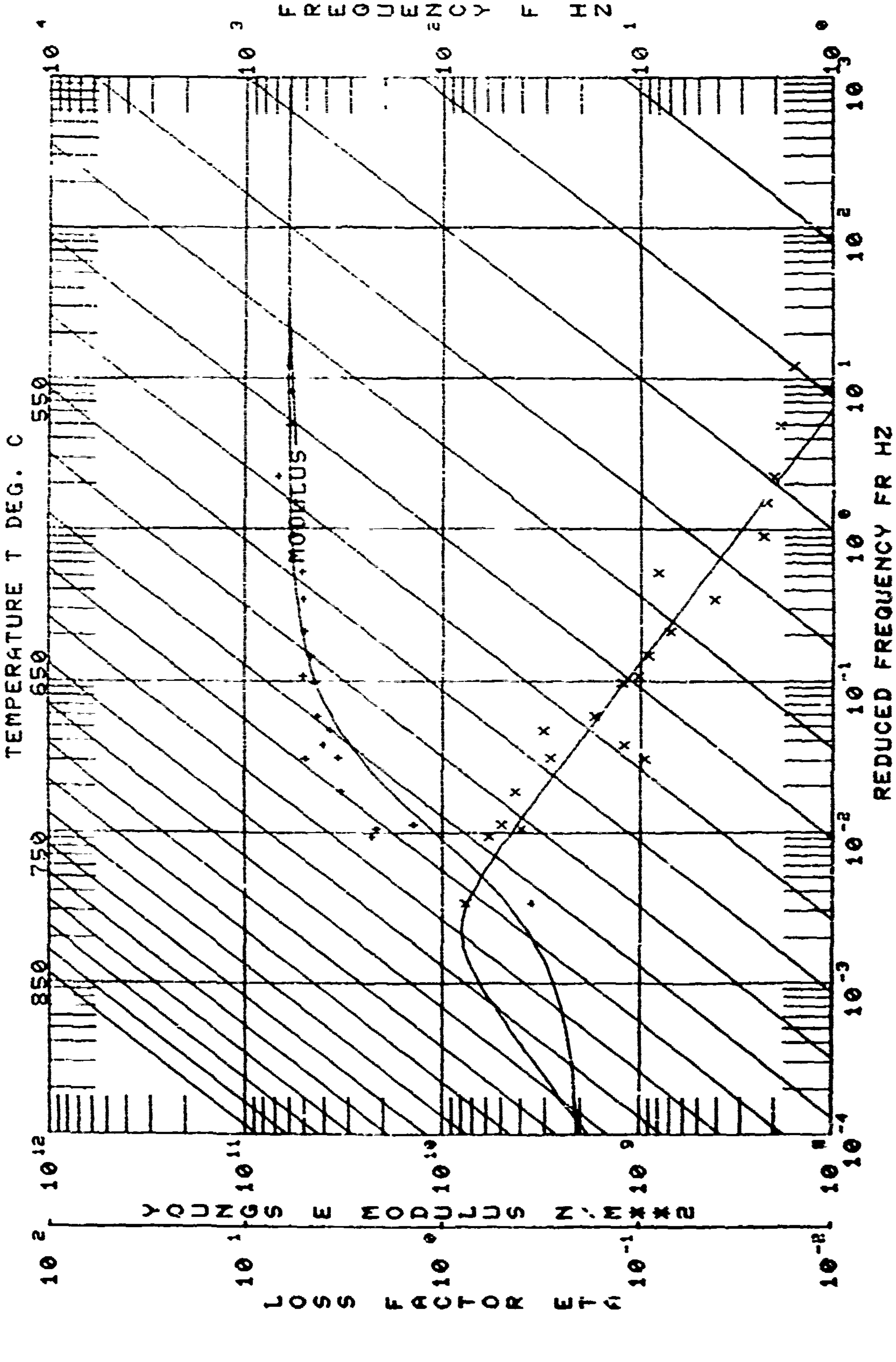
TABLE 6-B (Concluded)

Beam No. 01-19-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
950	5	932.15	859.00	931.00	932.87	1.87	0.00200		
950	6	1393.80	1282.00	1391.98	1396.20	4.22	0.00302		
900	2	95.60							
900	3	265.60							
900	4	520.50							
900	5	864.00							
900	6	1289.00							

EXPERIMENTAL CODE : 62
MATERIAL :J86-16 INITIAL TEST
DATA SOURCES
MANUFACTURER :PEMCO 79 R 1016 01-19-2
AFML :UDRI BEAM COATED ONE SIDE
OTHER :BLUE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	3.63709E+09	.7841	648.9	251.0	3.	1.78682E+11	.0127	255.3	8.85189E+09
2	1.44938E+10	.5180	648.9	835.9	5.	1.80410E+11	.0310	831.0	7.50802E+09
3	3.79746E+10	.3153	621.1	1314.9	6.	1.83904E+11	.0424	1251.0	1.19724E+10
4	3.45807E+10	.2922	621.1	874.7	5.	1.83025E+11	.0366	837.0	1.01049E+10
5	3.31720E+10	.4405	621.1	525.2	4.	1.80985E+11	.0538	503.5	1.46111E+10
6	2.33672E+10	.5984	621.1	263.1	3.	1.81070E+11	.0545	257.0	1.39836E+10
7	2.21286E+10	.4089	593.3	96.0	2.	1.90724E+11	.0340	94.2	9.04916E+09
8	5.05808E+10	.0970	593.3	278.0	3.	1.83615E+11	.0162	258.8	4.90625E+09
9	4.46216E+10	.1748	593.3	539.6	4.	1.83872E+11	.0266	507.5	7.80033E+09
10	4.55682E+10	.1253	593.3	896.2	5.	1.85218E+11	.0193	842.0	5.71135E+09
11	4.83017E+10	.0937	593.3	1344.8	6.	1.85968E+11	.0150	1258.0	4.52628E+09
12	5.26920E+10	.0827	565.6	1361.6	6.	1.88341E+11	.0140	1266.0	4.35686E+09
13	5.21472E+10	.0427	565.6	910.6	5.	1.87424E+11	.0072	847.0	2.22486E+09
14	5.11840E+10	.0719	565.6	548.7	4.	1.86417E+11	.0120	511.0	3.68127E+09
15	5.21563E+10	.1042	565.6	280.2	3.	1.86035E+11	.0177	260.5	5.43392E+09
16	4.12932E+10	.1237	565.6	98.8	2.	1.88302E+11	.0174	93.6	5.10612E+09
17	5.90727E+10	.0236	537.8	558.4	4.	1.88612E+11	.0043	514.0	1.39215E+09
18	6.97776E+10	.0207	537.8	1381.3	6.	1.82730E+11	.0044	1247.0	1.44355E+09
19	5.96781E+10	.0110	510.0	932.2	5.	1.92772E+11	.0020	859.0	6.54970E+08
20	6.14626E+10	.0192	510.0	563.5	4.	1.91189E+11	.0036	517.5	1.18243E+09
21	5.76264E+10	.0225	537.8	923.9	5.	1.90089E+11	.0040	853.0	1.29671E+09
22	6.10299E+10	.0163	510.0	1393.8	6.	1.93132E+11	.0030	1282.0	9.96869E+08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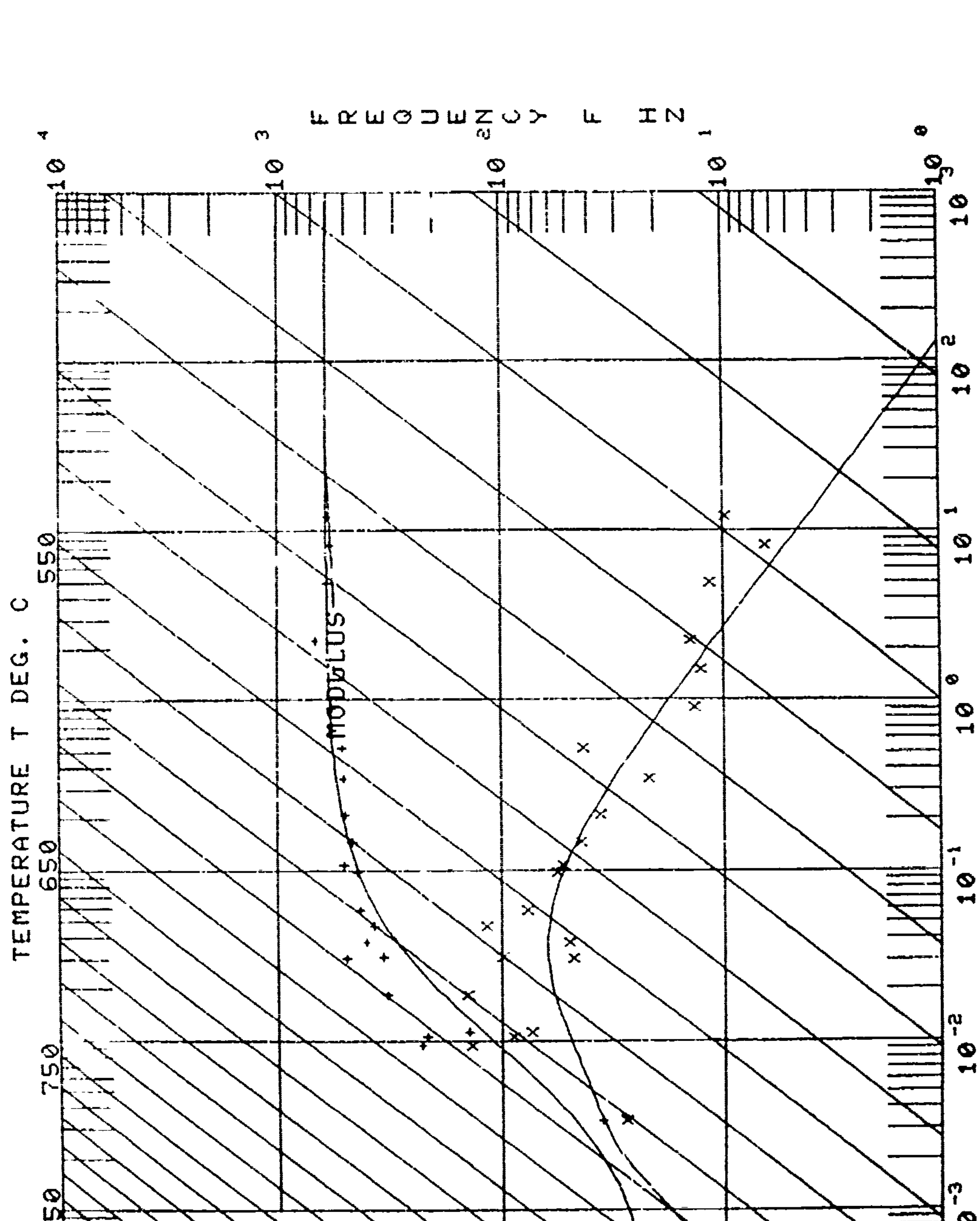
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS


TEMPERATURE T DEG. C
850
750
650
550
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-32-2

Date 4/18/79

Damping Material Pemco 79 R 835

Material Thickness 0.0185 cm Material Density 2.50 g/cc

Fixture No. 1 Beam Thickness 0.0958 cm

Beam Density 9.13 g/cc Beam Length 20.914 cm

Temperature Test Range: Between 480 °C and 760 °C

Frequency Test Range: Between 94 Hz and 1,530 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.85	Temperature 635 °C
	1,000 Hz	η_D 0.85	Temperature 685 °C
Range	100 Hz	600 °C	670 °C
	1,000 Hz	645 °C	735 °C

Complex Modulus E_D'':

Peak	100 Hz	8×10^9 PAS	Temperature 585 °C
	1,000 Hz	8×10^9 PAS	Temperature 620 °C
Range	100 Hz	555 °C	615 °C
	1,000 Hz	590 °C	655 °C

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :BEAM NO. 01-32
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM         MROM         N          ML
               A1           A2          A3          A4
   525.0  1.6741E-01  7.3500E+09      .625  9.5360E+08
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL         SH          FROL        C
            B1       B2         B3           B4         B5
   525.0     .850     .525     -.602  6.9989E-02      .993
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS:

TABLE 7-B

Beam No. 01-32-2

°F		f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
Temp.	Mode								
1400	2	94.46	96.60	94.31	94.65	0.34	0.00360	0.00100	
1400	3	264.32	270.20	263.96	264.75	0.79	0.00299	0.00189	
1400	4	517.75	530.00	517.03	518.55	1.52	0.00293	0.00226	
1400	5	858.87	878.00	857.30	860.60	3.30	0.00384	0.00304	
1400	6	1283.80	1315.00	1281.90	1286.10	4.20	0.00327	0.00282	
1350	2	95.18	97.30	95.02	95.37	0.35	0.00368	0.00188	
1350	3	266.60	272.20	266.10	266.90	0.80	0.00300	0.00209	
1350	4	522.33	534.00	521.41	523.20	1.79	0.00343	0.00287	
1350	5	866.34	885.00	864.31	868.10	3.79	0.00437	0.00362	
1350	6	1295.13	1325.00	1292.00	1297.80	5.80	0.00448	0.00403	
1300	2	95.94	98.10	95.80	96.17	0.37	0.00386	0.00238	
1300	3	268.70	274.40	268.20	269.30	1.10	0.00409	0.00331	
1300	4	526.50	538.00	525.27	528.00	2.73	0.00518	0.00469	
1300	5	873.50	891.00	870.22	875.90	5.68	0.00650	0.00579	
1300	6	1306.50	1334.00	1300.70	1311.10	10.40	0.00796	0.00753	
1250	2	96.72	98.80	96.05	97.62	1.57	0.01623	0.01503	
1250	3	271.20	276.50	270.10	272.30	2.20	0.00811	0.00739	
1250	4	531.86	542.00	528.78	534.90	6.12	0.01151	0.01106	
1250	5	882.10	898.00	873.97	887.47	13.50	0.01530	0.01460	
1250	6	1322.70	1344.00	1307.70	1333.50	25.80	0.01951	0.01909	
1200	2	97.80	99.50	97.12	98.43	1.31	0.01340	0.01240	
1200	3	274.30	278.40	271.60	276.90	5.30	0.01932	0.01866	
1200	4	539.30	546.00	533.40	548.20	14.80	0.02741	0.02695	

°F		f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
Temp.	Mode								
1200	5	872.00	905.00	869.70	875.60	11.60	0.01330	0.01262	X
1200	6	1353.10	1354.00	1341.00	1364.80	46.77	0.03456	0.03414	X
1150	2	99.73	100.20	98.30	101.53	3.23	0.03238	0.03158	
1150	3	282.80	280.40	279.60	286.10	12.77	0.04515	0.04451	X
1150	4	560.50	549.50	548.60	578.50	29.90	0.05334	0.0529	
1150	5	929.40	911.00	920.60	940.50	19.90	0.02141	0.02074	
1150	6	1405.40	1363.00	1391.50	1418.80	53.60	0.03814	0.03769	X
1100	2	103.90	100.90	101.96	106.30	4.34	0.04177	0.04111	
1100	3	293.60	282.20	289.10	297.00	7.90	0.02690	0.02628	
1100	4	583.30	553.00	575.90	592.90	17.00	0.02914	0.02874	
1100	5	960.90	917.00	944.50	971.50	27.00	0.02810	0.02744	
1100	6	1445.70	1372.00	1419.10	1485.90	66.80	0.04620	0.04575	
1100	2	104.24	100.90	102.30	106.56	4.26	0.0408	0.0402	
1100	3	293.90	828.20	288.70	297.60	8.90	0.03028	0.02968	
1100	4	584.90	553.00	579.10	593.90	14.80	0.02530	0.02490	
1100	5	963.90	91700	950.40	973.60	23.20	0.02406	0.02339	
1050	2	107.24	101.50	106.10	109.60	3.50	0.03263	0.03208	
1050	3	298.40	284.00	295.00	302.80	7.80	0.02614	0.02554	
1050	4	594.00	557.00	589.97	597.95	7.98	0.01343	0.01303	
1050	5	981.00	923.00	975.10	986.20	11.10	0.01131	0.01065	
1050	6	1485.80	1381.00	1472.60	1496.80	24.20	0.01628	0.01581	
1050	2	107.72	101.50	106.70	109.10	2.40	0.02228	0.02173	
1050	3	302.50	284.00	300.00	304.80	4.80	0.01587	0.01527	

TABLE 7-B (Concluded)

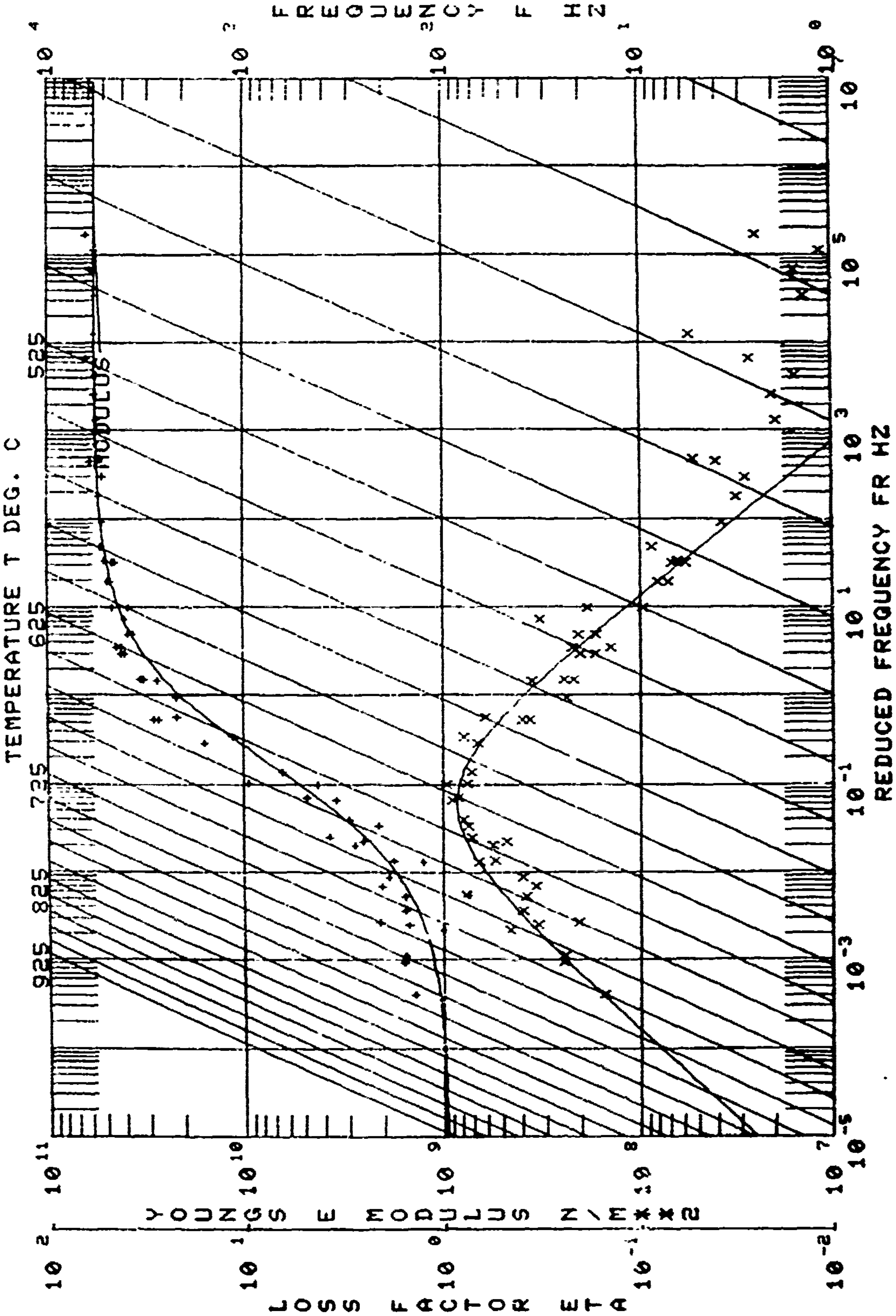
Beam No. 01-32-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1050	4	595.70	557.00	591.70	599.00	7.30	0.01225	0.01185	
1050	5	983.30	923.00	987.60	988.40	9.80	0.00997	0.00931	
1000	2	109.50	102.10	109.00	110.20	1.20	0.00109		
1000	3	306.90	285.60	306.00	308.00	2.00	0.00652		
1000	4	604.00	560.00	602.20	650.60	3.40	0.00563		
1000	5	997.00	928.00	994.40	999.30	4.90	0.00491		
1000	6	1508.70	1389.00	1504.10	1515.70	11.60	0.00768		
950	2	110.50	102.70	110.17	111.20	1.03	0.00932		
950	3	310.40	287.30	309.80	310.90	1.10	0.00354		
950	4	609.80	563.00	608.60	610.90	2.30	0.00377		
950	5	1007.20	933.00	1005.60	1008.40	2.80	0.00278		
950	6	1523.80	1397.00	1520.30	1528.30	8.00	0.00525		
900	2	111.58	103.20	111.15	112.27	1.12	0.01003		
900	3	312.60	288.80	312.30	313.10	0.80	0.00256		
900	4	614.90	566.00	613.90	615.70	1.80	0.00292		
900	5	1014.60	938.00	1013.70	1015.80	2.10	0.00207		
900	6	1530.10	1404.00	1527.20	1534.50	7.30	0.00477		

EXPERIMENTAL CODE : 67
MATERIAL :BEAM NO. 01-32
DATA SOURCES
MANUFACTURER :PEMCO 79 R 835
AFML :UDRI BEAM COATED ONE SIDE
OTHER :18 APRIL 1979

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.42630E+09	.1559	760.0	94.5	2.	1.73402E+11	.0011	96.6	2.22362E+08
2	1.59206E+09	.2488	760.0	264.3	3.	1.73040E+11	.0019	270.2	3.96114E+08
3	1.01444E+09	.4659	760.0	517.7	4.	1.73377E+11	.0023	530.0	4.72662E+08
4	1.58722E+09	.4039	760.0	858.9	5.	1.74118E+11	.0030	878.0	6.41039E+08
5	7.59766E+08	.7851	760.0	1283.8	6.	1.75681E+11	.0028	1315.0	5.96515E+08
6	1.29317E+09	.6716	732.2	1295.1	6.	1.78363E+11	.0040	1325.0	8.68557E+08
7	1.92015E+09	.4048	732.2	866.3	5.	1.76906E+11	.0036	885.0	7.77194E+08
8	1.57456E+09	.3884	732.2	522.3	4.	1.76004E+11	.0029	534.0	6.11621E+08
9	2.12947E+09	.2095	732.2	266.6	3.	1.75611E+11	.0021	272.2	4.46112E+08
10	1.53160E+09	.3363	704.4	95.9	2.	1.78829E+11	.0024	98.1	5.15102E+08
11	2.07324E+09	.3461	704.4	268.7	3.	1.78461E+11	.0033	274.4	7.17549E+08
12	1.81790E+09	.5589	704.4	526.5	4.	1.78651E+11	.0047	538.0	1.01602E+09
13	2.59250E+09	.4881	704.4	873.5	5.	1.79312E+11	.0058	891.0	1.26548E+09
14	2.17700E+09	.7600	704.4	1306.5	6.	1.80795E+11	.0075	1334.0	1.65456E+09
15	4.38840E+09	.9841	676.7	1322.7	6.	1.83516E+11	.0191	1344.0	4.31882E+09
16	3.51377E+09	.9278	676.7	882.1	5.	1.82141E+11	.0146	898.0	3.26022E+09
17	3.04430E+09	.8052	676.7	531.9	4.	1.81317E+11	.0111	542.0	2.45119E+09
18	2.83496E+09	.5766	676.7	271.2	3.	1.81203E+11	.0074	276.5	1.6[illegible]454E+09
19	3.83765E+09	.7301	648.9	97.8	2.	1.83970E+11	.0124	99.5	2.80201E+09
20	4.91471E+09	.8627	648.9	274.3	3.	1.83702E+11	.0187	278.4	4.24016E+09
21	6.56888E+09	.7336	648.9	539.9	4.	1.84003E+11	.0210	546.0	4.81917E+09
22	1.16482E+10	.8073	648.9	1353.1	6.	1.86257E+11	.0391	1354.0	9.40384E+09
23	2.77843E+10	.3630	621.1	1405.4	6.	1.88741E+11	.0377	1363.0	1.00852E+10
24	2.20312E+10	.2422	621.1	929.4	5.	1.87453E+11	.0267	911.0	5.33617E+09
25	2.18091E+10	.6201	621.1	560.5	4.	1.86370E+11	.0529	549.5	1.35243E+10
26	1.61340E+10	.6816	621.1	282.8	3.	1.86351E+11	.0445	280.4	1.09975E+10
27	9.73751E+09	.7712	621.1	99.7	2.	1.86567E+11	.0316	100.2	7.50951E+09
28	2.71356E+10	.4047	593.3	103.9	2.	1.89183E+11	.0411	100.9	1.09812E+10
29	3.26516E+10	.2214	593.3	293.6	3.	1.88751E+11	.0263	282.2	7.22873E+09
30	4.03743E+10	.2043	593.3	583.3	4.	1.88751E+11	.0287	553.0	8.24955E+09
31	3.68658E+10	.2106	593.3	960.9	5.	1.89930E+11	.0274	917.0	7.76506E+09
32	4.03151E+10	.3290	593.3	1445.7	6.	1.91242E+11	.0457	1372.0	1.32631E+10
33	5.34807E+10	.0890	565.6	1485.8	6.	1.93759E+11	.0152	1381.0	4.76057E+09
34	4.56634E+10	.0699	565.6	981.0	5.	1.92424E+11	.0106	923.0	3.19155E+09
35	4.74558E+10	.0828	565.6	594.0	4.	1.91492E+11	.0130	557.0	3.92716E+09
36	3.86459E+10	.1902	565.6	298.4	3.	1.91167E+11	.0256	284.0	7.34989E+09
37	4.10234E+10	.2239	565.6	107.2	2.	1.91440E+11	.0321	101.5	9.38821E+09
38	2.88922E+10	.3745	593.3	104.2	2.	1.89183E+11	.0401	100.9	1.08192E+10
39	3.32118E+10	.2466	593.3	293.9	3.	1.88751E+11	.0297	282.2	8.18959E+09
40	4.19509E+10	.1718	593.3	584.9	4.	1.88751E+11	.0249	553.0	7.20864E+09
41	3.86374E+10	.1730	593.3	963.9	5.	1.89930E+11	.0234	917.0	6.68333E+09
42	4.70666E+10	.0597	565.6	983.3	5.	1.92424E+11	.0093	923.0	2.81053E+09
43	4.91932E+10	.0733	565.6	595.7	4.	1.91492E+11	.0118	557.0	3.60401E+09
44	4.66539E+10	.0981	565.6	302.5	3.	1.91167E+11	.0153	284.0	4.57712E+09
45	4.45533E+10	.1447	565.6	107.7	2.	1.91440E+11	.0217	101.5	6.44876E+09
46	5.14878E+10	.0657	537.8	109.5	2.	1.93710E+11	.0109	102.1	3.38323E+09
47	5.25991E+10	.0386	537.8	306.9	3.	1.93327E+11	.0065	285.6	2.03227E+09
48	5.49933E+10	.0323	537.8	604.0	4.	1.93560E+11	.0056	560.0	1.77784E+09
49	5.27984E+10	.0291	537.8	997.0	5.	1.94514E+11	.0049	928.0	1.53887E+09

50	6.02436E+10	.0417	537.8	1508.7	6.	1.96010E+11	.0077	1389.0	2.51180E+09
51	6.37390E+10	.0276	510.0	1523.8	6.	1.98275E+11	.0053	1397.0	1.76051E+09
52	5.64366E+10	.0158	510.0	1007.2	5.	1.96616E+11	.0028	933.0	8.94277E+08
53	5.82882E+10	.0209	510.0	609.8	4.	1.95640E+11	.0038	563.0	1.21955E+09
54	5.66778E+10	.0200	510.0	310.4	3.	1.95635E+11	.0035	287.3	1.13603E+09
55	5.41389E+10	.0546	510.0	110.5	2.	1.95993E+11	.0093	102.7	2.95715E+09
56	5.78140E+10	.0565	482.2	111.6	2.	1.97906E+11	.0100	103.2	3.26377E+09
57	5.84697E+10	.0143	482.2	312.6	3.	1.97683E+11	.0026	288.8	8.35035E+08
58	6.08980E+10	.0158	482.2	614.9	4.	1.97730E+11	.0029	566.0	9.63976E+08
59	5.83323E+10	.0116	482.2	1014.6	5.	1.98729E+11	.0021	938.0	6.77297E+08
60	6.37934E+10	.0253	482.2	1530.1	6.	2.00267E+11	.0048	1404.0	1.61112E+09
61	1.60368E+09	.2498	732.2	95.2	2.	1.75924E+11	.0019	97.3	4.00545E+08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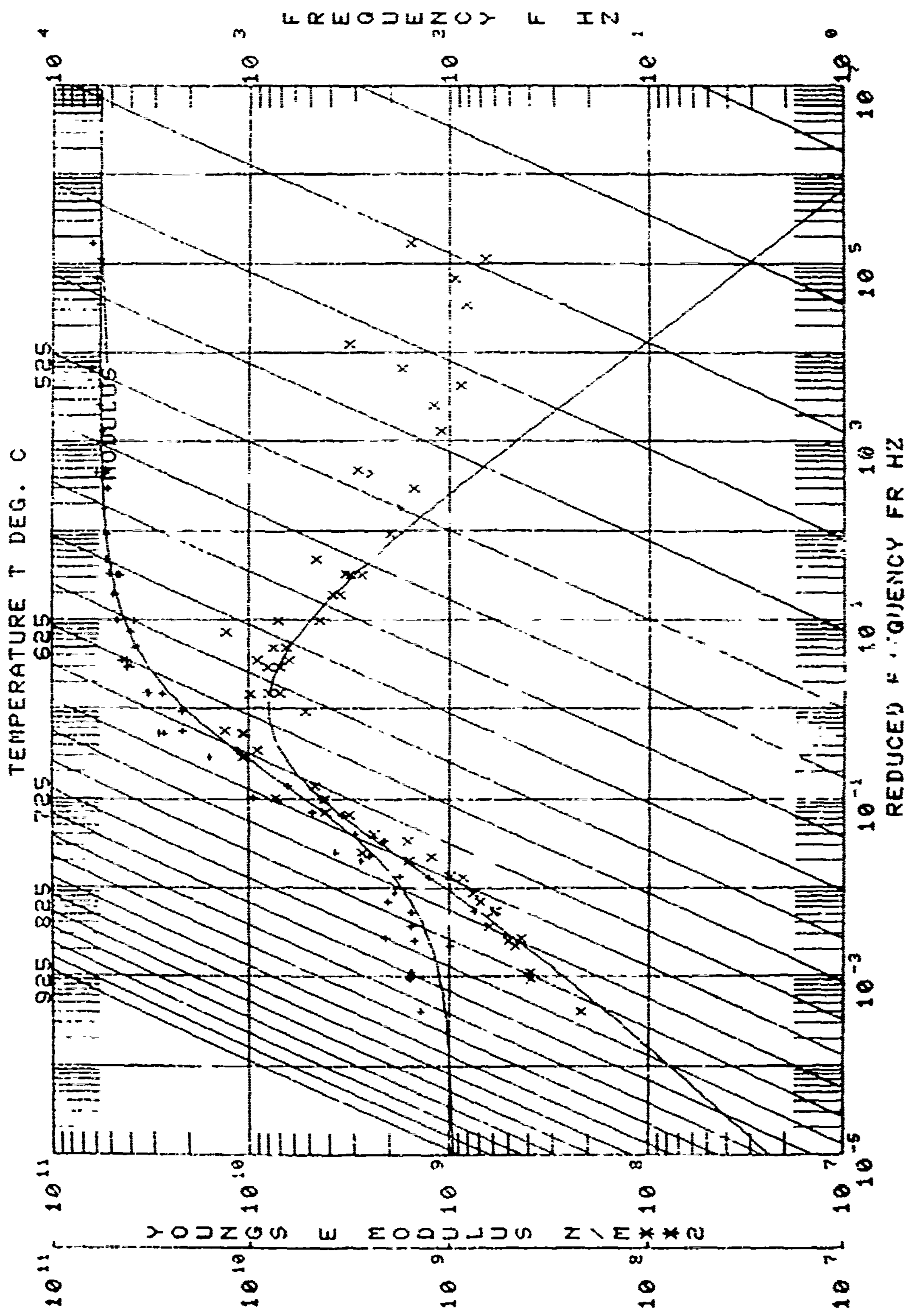
525
625
725
825
925
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
525
625
725
825
925
MODULUS
FREQUENCY F HZ
REDUCED F QUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-37-1

Date 6/5/78

Damping Material O. Hommel 7007

Material Thickness 0.0178 cm Material Density 2.74 g/cc

Fixture No. 1 Beam Thickness 0.0945 cm

Beam Density 9.13 g/cc Beam Length 20.904 cm

Temperature Test Range: Between 675 °C and 425 °C

Frequency Test Range: Between 95 Hz and 1,525 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.52		Temperature	530 °C
	1,000 Hz	η_D 0.52		Temperature	570 °C
Range	100 Hz	510 °C	560 °C		
	1,000 Hz	560 °C	600 °C		

Complex Modulus E_D'':

Peak	100 Hz	9.7×10^9 PAS		Temperature	520 °C
	1,000 Hz	9.7×10^9 PAS		Temperature	550 °C
Range	100 Hz	495 °C	530 °C		
	1,000 Hz	520 °C	565 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-37-4C  (O'HOMMEL 7007)
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM           MROM         N           ML
               A1             A2          A3          A4
   480.0  7.0000E-01  8.5000E+09     .600  1.3000E+09
A=(LOG(FR)-LOG(FRCL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0    ETAFROL     SL        SH          FRCL        C
           B1       B2        B3           B4         B5
   480.0    .520    .400    -.500  2.0000E+08     .550
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS:

TABLE 8-B

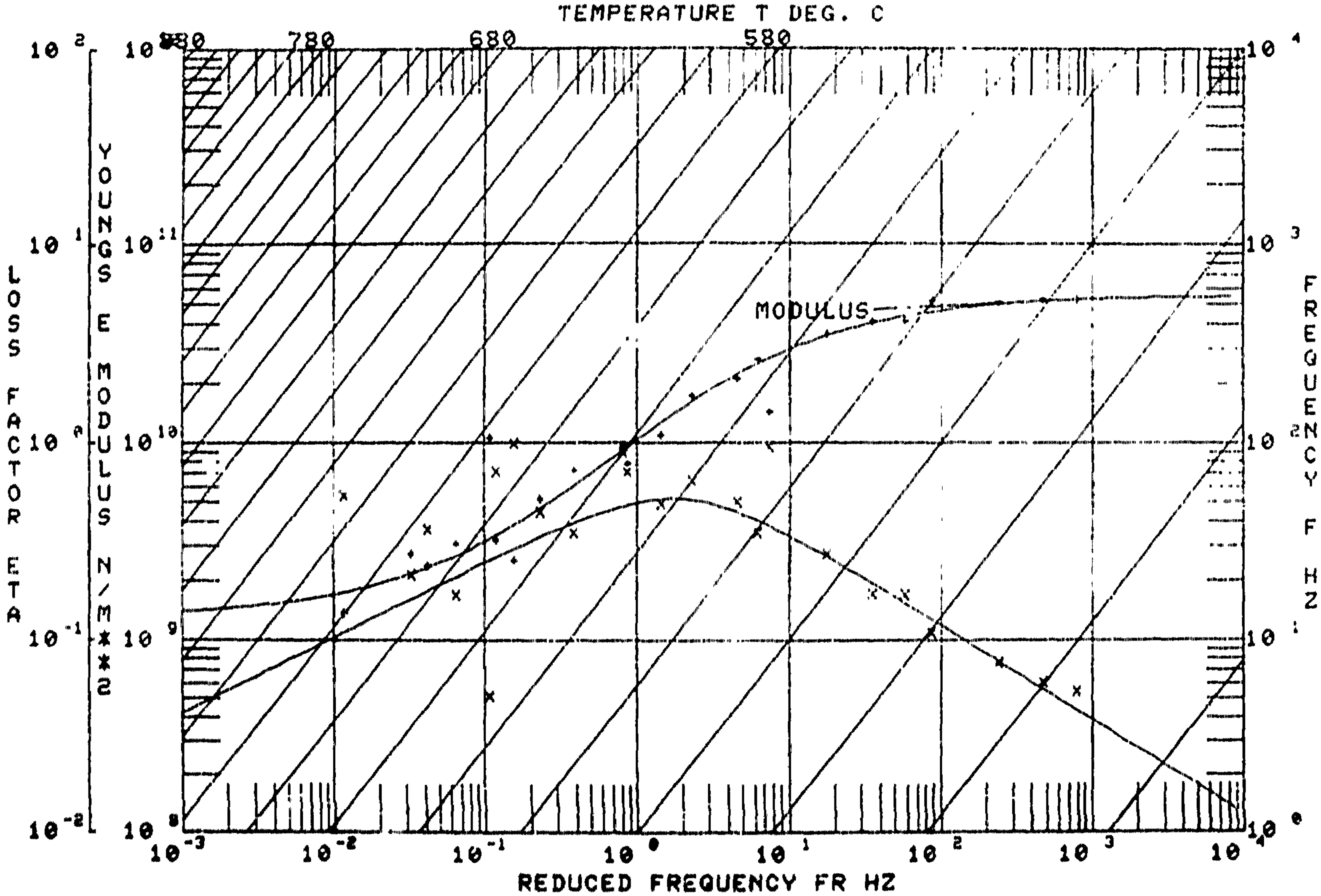
Beam No. 01-37-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1150	2	96.91	99.30	96.86	97.02	0.16	0.00165		
1150	3	271.69	277.60	271.31	272.13	0.82	0.00302		
1150	4	533.97	545.00	532.99	535.29	2.30	0.00431		
1150	5	885.29	903.10	882.20	887.54	5.34	0.00603		
1150	6	1327.10	1350.65	1322.80	1331.50	8.70	0.00634		
1100	2	97.63	99.80	97.41	97.79	.38	0.00389		
1100	3	273.90	279.60	272.98	274.83	1.85	0.00675		
1100	4	538.21	547.80	536.02	541.41	5.39	0.01001		
1100	5	898.59	914.40	893.66	904.20	10.54	0.01173		
1100	6	1340.00	1358.90	1328.00	1351.00	23.00	0.01716		
1055	2	98.55	100.60	97.93	99.15	1.22	0.01238		
1055	3	277.18	281.30	274.52	280.30	5.78	0.02085		
1055	4	546.69	550.80	540.20	554.87	4.67	0.00854		
1055	5	905.14	914.40	896.02	917.76	19.74	0.02181		
1055	6	1368.00	1364.45	1338.00	1389.00	51.00	0.03728		
1000	2	101.01	101.29	99.24	102.98	3.74	0.03703		
1000	3	284.54	283.50	279.04	290.14	11.10	0.03901		
1000	4	566.44	554.40	556.24	577.95	21.71	0.03833		
1000	5	947.30	921.80	941.18	957.47	16.29	0.01720		
1000	6	1417.00	1370.60	1387.00	1438.00	51.00	0.03599		
950	2	105.17	101.86	103.30	107.61	4.31	0.04098		
950	3	296.61	284.80	291.88	300.81	8.93	0.03011		

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
950	4	585.76	563.80	578.73	592.59	13.86	0.02366		
950	5	972.90	926.50	960.29	982.46	22.17	0.02279		
950	6	1459.00	1382.00	1445.00	1470.00	25.00	0.01714		
900	2	108.74	102.50	107.87	109.92	2.05	0.01885		
900	3	304.47	286.40	301.80	306.43	4.61	0.01514		
900	4	598.30	560.70	595.12	601.29	6.17	0.01031		
900	5	992.91	931.90	987.92	997.30	9.38	0.00945		
900	6	1484.00	1394.00	1478.00	1490.00	12.00	0.00809		
800	3	312.92	289.40	312.39	[illegible].54	1.12	0.00358		
800	4	613.53	567.00	612.64	614.66	2.02	0.00329		
800	5	1017.98	944.00	1016.32	1019.70	3.38	0.00332		
800	6	1519.94	1407.00	1517.27	1522.29	5.02	0.00330		

EXPERIMENTAL CODE : 6
MATERIAL :01-37-4C (O'HOMMEL 7007)
DATA SOURCES
MANUFACTURER :NONE
AFML :BEAM COATED ONE SIDE (UDRI)
OTHER :NONE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	5.19440E+10	.0781	482.2	305.2	3.	1.99285E+11	.0124	286.4	4.05640E+09
2	5.38089E+10	.0625	482.2	599.3	4.	1.98909E+11	.0102	560.7	3.36220E+09
3	5.36865E+10	.0557	482.2	995.0	5.	2.01070E+11	.0090	931.9	2.98879E+09
4	3.62561E+10	.2808	512.8	296.0	3.	1.96788E+11	.0340	284.6	1.01803E+10
5	4.18550E+10	.1765	512.8	585.0	4.	1.96433E+11	.0240	557.2	7.38536E+09
6	4.21725E+10	.1747	512.8	972.0	5.	1.98532E+11	.0237	926.0	7.36618E+09
7	9.82973E+09	.9106	541.1	100.4	2.	1.95081E+11	.0348	101.2	8.95080E+09
8	1.77013E+10	.6529	541.1	284.9	3.	1.94444E+11	.0431	282.9	1.15575E+10
9	2.17216E+10	.5159	541.1	562.2	4.	1.94254E+11	.0409	554.1	1.12064E+10
10	2.59214E+09	1.0150	568.3	98.4	2.	1.92774E+11	.0108	100.6	2.63100E+09
11	8.02746E+09	.7312	568.3	544.9	4.	1.92086E+11	.0234	551.0	5.86952E+09
12	1.10799E+10	.5038	568.3	909.6	5.	1.93589E+11	.0217	914.4	5.58216E+09
13	2.45916E+09	.3704	593.3	97.6	2.	1.89721E+11	.0038	99.8	9.10793E+08
14	3.28174E+09	.7349	593.3	273.9	3.	1.89934E+11	.0100	279.6	2.41168E+09
15	5.32608E+09	.4537	593.3	538.9	4.	1.89861E+11	.0099	547.8	2.41645E+09
16	7.46310E+09	.3575	593.3	898.6	5.	1.91562E+11	.0107	909.6	2.66817E+09
17	1.40520E+09	.5537	621.1	96.9	2.	1.87824E+11	.0033	99.3	7.78070E+08
18	2.80917E+09	.2194	621.1	271.7	3.	1.87227E+11	.0026	277.6	6.16462E+08
19	3.16175E+09	.1735	621.1	533.8	4.	1.87926E+11	.0023	545.0	5.48522E+08
20	1.08581E+10	.0532	621.1	898.5	5.	1.88834E+11	.0023	903.1	5.77343E+08
21	5.26097E+10	.1114	482.2	109.3	2.	2.00125E+11	.0178	102.5	5.85981E+09
22	1.45980E+10	.9674	541.1	921.0	5.	1.96052E+11	.0532	920.2	1.41220E+10
23	2.69989E+10	.3569	512.8	104.2	2.	1.97401E+11	.0337	101.8	9.63658E+09
24	2.27616E+14	.0598	242.4	871.3	5.	1.24578E+15	.0268	281.2	1.36194E+13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780
680
580
MODULUS
LOSS FACTOR ETA
YOUNGS E MODULUS N/M**2
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
10^{2}
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{11}
10^{10}
10^{9}
10^{8}
10^{4}
10^{3}
10^{2}
10^{1}
10^{0}
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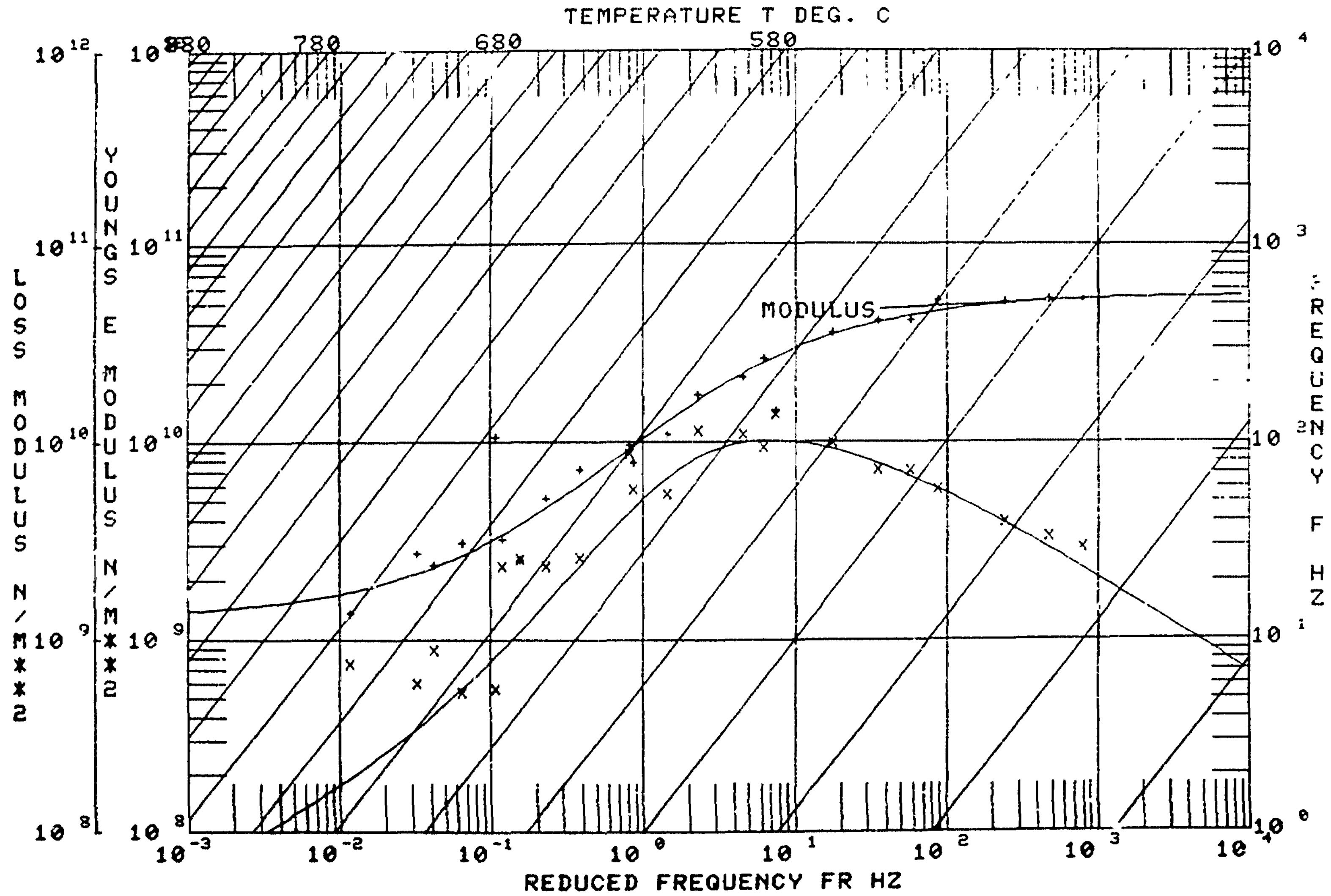
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}


TEMPERATURE T DEG. C
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780
680
580
LOSS MODULUS N/M**2
YOUNGS E MODULUS N/M**2
FREQUENCY F HZ
MODULUS
REDUCED FREQUENCY FR HZ

Beam No. 01-37-2

Date 6/5/78

Dam... .ng Material O. Hommel 7007

Material Thickness	0.0178 cm	Material Density	2.74 g/cc
Fixture No.	1	Beam Thickness	0.0945 cm
Beam Density	9.13 g/cc	Beam Length	20.904 cm

Temperature Test Range: Between 675 °C and 425 °C

Frequency Test Range: Between 95 Hz and 1,525 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.40	Temperature	515 °C
	1,000 Hz	η_D 0.40	Temperature	545 °C
Range	100 Hz	505 °C	530 °C	
	1,000 Hz	530 °C	570 °C	

Complex Modulus E_D'':

Peak	100 Hz	1.2×10^{10} PAS	Temperature	505 °C
	1,000 Hz	1.2×10^{10} PAS	Temperature	535 °C
Range	100 Hz	480 °C	535 °C	
	1,000 Hz	505 °C	590 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-37-4C(0'HOMMEL)
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM          N          ML
               A1            A2           A3         A4
   480.0  6.5000E+00  3.2000E+10     .625  1.3000E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH          FROL          C
            B1       B2        B3           B4           B5
   480.0     .380     .630    -.380  2.5000E+00     .300
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Retest of 01-37-1

TABLE 9-B

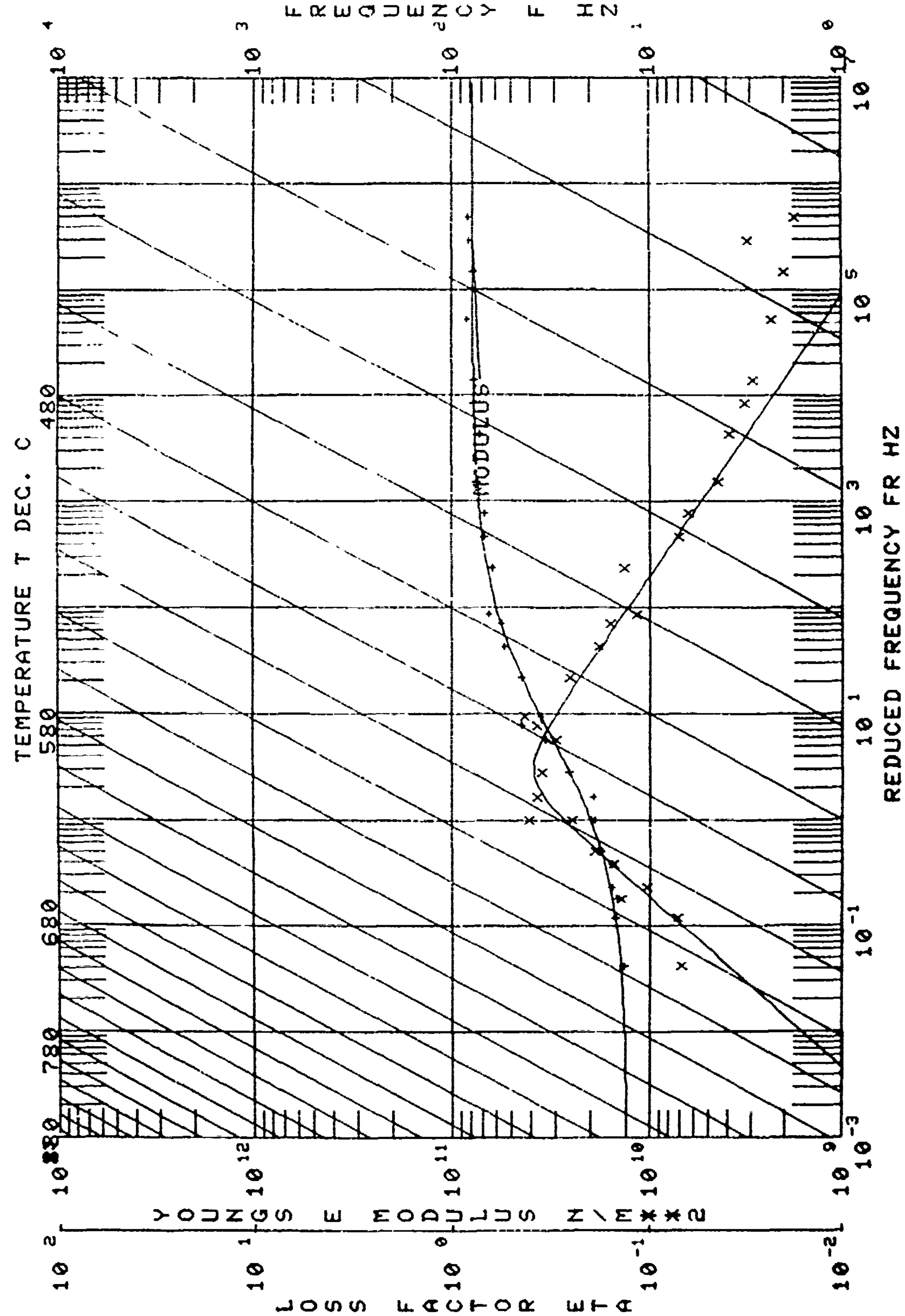
Beam No. 01-37-2

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	2	97.53	99.80	97.37	97.75	0.38	0.00390		
1100	3	273.90	279.60	273.33	274.51	1.18	0.00431		
1100	4	537.46	547.80	535.80	539.34	3.54	0.00659		
1100	5	892.02	914.40	887.91	896.25	8.34	0.00935		
1050	2	98.45	100.60	98.06	98.86	0.80	0.00813		
1050	3	276.86	281.30	274.89	278.56	3.67	0.01326		
1050	4	544.08	550.80	539.84	549.85	10.01	0.01840		
1050	5	902.95	914.40	890.97	916.00	25.03	0.02772		
1000	2	100.27	101.29	98.46	101.54	3.08	0.03072		
1000	3	282.48	283.50	276.91	286.20	9.29	0.03289		
1000	4	561.21	554.40	549.98	569.76	19.78	0.03525		
1000	5	934.69	921.80	901.55	951.52	49.97	0.05346		
950	2	104.94	101.88	102.07	107.81	5.74	0.05470		
950	3	293.41	284.88	288.23	299.21	10.98	0.03742		
950	4	583.82	563.80	575.59	593.61	18.02	0.03087		
950	5	972.16	926.50	956.81	983.87	27.06	0.02783		
900	2	108.88	102.50	107.45	109.89	2.44	0.02241		
900	3	303.48	286.40	298.75	306.42	7.67	0.02527		
900	4	599.87	560.70	595.49	604.12	8.63	0.01439		
900	5	995.56	931.90	989.14	1001.82	12.68	0.01274		
850	2	111.08	103.00	110.53	111.59	1.06	0.00954		
850	3	309.41	287.90	308.15	310.66	2.51	0.00811		
850	4	609.22	563.80	607.51	611.83	4.32	0.00709		
850	5	1011.48	937.00	1008.19	1014.57	6.38	0.00631		
800	2	112.75	103.55	112.49	113.09	0.60	0.00532		
800	3	313.06	289.40	312.43	313.83	1.40	0.00447		
800	4	616.08	567.00	614.20	618.50	4.30	0.00698		
800	5	1022.05	944.00	1020.21	1024.22	4.01	0.00392		
600	2	115.56	105.45	115.43	115.71	0.28	0.00242		
600	3	320.97	294.60	320.61	321.41	0.80	0.00249		
600	4	632.08	579.00	631.05	632.81	1.76	0.00278		
600	5	1047.44	959.00	1046.04	1048.47	2.43	0.00232		

EXPERIMENTAL CODE : 8
MATERIAL :01-37-4C(0'HOMMEL)
DATA SOURCES
MANUFACTURER :NONE
AFML :BEAM COATED ONE SIDE (UDRI)
OTHER :NONE

01-37-2

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	9.48468E+10	.0104	315.6	115.6	2.	2.11449E+11	.0024	105.4	9.88131E+08
2	8.89266E+10	.0113	315.6	321.0	3.	2.11018E+11	.0025	294.7	1.00340E+09
3	9.19703E+10	.0124	315.6	632.1	4.	2.11651E+11	.0028	578.4	1.14008E+09
4	8.60664E+10	.0239	426.7	112.7	2.	2.04128E+11	.0053	103.5	2.05812E+09
5	8.09198E+10	.0206	426.7	313.1	3.	2.03243E+11	.0044	289.2	1.66654E+09
6	8.39207E+10	.0316	426.7	616.1	4.	2.03404E+11	.0069	567.0	2.64891E+09
7	8.45519E+10	.0178	426.7	1022.1	5.	2.04855E+11	.0039	940.6	1.50811E+09
8	7.77323E+10	.0455	454.4	111.1	2.	2.02082E+11	.0095	103.0	3.53506E+09
9	7.46986E+10	.0397	454.4	309.4	3.	2.01518E+11	.0081	288.0	2.96837E+09
10	7.94749E+10	.0329	454.4	609.7	4.	2.01079E+11	.0070	563.7	2.61634E+09
11	7.89093E+10	.0300	454.4	1011.5	5.	2.03276E+11	.0063	937.0	2.36560E+09
12	6.63585E+10	.1185	482.2	108.9	2.	1.99969E+11	.0224	102.5	7.86223E+09
13	6.41618E+10	.1361	482.2	303.5	3.	1.99285E+11	.0252	286.4	8.73443E+09
14	7.07434E+10	.0721	482.2	599.9	4.	1.98909E+11	.0143	560.7	5.10282E+09
15	7.04654E+10	.0647	482.2	995.6	5.	2.01070E+11	.0127	931.9	4.55940E+09
16	4.55462E+10	.3786	510.0	104.9	2.	1.97478E+11	.0548	101.8	1.72425E+10
17	4.54343E+10	.2582	510.0	293.4	3.	1.96788E+11	.0374	284.6	1.17327E+10
18	5.76161E+10	.1617	510.0	972.2	5.	1.98532E+11	.0278	926.0	9.31788E+09
19	2.02845E+10	.4146	537.8	100.0	2.	1.95196E+11	.0308	101.2	8.40931E+09
20	2.59882E+10	.3554	537.8	282.5	3.	1.94444E+11	.0329	282.9	9.23658E+09
21	3.41422E+10	.3021	537.8	561.2	4.	1.94254E+11	.0352	554.1	1.03141E+10
22	3.62989E+10	.4391	537.8	934.7	5.	1.96052E+11	.0534	920.2	1.59392E+10
23	1.48294E+10	.1430	565.6	98.4	2.	1.92774E+11	.0081	100.6	2.12101E+09
24	1.79720E+10	.1952	565.6	276.9	3.	1.92114E+11	.0132	281.2	3.50791E+09
25	1.95369E+10	.2525	565.6	544.1	4.	1.92086E+11	.0184	551.0	4.93247E+09
26	1.97392E+10	.3792	565.6	902.9	5.	1.93589E+11	.0277	914.4	7.48507E+09
27	1.38687E+10	.0703	593.3	97.5	2.	1.89721E+11	.0038	99.8	9.75154E+08
28	1.51281E+10	.0736	593.3	273.9	3.	1.89934E+11	.0043	279.6	1.11272E+09
29	1.59228E+10	.1061	593.3	537.5	4.	1.89861E+11	.0065	547.8	1.68919E+09
30	1.58272E+10	.1555	593.3	892.0	5.	1.91562E+11	.0094	909.6	2.46131E+09
31	9.24912E+10	.0102	315.6	1047.4	5.	2.12623E+11	.0023	958.3	9.41175E+08
32	5.57164E+10	.1828	510.0	583.8	4.	1.96433E+11	.0309	557.2	1.01834E+10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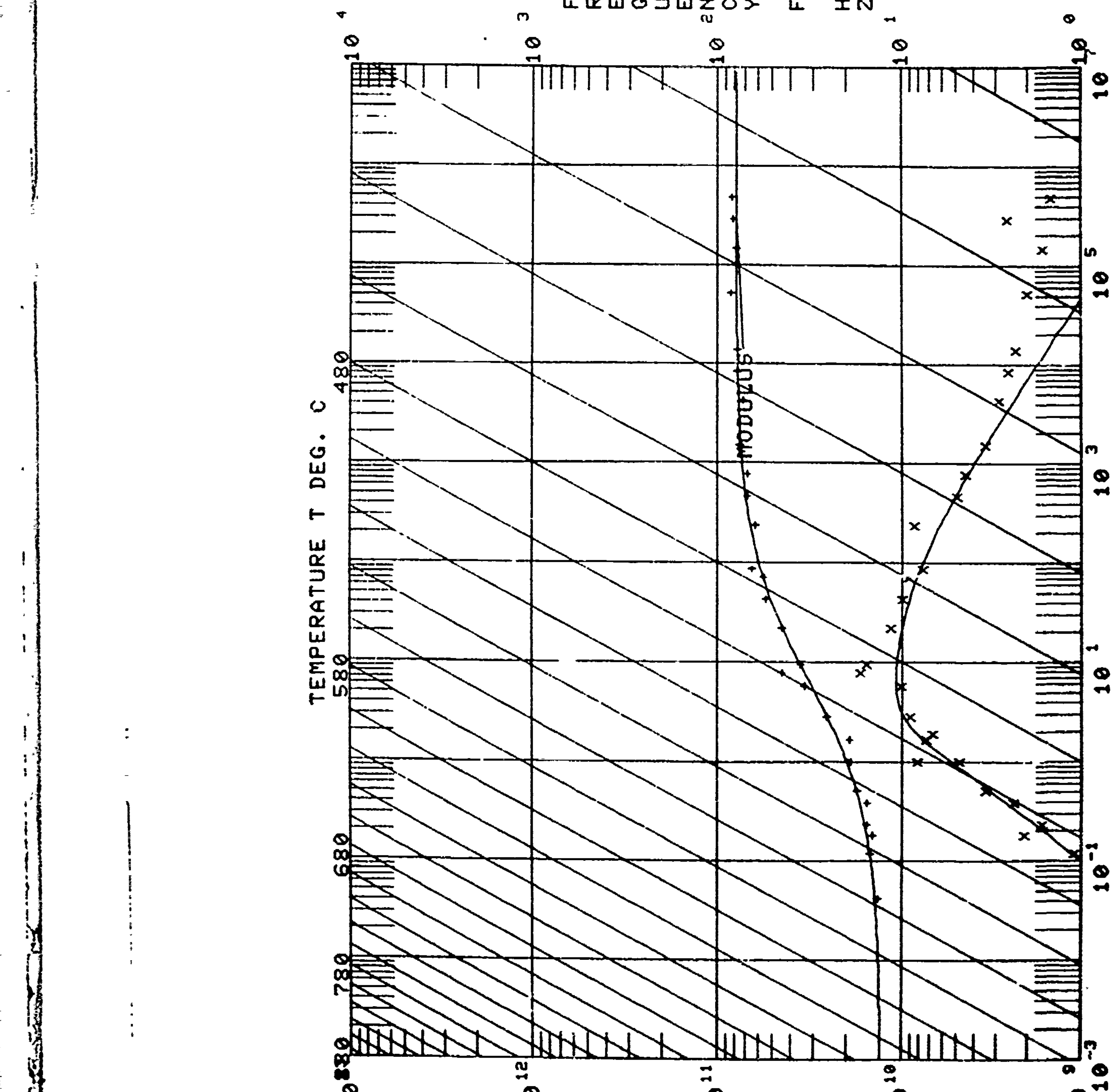
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS


TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-38-1

Date 10/12/78

Damping Material National Bureau of Standards 418

Material Thickness 0.0259 cm Material Density 2.4 g/cc

Fixture No. 1 Beam Thickness 0.0945 cm

Beam Density 9.13 g/cc Beam Length 20.867 cm

Temperature Test Range: Between 870 °C and 650 °C

Frequency Test Range: Between 90 Hz and 1,455 Hz

Loss Factor η_D:

Peak 100 Hz	η_D 0.40	Temperature 795 °C	
1,000 Hz	η_D 0.40	Temperature 860 °C	
Range 100 Hz	750 °C	840 °C	
1,000 Hz	810 °C	°C	

Complex Modulus E_D'':

Peak 100 Hz	7×10^9 PAS	Temperature 760 °C
1,000 Hz	7×10^9 PAS	Temperature 810 °C
Range 100 Hz	730 °C	790 °C
1,000 Hz	780 °C	850 °C

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-38-418  NBS 418 GLASS
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM         MROM        N          ML
               A1           A2         A3         A4
   650.0  1.4901E-02  1.3752E+10   1.089  5.0008E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL       SH        FROL        C
            B1       B2       B3         B4         B5
   650.0    .400     .500    -.600  1.3000E-02    .800
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS:

TABLE 10-B

Beam No. 01-38-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1600	2	91.77		91.08	92.33	1.25	0.0136		
1600	4	506.00		510.47	502.08	8.39	0.0166		
1600	5	839.00		834.93	844.24	9.31	0.0216		X
1600	6	1257.30		1266.64	1247.90	18.71	0.0290		X
1550	2	92.80		93.64	91.90	1.74	0.0188		
1550	3	274.50		280.94	265.82	15.12	0.0551		
1550	4	514.70		507.32	524.33	17.00	0.0330		
1550	5	856.40		867.45	847.71	19.74	0.0450		X
1550	6	1288.00		1266.83	1301.23	34.40	0.0521		X
1500	4	531.26	525.50	546.56	520.28	26.30	0.0495		
1500	5	919.70	872.00	917.86	921.16	3.30	0.0036		
1500	6	1403.50	1297.60	1398.10	1409.36	11.26	0.0080		
1500	4	533.40	525.50	540.00	526.84	13.20	0.0480		X
1500	4	532.40	525.50	529.86	526.90	12.96	0.0475		X
1500	5	888.70	872.00	909.98	876.01	33.98	0.0302		
1500	6	1344.00	1297.60						
1450	3	279.86	270.40	277.21	282.48	5.27	0.0367		X
1450	4	551.90	529.50	564.12	542.04	22.10	0.0400		
1450	5	917.70	879.00	902.09		31.22	0.0340		
1450	6	1386.90	1307.50	1392.55	1379.21	13.34	0.00962		
1400	2	104.71	97.00	105.43	103.97	1.46	0.0272		X
1400	4	562.50	534.00	568.28	557.88	10.40	0.0185		
1400	5	943.90	886.00	944.75	942.40	2.35	0.0025		

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1400	6	1395.10	1318.60	1390.21	1399.04	8.83	0.00633		
1350	2	103.40	99.00	102.80	104.38	1.58	0.0153		
1350	4	568.60	537.60	566.22	571.50	5.28	0.00929		
1350	5	944.40	893.00	941.54	947.18	5.64	0.0060		
1350	2	104.17	99.00	105.25	103.40	1.85	0.01776		
1350	3	290.80	274.90	292.38	239.32	3.06	0.0105		
1350	4	570.40	537.60	572.98	567.95	5.03	0.0088		
1350	5	947.20	893.00	947.44	945.16	2.28	0.00241		
1350	6	1415.90	1327.50	1419.32	1412.44	6.83	0.00486		
1300	2	105.10	100.00	105.46	104.75	0.71	0.00676		
1300	3	294.13	276.00	294.77	293.41	1.36	0.00462		
1300	4	576.30	542.00	577.83	574.74	3.09	0.00536		
1300	5	956.43	899.00	957.76	955.12	2.64	0.000276		
1300	6	1428.80	1338.40	1430.60	1427.30	3.30	0.00231		
1250	2	106.77	100.50	106.35	106.00	0.35	0.0033		
1250	3	296.94	278.80	297.29	296.63	0.66	0.00222		
1250	4	581.65	545.70	582.94	580.44	2.50	0.00430		
1250	5	965.30	906.00	966.06	964.50	1.56	0.00162		
1250	6	1442.00	1347.50	1442.80	1449.10	6.30	0.00436		
1200	2	107.06	101.00	107.16	106.94	0.22	0.00205		
1200	3	299.38	281 00	299.61	299.17	0.44	0.00147		
1200	4	586.26	550.00	587.48	585.05	2.43	0.00414		
1200	5	972.77	912.00	973.24	972.23	1.01	0.00104		

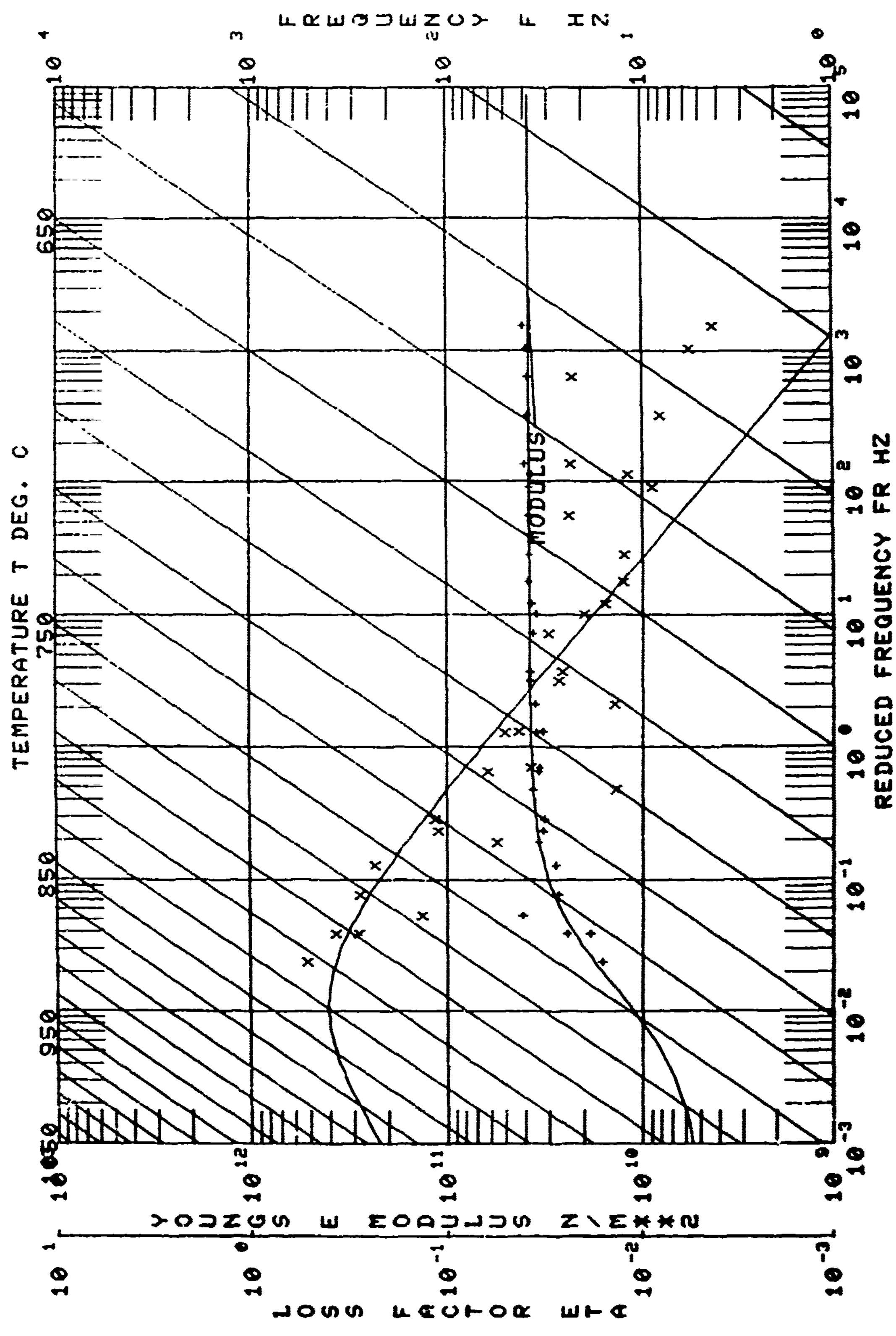
TABLE 10-B (Concluded)

Beam No. 01-38-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1200	6	1453.00	1358.10	1453.60	1452.44	1.16	0.0008		

EXPERIMENTAL CODE : 29
MATERIAL :01-38-418 NBS 418 GLASS
DATA SOURCES
MANUFACTURER :NONE
AFML :BEAM COATED BOTH SIDES (UDRI)
OTHER :NONE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.64643E+10	.5277	815.6	532.4	4.	1.73532E+11	.0475	525.5	8.68755E+09
2	1.87869E+10	.3792	815.6	888.7	5.	1.74857E+11	.0382	872.0	7.12388E+09
3	3.46994E+10	.0566	787.8	1386.9	6.	1.76829E+11	.0096	1307.5	1.96529E+09
4	2.84533E+10	.2376	787.8	917.7	5.	1.77676E+11	.0340	879.0	6.76119E+09
5	2.75640E+10	.2852	787.8	551.9	4.	1.76184E+11	.0400	529.5	7.86156E+09
6	4.22281E+10	.1372	760.0	104.7	2.	1.78008E+11	.0272	97.0	5.79229E+09
7	3.23018E+10	.1169	760.0	562.5	4.	1.79192E+11	.0185	534.0	3.77698E+09
8	3.72452E+10	.0141	760.0	943.9	5.	1.80517E+11	.0025	886.0	5.25938E+08
9	3.42306E+10	.0382	760.0	1395.1	6.	1.79844E+11	.0063	1318.6	1.30851E+09
10	3.81043E+10	.0272	732.2	1415.9	6.	1.82280E+11	.0049	1327.5	1.03482E+09
11	3.59723E+10	.0142	732.2	947.2	5.	1.83381E+11	.0024	893.0	5.10556E+08
12	3.57518E+10	.0517	732.2	570.4	4.	1.81616E+11	.0088	537.6	1.84744E+09
13	3.46387E+10	.0635	732.2	290.8	3.	1.82356E+11	.0105	274.9	2.20010E+09
14	3.29649E+10	.1136	732.2	104.2	2.	1.85424E+11	.0178	99.0	3.74383E+09
15	3.31349E+10	.0438	704.4	105.1	2.	1.89189E+11	.0068	100.0	1.45058E+09
16	3.80626E+10	.0260	704.4	294.1	3.	1.83819E+11	.0046	276.0	9.90340E+08
17	3.72543E+10	.0308	704.4	576.3	4.	1.84601E+11	.0054	542.0	1.14866E+09
18	3.77498E+10	.0158	704.4	956.4	5.	1.85853E+11	.0028	899.0	5.96154E+08
19	3.91193E+10	.0128	704.4	1428.8	6.	1.85285E+11	.0023	1338.4	5.00861E+08
20	4.07192E+10	.0236	676.7	1442.0	6.	1.87814E+11	.0044	1347.5	9.62895E+08
21	3.89881E+10	.0091	676.7	965.3	5.	1.88759E+11	.0016	906.0	3.56437E+08
22	3.89578E+10	.0241	676.7	581.7	4.	1.86993E+11	.0043	545.5	9.38685E+08
23	3.85828E+10	.0126	676.7	296.9	3.	1.87567E+11	.0022	278.8	4.85014E+08
24	3.57073E+10	.0202	676.7	106.2	2.	1.91086E+11	.0033	100.5	7.22613E+08
25	3.94607E+10	.0233	648.9	586.3	4.	1.90091E+11	.0041	550.0	9.18139E+08
26	4.00007E+10	.0058	648.9	972.8	5.	1.91267E+11	.0010	912.0	2.32379E+08
27	4.12563E+10	.0043	648.9	1453.0	6.	1.90780E+11	.0008	1358.1	1.79384E+08
28	3.93377E+10	.0083	648.9	299.4	3.	1.90539E+11	.0015	281.0	3.26458E+08
29	3.75658E+10	.0122	648.9	107.1	2.	1.92992E+11	.0020	101.0	4.56453E+08
30	2.48489E+10	.2866	787.8	279.9	3.	1.76435E+11	.0367	270.4	7.12216E+09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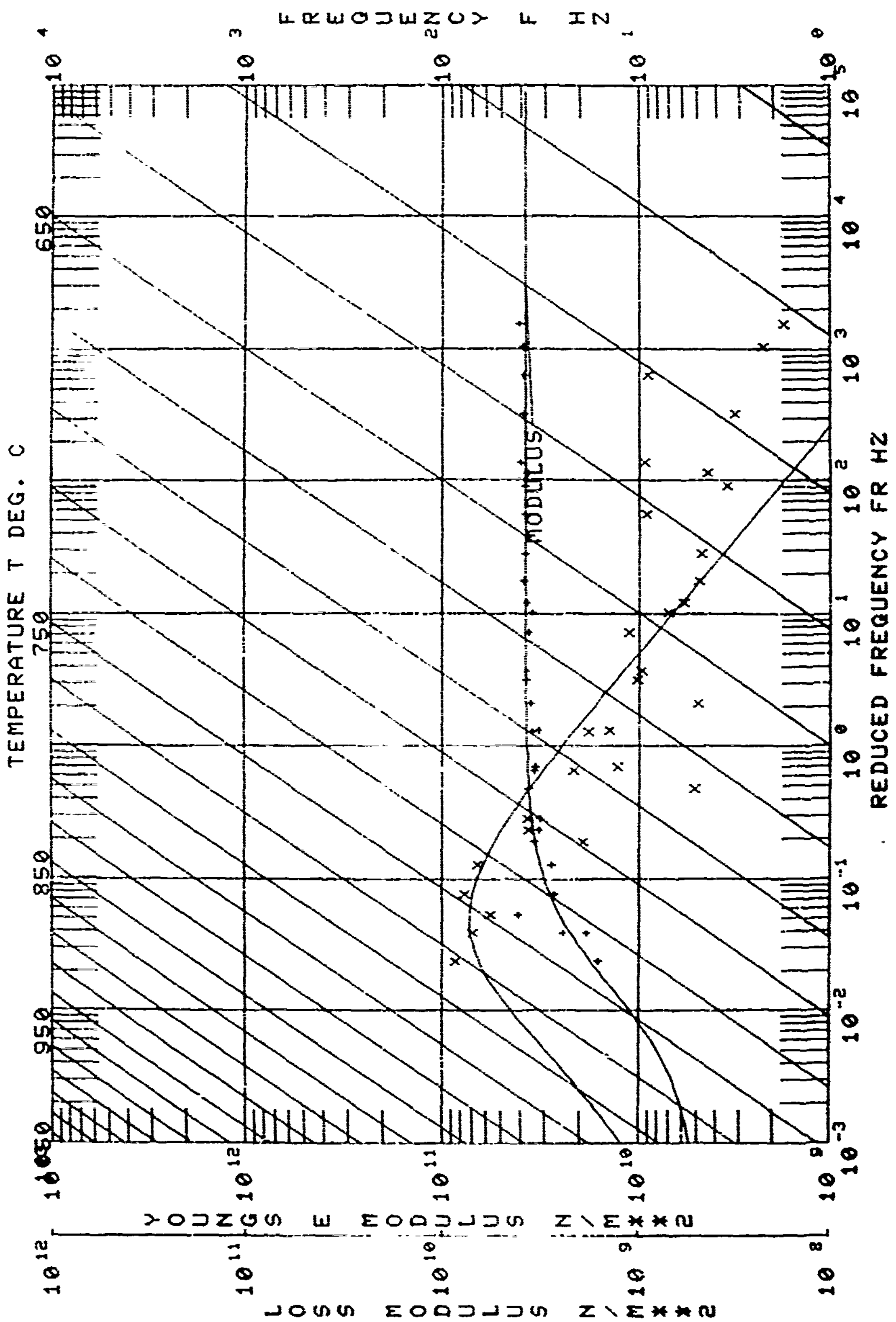
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS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FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-39-1

Date 9/1/78

Damping Material O. Hommel 7007

Material Thickness	0.0249 cm	Material Density	5.23 g/cc		
Fixture No.	1	Beam Thickness	0.0942 cm		
Beam Density	9.13 g/cc	Beam Length	20.853 cm		

Temperature Test Range: Between 595 °C and 370 °C

Frequency Test Range: Between 1,000 Hz and 1,100 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.28		Temperature	545 °C
	1,000 Hz	η_D 0.28		Temperature	595 °C
Range	100 Hz	525 °C	570 °C		
	1,000 Hz	570 °C	620 °C		

Complex Modulus E_D'':

Peak	100 Hz	5.2×10^9 PAS		Temperature	535 °C
	1,000 Hz	5.2×10^9 PAS		Temperature	580 °C
Range	100 Hz	505 °C	560 °C		
	1,000 Hz	540 °C	610 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-39-1-0OHOMMEL 7007
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM          N          ML
               A1            A2           A3         A4
   450.0   4.6000E-01   2.7000E+10     .746   1.1000E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH         FROL        C
            B1       B2        B3          B4         B5
   450.0    .280     .750    -.650 10.0000E-02       .500
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Prior to testing, was thermal soaked for 120 hours at 600°C.

/ 21

TABLE 11-B

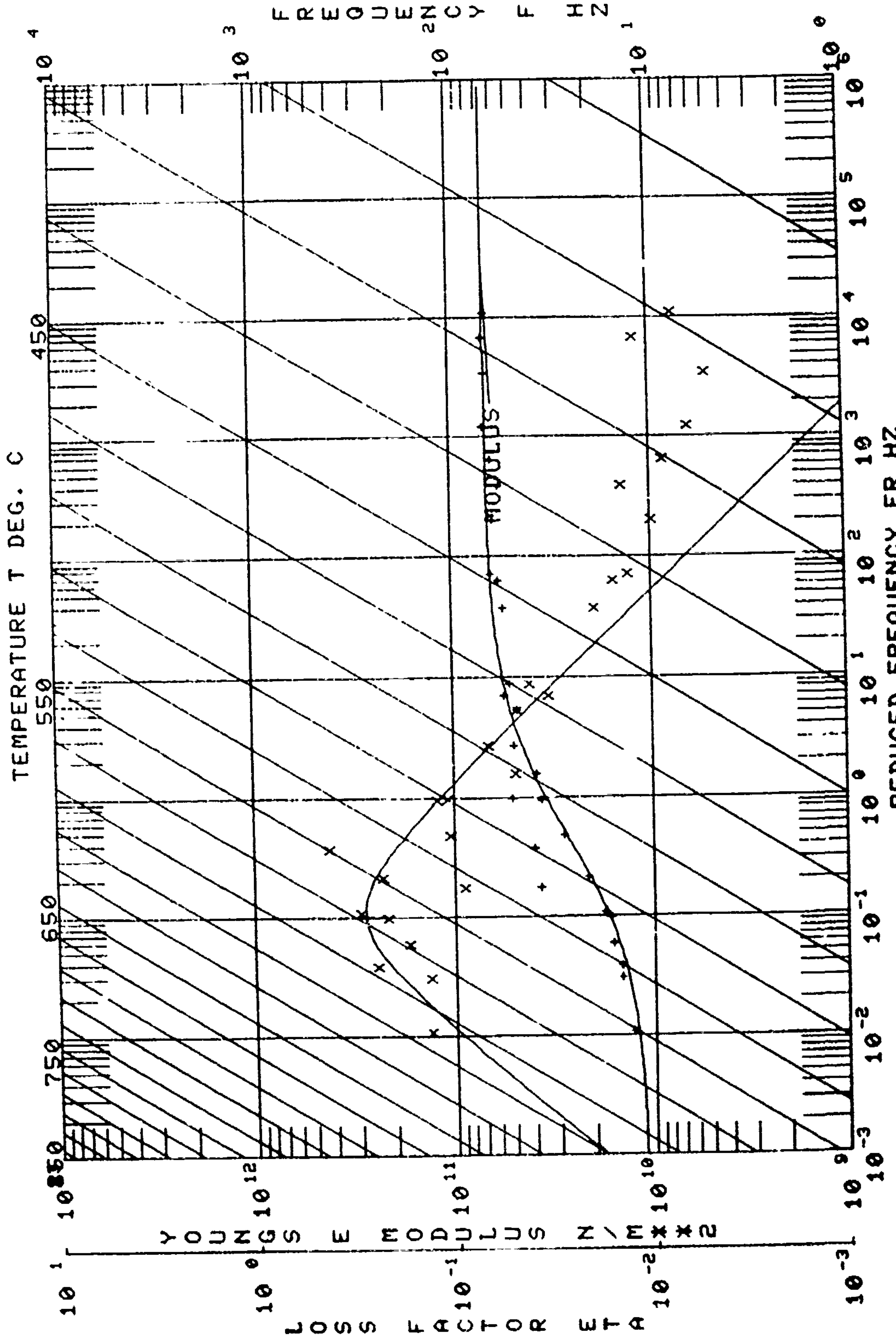
Beam No. 01-39-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	2	98.43	101.40	98.80	98.01	0.794	0.00807	0.1050	
1100	3	276.40	283.00	277.74	274.85	2.88	0.01040	0.1190	
1100	4	544.10	555.00	548.35	539.92	8.42	0.01550	0.1650	
1100	5	902.90	920.00	911.69	893.16	18.53	0.02050	0.2140	
1050	2	99.60	102.10	98.64	100.48	1.84	0.0185	0.2160	
1050	3	280.62	285.00	275.01	283.82	8.80	0.0314	0.0309	
1050	4	555.50	559.00	546.72	564.34	18.10	0.0326	0.2760	
1050	5	963.90	925.00	970.53	955.50	15.60	0.0156	0.0821	
1000	2	106.25	102.80	104.[illegible]3			0.0290	0.0163	
1000	3	290.00	286.70	292.91	286.37	6.54	0.0226	0.1550	
1000	4	582.30	564.00	593.26	570.62	22.60	0.0389	0.2200	
1000	5	965.90	931.00	960.38	976.78	16.40	0.0170	0.0926	
950	2	110.52	103.58	112.86	110.52	5.98	0.0541	0.2440	
950	3	307.00	288.30	313.54	303.33	10.21	0.0332	0.1510	
950	4	599.60	565.50	[illegible]6.10	592.66	13.43	0.0224	0.1050	
950	5	1000.60	937.00	1009.80	988.83	21.00	0.0209	0.0936	
950	6	1499.30		1483.06	1511.03	28.00	0.0187		
900	2	112.04	104.20	110.95	112.99	2.04	0.0182	0.0784	
900	3	291.60	290.50	289.11	295.08	5.97	0.0265	0.1530	
900	4	610.40	567.00	607.26	613.87	6.61	0.0108	0.0469	
900	5	1020.00	942.00	1015.30	1024.50	9.26	0.0091	0.0380	
900	6	1470.20		1466.10	1475.90	9.77	0.0066		
850	2	114.24	104.70	113.80	114.75	0.945	0.00827	0.0331	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
850	3	317.90	292.00	318.91	316.97	1.94	0.0061	0.0247	
850	4	617.50	571.50	620.12	615.12	5.00	0.0081	0.0340	
850	5	1031.80	947.00	1034.30	1028.80	5.50	0.0054	0.0217	
850	6	1544.70		1548.40	1540.50	7.90	0.0051		
800	2	115.69	105.20	115.44	115.95	0.51	0.00439	0.0159	
800	3	321.50	293.40	320.99	322.09	1.10	0.00342	0.013[illegible]	
800	4	631.50	574.00	634.19	629.01	5.18	0.0082	0.0316	
800	5	1042.70	952.00	1044.34	1039.12	5.20	0.00501	0.0197	
800	6	1559.40		1461.70	1556.80	4.96	0.00318		
700	2	116.89	106.15	116.72	117.06	0.34	0.00292	0.0112	
700	3	324.90	295.95	325.34	324.50	0.84	0.00259	0.0101	
700	4	637.90	580.30	640.96	635.06	5.89	0.00924	0.0357	
700	5	1054.30	1000.50	1052.60	1055.90	3.32	0.0032	0.0156	
700	6	1577.50		1575.20	1580.00	4.73	0.0030		

EXPERIMENTAL CODE :133
MATERIAL :01-39-1-0@HOMMEL 7007
DATA SOURCES
MANUFACTURER :NONE
AFML :UDRI BEAM COATED ONE SIDE 11\29\79
OTHER :TESTED 8\8\78

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.31016E+10	.1366	593.3	98.4	2.	1.95002E+11	.0105	101.4	1.78981E+09
2	1.51086E+10	.1358	593.3	276.4	3.	1.93737E+11	.0119	283.0	2.05139E+09
3	1.64387E+10	.1752	593.3	544.1	4.	1.94039E+11	.0165	555.0	2.88018E+09
4	1.69074E+10	.2229	593.3	902.9	5.	1.95117E+11	.0214	920.0	3.76803E+09
5	1.50017E+10	.2524	565.6	99.6	2.	1.97704E+11	.0216	102.1	3.78671E+09
6	2.18433E+10	.2333	565.6	555.9	4.	1.96846E+11	.0276	559.0	5.09652E+09
7	4.04521E+10	.4322	565.6	963.9	5.	1.97243E+11	.0821	925.0	1.74821E+10
8	3.76055E+10	.0915	537.8	106.2	2.	2.00424E+11	.0163	102.8	3.43976E+09
9	2.85685E+10	.1064	537.8	290.0	3.	1.98836E+11	.0155	286.7	3.04075E+09
10	3.71464E+10	.1245	537.8	582.3	4.	2.00383E+11	.0220	564.0	4.62657E+09
11	3.90950E+10	.0504	537.8	965.9	5.	1.99810E+11	.0093	931.0	1.97078E+09
12	5.25120E+10	.1098	510.0	110.5	2.	2.03477E+11	.0244	103.6	5.76731E+09
13	5.09581E+10	.0688	510.0	307.0	3.	2.01061E+11	.0151	288.3	3.50477E+09
14	4.90738E+10	.0491	510.0	599.6	4	2.01451E+11	.0105	565.5	2.40935E+09
15	5.26190E+10	.0419	510.0	1000.6	5.	2.02394E+11	.0094	937.0	2.20627E+09
16	5.68685E+10	.0338	482.2	112.0	2.	2.05921E+11	.0078	104.2	1.92124E+09
17	5.65148E+10	.0197	482.2	610.4	4.	2.02521E+11	.0046	567.0	1.11289E+09
18	5.99438E+10	.0158	482.2	1020.0	5.	2.04560E+11	.0038	942.0	9.45795E+08
19	6.48426E+10	.0132	454.4	114.2	2.	2.07901E+11	.0033	104.7	8.57960E+08
20	6.31930E+10	.0100	454.4	317.9	3.	2.06255E+11	.0025	292.0	6.30680E+08
21	5.92240E+10	.0143	454.4	617.5	4.	2.05748E+11	.0034	571.5	8.45401E+08
22	6.37354E+10	.0087	454.4	1031.8	5.	2.06737E+11	.0022	947.0	5.56741E+08
23	6.96210E+10	.0065	426.7	115.7	2.	2.09892E+11	.0017	105.2	4.53519E+08
24	6.71706E+10	.0053	426.7	321.5	3.	2.08238E+11	.0013	293.4	3.52665E+08
25	6.90686E+10	.0122	426.7	631.5	4.	2.07552E+11	.0032	574.0	8.39686E+08
26	6.71521E+10	.0077	426.7	1042.7	5.	2.08926E+11	.0020	952.0	5.19423E+08
27	7.16114E+10	.0043	371.1	116.9	2.	2.13700E+11	.0011	106.1	3.07323E+08
28	6.93497E+10	.0039	371.1	324.9	3.	2.11873E+11	.0010	296.0	2.72088E+08
29	7.01412E+10	.0138	371.1	637.9	4.	2.12133E+11	.0036	580.3	9.66973E+08
30	5.29921E+10	.0076	371.1	1054.3	5.	2.30756E+11	.0016	1000.5	4.02236E+08
31	1.81950E+10	.3040	565.6	280.6	3.	1.96485E+11	.0309	285.0	5.53169E+09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450
550
650
750
850
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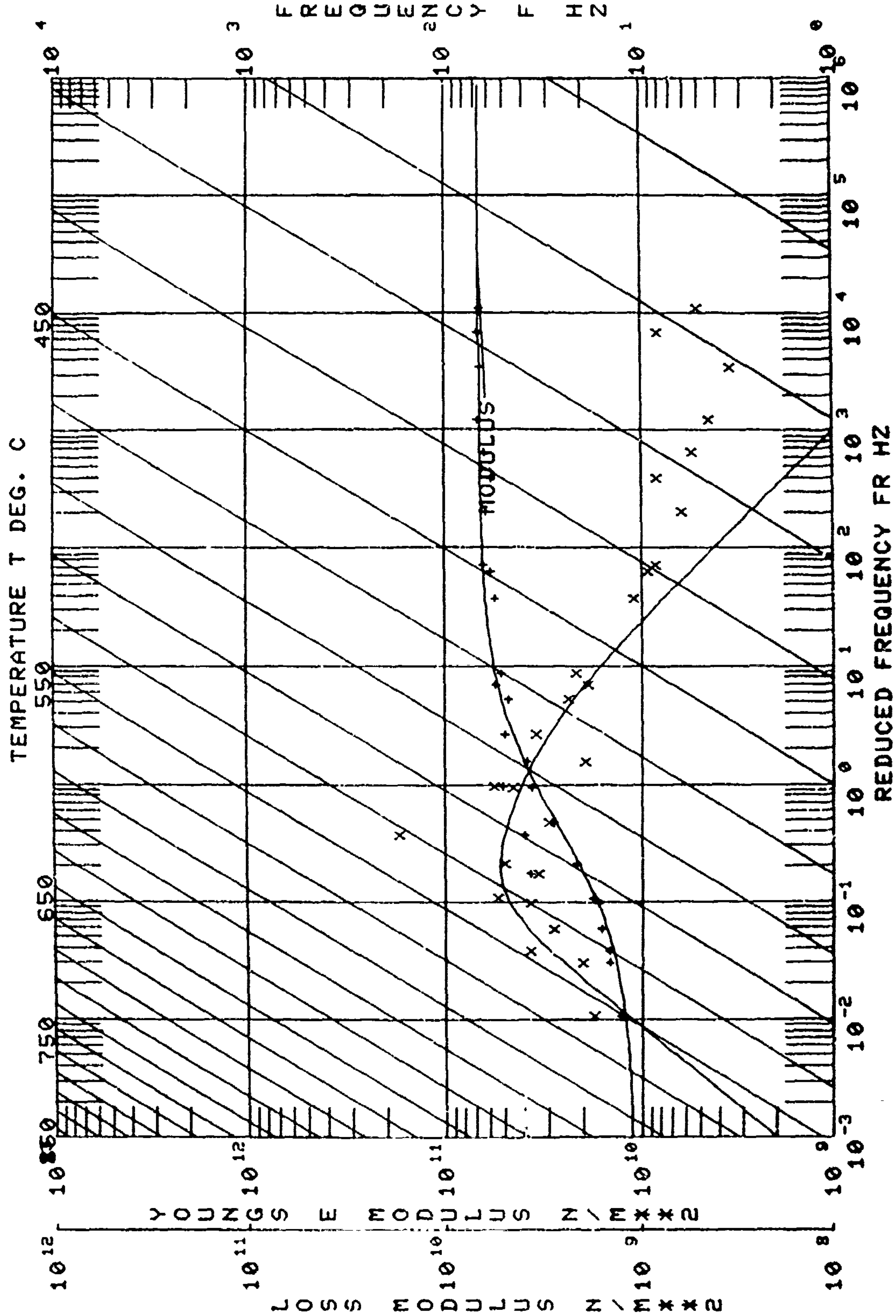
REDUCED FREQUENCY FR HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
450
550
650
750
850
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-40-1

Date 8/14/78

Damping Material Corning 7570

Material Thickness	0.0249 cm	Material Density	5.42 g/cc
Fixture No.	1	Beam Thickness	0.0945 cm
Beam Density	9.13 g/cc	Beam Length	20.904 cm

Temperature Test Range: Between 540 °C and 400 °C

Frequency Test Range: Between 95 Hz and 1,450 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.40		Temperature	465 °C
	1,000 Hz	η_D 0.40		Temperature	480 °C
Range	100 Hz	450 °C	480 °C		
	1,000 Hz	470 °C	500 °C		

Complex Modulus E_D'':

Peak	100 Hz	6.2×10^9 PAS		Temperature	465 °C
	1,000 Hz	6.2×10^9 PAS		Temperature	480 °C
Range	100 Hz	440 °C	475 °C		
	1,000 Hz	460 °C	495 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-40-02 (CORNING 7570)
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM         N          ML
              A1            A2           A3         A4
   490.0   1.5090E+03   1.5051E+10     .530   6.2116E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL         SH         FROL         C
            B1       B2         B3          B4          B5
   490.0     .400     .360     -.400   1.3000E+03     .300
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS:

TABLE 12-B

P am No. 01-40-1

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	2	95.51	100.62	95.44	95.60	0.16	0.00168		
1100	3	267.90	281.70	267.78	268.12	0.34	0.00125		
1100	4	525.90	552.10	525.54	526.26	0.71	0.00136		
1100	5	872.30	912.60	871.70	872.84	1.15	0.00132		
1100	6	1304.80	1363.30	1303.95	1305.70	1.77	0.00136		
1050	2	96.17	101.31	96.09	96.27	0.18	0.00186		
1050	3	269.79	283.70	269.59	269.98	0.39	0.00145		
1050	4	529.50	555.90	529.03	529.81	0.78	0.00147		
1050	5	878.00	918.90	877.34	878.66	1.32	0.00150		
1050	6	1313.20	1372.70	1312.16	1314.20	2.07	0.00158		
1000	2	96.82	101.93	96.72	96.92	0.20	0.00208		
1000	3	271.60	285.40	271.34	271.84	0.50	0.00185		
1000	4	533.00	559.30	532.42	533.58	1.16	0.00218		
1000	5	884.10	924.50	882.77	885.30	2.53	0.00286		
1000	6	1322.50	1381.10	1320.50	1324.74	4.27	0.00323		
1000	2	100.30	90.30	88.90	91.60	3.00	0.02990		
1000	3	281.00	271.90	271.60	272.20	0.44	0.00220		
1000	4	552.00	533.30	532.30	534.10	1.80	0.00330		
1000	5	916.00	893.80	882.10	885.80	3.70	0.00420		
950	2	97.47	102.53	97.30	97.62	0.318	0.00326		
950	4	537.00	562.60	534.82	539.10	4.28	0.00798		
950	5	891.90	929.98	885.92	899.00	13.10	0.01470		
950	6	1335.80	1389.20	1325.91	1345.16	19.25	0.01440		

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
950	2	102.50	97.30	97.10	97.70	0.63	0.00610		
950	3	286.80	273.60	273.80	274.50	0.75	0.00260		
950	4	562.50	537.10	534.90	539.80	4.90	0.00910		
950	5	927.00	891.10	884.80	897.60	12.80	0.01440		
900	2	98.57	103.19	97.88	99.77	1.89	0.01920		
900	4	547.30	566.20	539.86	554.53	14.67	0.02680		
900	5	912.98	935.90	905.75	919.22	13.50	0.02880		X
900	6	1373.10	1398.00	1355.77	1396.37	40.60	0.02960		
850	2	103.50	102.40	100.90	104.00	3.10	0.03020		
850	3	290.00	288.20	281.10	291.90	10.80	0.03740		
850	4	569.30	568.80	562.00	574.80	12.80	0.02250		
850	5	943.00	947.20	938.40	953.90	15.50	0.01630		
850	4	568.10	569.10	562.94	574.20	11.62	0.01980		
850	5	946.20	940.70	937.63	954.02	16.40	0.01730		
850	6	1420.10	1405.30	1409.44	1428.30	18.80	0.01330		
800	2	104.00	106.00	105.40	107.30	1.90	0.01790		
800	3	292.00	296.20	295.00	294.20	0.80	0.00680		
800	4	572.00	580.90	579.10	582.40	3.30	0.00568		
800	5	948.00	964.10	962.20	966.00	3.80	0.00390		
800	2	105.58	104.30	104.96	105.99	1.02	0.00970		
800	3	295.80	292 04	294.79	297.04	2.25	0.00759		
800	4	580.40	572.30	578.74	582.12	3.38	0.00582		
800	5	963.80	946.00	966.02	961.64	4.38	0.00455		

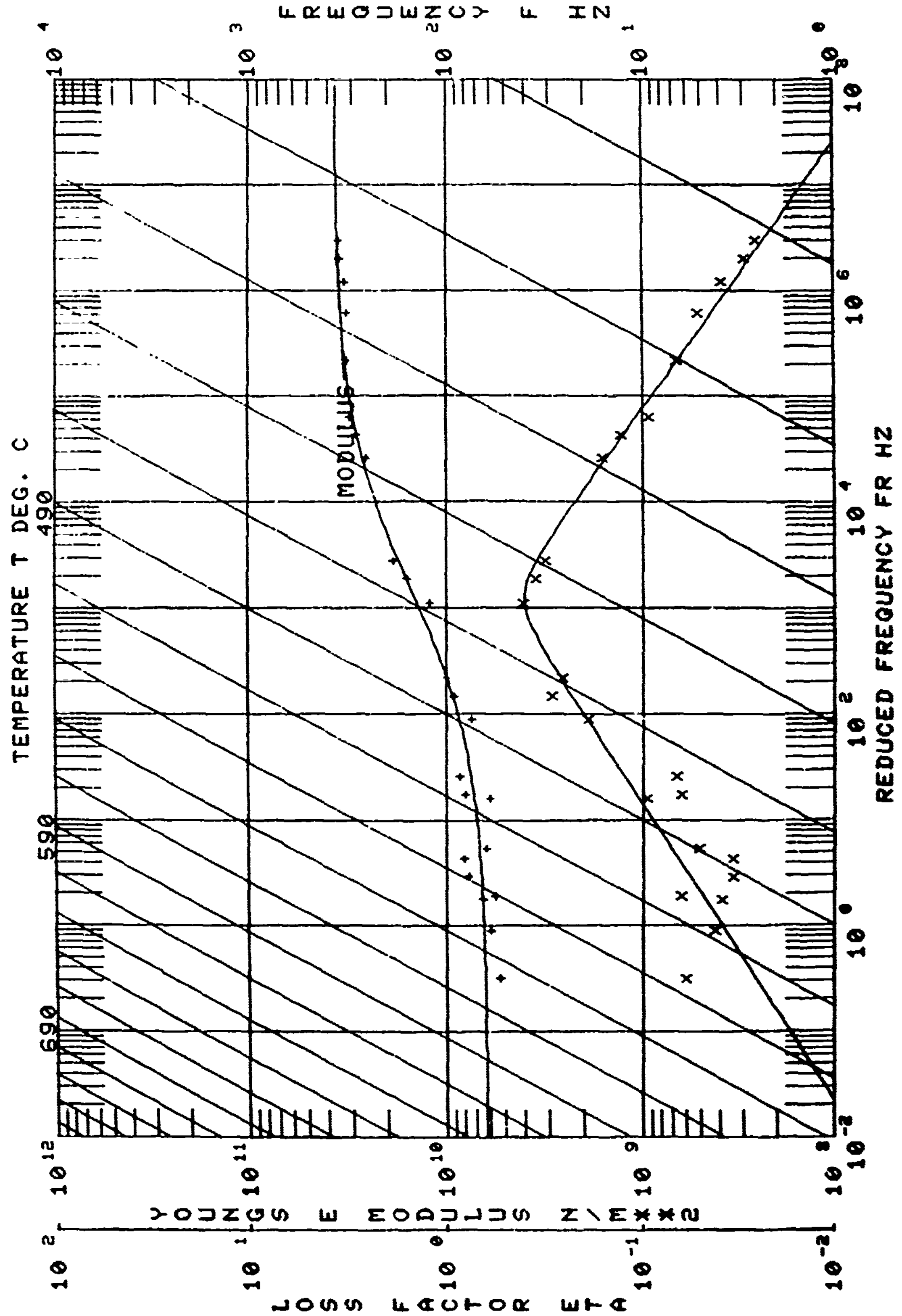
TABLE 12-B (Concluded)

Beam No. 01-40-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	$\dot{\eta}_s$	η_c	1dB
800	6	1441.30	1413.20	1438.50	144[illegible].20	5.68	0.00394		
750	2	104.60	107.10	107.00	107.30	0.30	0.00280		
750	3	293.80	299.70	299.40	299.90	0.40	0.00160		
750	4	575.00	587.00	586.30	587.60	1.30	0.00220		
750	5	952.20	974.60	974.10	975.30	1.20	0.00123		

EXPERIMENTAL CODE :142
MATERIAL :01-40-1 CORNING 7570
DATA SOURCES
MANUFACTURER :NONE
AFML :UDRI BEAM COATED ONE SIDE 11\27\79
OTHER :TESTED 8\14\78

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	5.36074E+09	.0549	593.3	95.5	2.	1.92851E+11	.0017	100.6	2.94227E+08
2	6.02035E+09	.0366	593.3	267.9	3.	1.92798E+11	.0012	281.7	2.20046E+08
3	6.59348E+09	.0365	593.3	525.9	4.	1.92854E+11	.0014	552.1	2.40597E+08
4	7.81866E+09	.0302	593.3	872.3	5.	1.92827E+11	.0013	912.6	2.35821E+08
5	8.31865E+09	.0294	593.3	1304.8	6.	1.93558E+11	.0014	1363.3	2.44811E+08
6	5.45404E+09	.0606	565.6	96.2	2.	1.95505E+11	.0019	101.3	3.30287E+08
7	6.09312E+09	.0425	565.6	269.8	3.	1.95545E+11	.0015	283.7	2.58864E+08
8	6.67154E+09	.0395	565.6	529.5	4.	1.95518E+11	.0015	555.9	2.63622E+08
9	7.79682E+09	.0348	565.6	878.0	5.	1.95499E+11	.0015	918.9	2.71410E+08
10	8.27044E+09	.0348	565.6	1313.2	6.	1.96236E+11	.0016	1372.7	2.87976E+08
11	5.75159E+09	.0651	537.8	96.8	2.	1.97905E+11	.0021	101.9	3.74576E+08
12	6.42329E+09	.0521	537.8	271.6	3.	1.97896E+11	.0018	285.4	3.34928E+08
13	6.93130E+09	.0572	537.8	533.0	4.	1.97917E+11	.0022	559.3	3.96305E+08
14	8.20176E+09	.0640	537.8	884.1	5.	1.97889E+11	.0029	924.5	5.25093E+08
15	8.72245E+09	.0685	537.8	1322.5	6.	1.98645E+11	.0032	1381.1	5.97572E+08
16	6.11947E+09	.0973	510.0	97.5	2.	2.00242E+11	.0033	102.5	5.95413E+08
17	7.59999E+09	.1940	510.0	537.0	4.	2.00259E+11	.0080	562.6	1.47461E+09
18	9.63798E+09	.2859	510.0	891.9	5.	1.99941E+11	.0147	929.3	2.75560E+09
19	1.03907E+10	.2625	510.0	1335.8	6.	2.00982E+11	.014[illegible]	1389.2	2.72807E+09
20	7.98784E+09	.4509	482.2	98.6	2.	2.02828E+11	.0192	103.2	3.60148E+09
21	1.25119E+10	.4158	482.2	547.3	4.	2.02830E+11	.0268	566.2	5.[illegible]0278E+09
22	1.61084E+10	.3564	482.2	913.0	5.	2.02800E+11	.0288	935.9	[illegible]155E+09
23	1.89247E+10	.3193	482.2	1373.1	6.	2.03536E+11	.0296	1398.0	[illegible]242E+09
24	2.63382E+10	.1626	454.4	568.7	4.	2.04913E+11	.0198	569.1	4.28326E+09
25	2.91924E+10	.1307	454.4	946.2	5.	2.04885E+11	.0173	940.7	3.81595E+09
26	3.13716E+10	.0952	454.4	1420.1	6.	2.05667E+11	.0133	1405.3	2.98627E+09
27	3.23872E+10	.0681	426.7	105.6	2.	2.07215E+11	.0097	104.3	2.20576E+09
28	3.26556E+10	.0529	426.7	295.8	3.	2.07211E+11	.0076	292.0	1.72900E+09
29	3.32371E+10	.0400	426.7	580.4	4.	2.07224E+11	.0058	572.3	1.33097E+09
30	3.53440E+10	.0298	426.7	963.8	5.	2.07200E+11	.0045	946.0	1.05497E+09
31	3.58288E+10	.0257	426.7	1441.3	6.	2.08133E+11	.0039	1413.7	9.19593E+08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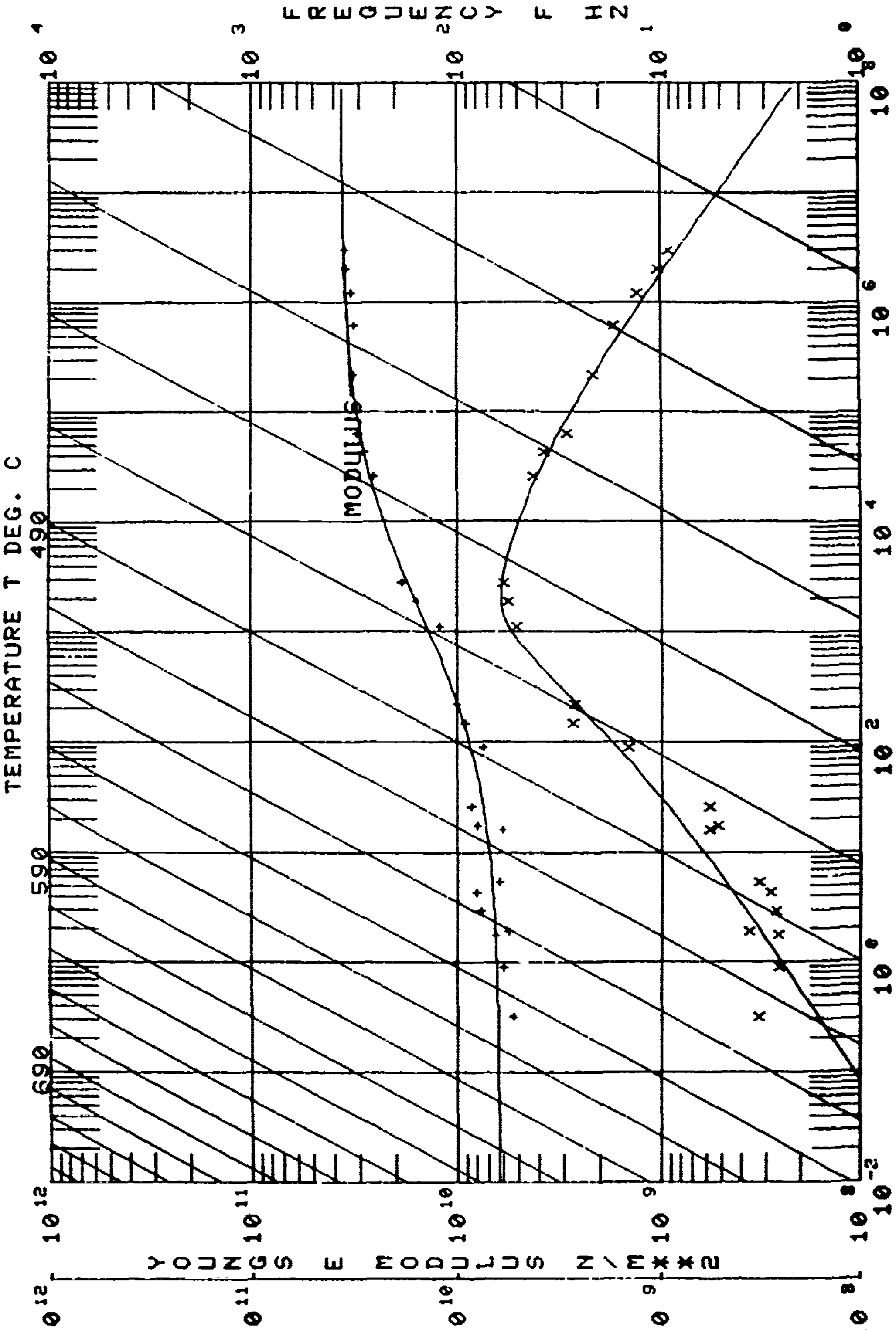
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA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YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

131

Beam No. 01-41-1

Date 9/22/78

Damping Material Corning 8463

Material Thickness 0.0188 cm Material Density 6.22 g/cc

Fixture No. 1 Beam Thickness 0.0945 cm

Beam Density 9.13 g/cc Beam Length 20.904 cm

Temperature Test Range: Between 595 °C and 345 °C

Frequency Test Range: Between 95 Hz and 1,455 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.32	Temperature	520 °C
	1,000 Hz	η_D 0.32	Temperature	560 °C
Range	100 Hz	490 °C	560 °C	
	1,000 Hz	520 °C	610 °C	

Complex Modulus E_D'':

Peak	100 Hz	7.2×10^9 PAS	Temperature	490 °C
	1,000 Hz	7.2×10^9 PAS	Temperature	530 °C
Range	100 Hz	470 °C	520 °C	
	1,000 Hz	500 °C	560 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-41-8463-1 (CORNING 8463)
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM        N          ML
               A1            A2         A3         A4
  450.0  1.0453E+00  1.9598E+10    .811   8.9003E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH         FROL        C
           B1        B2        B3          B4         B5
  450.0     .320     .850     -.618   2.6467E-01    1.647
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS:

TABLE 13-B

Beam No. C1-41-1

Temp. (°F)	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	2	95.41	99.65	95.56	95.25	0.31	0.00324		
1100	3	267.17	279.30	267.68	266.57	1.11	0.00415		
1100	4	524.30	550.00	526.37	522.55	3.82	0.00730		
1100	5	870.70	911.00	874.51	866.90	7.60	0.00873		
1100	6	1305.00	1361.60	1311.50	1299.40	12.10	0.00927		
1050	2	96.06	100.45	96.37	95.71	0.66	0.00687		
1050	3	269.50	281.10	271.26	267.56	3.70	0.01370		
1050	4	530.00	552.50	534.25	525.93	8.26	0.01560		
1050	5	884.00	915.20	885.11	881.86	3.25	0.00718		X
1050	6	1324.70	1368.10	1338.69	1313.72	25.00	0.01890		
1000	2	97.62	100.95	98.42	96.57	1.86	0.01900		
1000	3	276.00	282.90	277.58	274.84	2.75	0.01940		X
1000	4	543.00	556.00	550.89	537.05	13.83	0.02550		
1000	5	901.40	921.00	911.41	890.38	21.00	0.02330		
1000	6	1359.20	1376.60	1366.40	1349.10	17.45	0.01280		
1000	2	97.32	100.95	98.16	96.40	1.77	0.01820		
1000	3	274.90	282.90	276.26	273.67	2.59	0.01840		X
1000	4	541.30	556.00	544.59	538.33	6.27	0.02260		
1000	5	900.30	921.00	908.95	887.01	21.90	0.02440		
1000	6	1352.50	1376.60	1368.16	1341.91	26.30	0.01940		
950	2	99.94	101.45	104.35	101.96	2.38	0.02310		
950	4	557.40	559.20	565.44	551.32	14.10	0.0253		
950	5	924.90	926.50	933.50	914.50	18.96	0.02050		
950	6	1389.80	1383.85	1402.56	1377.68	24.90	0.01790		
950	2	99.81	101.45	100.78	98.65	2.13	0.02140		
950	3	281.81	284.68	283.29	280.22	3.07	0.02120		X
950	4	555.70	565.44	561.56	549.80	11.76	0.02120		
950	5	922.40	926.50	926.72	917.20	9.52	0.02010		
950	6	1382.40	1383.85	1395.33	1370.84	24.50	0.01772		
900	2	103.09	101.95	104.35	101.96	2.38	0.02310		
900	3	289.94	286.45	292.06	287.54	4.51	0.01560		
900	4	571.10	565.20	575.95	566.83	9.12	0.01600		
900	5	947.10	932.00	952.49	941.76	10.73	0.01130		
900	6	1420.62	1382.00	1427.30	1412.69	14.60	0.01030		
900	2	102.51	101.95	103.48	101.62	1.86	0.01820		
900	3	288.28	286.45	290.25	286.00	4.25	0.01470		
900	4	569.00	565.20	572.10	563.79	8.32	0.0[illegible]460		
900	5	941.40	932.00	946.88	936.50	10.38	0.01100		
900	6	1410.80	1382.00	1417.04	1404.36	12.69	0.00899		
850	2	105.60	102.45	105.95	105.24	0.72	0.00680		
850	3	295.59	288.25	296.19	294.91	1.28	0.00430		
850	4	581.30	565.50	583.23	579.49	3.74	0.00640		
850	5	961.80	937.50	963.15	960.37	2.78	0.00290		
850	6	1441.90	1389.25	1443.10	1439.90	3.32	0.00230		
850	2	104.68	102.45	105.02	104.30	0.72	0.00690		
850	3	292.70	288.45	293.47	292.12	1.35	0.00462		

TABLE 13-B (Concluded)

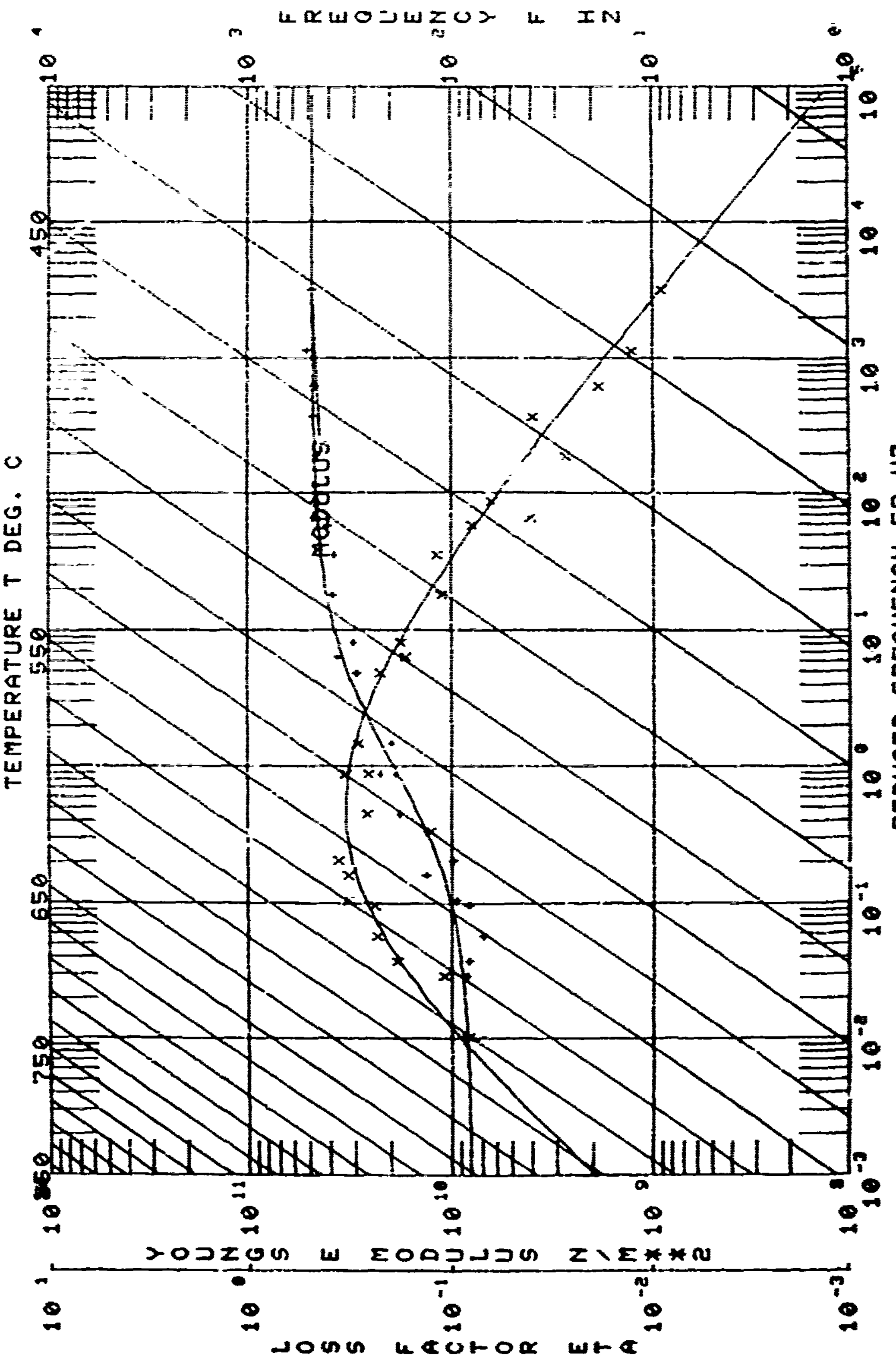
Beam No. 01-41-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
850	4	575.76	565.50	577.27	574.04	3.23	0.00561		
850	5	953.50	937.50	955.01	952.10	2.90	0.00304		
850	6	1427.30	1389.25	1429.27	1425.31	3.95	0.00277		
800	2	106.67	102.95	106.79	106.55	0.23	0.00220		
800	3	298.17	290.00	298.39	297.96	0.43	0.00920		
800	4	586.02	568.50	587.40	584.79	2.61	0.00445		
800	5	969.10	943.00	969.81	968.48	1.33	0.00138		
600	6	1451.70	1405.45	1451.73	1451.25	0.47	0.00033		
800	2	105.61	102.95	105.75	105.52	0.23	0.02210		
800	3	295.30	290.00	295.53	295.06	0.46	0.00160		
800	4	580.30	568.50	581.43	579.21	2.22	0.00382		
800	5	960.80	943.00	961.50	960.35	1.15	0.00120		
800	6	1438.30	1405.45	1439.18	1437.63	1.55	0.00108		
750	2	105.86	103.40	105.94	105.79	0.16	0.00147		
750	3	295.90	290.10	296.20	295.86	0.34	0.00115		
750	4	582.00	570.20	583.08	581.13	1.96	0.00336		
750	5	961.41	945.51	960.14	962.67	2.52	0.00262		
750	6	1443.50	1411.87	1444.00	1442.90	1.10	0.00076		
700	2	107.83	103.90						
700	3	301.30	291.40						
700	4	592.38	571.89						
700	5	979.80	948.04						
700	6	1467.10	1418.28						

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
650	2	107.10		107.18	107.06	0.115	0.00110		
650	3	299.37		299.52	299.24	0.28	0.00090		
650	4	588.60		589.55	587.75	1.80	0.00310		
650	5	972.48		973.31	971.25	2.06	0.00210		
600	2	107.77		107.82	107.64	0.13	0.00120		
600	3	300.82		300.97	300.68	0.31	0.00100		
600	4	591.47		592.45	590.50	1.95	0.00330		

EXPERIMENTAL CODE : 88
MATERIAL :01-41-1 CORNING 8463
DATA SOURCES
MANUFACTURER :NONO
AFML :UDRI BEAM COATED ONE SIDE 11\29\79
OTHER :TESTED 10\21\78

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	9.42216E+09	.0798	593.3	95.4	2.	1.88809E+11	.0032	99.6	7.51451E+08
2	8.60669E+09	.1117	593.3	267.2	3.	1.89527E+11	.0042	279.3	9.60942E+08
3	7.08852E+09	.2384	593.3	524.3	4.	1.91389E+11	.0073	550.0	1.68969E+09
4	8.33093E+09	.2454	593.3	870.7	5.	1.92152E+11	.0087	911.0	2.04436E+09
5	8.59638E+09	.1875	565.6	96.1	2.	1.92200E+11	.0069	100.4	1.61187E+09
6	1.40540E+10	.3311	537.8	97.6	2.	1.94118E+11	.0190	100.9	4.65376E+09
7	1.84741E+10	.2645	537.8	276.0	3.	1.94444E+11	.0194	282.9	4.88729E+09
8	1.91114E+10	.3392	537.8	543.0	4.	1.95588E+11	.0255	556.0	6.48205E+09
9	2.02891E+10	.2950	537.8	901.4	5.	1.96394E+11	.0233	921.0	5.98571E+09
10	2.36262E+10	.2557	510.0	99.9	2.	1.96046E+11	.0231	101.4	6.04142E+09
11	3.01691E+10	.2294	510.0	557.4	4.	1.97846E+11	.0253	559.2	6.92099E+09
12	3.11310E+10	.1818	510.0	924.9	5.	1.98746E+11	.0205	926.5	5.65929E+09
13	3.82161E+10	.1729	482.2	103.1	2.	1.97983E+11	.0231	101.9	6.60878E+09
14	3.90576E+10	.1154	482.2	289.9	3.	1.99355E+11	.0156	286.5	4.50793E+09
15	3.85904E+10	.1208	482.2	571.1	4.	2.02114E+11	.0160	565.2	4.66255E+09
16	4.17293E+10	.0799	482.2	947.1	5.	2.01113E+11	.0113	932.0	3.33498E+09
17	4.80851E+10	.0648	482.2	1420.6	6.	1.98904E+11	.0103	1382.0	3.11619E+09
18	5.00073E+10	.1116	454.4	105.6	2.	1.99930E+11	.0182	102.4	5.58263E+09
19	4.73340E+10	.0277	454.4	295.6	3.	2.01868E+11	.0043	288.2	1.31041E+09
20	4.89208E+10	.0403	454.4	581.3	4.	2.02329E+11	.0064	565.5	1.96969E+09
21	4.79940E+10	.0186	454.4	961.8	5.	2.03493E+11	.0029	937.5	8.92152E+08
22	5.37550E+10	.0129	426.7	106.7	2.	2.01886E+11	.0022	102.9	6.92749E+08
23	4.95438E+10	.0578	426.7	298.2	3.	2.04327E+11	.0092	290.0	2.86141E+09
24	5.13793E+10	.0272	426.7	586.2	4.	2.04481E+11	.0044	568.5	1.39770E+09
25	1.07362E+11	.0047	426.7	969.1	5.	1.64537E+11	.0014	843.0	5.01127E+08
26	9.78489E+09	.3306	565.6	269.5	3.	1.91978E+11	.0137	281.1	3.23490E+09
27	1.01158E+10	.3669	565.6	530.0	4.	1.93133E+11	.0156	552.5	3.71199E+09
28	1.34792E+10	1.2990	565.6	884.0	5.	1.93928E+11	.0718	915.2	1.75091E+10


FREQUENCY F HZ
TEMPERATURE T DEG. C
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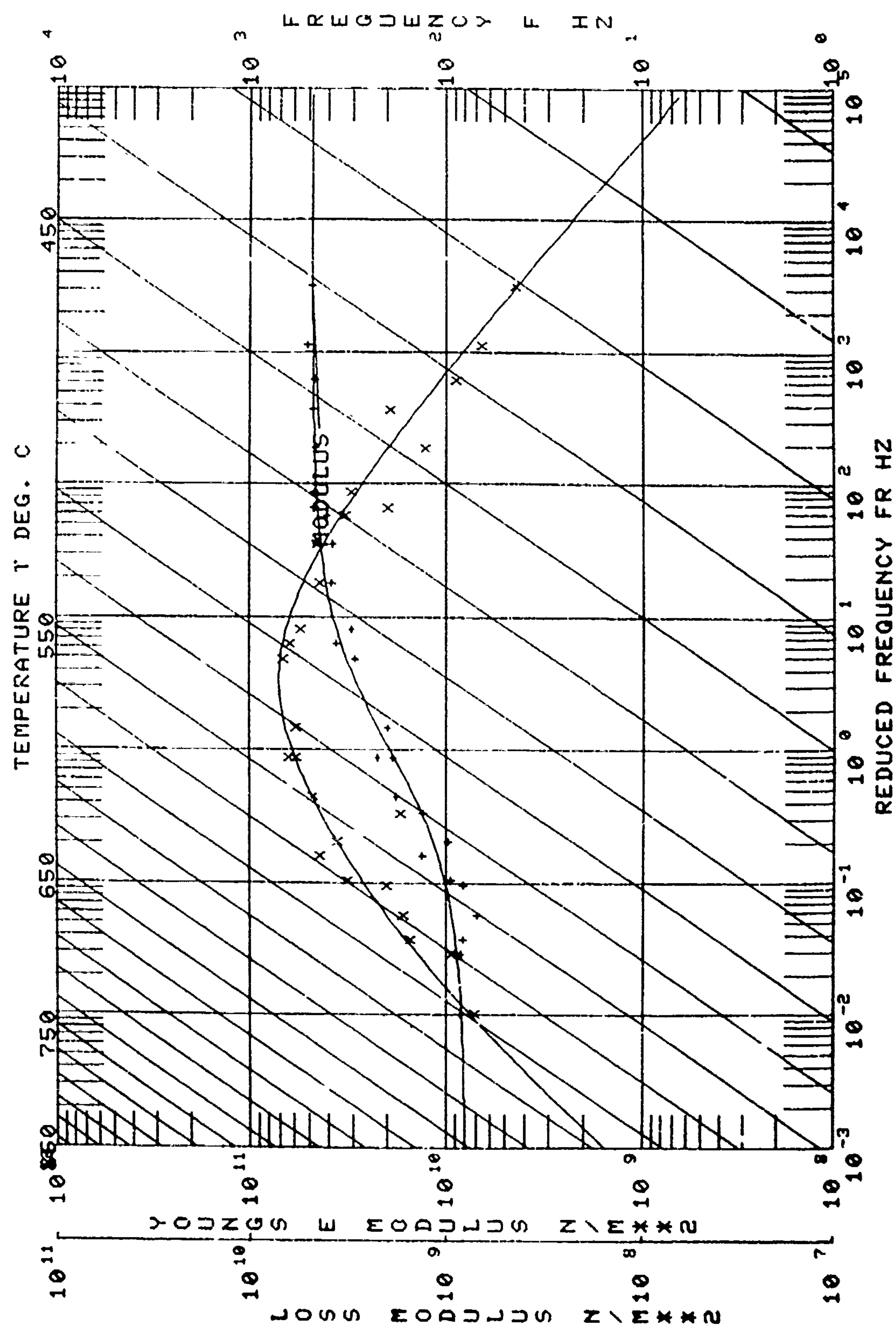
550
650
750
MODULUS
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
450
550
650
750
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-42-1

Date 9/19/78

Damping Material Corning 7556

Material Thickness 0.0168 cm   Material Density 4.68 g/cc

Fixture No. 1   Beam Thickness 0.0945 cm

Beam Density 9.13 g/cc   Beam Length 20.904 cm

Temperature Test Range: Between 565 °C and 300 °C

Frequency Test Range: Between 98 Hz and 1,480 Hz

Loss Factor η_D:

Peak 100 Hz	η_D 0.40	Temperature	510 °C
1,000 Hz	η_D 0.40	Temperature	550 °C
Range 100 Hz	485 °C	550 °C	
1,000 Hz	970 °C	585 °C	

Complex Modulus E_D'':

Peak 100 Hz	6.2×10^9 PAS	Temperature	495 °C
1,000 Hz	6.2×10^9 PAS	Temperature	520 °C
Range 100 Hz	475 °C	515 °C	
1,000 Hz	500 °C	545 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-42-7556-1 (CORNING 7556)
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM         MROM        N         ML
               A1           A2         A3        A4
   500.0  3.6596E+01  1.4392E+10    .570  4.7855E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0    ETAFROL     SL        SH        FROL       C
           B1       B2        B3         B4        B5
   500.0    .380     .350    -.450  2.2000E+01   1.100
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS:

TABLE 14-B

Beam No. 01-42-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	2	98.16	101.30	98.84	98.13	0.71	0.0072		
1100	3	273.88	283.00	274.14	273.61	0.52	0.0019		
1100	4	536.50	556.00	537.75	535.29	2.46	0.0046		
1100	5	887.20	921.60	892.05	889.41	2.63	0.0030		
1100	6	1332.70	1380.10	1334.91	1330.67	4.23	0.0032		
1050	2	98.70	101.98	98.89	98.49	0.40	0.0040		
1050	3	275.90	294.60	276.66	275.24	1.41	0.0051		
1050	4	541.70	557.80	544.39	539.21	5.18	0.0096		
1050	5	899.60	926.60	903.17	896.00	7.17	0.0080		
1050	6	1348.60	1386.40	1355.50	1342.90	12.60	0.0093		
1000	2	99.63	102.50	100.205	99.133	1.072	0.0110		
1000	3	279.24	286.50	280.315	278.312	2.026	0.0241		X
1000	4	550.23	562.20	553.80	545.11	8.69	0.0158		
1000	5	813.125	932.00	915.022	909.347	5.675	0.0122		X
1000	6	1373.74	1394.70	1386.65	1362.30	24.35	0.0177		
1000	2	99.88	102.50	100.47	99.29	1.18	0.0118		
1000	3	279.40	286.50	281.39	277.24	4.15	0.0149		
1000	4	550.20	562.20	555.33	545.09	10.25	0.0186		
1000	5	913.80	932.00	922.02	906.06	15.96	0.0175		
1000	6	1373.60	1394.70	1386.78	1364.42	22.36	0.0163		
975	2	100.60	102.73	101.59	99.90	1.69	0.0168		
975	3	282.20	287.27	283.76	280.93	2.83	0.0196		X
975	4	556.30	563.90	562.70	550.25	12.49	0.0225		
975	5	924.60	935.10	933.46	913.38	20.10	0.0217		
975	6	1390.50	1396.50	1407.49	1379.33	28.20	0.0203		
950	2	102.16	102.94	103.08	101.31	1.77	0.0174		
950	3	286.30	287.88	288.00	284.88	3.12	0.0213		X
950	4	564.96	565.16	571.18	559.15	12.03	0.0213		
950	5	938.50	937.10	946.10	930.30	15.70	0.0168		
950	6	1410.00	1400.00	1424.80	1400.40	24.40	0.0173		
950	2	101.26	102.94	102.17	100.39	1.77	0.0175		
950	3	284.69	287.88	287.61	282.55	5.06	0.0178		
950	4	560.68	565.16	565.53	555.93	9.60	0.0171		
950	6	1399.80	1400.00	1411.83	1391.83	20.01	0.0143		
925	2	103.60	103.16	104.52	102.83	1.69	0.0163		
925	3	291.00	288.64	292.38	289.63	2.75	0.0180		X
925	4	572.80	566.40	577.83	567.96	9.88	0.0172		
925	5	950.30	939.20	956.23	943.79	12.44	0.0131		
925	6	1423.80	1406.70	1433.30	1416.07	17.30	0.0121		
900	1	17.35				0.42	0.0241		
900	2	104.28	103.42	105.15	103.27	1.88	0.0180		
900	3	292.41	289.40	294.67	290.55	4.12	0.0141		
900	4	576.13	568.50	580.62	572.30	8.31	0.0144		
900	5	954.96	942.90	959.34	950.32	9.03	0.0095		
900	6	1431.40	1410.20	1425.30	1437.30	11.98	0.0084		
900	2	104.17	103.42	104.80	103.66	1.14	0.0110		

TABLE 14-B (Continued)

Beam No. 01-42-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
900	3	291.41	289.40	290.23	292.93	2.[illegible]	[illegible]0093		
900	4	57[illegible].40	568.50	569.59	575.[illegible]	[illegible]	[illegible]0102		
900	5	949.82	942.90	946.53	952.91	[illegible]	0.0067		
900	6	1422.80	1410.20	1419.12	1426.96	7.[illegible]	0.0055		
850	2	105.28	103.83	105.56	105.03	0.53	0.0050		
850	3	294.91	290.48	295.53	294.41	[illegible].11	0.0038		
850	4	579.04	570.36	581.13	577.22	3.90	0.0067		
850	5	960.10	945.70	961.60	958.81	2.79	0.0029		
850	6	1437.40	1417.00	1439.52	1435.32	4.20	0.0029		
850	3	297.65	290.48	298.22	297.09	1.13	0.0038		
850	4	585.25	570.36	587.19	583.25	3.94	0.0067		
850	5	968.80	945.70	970.02	967.47	2.54	0.0026		
850	6	1450.20	1417.00	1448.20	1451.69	3.51	0.0024		
800	2	107.41	104.36	107.34	107.50	0.167	0.0016		
800	3	300.47	291.91	300.65	300.34	0.32	0.0011		
800	4	590.60	573.21	591.93	589.18	2.75	0.0047		
800	5	977.14	950.50	976.87	977.50	0.63	0.0006		
800	6	1461.90	1419.90	1462.30	1461.20	1.07	0.00073		
800	2	106.10	104.36	106.28	105.91	0.37	0.0035		
800	3	297.35	291.91	296.99	297.82	0.84	0.0028		
900	4	583.80	573.21	585.69	582.05	3.64	0.0062		
800	5	967.70	950.50	968.64	966.67	1.97	0.0020		
800	6	1448.00	1419.90	1449.40	1446.30	3.06	0.0021		

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
750	2	107.57	104.89	107.67	107.52	0.15	0.0014		
750	3	301.50	293.40	301.68	301.40	0.27	0.00090		
750	4	593.10	576.30	595.46	590.63	4.84	0.00815		
750	5	980.50	955.50	980.80	980.12	0.69	0.00071		
750	6	1466.10	1428.20	1466.80	1465.40	1.40	0.00095		
700	2	107.83	105.48	107.78	107.90	0.12	0.0011		
700	3	301.13	295.10	301.06	301.27	0.21	0.0007		
700	3	301.12	295.10	301.06	301.25	0.19	0.0006		
700	4	590.28	579.63	592.02	588.79	3.23	0.0055		
700	5	978.60	962.60						
675	2	108.46	105.78	108.49	108.38	0.11	0.00099		
675	3	303.80	295.95	303.92	303.82	0.10	0.00033		
675	4	597.60	581.30	598.95	596.09	2.86	0.0048		
675	5	987.90	964.10						
675	6	1477.40	1441.80						
600	2	108.63	106.79						
600	3	303.82	298.84	303.92	303.76	0.16	0.00054		
600	4	595.60	587.50	597.70	593.54	4.17	0.0070		
600	5	987.63	967.10	987.44	987.84	0.40	0.0004		
575	2	109.45	107.13						
575	3	306.68	299.80						
575	4	603.20	589.00						
575	5	996.90	969.00						

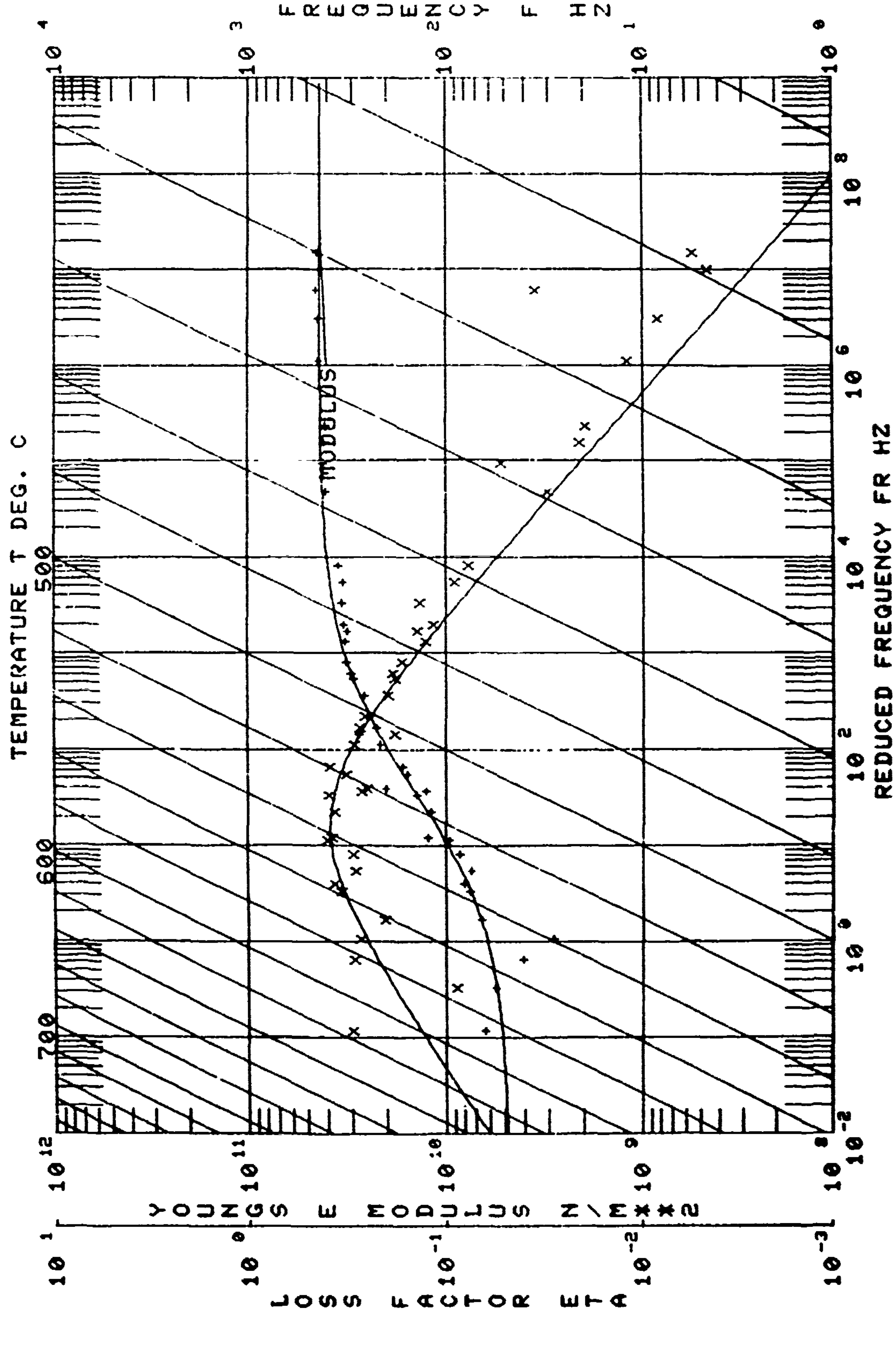
TABLE 14-B (Concluded)

Beam No. 01-42-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
575	6	1491.00							
75	3	315.07							
75	4	620.60							
75	5	1024.00							
75	6	1531.80							

EXPERIMENTAL CODE : 26
MATERIAL :01-42-7556-1 (CORNING 7556)
DATA SOURCES
MANUFACTURER :NONE
AFML :BEAM COATED ONE SIDE (UDRI)SEPT78
OTHER :NONE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	8.31869E+09	.3723	537.8	99.6	2.	2.00125E+11	.0110	102.5	3.09665E+09
2	1.21860E+10	.3722	537.8	550.2	4.	1.99974E+11	.0158	562.2	4.53612E+09
3	1.28965E+10	.2740	537.8	913.1	5.	2.01113E+11	.0122	932.0	3.53425E+09
4	1.61222E+10	.3255	537.8	1373.7	6.	2.02576E+11	.0177	1394.7	5.24830E+09
5	9.83712E+09	.4054	537.8	279.2	3.	1.99424E+11	.0141	286.5	3.98803E+09
6	2.92190E+09	.2760	593.3	887.2	5.	1.96649E+11	.0030	921.6	8.06460E+08
7	4.16506E+09	.2973	593.3	536.5	4.	1.95588E+11	.0046	556.0	1.23848E+09
8	5.72383E+09	.0897	593.3	273.9	3.	1.94582E+11	.0019	283.0	5.13370E+08
9	6.44360E+09	.3044	593.3	98.2	2.	1.95466E+11	.0072	101.3	1.96168E+09
10	3.55814E+10	.0785	482.2	1431.4	6.	2.07104E+11	.0084	1410.2	2.79155E+09
11	3.39038E+10	.0919	482.2	955.0	5.	2.05844E+11	.0095	942.9	3.11644E+09
12	3.40852E+10	.1379	482.2	576.1	4.	2.04481E+11	.0144	568.5	4.70162E+09
13	3.07005E+10	.1878	482.2	104.3	2.	2.03733E+11	.0180	103.4	5.76502E+09
14	6.72392E+09	.2083	565.6	275.9	3.	1.96788E+11	.0051	284.6	1.40071E+09
15	7.69731E+09	.3445	565.6	541.7	4.	1.96857E+11	.0096	557.8	2.65144E+09
16	7.61742E+09	.2927	565.6	899.6	5.	1.98789E+11	.0080	926.6	2.22937E+09
17	8.75416E+09	.2998	565.6	1348.6	6.	2.00172E+11	.0093	1386.4	2.62471E+09
18	4.17786E+10	.0213	454.4	968.8	5.	2.07069E+11	.0026	945.7	8.88978E+08
19	4.15345E+10	.0310	454.4	297.7	3.	2.05003E+11	.0038	290.5	1.28734E+09
20	4.50579E+10	.0085	426.7	300.5	3.	2.07027E+11	.0011	291.9	3.81689E+08
21	4.50885E+10	.0123	426.7	107.4	2.	2.07454E+11	.0016	104.4	5.56172E+08
22	4.59322E+10	.0358	426.7	590.6	4.	2.07884E+11	.0047	573.2	1.64267E+09
23	4.46197E+10	.0047	426.7	977.1	5.	2.09176E+11	.0006	950.5	2.09503E+08
24	4.58738E+10	.0056	426.7	1461.9	6.	2.09963E+11	.0007	1419.9	2.57097E+08
25	3.19969E+10	.1419	482.2	292.4	3.	2.03482E+11	.0141	289.4	4.53934E+09
26	4.15230E+10	.0199	454.4	1450.2	6.	2.09106E+11	.0024	1417.0	8.26173E+08
27	4.25358E+10	.0538	454.4	585.2	4.	2.05850E+11	.0067	570.4	2.28785E+09
28	4.43490E+10	.0071	398.9	301.5	3.	2.09146E+11	.0009	293.4	3.13837E+08
29	4.30515E+10	.0113	398.9	107.6	2.	2.09566E+11	.0014	104.9	4.86136E+08
30	4.56197E+10	.0629	398.9	593.1	4.	2.10131E+11	.0082	576.3	2.86891E+09
31	4.38442E+10	.0057	398.9	980.5	5.	2.11383E+11	.0007	955.5	2.49143E+08
32	4.43160E+10	.0076	398.9	1466.1	6.	2.12425E+11	.0010	1428.2	3.35383E+08
33	3.35331E+10	.1183	496.1	1423.8	6.	2.06077E+11	.0121	1406.7	3.96621E+09
34	3.30240E+10	.1287	496.1	950.3	5.	2.04232E+11	.0131	939.2	4.25132E+09
35	3.24786E+10	.1705	496.1	572.8	4.	2.02973E+11	.0172	566.4	5.53841E+09
36	3.24786E+10	.1705	496.1	572.8	4.	2.02973E+11	.0172	566.4	5.53841E+09
37	2.79978E+10	.1832	496.1	103.6	2.	2.02710E+11	.0163	103.2	5.13051E+09
38	2.05689E+10	.2557	510.0	102.2	2.	2.01847E+11	.0174	102.9	5.25936E+09
39	2.17901E+10	.2966	510.0	286.3	3.	2.01350E+11	.0213	287.9	6.46350E+09
40	2.50426E+10	.2632	510.0	565.0	4.	2.02086E+11	.0213	565.2	6.59011E+09
41	2.63452E+10	.1996	510.0	938.5	5.	2.03320E+11	.0168	937.1	5.25910E+09
42	3.00219E+10	.1843	510.0	1410.0	6.	2.04119E+11	.0173	1400.0	5.53170E+09
43	2.27247E+10	.2744	523.9	1390.5	6.	2.03100E+11	.0203	1396.5	6.23658E+09
44	1.69434E+10	.3929	523.9	556.3	4.	2.01186E+11	.0225	563.9	6.65741E+09
45	1.44130E+10	.3959	523.9	282.2	3.	2.00498E+11	.0196	287.3	5.70646E+09
46	1.26248E+10	.3848	523.9	100.6	2.	2.01024E+11	.0168	102.7	4.85798E+09
47	4.36313E+10	.0080	357.2	108.5	2.	2.13138E+11	.0010	105.8	3.49388E+08
48	4.43680E+10	.0026	357.2	303.8	3.	2.12797E+11	.0003	296.0	1.16693E+08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700
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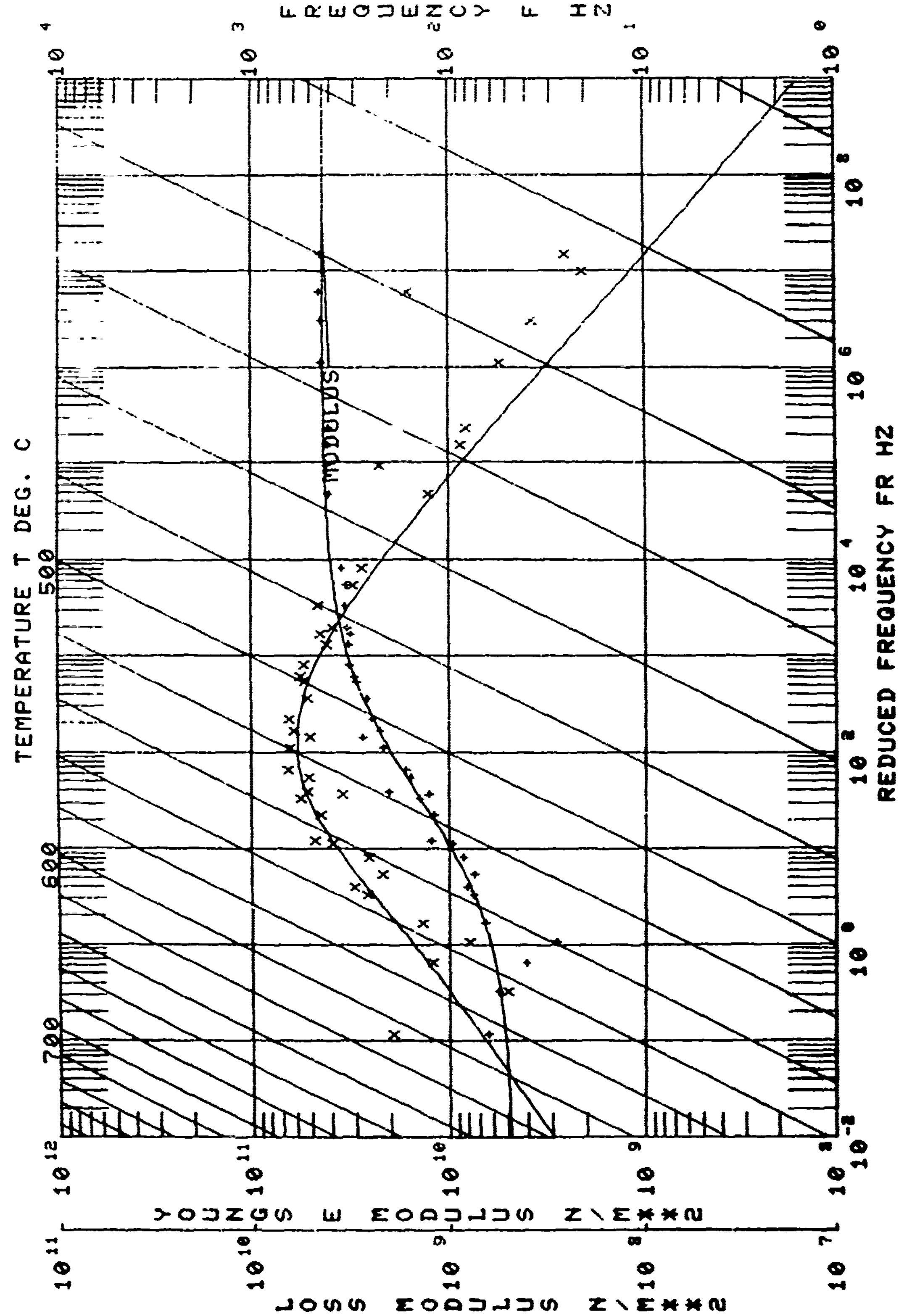
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS



TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-43-1

Date 10/31/79

Damping Material Borosilicate + 5% Na_2O + 2% Co_2O_3

Material Thickness 0.0196 cm Material Density 2.23 g/cc

Fixture No. 1 Beam Thickness 0.0953 cm

Beam Density 9.13 g/cc Beam Length 20.904 cm

Temperature Test Range: Between 900 °C and 540 °C

Frequency Test Range: Between 93 Hz and 1,472 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.55		Temperature	620 °C
	1,000 Hz	η_D 0.55		Temperature	675 °C
Range	100 Hz	550 °C	655 °C		
	1,000 Hz	630 °C	715 °C		

Complex Modulus E_D'':

Peak	100 Hz	6.6×10^9 PAS		Temperature	565 °C
	1,000 Hz	6.6×10^9 PAS		Temperature	615 °C
Range	100 Hz	550 °C	610 °C		
	1,000 Hz	570 °C	670 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-43-BS  BOROSILICATE +2%Co2O3 +5%Na2O NO HEAT TREAT
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0         FROM         MROM         N          ML
              A1           A2          A3         A4
   500.0  7.0000E-02  1.0500E+10     .674  2.8000E+05
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH         FROL        C
            B1       B2        B3          B4         B5
   500.0    .537     .900     -.500   1.8000E-02     .870
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS:

TABLE 15-B

Beam No. 01-43-1

Temp. (°F)	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1500	2	93.17	94.91	92.93	93.37	.44	.0047	.0014	
	3	260.92	265.8	260.50	261.27	.76	.0029	.0009	
	4	512.14	520.7	511.51	512.77	1.26	.0025	.0013	
	5	849.72	863.0	848.69	850.61	1.91	.0023	.0012	
	6	1271.6	1292	1270.15	1272.88	2.73	.0021	.00134	
1450	2	93.95	95.61	93.78	94.12	.33	.00356	.00096	
	4	516.1	524.7	515.57	516.73	1.16	.00224	.00136	
	6	1281.4	1301.8	1279.59	1283.01	3.41	.00266	.00206	
1425	4	518.00	526.7	517.40	518.65	1.25	.00241	.00166	
	5	859.4	872.7	858.21	860.44	2.23	.00259	.00175	
	6	1286.1	1306.8	1283.95	1288.1	4.14	.00322	.00267	
1400	3	265.00	269.5	264.64	265.27	.63	.00238	.00128	
	4	520.08	528.6	519.38	520.78	1.40	.00269	.00202	
	5	862.65	876.1	861.29	864.06	2.77	.00321	.00241	
	6	1291.24	1311.6	1288.20	1293.60	5.40	.00418	.00485	
1350	2	95.41	97.07	95.25	95.54	.29	.00304	.00139	
	3	266.95	271.06	266.51	267.35	.84	.00315	.00225	
	4	524.08	532.5	522.96	525.22	2.26	.00431	.00356	
	5	869.65	872.8	866.93	871.86	4.93	.00567	.00492	
	6	1301.7	1321.7	1295.81	1306.27	10.46	.00804	.00759	

Temp. (°F)	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1300	2	96.12	97.74	95.90	96.29	.39	.00406	.00276	
	3	269.15	273.4	268.43	269.93	1.50	.00557	.00467	
	4	528.52	536.0	526.51	530.57	4.06	.00768	.00712	
	5	877.51	889.3	872.44	881.51	9.07	.0103	.00959	
	6	1314.6	1329.9	1309.12	-	10.96	.0163	.0158	X
1250	2	96.92	98.48	96.52	97.22	.70	.00722	.00612	
	3	271.94	275.6	270.52	273.45	2.93	.0108	.0101	
	4	534.68	540.3	530.87	538.7	7.83	.0146	.0142	
	5	888.23	896.0	879.90	894.77	14.87	.0162	.0160	
	6	1333.51	1341	1319.37	1347.18	27.81	.0209	.02044	
1200	2	97.96	99.19	97.52	98.28	.76	.0151	.0141	X
	3	275.72	277.6	274.54	277.17	2.63	.0186	.01794	X
	4	543.5	544.1	537.64	550.23	12.59	.0232	.0227	
	5	901.81	902.4	888.62	912.00	23.38	.0259	.0254	
	6	1359.47	1351.3	1341.12	1377.18	36.06	.0265	.0261	
1150	3	281.74	279.6	278.34	285.66	7.32	.00260	.0253	
	4	555.6	547.4	548.52	563.96	15.44	.0278	.0274	
	5	922.34	908.7	905.67	932.98	27.31	.0296	.0289	
	6	1390.1	1360.3	1371.75	1409.51	37.76	.02716	.0268	

TABLE 15-B (Concluded)

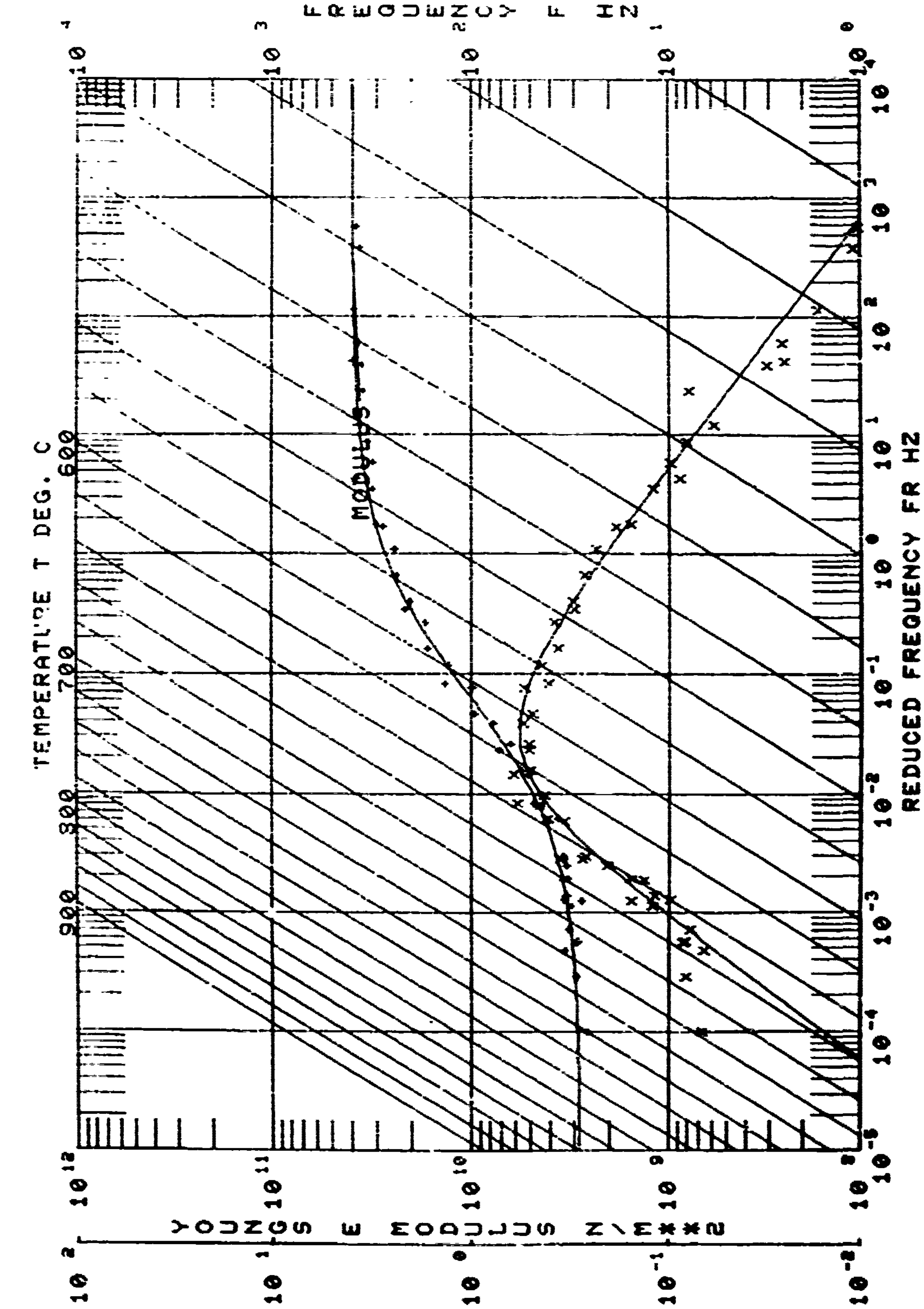
Beam No. 01-43-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	2	101.76	100.54	100.78	102.52	1.74	.0333	.0325	X
	3	288.37	281.5	284.42	-	-	.0274	.028	
	4	567.8	551.7	561.43	576.80	15.37	.0271	.0267	
	5	942.6	914.9	929.73	952.85	23.12	.0245	.024	
	6	1420.5	1369.7	1404.92	1435.47	30.55	.0215	.0211	
1050	2	104.69	101.21	103.71	105.48	1.77	.0330	.0323	X
	3	295.25	283.35	292.68	299.42	5.74	.0194	.0188	
	4	579.7	555.1	575.20		9.0	.0155	.0151	
	5	961.8	921	955.41	967.77	12.36	.0129	.0122	
	6	1444.5	1378.9	1436.98	1452.84	15.85	.0110	.0106	
1000	2	107.64	101.89	107.05	108.46	1.41	.0131	.0126	
	3	300.2	285.1	299.01	301.6	2.59	.00863	.0081	
	4	587.4	558.5	584.61	591.11	6.5	.0111	.0108	
	5	974.16	926.5	971.79	976.46	4.67	.0048	.0042	
	6	1461.5	1387.0	1458.21	1464.05	5.84	.0040	.0036	
950	2	108.58	102.6	108.37	108.82	.46	.00414	.00364	
	3	302.96	286.7	302.58	303.40	.82	.00271	.00241	
	4	593.9	561.7	590.11	597.26	7.15	.01204	.0116	
	4	594.2	561.7	591.20	596.92	5.72	.0096	.0093	
	5	981.2	931.8	980.24	982.08	1.84	.00188	.0015	
	6	1470.9	1394.6	1469.68	1472.24	2.56	.00174	.00144	

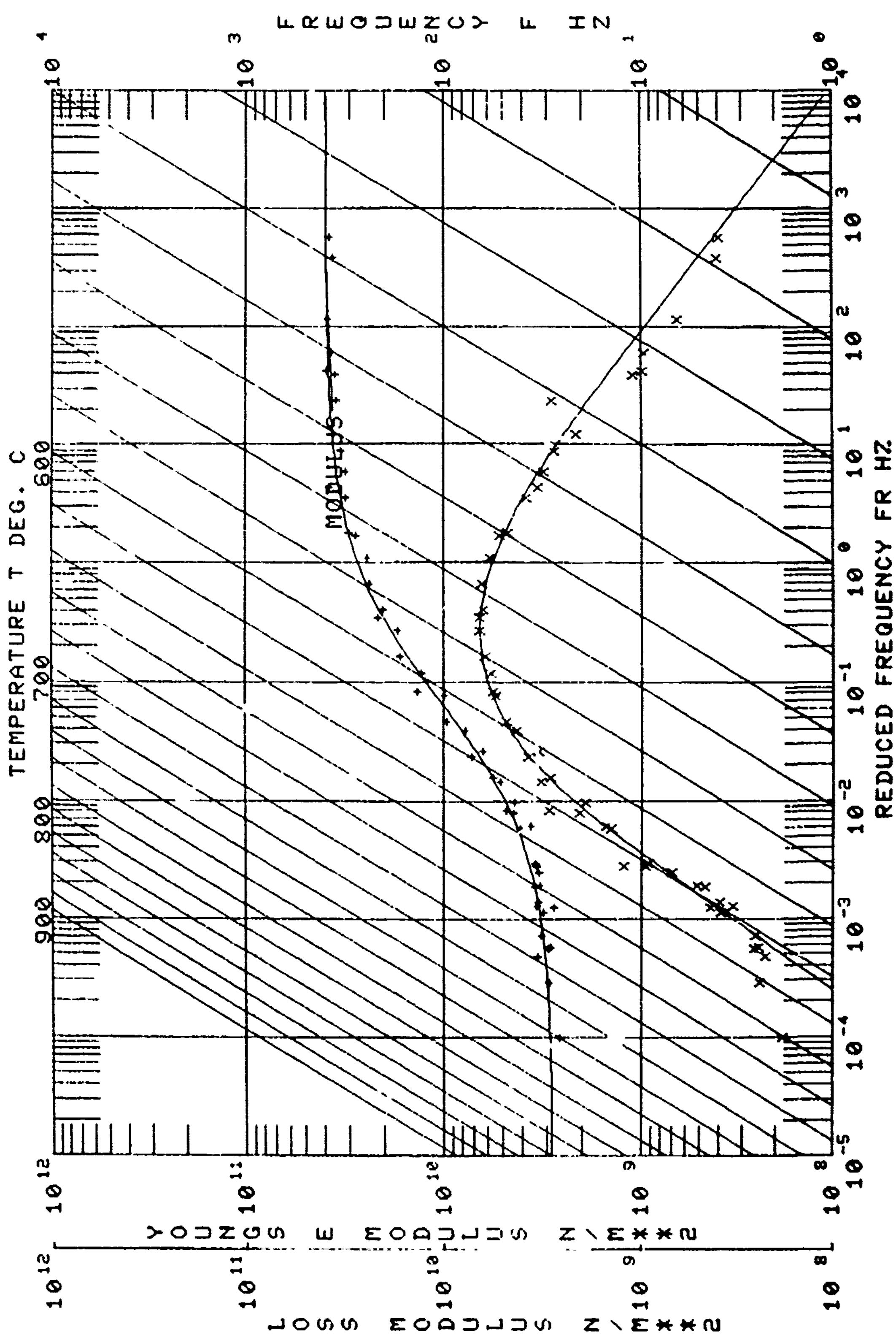
EXPERIMENTAL CODE : 30
MATERIAL :01-43-BS BOROSILICATE +2%[illegible]2O3 +5%Na2O NO HEAT TREAT
DATA SOURCES
MANUFACTURER :NONE
AFML :BEAM COATED ONE SIDE (UDRI NOV 3 78)
OTHER :NONE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	2.24767E+09	.1184	815.6	93.2	2.	1.68850E+11	.0014	94.9	2.66182E+08
2	9.72696E+09	.0179	815.6	260.9	3.	1.62244E+11	.0009	260.5	1.74422E+08
3	2.98294E+09	.0833	815.6	512.1	4.	1.68807E+11	.0013	520.7	2.48502E+08
4	3.40818E+09	.0679	815.6	849.7	5.	1.69689E+11	.0012	863.0	2.31301E+08
5	3.27532E+09	.0794	815.6	1271.6	6.	1.71071E+11	.0013	1292.0	2.60076E+08
6	3.37178E+09	.1204	787.8	1281.4	6.	1.73676E+11	.0021	1301.8	4.06046E+08
7	3.04618E+09	.0867	787.8	516.1	4.	1.71411E+11	.0014	524.7	2.64015E+08
8	2.66015E+09	.0698	787.8	93.9	2.	1.71350E+11	.0010	95.6	1.85758E+08
9	6.67633E+09	.0491	773.9	518.0	4.	1.69456E+11	.0017	521.7	3.27487E+08
10	3.45771E+09	.0998	773.9	859.4	5.	1.73604E+11	.0018	872.9	3.45023E+08
11	3.33318E+09	.1590	773.9	1286.1	6.	1.75012E+11	.0027	1306.8	5.30082E+08
12	3.48777E+09	.2784	760.0	1291.2	6.	1.76300E+11	.0049	1311.6	9.70891E+08
13	3.52416E+09	.1359	760.0	862.7	5.	1.74879E+11	.0024	876.1	4.78781E+08
14	3.20247E+09	.1244	760.0	520.1	4.	1.73968E+11	.0020	528.6	3.98317E+08
15	2.96367E+09	.0849	760.0	265.0	3.	1.73648E+11	.0013	269.5	2.51499E+08
16	2.83854E+09	.1580	732.2	267.0	3.	1.76365E+11	.0022	271.6	4.46442E+08
17	2.84862E+09	.0974	732.2	95.4	2.	1.76623E+11	.0014	97.1	2.77455E+08
18	3.36829E+09	.2117	732.2	524.1	4.	1.76545E+11	.0036	532.5	7.12997E+08
19	8.25820E+09	.1216	732.2	869.7	5.	1.73564E+11	.0049	872.8	1.00444E+09
20	3.69776E+09	.4177	732.2	1301.7	6.	1.79026E+11	.0076	1321.7	1.54461E+09
21	5.26926E+09	.6245	704.4	1314.6	6.	1.81254E+11	.0158	1329.9	3.29067E+09
22	4.50118E+09	.4388	704.4	877.5	5.	1.80189E+11	.0096	889.3	1.97523E+09
23	4.18043E+09	.3475	704.4	528.5	4.	1.78873E+11	.0071	536.0	1.45278E+09
24	3.52345E+09	.2689	704.4	269.2	3.	1.78710E+11	.0047	273.4	9.47554E+08
25	3.10423E+09	.1802	704.4	96.1	2.	1.79069E+11	.0028	97.7	5.59419E+08
26	3.46229E+09	.3645	676.7	96.9	2.	1.81791E+11	.0061	98.5	1.26208E+09
27	4.53029E+09	.4628	676.7	271.9	3.	1.81598E+11	.0101	275.6	2.09645E+09
28	5.74698E+09	.5177	676.7	534.7	4.	1.81755E+11	.0142	540.3	2.97524E+09
29	6.52576E+09	.5197	676.7	888.2	5.	1.82914E+11	.0160	896.0	3.39118E+09
30	7.90970E+09	.5569	676.7	1333.5	6.	1.84293E+11	.0204	1341.0	4.40498E+09
31	1.32083E+10	.4475	648.9	1359.5	6.	1.87135E+11	.0261	1351.3	5.91122E+09
32	1.01218E+10	.5524	648.9	901.8	5.	1.85536E+11	.0254	902.4	5.59169E+09
33	9.86390E+09	.5027	648.9	543.5	4.	1.84320E+11	.0227	544.1	4.95812E+09
34	7.39481E+09	.5197	648.9	275.7	3.	1.84243E+11	.0179	277.6	3.84306E+09
35	4.97795E+09	.5986	648.9	98.0	2.	1.84422E+11	.0141	99.2	2.98002E+09
36	1.39130E+10	.4133	621.1	281.7	3.	1.86907E+11	.0253	279.6	5.75018E+09
37	1.70589E+10	.3722	621.1	555.6	4.	1.86699E+11	.0274	547.6	6.34970E+09
38	1.73731E+10	.3889	621.1	922.3	5.	1.88136E+11	.0289	908.7	6.75676E+09
39	2.07354E+10	.3108	621.1	1390.1	6.	1.89636E+11	.0268	1360.3	6.44533E+09
40	2.83788E+10	.1896	593.3	1420.5	6.	1.92265E+11	.0211	1369.7	5.37981E+09
41	2.48498E+10	.2394	593.3	942.6	5.	1.90712E+11	.0240	914.9	5.94949E+09
42	2.41652E+10	.2713	593.3	567.8	4.	1.89505E+11	.0267	551.7	6.55561E+09
43	2.18974E+10	.3095	593.3	288.4	3.	1.89456E+11	.0280	281.5	6.77737E+09
44	1.61090E+10	.4693	593.3	101.8	2.	1.89476E+11	.0325	100.5	7.58807E+09
45	2.70148E+10	.3020	565.6	104.7	2.	1.92010E+11	.0323	101.2	8.15932E+09
46	3.07529E+10	.1579	565.6	295.2	3.	1.91954E+11	.0188	283.3	4.85507E+09
47	3.18874E+10	.1231	565.6	579.7	4.	1.91848E+11	.0151	555.1	3.92402E+09
48	3.21162E+10	.0994	565.6	961.8	5.	1.93264E+11	.0122	921.0	3.19367E+09
49	3.40405E+10	.0830	565.6	1444.5	6.	1.94857E+11	.0166	1378.9	2.82469E+09

50	3.76213E+10	.0263	537.8	1461.5	6.	1.97153E+11	.0036	1387.0	9.88269E+08
51	3.61471E+10	.0314	537.8	974.2	5.	1.95579E+11	.0042	926.5	1.13617E+09
52	3.85368E+10	.0893	537.8	107.6	2.	1.94599E+11	.0126	101.9	3.44146E+09
53	3.66988E+10	.0596	537.8	300.2	3.	1.94333E+11	.0081	285.1	2.18699E+09
54	3.59648E+10	.0807	537.8	587.4	4.	1.94275E+11	.0108	558.6	2.90308E+09
55	3.93686E+10	.0815	510.0	593.9	4.	1.96438E+11	.0116	561.7	3.20667E+09
56	3.73844E+10	.0110	510.0	981.2	5.	1.97823E+11	.0015	931.8	4.12333E+08
57	3.85628E+10	.0104	510.0	1470.9	6.	1.99319E+11	.0014	1394.6	4.00827E+08
58	3.90623E+10	.0170	510.0	303.0	3.	1.96520E+11	.0024	286.7	6.65289E+08
59	4.00483E+10	.0253	510.0	108.6	2.	1.97320E+11	.0036	102.6	1.01359E+09
60	3.96453E+10	.0649	510.0	594.2	4.	1.96438E+11	.0093	561.7	2.57485E+09



TEMPERATURE T DEG. C
600
700
800
900
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
600
700
800
900
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-44-1

Date 11/6/79

Damping Material Borosilicate + 5% Na_2O + 2% Co_2O_3

Material Thickness 0.0193 cm Material Density 2.23 g/cc

Fixture No. 1 Beam Thickness 0.0960 cm

Beam Density 9.13 g/cc Beam Length 20.899 cm

Temperature Test Range: Between 760 °C and 480 °C

Frequency Test Range: Between 90 Hz and 1,500 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.90	Temperature	650 °C	
	1,000 Hz	η_D 0.90	Temperature	696 °C	
Range	100 Hz	610 °C	680 °C		
	1,000 Hz	630 °C	745 °C		

Complex Modulus E_D'':

Peak	100 Hz	7.6×10^9 PAS	Temperature	590 °C	
	1,000 Hz	7.6×10^9 PAS	Temperature	630 °C	
Range	100 Hz	555 °C	610 °C		
	1,000 Hz	590 °C	660 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :BOROSILICATE + 2% Co2O3 + 5% Na2O
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM           MROM        N          ML
               A1             A2         A3         A4
   500.0  1.6000E-02  5.0000E+09     .600  5.5000E+08
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH         FROL       C
            B1       B2        B3          B4        B5
   500.0     .820     .450    -.500  2.0000E-02     .500
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Beam was cured in Lindburg furnace for 120 hours at 515°C prior to testing.

TABLE 16-B

Beam No. 01-44-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1500	2	98.59	95.41	98.28	98.92	0.64	.00649	.00279	
1500	3	276.58	267.10	275.61	276.98	1.37	.00496	.00302	
1500	4	541.64	524.00	540.26	543.11	2.85	.00526	.00325	
1500	5	894.97	869.70	892.72	897.72	5.50	.00615	.00508	
1500	6	1336.10	1300.00	1331.21	1340.29	9.08	.00680	.00604	
1450	2	99.48	96.14	99.18	99.75	0.57	.00573	.00290	
1450	3	278.60	269.15	277.86	279.38	1.52	.00546	.00402	
1450	4	546.32	528.00	544.42	548.34	3.92	.00718	.00630	
1450	5	902.64	876.20	898.29	906.90	8.61	.00954	.00864	
1450	6	1343.28	1309.80	1332.92	1353.64	20.72	.01542	.01482	
1400	2	100.27	96.83	99.95	100.59	0.64	.00638	.00413	
1400	3	280.91	271.20	279.89	282.12	2.23	.00794	.00683	
1400	4	551.28	532.08	548.08	554.96	6.88	.01248	.01180	
1400	5	991.13	882.00	903.00	919.26	16.26	.01785	.01705	
1400	6	1360.53	1319.90	1349.72	1369.50	19.78	.01454	.01403	X
1400	2	94.70	96.83	94.57	94.87	0.30	.00317	.00097	
1400	4	521 32	532.08	520.30	522.33	2.03	.00389	.00322	
1400	5	864.80	882.00	862.95	866.69	3.74	.00432	.00352	
1400	6	1295.06	1319.90	1292.04	1298.00	6.02	.00465	.00414	
1400	6	1295.44	1319.90	1291.93	1298.95	7 02	.00542	.00491	
1350	2	101.16	97.55	100.64	101.63	1.01	.0098	.00818	
1350	3	283.79	273.20	281.88	285.96	4.08	.01438	.01346	
1350	4	559.11	536.00	552.45	565.77	13.32	.02382	.02326	
1350	5	925.55	889.10	909.42	942.47	33.05	.03571	.03496	
1350	6	1394.68	1339.60	1380.58	1407.02	51.96	.03726	.03690	X
1350	2		97.55						
1350	4	525.33	536.00	523.37	527.31	3.94	.00750	.00695	
1350	6	1306.91	1339.60	1300.70	1313.37	12.67	.00969		
1350	2	95.64	97.55	95.47	95.80	0.33	.00345	.00165	
1350	3	268.02	273.20	267.66	268.47	0.81	.00302	.00211	
1350	4	526.04	536.00	524.87	527.24	2.37	.0045	.00395	
1350	5	872.54	889.10	870.00	975.04	5.04	.00578	.00503	
1350	6	1306.82	1339.60	1302.18	1312.00	9.82	.00751	.00706	
1300	2	102.29	98.25	101.16	103.29	2.13	.02082	.01935	
1300	3	288.04	275.02	283.76	291.75	7.99	.02774	.02695	
1300	4	571.58	540.20	562.02	585.00	22.98	.04020	.03971	
1300	5	952.46	895.20	928.78	971.04	42.26	.04437	.04365	
1300	6	1434.44	1339.20	1420.76	1447.24	52.03	.03628	.03585	
1300	2	96.31	98.25	96.05	96.49	0.44	.00465	.00309	
1300	3	270.19	275.20	269.31	271.01	1.70	.00629	.00156	
1300	4	530.62	540.20	528.04	533.35	5.31	.01001	.00952	
1300	5	880.50	895.20	874.43	887.14	12.71	.01443	.01372	
1300	6	1322.66	1339.20	1312.29	1334.19	21.90	.01656	.01613	
1250	2	104.66	90.90	102.63	106.72	4.09	.03908	.03788	
1250	3	297.15	277.18	293.97	299.11	10.10	.03399	.03327	X
1250	4	588.76	544.00	583.58	593.94	20.36	.03458	.03412	X

TABLE 16-B (Continued)

Beam No. 01-44-1

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1250	5	977.40	901.50	963.90	991.36	27.46	.02809	.02739	
1250	6	1463.65	1348.80	1450.19	1480.52	30.33	.02072	.02030	
1250	2	97.11	98.90	96.51	97.42	0.91	.00937	.00817	
1250	3	272.77	277.18	271.30	274.24	2.94	.01077	.01005	
1250	4	536.81	544.00	532.61	541.55	8.94	.01665	.01620	
1250	5	892.26	901.50	881.91	900.89	18.98	.02127	.02057	
1250	6	1340.59	1348.80	1327.64	1351.52	23.88	.01781	.01740	
1200	2	107.80	99.66	106.99	109.30	4.56	.04229	.04219	X
1200	3	302.55	279.12	298.91	306.20	7.29	.02409	.02343	
1200	4	596.30	547.63	591.66	603.70	12.04	.02019	.01976	
1200	5	993.55	907.75	985.98	1000.32	14.34	.01443	.01375	
1200	6	1482.88	1358.20	1474.88	1491.88	17.00	.01146	.01104	
1200	2	97.94	98.66	97.21	98.67	1.46	.01491	.01390	
1200	3	276.86	279.12	278.81	279.79	5.98	.02160	.02094	
1200	4	546.85	547.63	540.05	554.66	14.61	.02672	.02628	
1200	5	910.57	907.75	905.07	923.22	18.15	.01993	.01925	
1200	6	1351.66	1358.20	1337.44	1361.16	23.72	.01758	.01713	
1150	2	110.42	100.30	109.65	111.69	2.04	.01847	.01765	
1150	3	308.64	281.15	206.94	310.20	3.26	.01056	.00992	
1150	4	603.26	551.60	600.11	607.90	7.29	.01208	.01166	
1150	5	1007.26	913.60	1003.84	1011.17	7.33	.00728	.00660	
1150	6	1502.12	1367.50	1497.81	1506.90	9.09	.00605	.00562	
1150	3	285.11	281.15	281.44	288.24	6.80	.02395	.02321	

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1150	4	559.56	551.60	551.46	570.70	19.34	.03438	.03396	
1150	5	933.08	913.60	910.48	952.48	42.00	.04501	.04434	
1150	6	1405.85	1367.50	1387.57	1428.24	40.70	.02892	.02850	
1100	2	111.81	100.95	111.43	112.25	0.82	.00733	.00665	
1100	3	312.07	282.90	311.29	312.90	1.61	.00516	.00454	
1100	4	615.40	550.00	613.91	617.24	3.36	.00546	.00505	
1100	5	1017.86	919.60	1015.45	1020.02	4.57	.00499	.00382	
1100	6	1516.56	1376.40	1513.61	1519.51	5.90	.00389	.00344	
1100	2	104.10	100.95	103.60	105.00	1.40	.01345	.01275	
1100	3	295.60	282.90	292.76	298.48	5.73	.03780	.03700	X
1100	4	579.12	555.00	572.35	588.52	16.17	.02790	.02750	
1100	5	963.40	919.60	957.04	969.72	11.68	.02360	.02300	X
1100	6	1444.40	1376.40	1431.84	1459.72	27.88	.01930	.01870	
1050	2	112.90	101.30	112.60	113.12	0.52	.00461	.00405	
1050	3	314.96	284.70	314.44	315.51	1.07	.00340	.00280	
1050	4	620.55	558.50	619.44	621.77	2.33	.00375	.00335	
1050	5	1026.77	925.20	1025.15	1028.17	3.02	.00294	.00228	
1050	6	1529.70	1384.60	1327.38	1531.56	4.18	.00273	.00225	
1050	2	106.60	101.30	105.79	107.55	1.76	.03245		X
1050	3	299.60	284.70	298.53	301.21	2.68	.01744	.01684	X
1050	4	589.62	558.50	585.75	594.32	8.57	.01453	.01413	
1050	5	981.20	925.20	974.90	987.00	12.10	.01233	.01170	
1050	6	1466.30	1384.80	1459.00	1473.10	14.10	.00982	.00934	

TABLE 16-B (Concluded)

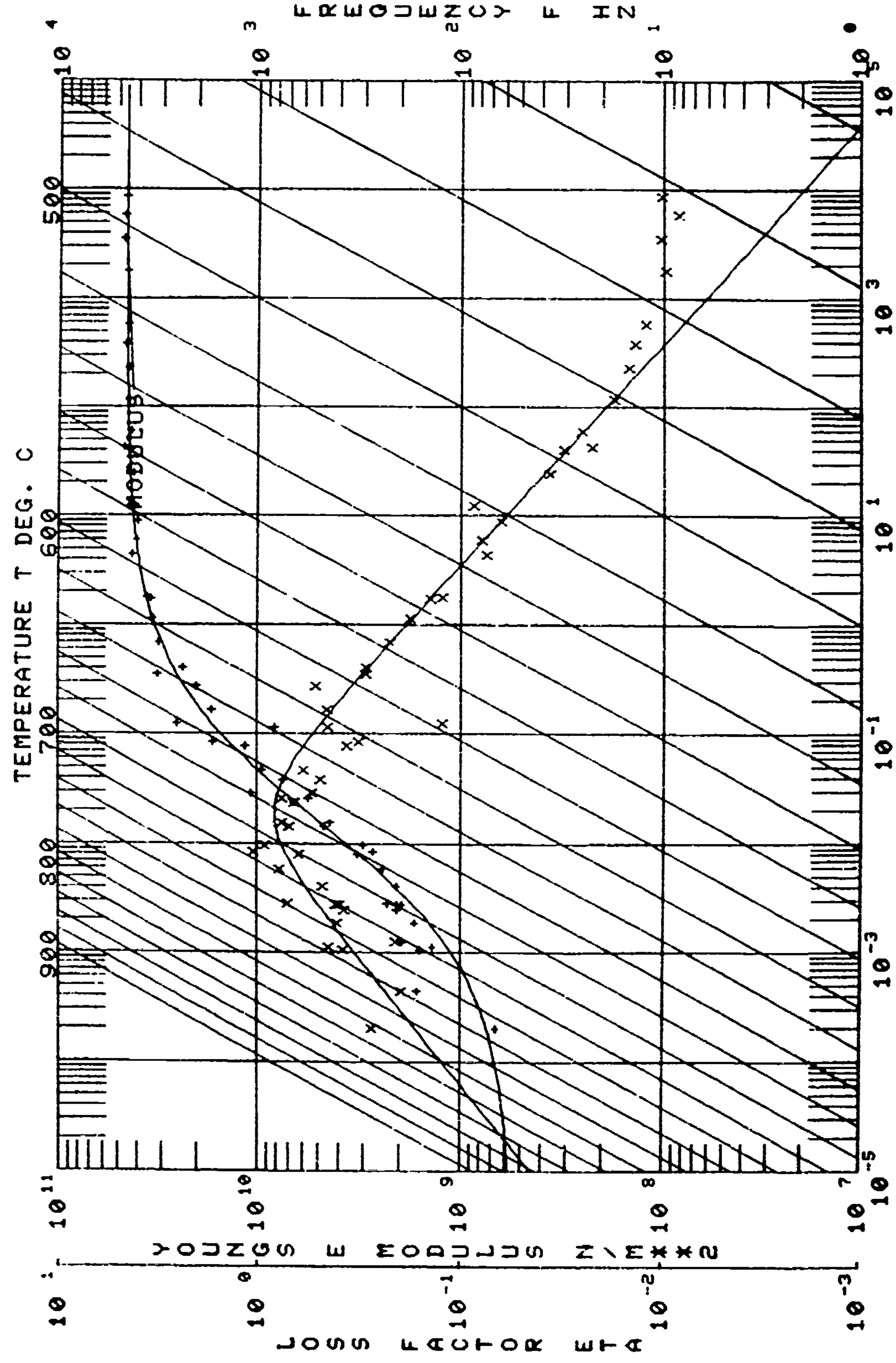
Beam No. 01-44-1

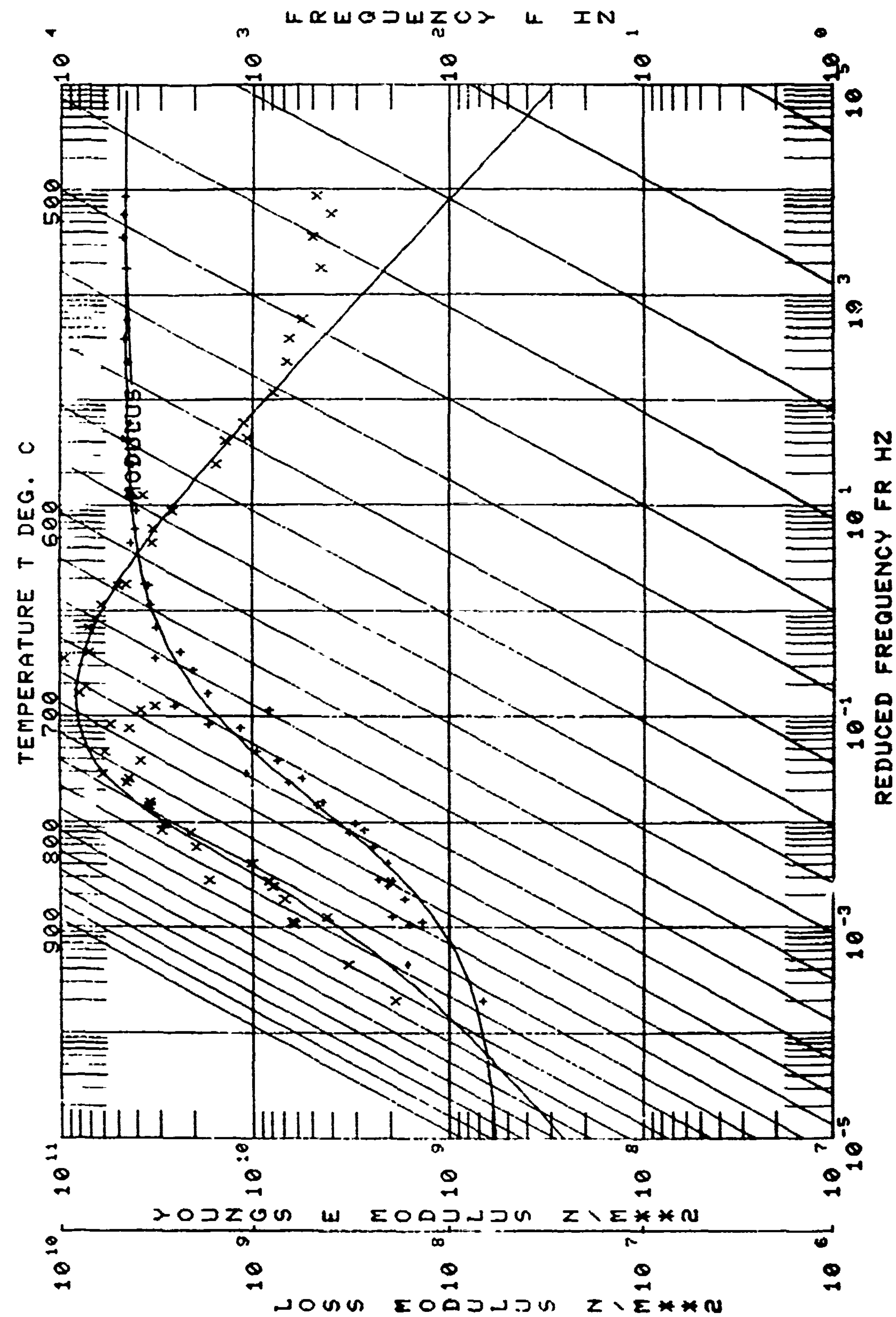
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1000	2	113.86	102.24	113.66	114.00	0.34	.00299	.00243	
1000	3	317.48	286.37	317.03	317.92	0.89	.00280	.00220	
1000	4	625.38	561.80	624.48	626.29	1.81	.00289	.00249	
1000	5	1035.00	930.90	1033.94	1036.14	2.20	.00213	.00147	
1000	6	1541.50	1392.80	1539.96	1399.60	3.00	.00195	.00147	
1000	2	108.84	102.74	108.54	109.19	0.65	.01165		X
1000	3	304.07	286.37	305.71	309.21	4.00	.01315		
1000	4	597.15	561.80	595.53	598.84	3.31	.00554		
1000	5	992.25	930.90	989.73	994.59	4.86	.00490		
1000	6	1482.08	1392.80	1478.92	1484.70	5.78	.00390		
950	2	110.09	107.80	109.87	110.28	0.41	.00372		
950	3	307.11	287.95	306.69	302.54	0.85	.00277		
950	4	602.52	564.75	601.74	603.17	1.43	.00237		
950	5	1000.88	935.90	999.62	1001.88	2.26	.00226		
950	6	1494.10	1400.40	1492.48	1495.40	2.92	.00195		
900	2	110.84	103.82	110.74	110.96	0.22	.00195		
900	3	309.21	289.50	308.47	309.46	0.49	.00158		
900	4	606.37	565.40	605.85	606.89	1.04	.00172		
900	5	1006.70	940.60	1005.97	1007.36	1.39	.00138		
900	6	1503.52	1407.80	1402.45	1504.92	2.47	.00164		

EXPERIMENTAL CODE : 28
MATERIAL :BOROSILICATE + 2% Co2O3 + 5% Na2O
DATA SOURCES
MANUFACTURER :NONE
AFML :BEAM COATED ONE SIDE (UDRI)
OTHER :NONE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.99133E+09	.4216	760.0	1295.0	6.	1.75545E+11	.0041	1319.9	8.39530E+08
2	2.28582E+09	.1406	704.4	270.2	3.	1.78035E+11	.0016	275.2	3.21433E+08
3	1.63528E+09	.3873	704.4	96.3	2.	1.77909E+11	.0031	98.2	6.33318E+08
4	4.83164E+09	.7105	704.4	1322.7	6.	1.80717E+11	.0161	1339.2	3.43292E+09
5	2.09926E+09	.4905	732.2	872.5	5.	1.77088E+11	.0050	889.1	1.02964E+09
6	2.10411E+09	.3817	732.2	526.0	4.	1.75874E+11	.0039	536.0	8.03131E+08
7	2.00312E+09	.2135	732.2	268.1	3.	1.75457E+11	.0021	273.2	4.27700E+08
8	1.68243E+09	.1983	732.2	95.6	2.	1.75383E+11	.0016	97.6	3.33548E+08
9	2.36055E+09	.7223	676.7	97.1	2.	1.80271E+11	.0082	98.9	1.70512E+09
10	3.30038E+09	.6409	676.7	272.8	3.	1.80606E+11	.0101	277.2	2.11512E+09
11	5.77739E+09	.7682	676.7	892.3	5.	1.82062E+11	.0206	901.5	4.43794E+09
12	7.65598E+09	.4999	676.7	1340.6	6.	1.83317E+11	.0174	1348.8	3.82697E+09
13	8.33258E+09	.4602	648.9	1351.7	6.	1.85881E+11	.0171	1358.2	3.83467E+09
14	1.18435E+10	.3699	648.9	910.6	5.	1.84595E+11	.0193	907.7	4.38112E+09
15	9.74324E+09	.6024	648.9	546.8	4.	1.83589E+11	.0263	547.6	5.86919E+09
16	6.76027E+09	.6766	648.9	276.9	3.	1.83143E+11	.0209	279.1	4.57380E+09
17	2.75752E+09	1.0709	648.9	97.9	2.	1.83052E+11	.0139	99.7	2.95308E+09
18	2.11939E+09	.4013	760.0	1295.4	6.	1.75545E+11	.0042	1319.9	8.50453E+08
19	1.69915E+10	.3233	621.1	285.1	3.	1.85817E+11	.0232	281.2	5.49283E+09
20	1.71884E+10	.4692	621.1	559.6	4.	1.86261E+11	.0340	551.6	8.06405E+09
21	2.05218E+10	.5257	621.1	933.1	5.	1.86982E+11	.0443	913.6	1.07873E+10
22	2.39254E+10	.2979	621.1	1405.9	6.	1.88435E+11	.0285	1367.5	7.12725E+09
23	1.09355E+10	.5540	621.1	100.4	2.	1.85411E+11	.0267	100.3	6.05866E+09
24	2.53889E+10	.1264	593.3	104.1	2.	1.87822E+11	.0127	100.9	3.20795E+09
25	3.15624E+10	.2282	593.3	579.1	4.	1.88564E+11	.0275	555.0	7.20149E+09
26	3.22046E+10	.3014	593.3	295.6	3.	1.88137E+11	.0370	282.9	9.70791E+09
27	3.38245E+10	.1811	593.3	963.4	5.	1.89446E+11	.0230	919.6	6.12602E+09
28	4.03858E+10	.0649	565.6	1466.3	6.	1.93233E+11	.0093	1384.8	2.62250E+09
29	4.09594E+10	.0800	565.6	981.2	5.	1.91761E+11	.0117	925.2	3.27616E+09
30	3.64312E+10	.1255	565.6	299.6	3.	1.90539E+11	.0168	284.7	4.57386E+09
31	4.32932E+10	.0766	537.8	108.8	2.	1.92653E+11	.0116	102.2	3.31629E+09
32	4.18594E+10	.0888	537.8	304.1	3.	1.92781E+11	.0131	286.4	3.71574E+09
33	4.43546E+10	.0318	537.8	992.2	5.	1.94131E+11	.0049	930.9	1.41112E+09
34	4.25522E+10	.0370	537.8	597.2	4.	1.93213E+11	.0055	561.8	1.57410E+09
35	4.36843E+10	.0258	537.8	1482.1	6.	1.95472E+11	.0039	1392.8	1.12494E+09
36	4.72284E+10	.0231	510.0	110.1	2.	1.94769E+11	.0037	102.8	1.09073E+09
37	4.48820E+10	.0179	510.0	307.1	3.	1.94914E+11	.0028	288.0	8.02444E+08
38	4.51439E+10	.0152	510.0	602.5	4.	1.95248E+11	.0024	564.7	6.88429E+08
39	4.67648E+10	.0142	510.0	1000.9	5.	1.96222E+11	.0023	935.9	6.64697E+08
40	4.67937E+10	.0104	482.2	1503.5	6.	1.99705E+11	.0016	1407.8	4.88848E+08
41	4.77128E+10	.0086	482.2	1006.7	5.	1.98197E+11	.0014	940.6	4.10998E+08
42	1.40337E+09	.4575	760.0	521.3	4.	1.73311E+11	.0032	532.1	6.42016E+08
43	6.80722E+08	.2818	760.0	94.7	2.	1.72804E+11	.0010	96.8	1.91821E+08
44	1.70990E+09	.4136	760.0	864.8	5.	1.74271E+11	.0035	882.0	7.07251E+08
45	2.48908E+09	.7919	704.4	530.6	4.	1.78641E+11	.0095	540.2	1.97099E+09
46	3.05800E+09	.9371	704.4	880.5	5.	1.79526E+11	.0137	895.2	2.86578E+09
47	4.46694E+09	.7718	676.7	536.8	4.	1.81164E+11	.0162	544.0	3.44739E+09
48	3.49885E+10	.1442	593.3	1444.4	6.	1.90896E+11	.0187	1376.4	5.04493E+09
49	4.57048E+10	.0125	510.0	1494.1	6.	1.97611E+11	.0019	1400.4	5.73330E+08

50	4.83101E+10	.0105	482.2	606.4	4.	1.95697E+11	.0017	565.4	5.09038E+08
51	4.62144E+10	.0101	482.2	309.2	3.	1.97018E+11	.0016	289.5	4.64752E+08
52	4.62144E+10	.0101	482.2	309.2	3.	1.97018E+11	.0016	289.5	4.64752E+08


TEMPERATURE T DEG. C
500
600
700
800
900
MODULUS
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
MODULUS
500
600
700
800
900

Beam No. 01-44-2

Date 3/79

Damping Material 75.4% SiO_2 + 12.75% Na_2O + 10.75% CaO + 3% Al_2O_3 + 2% Co_2O_3

Material Thickness 0.0221 cm Material Density 2.51 g/cc

Fixture No. 1 Beam Thickness 0.0960 cm

Beam Density 9.13 g/cc Beam Length 20.889 cm

Temperature Test Range: Between 815 °C and 540 °C

Frequency Test Range: Between 95 Hz and 1,550 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.25		Temperature	675 °C
	1,000 Hz	η_D 0.25		Temperature	700 °C
Range	100 Hz	650 °C	700 °C		
	1,000 Hz	700 °C	730 °C		

Complex Modulus E_D":

Peak	100 Hz	8.3×10^9 PAS		Temperature	650 °C
	1,000 Hz	8.3×10^9 PAS		Temperature	700 °C
Range	100 Hz	640 °C	675 °C		
	1,000 Hz	665 °C	730 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-12
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  Te         FROM         MROM       N        ML
              A1           A2        A3       A4
   610.0  6.0000E-01  3.1000E+10   .550  1.7300E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL    SL       SH        FROL        C
            B1      B2       B3         B4         B5
   610.0    .250    .483    -.350  6.0000E-01     .300
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J85-12, test 1. Beam was retested 01-44-3.

TABLE 17-B

Beam No. 01-44-2

°F		f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
Temp.	Mode								
1500	2	98.59	95.41	98.28	98.92	.64	.00649	.00279	
	3	276.58	267.[illegible]	275.61	276.98	1.37	.00496	.00302	
	4	541.64	524.0	540.26	543.11	2.85	.00526	.00325	
	5	894.97	869.7	892.72	897.72	5.50	.00615	.00508	
	6	1336.1	1300	1331.21	1340.29	9.08	.00680	.00604	
1450	2	99.48	96.14	99.18	99.75	.57	.00573	.00290	
	3	278.60	269.15	277.86	279.38	1.52	.00546	.00402	
	4	546.32	528.0	544.42	548.34	3.92	.00718	.00630	
	5	902.64	876.2	898.29	906.90	8.61	.00954	.00864	
	6	1343.28	1309.8	1332.92	1353.64	20.72	.01542	.01482	
1400	2	100.27	96.83	99.95	100.59	.64	.00638	.00413	
	3	280.91	271.2	279.89	282.12	2.23	.00794	.00683	
	4	551.28	532.08	548.08	554.96	6.88	.01248	.01180	
	5	911.13	882	903.00	919.2[illegible]	16.26	.01785	.01705	
	6	1360.53	1319.9	1349.72	1369.50	19.78	.01454	.01403	x
1350	2	101.16	97.55	100.64	101.63	1.01	.00998	.00818	
	3	283.79	273.2	281.88	285.96	4.08	.01438	.01346	
	4	559.11	536.0	552.45	565.77	13.32	.02382	.02326	
	5	925.55	889.1	909.42	942.47	33.05	.03571	.03496	
	6	1394.68	1339.6	1380.58	1407.02	51.96	.03726	.03680	x

°F		f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
Temp.	Mode								
1300	2	102.29	98.25	101.16	103.29	2.13	.02082	.01935	
	3	288.04	275.2	283.76	291.75	7.99	.02774	.02695	
	4	571.58	540.2	562.02	585.00	22.98	.04020	.03971	
	5	952.46	895.2	928.78	971.04	42.26	.04437	.04365	
	6	1434.44	1339.2	1420.76	1447.24	52.03	.03628	.03585	
1250	2	104.66	98.9	102.63	106.72	4.09	.03908	.03788	
	3	297.15	277.18	293.97	299.11	10.10	.03399	.03327	x
	4	588.76	544.0	583.58	593.94	20.36	.03458	.03412	x
	5	977.40	901.5	963.90	991.36	27.46	.02809	.02739	
	6	1463.65	1348.8	1450.19	1480.52	30.33	.02702	.02030	
1200	2	107.80	99.66	106.98	109.30	4.56	.04229	.04219	x
	3	302.55	279.12	298.91	306.20	7.29	.02409	.02343	
	4	596.3	547.63	591.66	603.20	12.04	.02019	.01976	
	5	993.55	907.75	985.98	1000.32	14.34	.01443	.01375	
	6	1482.88	1358.2	1474.88	1491.88	17.00	.01146	.01104	
1150	2	110.42	100.3	109.65	111.69	2.04	.01847	.01765	
	3	308.64	281.15	306.94	310.2	3.26	.01036	.00992	
	4	603.26	551.6	600.11	607.4	7.29	.01208	.01166	
	5	1007.26	913.6	1003.84	1011.77	7.33	.00728	.0066	
	6	1502.12	1367.5	1497.81	1506.9	9.09	.00605	.00562	

TABLE 17-B (Concluded)

Beam No. 01-44-2

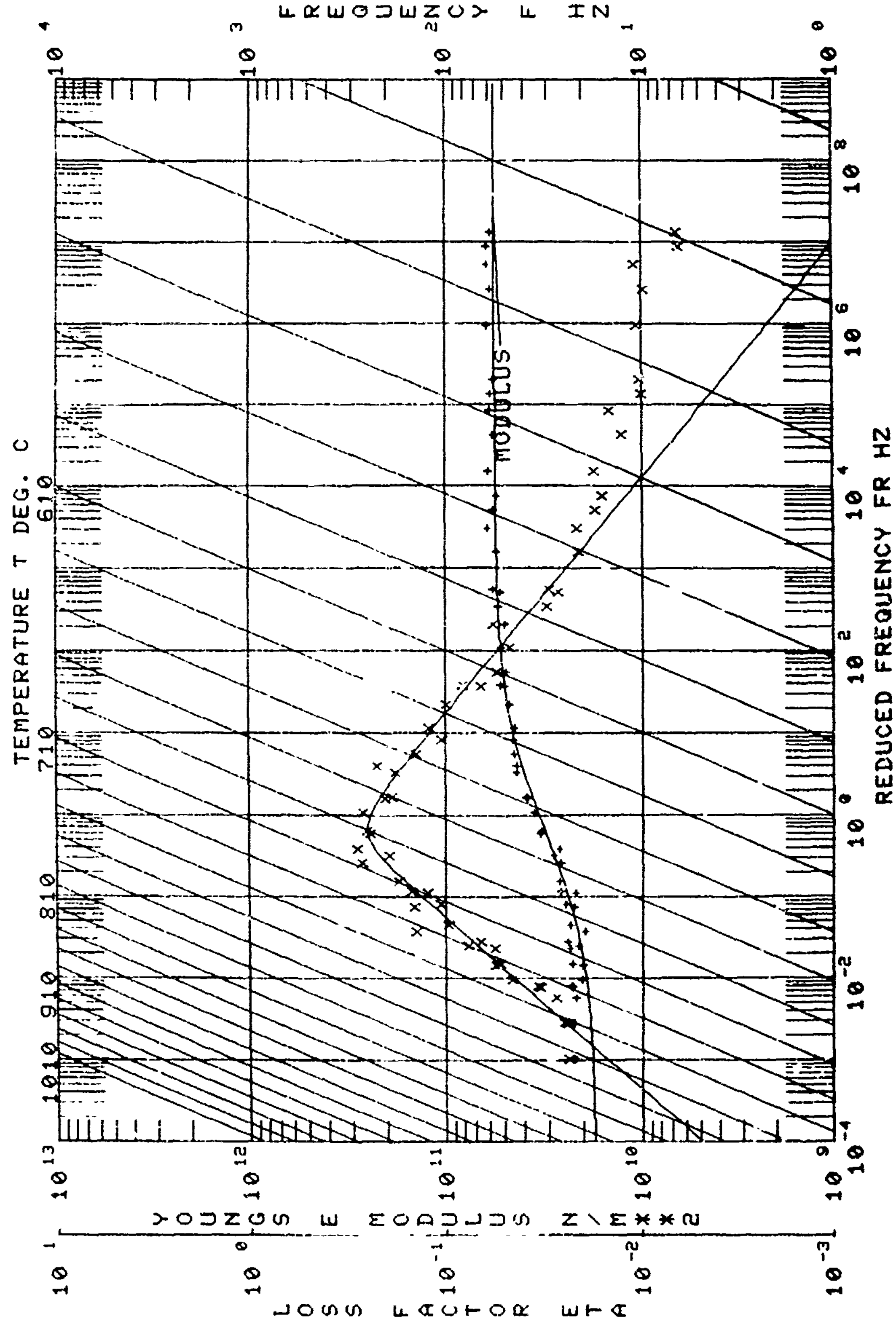
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	2	111.81	100.95	111.43	112.25	.82	.00733	.00665	
	3	312.07	282.9	311.29	312.90	1.61	.00516	.00454	
	4	615.40	550	613.91	617.24	3.36	.00546	.00505	
	5	1017.86	919.6	1015.45	1020.02	4.57	.00499	.00382	
	6	1516.56	1376.4	1513.61	1519.51	5.90	.00389	.00344	
1050	2	112.90	101.3	112.60	113.12	.52	.00461	.00405	
	3	314.96	284.7	314.44	315.51	1.07	.0034	.0028	
	4	620.55	558.5	619.44	621.77	2.33	.00375	.00335	
	5	1026.77	925.2	1025.15	1078.17	3.02	.00294	.00228	
	6	1529.7	1384.8	1327.38	1531.56	4.18	.00273	.00225	
1000	2	113.86	102.2	113.66	114.00	.34	.00299	.00243	
	3	317.48	286.37	317.03	317.92	.89	.0028	.0022	
	4	625.38	561.8	624.48	626.29	1.81	.00289	.00249	
	5	1035.0	930.9	1033.94	1036.14	2.20	.00213	.00147	
	6	1541.5	1392.8	1539.96	1399.6	3.00	.00195	.00147	

EXPERIMENTAL CODE : 47
MATERIAL :J85-12
DATA SOURCES
MANUFACTURER :N
AFML :UDRI BEAM COATED ONE SIDE
OTHER :74.5% SI O2, 12.75% NA2 O, 10.75% CA O, 3% AL2 O3, 2% CO2 O3

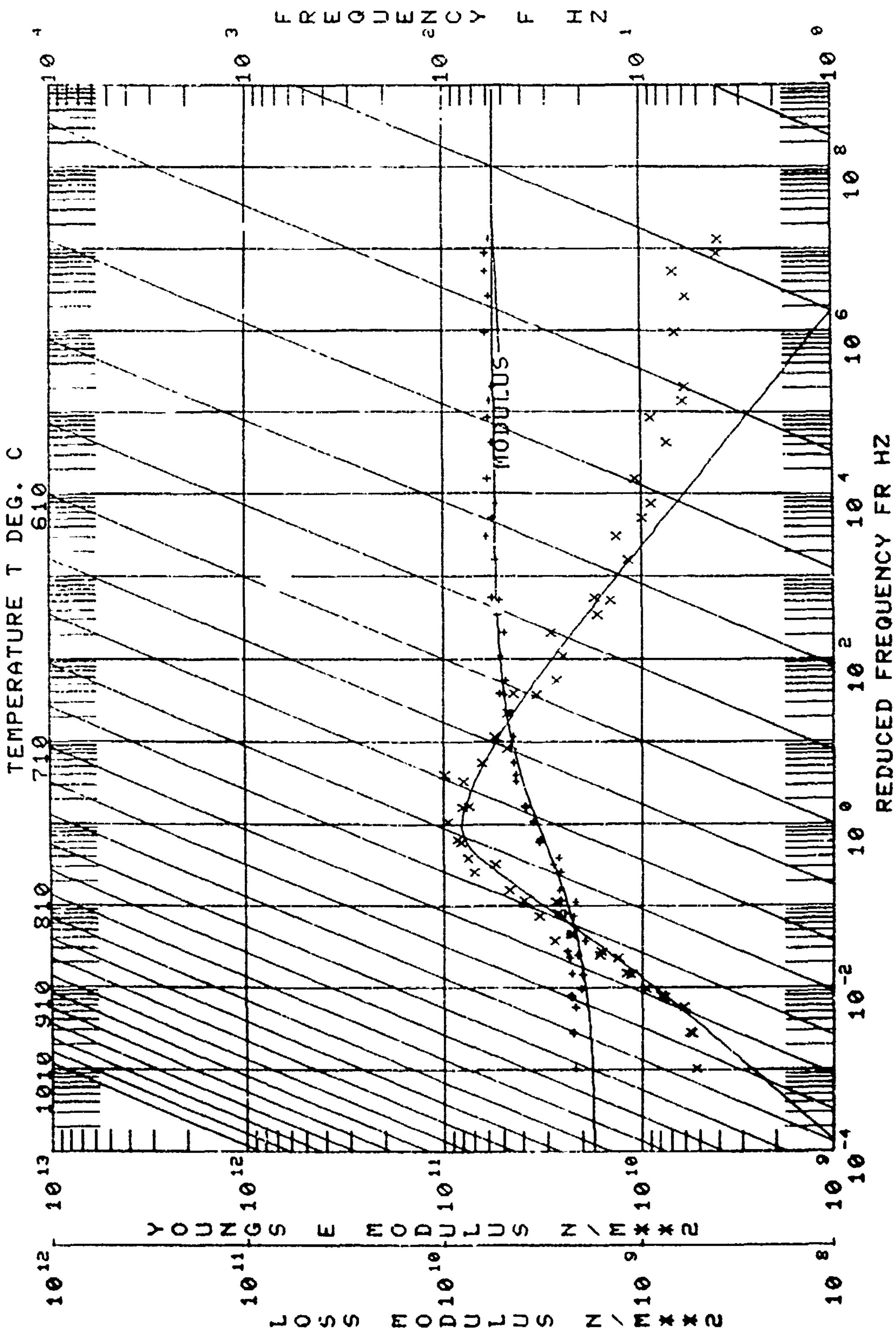
01-44-2

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	2.21087E+10	.0241	815.6	98.6	2.	1.67773E+11	.0028	95.4	5.33274E+08
2	2.29054E+10	.0254	815.6	276.6	3.	1.67709E+11	.0030	267.1	5.80674E+08
3	2.22716E+10	.0280	815.6	541.6	4.	1.68088E+11	.0033	524.0	6.22956E+08
4	2.07382E+10	.0467	815.6	895.0	5.	1.69444E+11	.0051	869.7	9.68530E+08
5	2.03644E+10	.0566	815.6	1336.1	6.	1.70292E+11	.0060	1300.0	1.15300E+09
6	1.98428E+10	.1438	787.8	1343.3	6.	1.72869E+11	.0148	1309.8	2.85349E+09
7	2.15057E+10	.0780	787.8	902.6	5.	1.71955E+11	.0086	876.1	1.67763E+09
8	2.31064E+10	.0339	787.8	278.6	3.	1.70293E+11	.0040	269.2	7.83942E+08
9	2.29766E+10	.0246	787.8	99.5	2.	1.70350E+11	.0029	96.1	5.65119E+08
10	2.36086E+10	.0347	760.0	100.3	2.	1.72804E+11	.0041	96.8	8.18270E+08
11	2.37315E+10	.0571	760.0	280.9	3.	1.72897E+11	.0068	271.2	1.35508E+09
12	2.38914E+10	.0983	760.0	551.3	4.	1.73311E+11	.0118	532.1	2.34857E+09
13	2.28466E+10	.1480	760.0	911.1	5.	1.74271E+11	.0171	882.0	3.38209E+09
14	2.21486E+10	.1257	760.0	1360.5	6.	1.75545E+11	.0140	1319.9	2.78517E+09
15	2.69551E+10	.2877	732.2	1394.7	6.	1.80825E+11	.0368	1339.6	7.75451E+09
16	2.63530E+10	.2737	732.2	925.6	5.	1.77088E+11	.0350	889.1	7.21217E+09
17	2.70092E+10	.1775	732.2	559.1	4.	1.75874E+11	.0233	536.0	4.79506E+09
18	2.52307E+10	.1083	732.2	283.8	3.	1.75457E+11	.0135	273.2	2.73331E+09
19	2.45421E+10	.0673	732.2	101.2	2.	1.75383E+11	.0082	97.6	1.65204E+09
20	2.65281E+10	.1512	704.4	102.3	2.	1.77909E+11	.0193	98.2	4.01192E+09
21	2.87629E+10	.1976	704.4	288.0	3.	1.78035E+11	.0270	275.2	5.68214E+09
22	3.35280E+10	.2590	704.4	571.6	4.	1.78641E+11	.0397	540.2	8.68383E+09
23	3.61575E+10	.2699	704.4	952.5	5.	1.79526E+11	.0437	895.2	9.75801E+09
24	4.61998E+10	.1066	676.7	1463.6	6.	1.83317E+11	.0203	1348.8	4.92676E+09
25	4.54543E+10	.1448	676.7	977.4	5.	1.82062E+11	.0274	901.5	6.58355E+09
26	4.43911E+10	.1828	676.7	588.8	4.	1.81164E+11	.0341	544.0	8.11529E+09
27	3.98199E+10	.1924	676.7	297.2	3.	1.80606E+11	.0333	277.2	7.65949E+09
28	3.39028E+10	.2467	676.7	104.7	2.	1.80271E+11	.0379	98.9	8.36321E+09
29	4.45896E+10	.2270	648.9	107.8	2.	1.83052E+11	.0422	99.7	1.01226E+10
30	4.56153E+10	.1241	648.9	302.5	3.	1.83143E+11	.0234	279.1	5.66115E+09
31	4.79414E+10	.1013	648.9	596.3	4.	1.83589E+11	.0198	547.6	4.85476E+09
32	5.09984E+10	.0677	648.9	993.6	5.	1.84392E+11	.0137	907.2	3.45473E+09
33	4.98783E+10	.0555	648.9	1482.9	6.	1.85881E+11	.0110	1358.2	2.76952E+09
34	5.36776E+10	.0271	621.1	1502.1	6.	1.88435E+11	.0056	1367.5	1.45690E+09
35	5.51820E+10	.0311	621.1	1007.3	5.	1.86982E+11	.0066	913.6	1.71788E+09
36	5.08348E+10	.0580	621.1	603.3	4.	1.86261E+11	.0117	551.6	2.94676E+09
37	5.26239E+10	.0481	621.1	308.6	3.	1.85817E+11	.0099	281.2	2.53104E+09
38	5.39582E+10	.0840	621.1	110.4	2.	1.85411E+11	.0177	100.3	4.53409E+09
39	5.78395E+10	.0305	593.3	111.8	2.	1.87822E+11	.0066	100.9	1.76424E+09
40	5.58066E+10	.0213	593.3	312.1	3.	1.88137E+11	.0045	282.9	1.19105E+09
41	6.24389E+10	.0219	593.3	615.4	4.	1.85182E+11	.0050	550.0	1.36486E+09
42	5.79896E+10	.0176	593.3	1017.9	5.	1.89446E+11	.0038	919.6	1.02007E+09
43	5.60045E+10	.0163	593.3	1516.6	6.	1.90896E+11	.0034	1376.4	9.12303E+08
44	5.80611E+10	.0105	565.6	1529.7	6.	1.93233E+11	.0022	1384.8	6.08929E+08
45	6.01359E+10	.0103	565.6	1026.8	5.	1.91761E+11	.0023	925.2	6.21521E+08
46	6.05265E+10	.0151	565.6	620.6	4.	1.90950E+11	.0033	558.5	9.12802E+08
47	5.80530E+10	.0129	565.6	315.0	3.	1.90539E+11	.0028	284.7	7.50795E+08
48	6.16117E+10	.0179	565.6	112.9	2.	1.89127E+11	.0040	101.3	1.10382E+09
49	6.23346E+10	.0108	537.8	113.9	2.	1.92653E+11	.0024	102.2	6.72977E+08

50	5.98908E+10	.0100	537.8	317.5	3.	1.92781E+11	.0022	286.4	6.00913E+08
51	6.22740E+10	.0111	537.8	625.4	4.	1.93213E+11	.0025	561.8	6.90630E+08
52	6.18976E+10	.0066	537.8	1035.0	5.	1.94131E+11	.0015	930.9	4.08071E+08
53	5.97926E+10	.0068	537.8	1541.5	6.	1.95472E+11	.0015	1392.8	4.04928E+08
54	2.30044E+10	.0535	787.8	546.3	4.	1.70664E+11	.0063	528.0	1.22979E+09
55	3.94374E+10	.2088	704.4	1434.4	6.	1.80717E+11	.0359	1339.2	8.23589E+09



TEMPERATURE T DEG. C
610
710
810
910
1010
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS



FREQUENCY F HZ
TEMPERATURE T DEG. C
610
710
810
910
1010
MODULUS
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-44-3

Date 3/79

Damping Material 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 3% Al_2O_3 + 2% Co_2O_3

Material Thickness 0.0221 cm   Material Density 2.51 g/cc

Fixture No. 1   Beam Thickness 0.0960 cm

Beam Density 9.13 g/cc   Beam Length 20.889 cm

Temperature Test Range: Between 815 °C and 540 °C

Frequency Test Range: Between 98 Hz and 1,550 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.22		Temperature	670 °C
	1,000 Hz	η_D 0.22		Temperature	720 °C
Range	100 Hz	640 °C	695 °C		
	1,000 Hz	685 °C	760 °C		

Complex Modulus E_D'':

Peak	100 Hz	8.2×10^9 PAS		Temperature	675 °C
	1,000 Hz	8.2×10^9 PAS		Temperature	705 °C
Range	100 Hz	640 °C	710 °C		
	1,000 Hz	660 °C	750 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-44-3
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0         FROM          MROM         N          ML
              A1            A2          A3         A4
  550.0  5.7798E-02  3.8755E+10       .742  2.4152E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0    ETAFROL     SL          SH          FROL        C
            B1      B2          B3          B4          B5
  550.0     .217    .412      -.500  4.4345E-02      .657
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J85-12 test 2; retest of 01-44-2 after 98 hours at 750°C. After test, the specimen was soaked for 202 hours at 760°C. The coating deteriorated; could not retest.

TABLE 18-B

Beam No. 01-44-3

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1500	2	99.41	95.41	99.04	99.94	0.90	.00905	.00543	
1500	3	277.28	267.10	277.01	279.49	2.48	.00863	.00669	
1500	4	545.68	524.00	542.87	548.36	6.51	.01193	.01071	
1500	5	902.10	869.70	896.09	907.18	11.09	.01229	.01124	
1500	6	1347.66	1300.00	1338.96	1357.98	19.02	.01411	.01335	
1450	2	100.24	96.14	99.80	100.68	0.88	.00878	.00595	
1450	3	280.65	269.15	278.97	282.17	3.20	.01140	.00997	
1450	4	550.24	528.00	546.92	554.02	7.10	.01290	.01202	
1450	5	910.22	876.12	902.77	918.10	15.33	.01684	.01594	
1450	6	1362.50	1309.80	1350.50	1376.10	25.60	.01879	.01819	
1400	2	101.07	96.83	100.55	101.61	1.06	.01049	.01267	
1400	3	283.30	271.20	281.10	285.56	4.46	.01574	.01482	
1400	4	556.23	532.08	551.57	561.59	10.02	.01801	.01745	
1400	5	922.59	882.00	908.90	932.85	23.95	.02596	.02526	
1400	6	1381.82	1319.90	1365.20	1404.12	38.30	.02772	.02721	
1350	2	102.21	97.55	101.53	103.11	1.58	.01546	.01365	
1350	3	287.32	273.20	283.96	290.22	6.26	.02173	.02094	
1350	4	564.10	536.00	556.07	573.79	17.22	.03141	.03085	
1350	5	937.75	889.10	920.60	951.46	30.86	.03291	.03216	
1350	6	1411.84	1339.60	1387.17	1437.21	50.04	.03544	.03498	
1300	2	103.60	98.25	102.42	104.88	2.46	.02375	.02228	
1300	3	291.19	275.20	286.00	295.76	9.76	.03352	.03273	
1300	5	959.65	895.20	940.00	976.07	36.07	.03759	.03687	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1300	6	1442.90	1339.20	1416.57	1470.31	53.74	.03724	.03681	
1250	2	105.64	98.90	103.83	107.46	3.63	.03436	.03316	
1250	3	298.05	277.18	292.34	303.42	11.08	.03717	.03645	
1250	5	981.85	901.50	966.46	996.64	30.18	.03074	.03004	
1250	6	1469.10	1348.80	1451.10	1490.17	39.07	.02659	.02616	
1200	2	108.30	99.60	106.26	110.25	3.99	.03684	.03586	
1200	3	305.25	279.12	301.15	309.74	8.59	.02814	.02748	
1200	5	998.98	907.25	989.12	1008.46	19.34	.01936	.01868	
1200	6	1492.25	1358.20	1480.69	1500.16	19.47	.01305	.01263	
1150	2	111.43	100.30	110.37	112.70	2.33	.02091		
1150	3	310.50	281.15	308.42	312.88	4.46	.01436		
1150	4	611.98	551.60	606.87	615.80	8.13	.01328		
1150	5	1013.38	913.60	1008.47	1018.09	9.62	.00949		
1150	6	1510.36	1367.50	1506.13	1516.76	10.63	.00704		
1100	2	112.47	100.95	111.95	113.06	1.11	.00987		
1100	3	314.13	282.90	313.07	315.21	2.14	.00681		
1100	4	618.48	550.00	616.82	620.38	3.56	.00576		
1100	5	1023.78	919.60	1021.09	1026.33	5.29	.00517		
1100	6	1524.87	1376.40	1521.56	1528.47	6.91	.00453		
1050	2	113.55	101.30	113.23	113.83	0.60	.00528		
1050	3	316.67	284.70	316.00	317.34	1.34	.00423		
1050	4	623.06	558.50	622.00	624.28	2.28	.00366		
1050	5	1031.71	925.20	1030.10	1033.36	3.26	.00316		

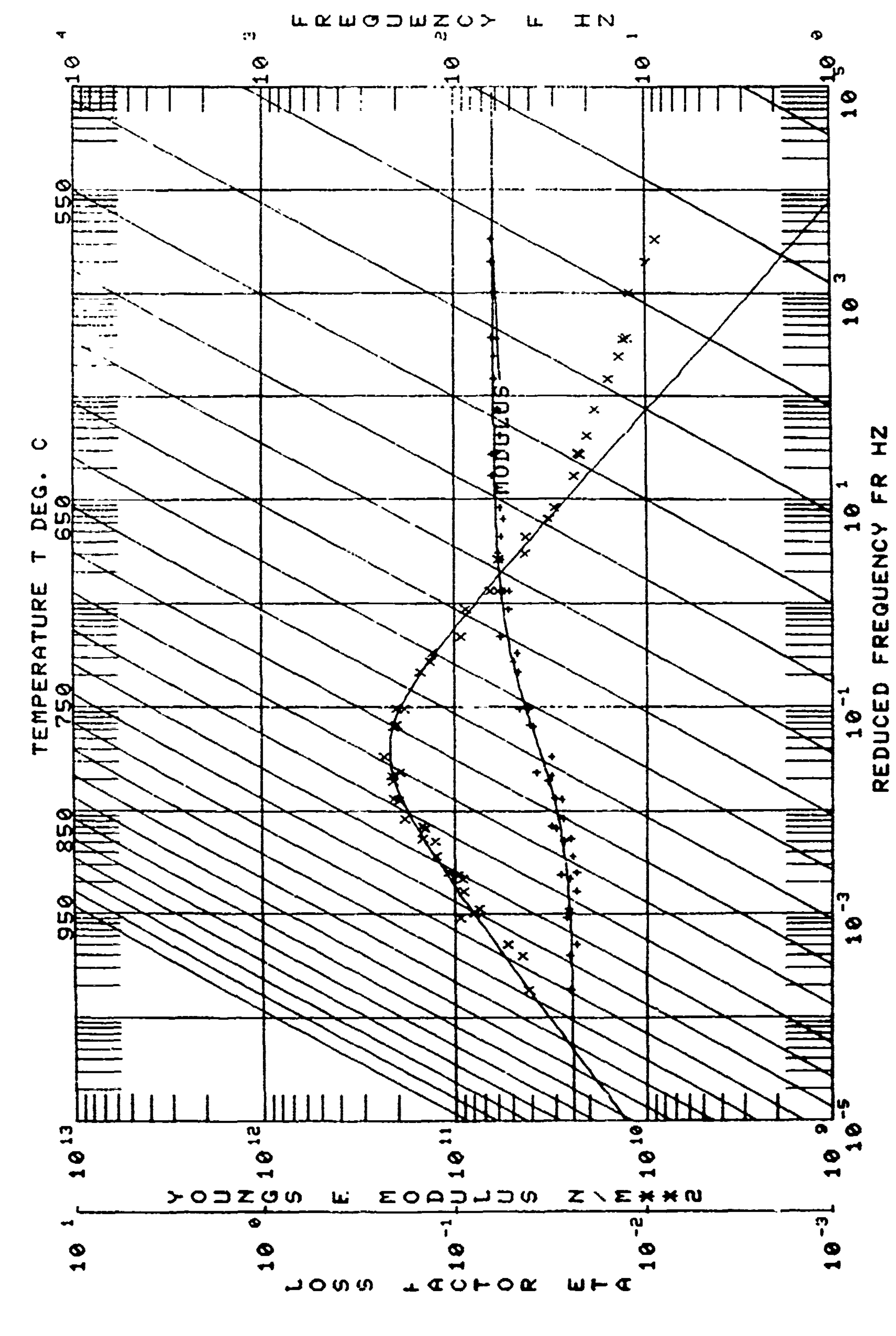
TABLE 18-B (Concluded)

Beam No. 01-44-3

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1050	6	1536.10	1384.80	1534.13	1538.62	4.49	.00292		
1000	2	114.44	102.24	114.28	114.62	0.34	.00297		
1000	3	319.07	286.37	318.68	319.57	0.89	.00279		
1000	4	627.89	561.80	627.23	628.70	1.47	.00234		
1000	5	1039.64	930.90	1038.63	1340.75	2.12	.00204		
1000	6	1548.31	1392.80	1547.08	1550.08	3.00	.00194		

EXPERIMENTAL CODE :152
MATERIAL :01-44-3
DATA SOURCES
MANUFACTURER :N
AFML :UDRI BEAM COATED ONE SIDE 1\2\80
OTHER :N

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	2.53160E+10	.0420	815.6	99.4	2.	1.67773E+11	.0054	95.4	1.06414E+09
2	2.38815E+10	.0543	815.6	277.3	3.	1.67709E+11	.0067	267.1	1.29617E+09
3	2.58705E+10	.0816	815.6	546.7	4.	1.68088E+11	.0107	524.0	2.11104E+09
4	2.37614E+10	.0923	815.6	902.0	5.	1.69444E+11	.0112	869.7	2.19403E+09
5	2.36994E+10	.1104	815.6	1347.7	6.	1.70292E+11	.0134	1300.0	2.61529E+09
6	2.59798E+10	.0457	787.8	100.2	2.	1.70350E+11	.0060	96.1	1.18644E+09
7	2.60002E+10	.0765	787.8	280.7	3.	1.70293E+11	.0100	269.2	1.98781E+09
8	2.58247E+10	.0928	787.8	550.2	4.	1.70664E+11	.0120	528.0	2.39752E+09
9	2.47929E+10	.1280	787.8	910.2	5.	1.71955E+11	.0159	876.1	3.17390E+09
10	2.54314E+10	.1494	787.8	1362.5	6.	1.72869E+11	.0189	1309.8	3.79975E+09
11	2.67945E+10	.0960	760.0	101.1	2.	1.72804E+11	.0127	96.8	2.57126E+09
12	2.74990E+10	.1298	760.0	556.2	4.	1.73311E+11	.0175	532.1	3.56827E+09
13	2.79030E+10	.1865	760.0	922.6	5.	1.74271E+11	.0253	882.0	5.20356E+09
14	2.84576E+10	.1989	760.0	1381.8	6.	1.75545E+11	.0272	1319.9	5.66073E+09
15	3.03514E+10	.1455	732.2	287.3	3.	1.75457E+11	.0209	273.2	4.41496E+09
16	3.07150E+10	.2127	732.2	564.1	4.	1.75874E+11	.0309	536.0	6.53357E+09
17	2.87740E+10	.0988	732.2	102.2	2.	1.75383E+11	.0137	97.6	2.84422E+09
18	3.18598E+10	.2167	732.2	937.7	5.	1.77088E+11	.0322	889.1	6.90384E+09
19	3.22094E+10	.2375	732.2	1411.8	6.	1.80825E+11	.0350	1339.6	7.65041E+09
20	3.19017E+10	.1505	704.4	103.6	2.	1.77909E+11	.0223	98.2	4.80146E+09
21	3.34218E+10	.2134	704.4	291.2	3.	1.78035E+11	.0327	275.2	7.13353E+09
22	3.95513E+10	.2133	704.4	959.7	5.	1.79526E+11	.0369	895.2	8.43575E+09
23	4.21627E+10	.2043	704.4	1442.9	6.	1.80717E+11	.0368	1339.2	8.61235E+09
24	3.80765E+10	.1979	676.7	105.6	2.	1.80271E+11	.0332	98.9	7.53425E+09
25	4.12163E+10	.2055	676.7	298.0	3.	1.80606E+11	.0364	277.2	8.47066E+09
26	4.76548E+10	.1537	676.7	981.8	5.	1.82062E+11	.0300	901.5	7.32433E+09
27	4.80104E+10	.1338	676.7	1469.1	6.	1.83317E+11	.0262	1348.8	6.42339E+09
28	4.70602E+10	.1856	648.9	108.3	2.	1.82832E+11	.0359	99.6	8.73543E+09
29	4.99684E+10	.1366	648.9	305.2	3.	1.83143E+11	.0275	279.1	6.82793E+09
30	5.35405E+10	.0892	648.9	999.0	5.	1.84595E+11	.0187	907.7	4.77477E+09
31	5.30684E+10	.0609	648.9	1492.2	6.	1.85881E+11	.0126	1358.2	3.23213E+09
32	5.87078E+10	.0942	621.1	111.4	2.	1.85411E+11	.0209	100.3	5.53014E+09
33	5.57183E+10	.0670	621.1	310.5	3.	1.85817E+11	.0144	281.2	3.73454E+09
34	5.82569E+10	.0603	621.1	612.0	4.	1.86261E+11	.0133	551.6	3.51298E+09
35	5.83673E+10	.0431	621.1	1013.4	5.	1.86082E+11	.0095	913.6	2.51838E+09
36	5.65394E+10	.0328	621.1	1510.4	6.	1.88435E+11	.0070	1367.5	1.85706E+09
37	6.09952E+10	.0437	593.3	112.5	2.	1.87822E+11	.0099	100.9	2.66845E+09
38	5.92913E+10	.0308	593.3	314.1	3.	1.88137E+11	.0068	282.9	1.82449E+09
39	6.11163E+10	.0230	593.3	1023.8	5.	1.89446E+11	.0052	919.6	1.40647E+09
40	5.89321E+10	.0207	593.3	1524.9	6.	1.90896E+11	.0045	1376.4	1.22253E+09
41	6.47692E+10	.0226	565.6	113.6	2.	1.89127E+11	.0053	101.3	1.46595E+09
42	6.09831E+10	.0189	565.6	316.7	3.	1.90539E+11	.0042	284.7	1.15409E+09
43	6.27410E+10	.0161	565.6	623.1	4.	1.90950E+11	.0037	558.5	1.01030E+09
44	6.27712E+10	.0139	565.6	1031.7	5.	1.91761E+11	.0032	925.2	8.74780E+08
45	6.03349E+10	.0133	565.6	1536.1	6.	1.93233E+11	.0029	1384.8	8.00866E+08
46	6.51707E+10	.0128	537.8	114.4	2.	1.92653E+11	.0030	102.2	8.36102E+08
47	6.26425E+10	.0124	537.8	319.1	3.	1.92781E+11	.0028	286.4	7.74386E+08
48	6.45107E+10	.0102	537.8	627.9	4.	1.93213E+11	.0023	561.8	6.57453E+08
49	6.44006E+10	.0089	537.8	1039.6	5.	1.94131E+11	.0020	930.9	5.74516E+08
50	6.51608E+10	.0243	593.3	618.5	4.	1.85182E+11	.0058	550.0	1.58213E+09
51	2.71396E+10	.1110	762.0	283.3	3.	1.72897E+11	.0148	271.2	3.01256E+09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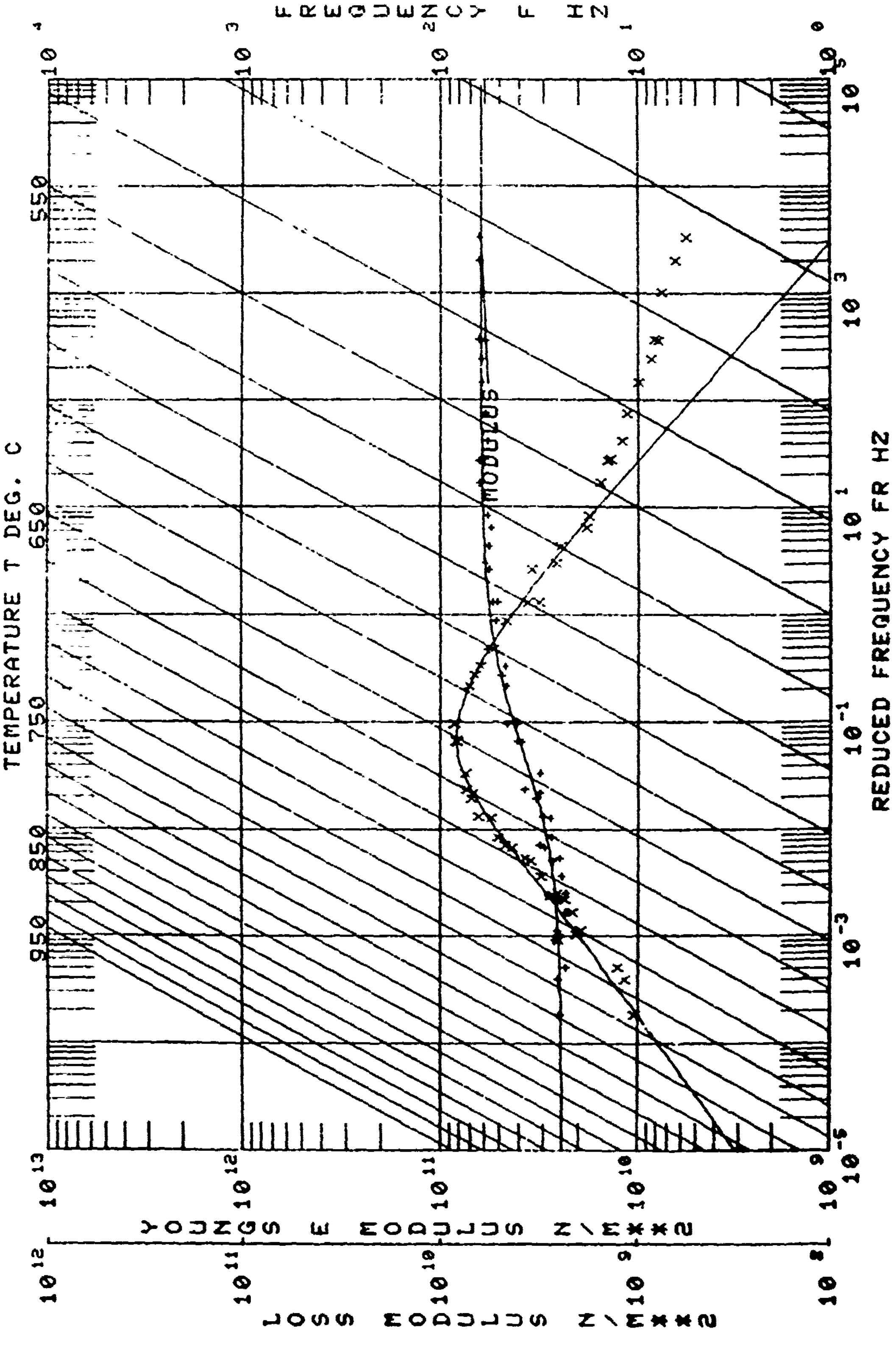
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS


TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-46-1

Date 12/19/78

Damping Material 74.5% SiO_2 + 10.75% CaO + 12.75% Na_2O + 2% Co_2O_3

Material Thickness 0.0155 cm Material Density 2.34 g/cc

Fixture No. 1 Beam Thickness 0.0960 cm

Beam Density 9.13 g/cc Beam Length 20.950 cm

Temperature Test Range: Between 870 °C and 540 °C

Frequency Test Range: Between 90 Hz and 1,450 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.93	Temperature 670 °C
	1,000 Hz	η_D 0.93	Temperature 735 °C
Range	100 Hz	650 °C	715 °C
	1,000 Hz	700 °C	770 °C

Complex Modulus E_D":

Peak	100 Hz	9.7×10^9 PAS	Temperature 650 °C
	1,000 Hz	9.7×10^9 PAS	Temperature 700 °C
Range	100 Hz	630 °C	675 °C
	1,000 Hz	665 °C	715 °C

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-11           INITIAL TEST
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0        FROM          MROM        N          ML
             A1            A2         A3         A4
  550.0   3.0540E-02   6.4000E+09    .680   1.2000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH        FROL        C
           B1        B2        B3         B4         B5
  550.0     .950     .450     -.550   2.5000E-02    .460
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J85-11, test 1; beam retested twice: 01-46-2 and 01-46-3

TABLE 19-B

Beam No. 01-46-1

°F		f_c	f_n	f_L	f_R	Δf	n_s	n_c	1dB
Temp.	Mode								
1600	2	92.12	93.90	91.76	92.52	.76	.00825	.00135	
	4	508.95	518.1	507.93	510.05	2.12	.00417	.00145	
	5	843.93	858.7	842.5	845.42	2.92	.00346	.00106	
	6	1262.82	1287.2	1260.96	1265.1	4.14	.00328	.0014	
1550	2	93.09	94.78	92 77	93.39	.62	.00666	.00105	
	4	513.56	522.2	512.7	514.38	1.68	.00327	.0015	
	5	851.48	865.4	850.62	852.12	2.05	.00242	.0007	
	6	1273.87	1297.4	1271.88	1276.2	4.32	.00339	.00205	
1500	2	93.92	95.63	93.66	94.16	.50	.00532	.00129	
	3	263.87	268.1	263.54	264.15	1.19	.00451	.00230	
	4	517.80	526.5	516.96	518.64	1.68	.00324	.00213	
	5	858.41	872.3	857.48	859.2	3.35	.00391	.00271	
	6	1283.98	1307.00	1281.36	1286.77	5.41	.00421	.0032	
1450	2	94.70	96.45	94.51	99.91	.40	.00422	.00169	
	3	266.00	270.2	265.67	266.27	1.17	.00440	.0028	
	4	522.40	530.5	521.14	523.37	2.23	.00427	.0033	
	5	865.67	879.0	863 41	868.0	4.59	.00530	.00442	
	6	1295.84	1317.0	1292.10	1299.57	7.47	.00576	.0055	

°F		f_c	f_n	f_L	f_R	Δf	n_s	n_c	1dB
Temp.	Mode								
1400	2	95.46	97.21	95.25	95.69	.44	.00461	.00244	
	3	268.41	272.4	267.69	269.32	1.63	.00607	.0045	
	4	526.70	534.6	525.04	528.43	3.39	.00644	.0058	
	5	873.16	885.5	869.36	877.12	7.76	.00889	.00817	
	6	1307.2	1327.0	1298.14	1315.02	16.88	.01293	.0109	
1350	2	96.29	97.98	96.00	96.56	.56	.00582	.00413	
	3	270.60	274.57	269.28	271.81	2.53	.00935	.0085	
	4	531.83	538.7	528.74	535.20	6.46	.01215	.0117	
	5	883.90	892.0	875.01	890.22	15.21	.01723	.0166	
	6	1321.92	1337.2	1303.48	1334.87	31.39	.02375	.0234	
1300	2	97.12	98.68	96.68	97.68	1.00	.01030	.0086	
	3	273.30	276.7	271.84	274.47	5.13	.01877	.018	
	4	538.88	542.8	531.85	545.09	13.24	.02457	.024	
	5	897.5	898.4	884.05	908.70	24.65	.02747	.0269	
	6	1339.27	1347.3	1325.26	1353.29	54.66	.04081	.040	
1250	2	98.35	99.39	97.47	99.49	2.02	.02054	.020	
	3	271.31	278.76	272.92	276.01	6.02	.02197	.0212	
	4	550.26	546.9	545.72	555.94	19.93	.03622	.0362	
	5	914.12	904.9	902.48	924.0	2[illegible]	.02354	.0230	
	6	1369.62	1357.0	1357.17	1379.11	4[illegible]	.03124	.031	

TABLE 19-B (Concluded)

Beam No. 01-46-1

Temp.	Mode	f_c	f_n	f_L	f_R	Δf	r_s	r_c	1db
1200	2	100.75	100.07	99.50	102.32	2.82	.02799	.02677	
	3	277.72	280 64	276.25	278.67	4.72	.01699	.01615	
	4	561.98	550.7	557.36	568.26	10.90	.01940	.01901	
	5	930.74	911.0	924.3	937.23	12.93	.01389	.01335	
	6	1395.38	1367.0	1381.43	1404.1	22.67	.01625	.01588	
1150	2	102.80	100.72	102.04	103.85	1.81	.01761	.01639	
	3	289.20	282.5	288.33	290.5	4.23	.01463	.01420	
	4	569.22	554.5	566.92	571.66	4.74	.00833	.00790	
	5	943.1	917.1	940.0	946.41	6.41	.00680	.00627	
	6	1413.68	1376.0	1408.07	1418.28	10.21	.00722	.00686	
1100	2	104.28	101.37	103.84	104.75	.91	.00873	.00769	
	3	291.86	284.2	291.26	292.45	2.32	.00795	.00721	
	4	574.87	558.0	573.78	576.34	1 47	.00256	.00204	
	5	952.73	923.0	950.93	954.69	3.76	.00395	.00342	
	6	1427.65	1384.5	1424.83	1430.57	5.74	.00402	.0036[illegible]	
1050	2	105.28	101.96	104.99	105.48	.49	.00465	.00365	
	4	580.02	561.3	579.20	580.8	1.60	.00276	.00271	
	5	961.06	928.8	959.87	462.28	2.41	.00251	.00251	
	6	1439.93	1392.0	1437.89	1441 66	3.77	.00262	.00262	

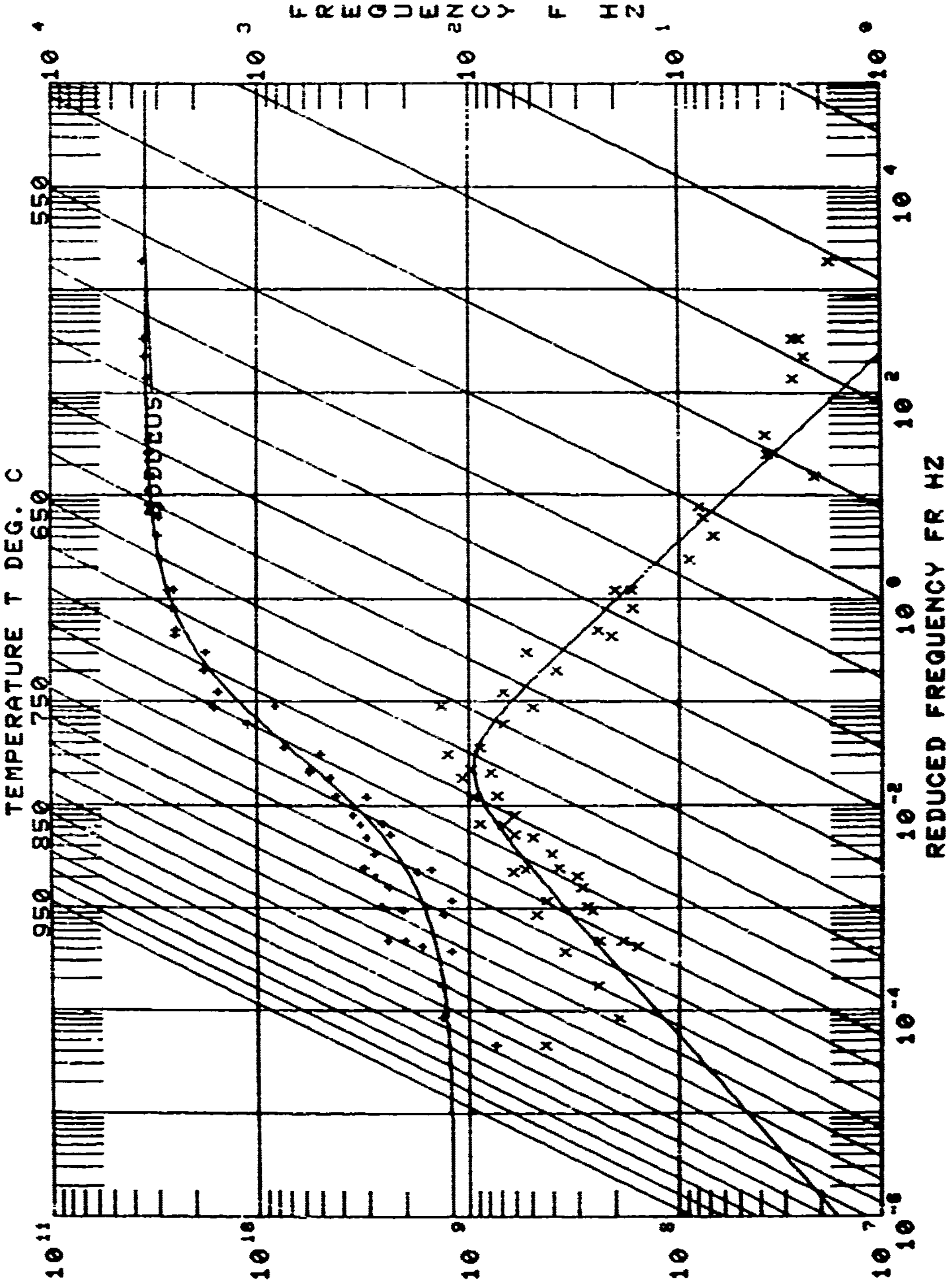
Temp.	Mode	f_c	f_n	f_L	f_R	Δf	r_s	r_c	1db
1000	2	106.11	102.52	105.97	106.27	.30	.00283	.00283	
	4	584.48	564.4	583.97	585.07	1.10	.00198	.00188	
	5	968.36	934.4	967 55	969.77	1.62	.00167	.00167	
	6	1451.0	1399.3	1449.66	1452.06	2.40	.00165	.00165	

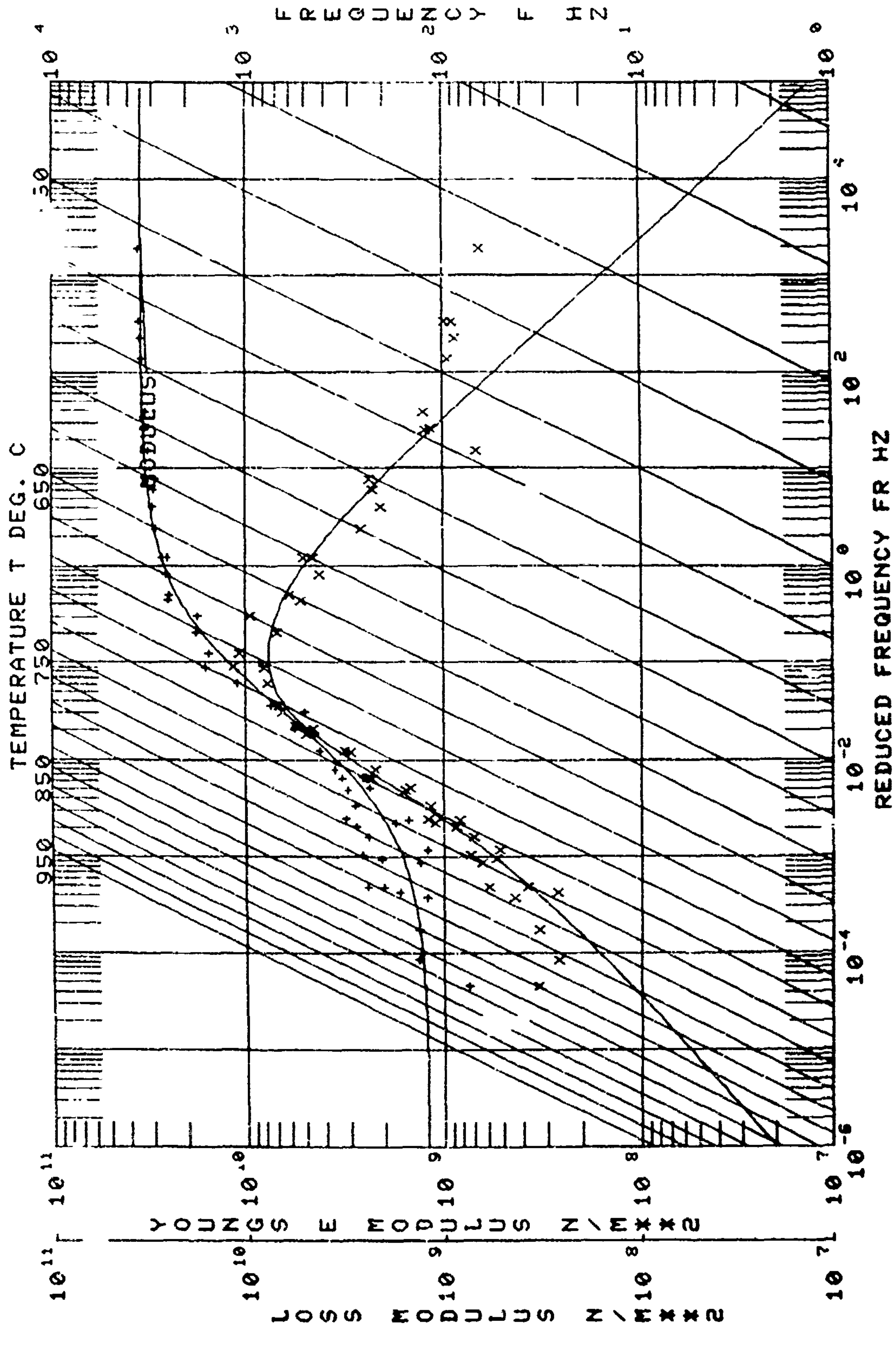
EXPERIMENTAL CODE : 38
MATERIAL :J85-11 INITIAL TEST
DATA SOURCES
MANUFACTURER :NONE
AFML :BEAM COATED ONE SIDE (UDRI DEC 19,78)
OTHER :74.5% SiO2 +10.75% CaO +12.75% NaO2 +Co2O3

01-46-1

NO.	MODULUS LB/IN**2	LOSS FACTOR	TEMP. DEG. F	FREQ. HZ	MODE NO.	BEAM MOD. LB/IN**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. LB/IN**2
1	1.10858E+05	.4430	1600.0	92.1	2.	2.37992E+07	.0014	93.9	4.91112E+04
2	2.46635E+05	.1598	1600.0	843.9	5.	2.41919E+07	.0011	858.7	3.94092E+04
3	1.16043E+05	.4509	1600.0	1262.8	6.	2.44510E+07	.0014	1287.2	5.23295E+04
4	1.98187E+05	.1970	1550.0	93.1	2.	2.42474E+07	.0011	94.8	3.90503E+04
5	2.98667E+05	.1891	1550.0	513.6	4.	2.44481E+07	.0015	522.2	5.64691E+04
6	3.34718E+05	.0792	1550.0	851.5	5.	2.45708E+07	.0007	865.4	2.65207E+04
7	1.79017E+05	.4359	1550.0	1273.9	6.	2.48401E+07	.0020	1297.4	7.80313E+04
8	2.23772E+05	.5533	1500.0	1284.0	6.	2.52091E+07	.0032	1307.0	1.23815E+05
9	3.53242E+05	.2955	1500.0	858.4	5.	2.49642E+07	.0027	872.3	1.04370E+05
10	3.05790E+05	.2666	1500.0	517.8	4.	2.48524E+07	.0021	526.5	8.15191E+04
11	3.61024E+05	.2433	1500.0	263.9	3.	2.47457E+07	.0023	268.1	8.78419E+04
12	1.97419E+05	.2474	1500.0	93.9	2.	2.46843E+07	.0013	95.6	4.88321E+04
13	1.80958E+05	.3593	1450.0	94.7	2.	2.51094E+07	.0017	96.4	6.50256E+04
14	3.86584E+05	.2812	1450.0	266.0	3.	2.51349E+07	.0028	270.2	1.08703E+05
15	4.10243E+05	.3138	1450.0	522.4	4.	2.52314E+07	.0033	530.5	1.28715E+05
16	4.18842E+05	.4136	1450.0	865.7	5.	2.53492E+07	.0044	879.0	1.73249E+05
17	3.50937E+05	.6186	1450.0	1295.8	6.	2.55963E+07	.0055	1317.0	2.17092E+05
18	4.49926E+05	.9742	1400.0	1307.2	6.	2.59865E+07	.0109	1327.0	4.38320E+05
19	5.24541E+05	.6219	1400.0	873.2	5.	2.57255E+07	.0082	885.5	3.26206E+05
20	4.54892E+05	.5058	1400.0	526.7	4.	2.56229E+07	.0058	534.6	2.30069E+05
21	4.64750E+05	.3831	1400.0	268.4	3.	2.55459E+07	.0045	272.4	1.78041E+05
22	1.95030E+05	.4892	1400.0	95.5	2.	2.55067E+07	.0024	97.2	9.54093E+04
23	2.59621E+05	.6334	1350.0	96.3	2.	2.59123E+07	.0041	98.0	1.64439E+05
24	4.85871E+05	.7036	1350.0	270.6	3.	2.59545E+07	.0085	274.6	3.41853E+05
25	6.26532E+05	.7568	1350.0	531.8	4.	2.60175E+07	.0117	538.7	4.74133E+05
26	8.48878E+05	.8016	1350.0	883.0	5.	2.61045E+07	.0166	892.0	6.80434E+05
27	7.46761E+05	1.2931	1350.0	1321.9	6.	2.63875E+07	.0234	1337.2	9.65656E+05
28	1.22424E+06	1.3917	1300.0	1339.3	6.	2.67876E+07	.0400	1347.3	1.70374E+06
29	1.63377E+06	.7038	1300.0	897.5	5.	2.64805E+07	.0269	898.4	1.14983E+06
30	1.10042E+06	.9185	1300.0	538.9	4.	2.64150E+07	.0240	542.8	1.00417E+06
31	6.74134E+05	1.0978	1300.0	273.3	3.	2.63588E+07	.0180	276.7	7.40067E+05
32	3.81155E+05	.9152	1300.0	97.1	2.	2.62839E+07	.0086	98.7	3.48838E+05
33	8.36591E+05	.9998	1250.0	98.4	2.	2.66635E+07	.0200	99.4	8.36440E+05
34	2.27663E+06	.7033	1250.0	550.3	4.	2.68156E+07	.0362	546.9	1.60110E+06
35	2.63971E+06	.3909	1250.0	914.1	5.	2.68650E+07	.0230	904.9	1.03173E+06
36	2.58894E+06	.5418	1250.0	1369.6	6.	2.71747E+07	.0310	1357.0	1.40278E+06
37	3.68395E+06	.2049	1200.0	1395.4	6.	2.75767E+07	.0159	1367.0	7.54950E+05
38	3.72119E+06	.1689	1200.0	930.7	5.	2.72285E+07	.0134	911.0	6.28380E+05
39	3.60594E+06	.2469	1200.0	562.0	4.	2.71895E+07	.0190	550.7	8.90293E+05
40	2.35181E+06	.5085	1200.0	100.7	2.	2.70296E+07	.0268	100.1	1.19579E+06
41	3.64589E+06	.2121	1150.0	102.8	2.	2.73819E+07	.0164	100.7	7.73386E+05
42	3.94328E+06	.1721	1150.0	289.2	3.	2.74754E+07	.0142	282.5	6.78579E+05
43	4.22279E+06	.0905	1150.0	569.2	4.	2.75660E+07	.0079	554.5	3.82021E+05
44	4.39931E+06	.0694	1150.0	943.1	5.	2.75943E+07	.0063	917.1	3.05184E+05
45	4.36127E+06	.0773	1150.0	1413.7	6.	2.79410E+07	.0069	1376.0	3.37104E+05
46	4.78326E+06	.0385	1100.0	1427.6	6.	2.82873E+07	.0037	1384.5	1.84174E+05
47	4.82703E+06	.0353	1100.0	952.7	5.	2.79505E+07	.0034	923.0	1.70584E+05
48	4.62955E+06	.0218	1100.0	574.9	4.	2.79151E+07	.0020	558.0	1.01016E+05
49	4.29882E+06	.0819	1100.0	291.9	3.	2.78071E+07	.0072	284.2	3.52141E+05

50	3.36499E+10	.0375	565.6	105.3	2.	1.93468E+11	.0036	102.0	1.26151E+09
51	3.44036E+10	.0280	565.6	580.0	4.	1.94751E+11	.0028	561.3	9.62517E+08
52	3.54158E+10	.0249	565.6	961.1	5.	1.95141E+11	.0025	928.8	8.80777E+08
53	3.55729E+10	.0261	565.6	1439.9	6.	1.97153E+11	.0026	1392.0	9.23004E+08
54	3.76805E+10	.1579	537.8	1451.0	6.	1.99226E+11	.0165	1399.3	5.95041E+09
55	3.69377E+10	.1613	537.8	968.4	5.	1.97502E+11	.0167	934.4	5.95954E+09
56	3.63076E+10	.0184	537.8	584.5	4.	1.96908E+11	.0019	564.4	6.67355E+08
57	3.56881E+10	.0279	537.8	106.1	2.	1.95600E+11	.0028	102.5	9.96234E+08
58	3.07237E+10	.0845	593.3	104.3	2.	1.91236E+11	.0077	101.4	2.59681E+09


TEMPERATURE T DEG. C
550
650
750
850
950
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS


TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-46-2

Date 12/28/79

Damping Material 74.5% SiO_2 + 10.75% CaO + 12.75% Na_2O + 2% Co_2O_3

Material Thickness 0.0155 cm Material Density 2.24 g/cc

Fixture No. 2 Beam Thickness 0.0960 cm

Beam Density 9.13 g/cc Beam Length 20.950 cm

Temperature Test Range: Between 815 °C and 540 °C

Frequency Test Range: Between 93 Hz and 1,460 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.51	Temperature	675 °C
	1,000 Hz	η_D 0.51	Temperature	730 °C
Range	100 Hz	640 °C	705 °C	
	1,000 Hz	680 °C	765 °C	

Complex Modulus E_D'':

Peak	100 Hz	7.5×10^9 PAS	Temperature	635 °C
	1,000 Hz	7.5×10^9 PAS	Temperature	675 °C
Range	100 Hz	605 °C	665 °C	
	1,000 Hz	645 °C	695 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-11 AFTER 100.75 HRS @,1400*F
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM           MROM          N          ML
               A1             A2           A3         A4
   550.0  4.4221E-02  1.4335E+10     .686   5.5400E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH         FROL         C
            B1       B2        B3          B4          B5
   550.0    .530    .450     -.510   3.6000E-02     .460
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J85-11, test 2. Retest of 01-46-1 after 100 hours at 760°C. Surface of coating slightly deteriorated.

TABLE 20-B

Beam No. 01-46-2

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1550	2	93.72	94.78	93.41	94.17	0.76	.0081	.0025	
1550	3	263.34	265.80	262.16	264.45	2.29	.0087	.0054	
1550	4	517.79	522.20	516.36	519.06	2.70	.0052	.0034	
1550	5	858.91	865.40	856.64	860.96	4.32	.0050	.0033	
1550	6	1286.30	1297.40	1282.41	1290.78	8.37	.0065	.0052	
1500	2	94.56	95.63	94.23	94.88	0.65	.0069	.0029	
1500	3	265.41	268.10	264.40	266.45	2.05	.0077	.0055	
1500	4	522.05	526.50	520.72	523.68	2.90	.0057	.0046	
1500	5	865.27	872.30	862.79	867.80	5.01	.0058	.0046	
1500	6	1295.12	1307.00	1289.74	1299.52	9.78	.0076	.0066	
1450	2	95.60	96.45	95.35	95.88	0.53	.0055	.0028	
1450	3	268.06	270.20	267.16	269.20	2.04	.0076	.0060	
1450	4	526.62	530.50	524.94	528.16	3.12	.0059	.0057	
1450	5	873.28	879.00	869.78	876.25	6.47	.0074	.0065	
1450	6	1304.95	1317.00	1293.90	1312.24	18.34	.0141	.0133	
1450	2	95.51	96.45	95.23	95.84	0.61	.00639	.0036	
1450	3	267.68	270.20	267.10	268.31	2.37	.00885	.00706	X
1450	4	527.41	530.50	525.26	529.32	4.06	.0077	.0069	
1450	5	873.74	879.00	870.20	877.35	7.15	.00818	.00730	
1450	6	1307.85	1317.00	1304.53	1311.13	12.97	.0992	.00916	
1400	2	96.46	97.21	96.20	96.73	0.53	.0055	.0034	
1400	3	271.56	268.41	270.47	272.87	2.40	.0088	.0075	
1400	4	532.26	534.60	530.28	534.68	4.40	.0083	.0076	

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1400	5	880.57	885.50	875.58	884.92	9.34	.0106	.00998	
1400	6	1315.12	1327.00	1306.24	1325.13	18.89	.0144	.0138	
1400	2	96.31	97.21	96.00	96.63	0.63	.00654	.00444	
1400	3	269.90	272.40	269.21	270.58	2.69	.00993	.00867	X
1400	4	531.56	534.60	530.19	532.54	4.58	.00862	.00802	X
1400	5	881.78	885.50	876.83	886.66	9.83	.01115	.01043	
1400	6	1320.27	1327.00	1314.67	1325.67	21.62	.01637	.01576	X
1350	2	97.13	97.98	96.76	97.48	0.72	.00741	.00568	
1350	3	272.85	274.57	270.00	276.16	6.16	.02258	.02147	
1350	4	534.70	538.70	527.90	538.90	11.10	.02076	.02028	
1350	5	892.67	892.00	885.56	901.85	16.29	.01825	.01761	
1350	6	1346.00	1337.20	1330.00	1371.50	41.50	.03093	.03031	
1350	2	97.21	97.98	96.82	97.59	0.77	.00792	.00619	
1350	3	272.22	274.57	271.28	243.43	4.22	.01552	.01440	X
1350	4	536.01	538.70	532.86	537.79	7.72	.01441	.01393	X
1350	5	891.78	892.00	887.95	895.62	15.07	.01690	.01626	X
1350	6	1333.50	1337.20	1325.20	1341.52	32.07	.02405	.02353	X
1300	2	98.14	98.68	97.56	98.69	1.13	.01151	.01001	
1300	3	275.77	276.70	274.52	277.02	4.91	.01782	.01682	X
1300	4	542.87	542.80	[illegible]	545.88	11.83	.02191	.02130	X
1300	5	904.00	898.40	899.02	909.26	20.12	.02226	.02167	X
1300	6	1370.04	1347.30	1364.27	1375.72	22.50	.01642	.01597	X
1250	2	99.35	[illegible]	[illegible]	[illegible]	1.98	.01892	.01759	

TABLE 20-B (Concluded)

Beam No. 01-46-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1250	3	280.36	278.76	278.29	282.02	7.33	.02615	.02525	X
1250	4	553.50	546.90	549.92	556.77	13.46	.02432	.02393	X
1250	5	922.12	904.90	916.44	927.80	22.32	.02421	.02365	X
1250	6	1384.05	1357.00	1380.70	1388.80	15.92	.01150	.01146	X
1200	2	101.41	100.07	100.79	102.15	2.67	.02636	.02514	
1200	3	286.03	280.64	282.99	289.07	6.08	.02126	.02042	
1200	4	565.55	550.70	562.86	568.38	10.84	.01918	.01879	X
1200	5	938.91	911.00	931.31	945.47	14.16	.01508	.01454	
1150	2	103.28	100.72	102.22	104.36	2.14	.02072	.01968	
1150	3	291.12	282.50	290.08	292.35	4.46	.01532	.01454	X
1150	4	572.51	554.50	571.00	574.07	6.03	.01054	.01011	X
1150	5	948.44	917.10	945.22	952.88	7.66	.00808	.00755	
1150	6	1423.34	1376.00	1418.42	1429.69	11.27	.00792	.00756	
1100	2	104.89	101.37	104.40	105.38	0.98	.00934		
1100	3	295.01	284.20	293.97	295.90	1.93	.00654		
1100	4	578.43	558.00	577.04	580.08	3.04	.00526		
1100	5	958.62	923.00	956.78	960.51	3.73	.00389		
1100	6	1436.75	1384.50	1434.04	1439.50	5.46	.00380		
1050	2	105.89	101.96	105.61	106.11	0.50	.00472		
1050	3	297.49	285.70	296.95	297.95	1.00	.00336		
1050	4	583.27	561.30	582.39	584.09	1.70	.00291		
1050	5	966.50	928.80	965.21	967.42	2.21	.00229		
1050	6	1447.40	1392.00	1445.96	1449.36	3.40	.00235		

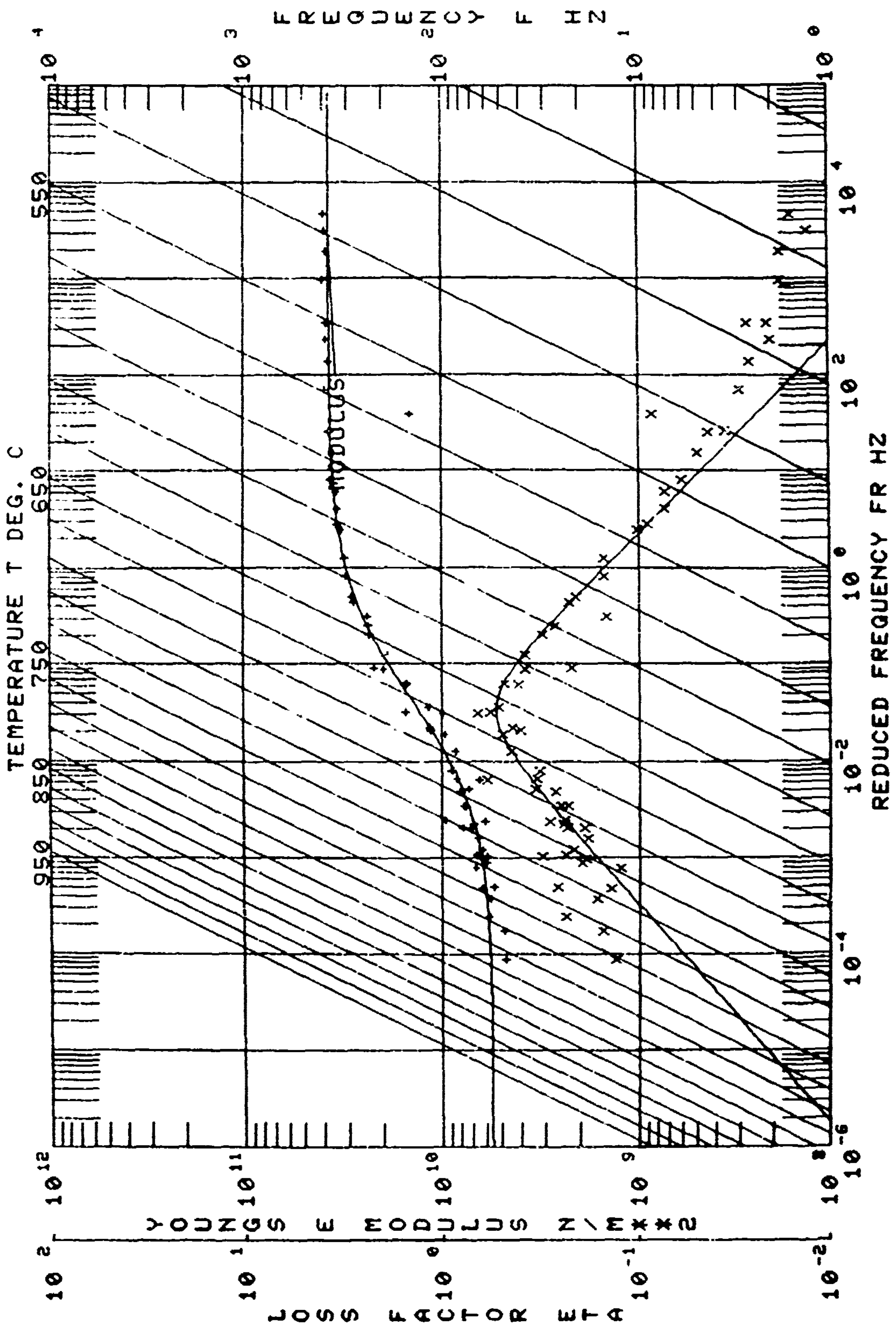
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1000	2	106.62	102.57	106.45	106.77	0.32	.00300		
1000	3	299.43	287.30	299.11	299.73	0.62	.00207		
1000	4	587.10	564.40	586.52	587.70	1.18	.00201		
1000	5	972.55	934.40	971.92	973.34	1.42	.00146		
1000	6	1456.57	1399.30	1455.39	1458.00	2.61	.00179		

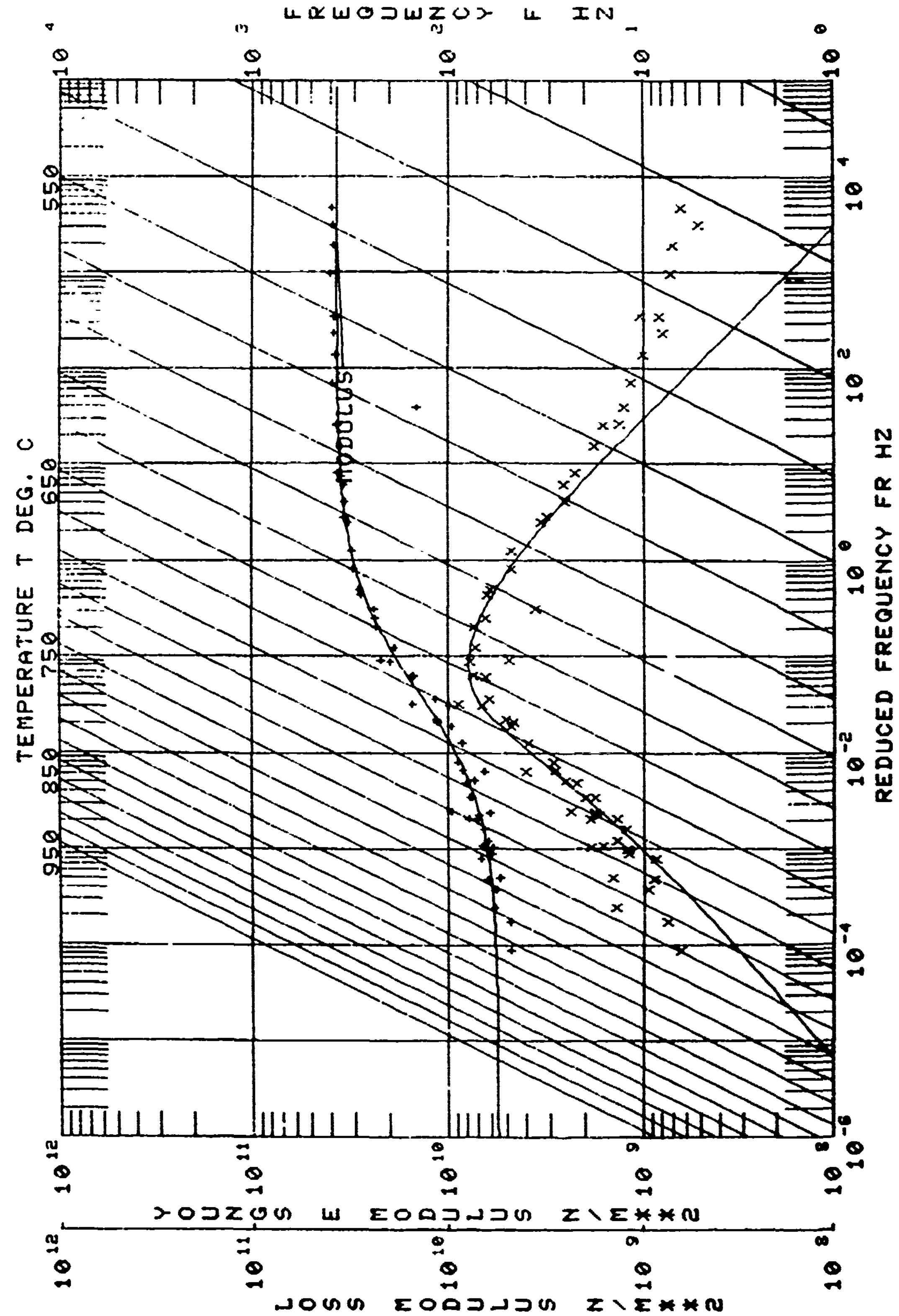
EXPERIMENTAL CODE : 40
MATERIAL :J85-11 AFTER 100.75 HRS @,1400*F
DATA SOURCES
MANUFACTURER :N
AFML :UDRI BEAM COATED ONE SIDE
OTHER :COATING M-1 +1 % COLBALT OXIDE (M-12)

01-46-2

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	4.86340E+09	.1345	843.3	93.7	2.	1.67180E+11	.0025	94.8	6.54126E+08
2	5.91028E+09	.2412	843.3	263.3	3.	1.67701E+11	.0054	265.8	1.42568E+09
3	6.37030E+09	.1420	843.3	517.8	4.	1.68564E+11	.0034	522.2	9.04462E+08
4	6.90852E+09	.1281	843.3	858.9	5.	1.69410E+11	.0033	865.4	8.84779E+08
5	6.41224E+09	.2191	843.3	1286.3	6.	1.71266E+11	.0052	1297.4	1.40500E+09
6	4.95102E+09	.1560	815.6	94.6	2.	1.70192E+11	.0029	95.6	7.72457E+08
7	5.57815E+09	.2642	815.6	265.4	3.	1.70616E+11	.0055	268.1	1.47373E+09
8	6.47565E+09	.1921	815.6	522.1	4.	1.71351E+11	.0046	526.5	1.24392E+09
9	6.71657E+09	.1863	815.6	865.3	5.	1.72122E+11	.0046	872.3	1.25098E+09
10	6.21724E+09	.2906	815.6	1295.1	6.	1.73810E+11	.0066	1307.0	1.80688E+09
11	5.82749E+09	.1681	787.8	95.5	2.	1.73123E+11	.0036	96.4	9.79701E+08
12	6.06189E+09	.3177	787.8	267.7	3.	1.73299E+11	.0071	270.2	1.92568E+09
13	8.02690E+09	.2379	787.8	527.4	4.	1.73965E+11	.0069	530.5	1.90942E+09
14	7.97220E+09	.2544	787.8	873.7	5.	1.74776E+11	.0073	879.0	2.02852E+09
15	7.52256E+09	.3407	787.8	1307.9	6.	1.76480E+11	.0092	1317.0	2.56292E+09
16	6.18245E+09	.1988	760.0	96.3	2.	1.75862E+11	.0044	97.2	1.22917E+09
17	9.86683E+09	.2454	760.0	269.9	3.	1.73787E+11	.0087	270.6	2.42095E+09
18	8.22909E+09	.2740	760.0	531.6	4.	1.76664E+11	.0080	534.6	2.25473E+09
19	9.11940E+09	.3243	760.0	881.8	5.	1.77371E+11	.0104	885.5	2.95748E+09
20	8.70802E+09	.0000	760.0	1320.3	6.	1.79170E+11	.0000	1327.0	0.00000E+00
21	1.01855E+10	.6748	732.2	1333.5	6.	1.81935E+11	.0235	1337.2	6.87329E+09
22	1.15316E+10	.4106	732.2	891.8	5.	1.79984E+11	.0163	892.0	4.73451E+09
23	8.74993E+09	.4554	732.2	536.0	4.	1.79384E+11	.0139	538.7	3.98482E+09
24	6.69992E+09	.6068	732.2	272.2	3.	1.78950E+11	.0144	274.6	4.06534E+09
25	7.08158E+09	.2469	732.2	97.2	2.	1.78659E+11	.0062	98.0	1.74834E+09
26	8.56878E+09	.3371	704.4	98.1	2.	1.81221E+11	.0100	98.7	2.88871E+09
27	9.82307E+09	.4987	704.4	275.8	3.	1.81737E+11	.0168	276.7	4.89898E+09
28	1.18929E+10	.5283	704.4	542.9	4.	1.82125E+11	.0213	542.8	6.28302E+09
29	1.55648E+10	.4194	704.4	904.0	5.	1.82576E+11	.0217	898.4	6.52781E+09
30	2.24169E+10	.2244	704.4	1370.4	6.	1.84694E+11	.0160	1347.3	5.02947E+09
31	2.45027E+10	.1507	676.7	1384.1	6.	1.87363E+11	.0115	1357.0	3.69233E+09
32	2.36537E+10	.3176	676.7	922.1	5.	1.85228E+11	.0237	904.9	7.51229E+09
33	1.92433E+10	.3860	676.7	553.5	4.	1.84927E+11	.0239	547.0	7.42840E+09
34	1.54168E+10	.4977	676.7	280.4	3.	1.84454E+11	.0252	278.8	7.67261E+09
35	1.16978E+10	.4470	676.7	93.4	2.	1.83838E+11	.0176	99.4	5.22929E+09
36	2.02772E+10	.3895	648.9	101.4	2.	1.86362E+11	.0251	100.1	7.89861E+09
37	2.39887E+10	.2731	648.9	286.0	3.	1.86950E+11	.0204	280.6	6.55021E+09
38	2.89975E+10	.2134	648.9	565.6	4.	1.87495E+11	.0188	550.7	6.18737E+09
39	3.13985E+10	.1544	648.9	938.9	5.	1.87734E+11	.0145	911.0	4.84799E+09
40	1.57180E+10	.5795	732.2	1346.0	6.	1.81935E+11	.0303	1337.2	9.10803E+09
41	3.47260E+10	.0753	621.1	1423.3	6.	1.92647E+11	.0076	1376.0	2.61615E+09
42	3.41445E+10	.0755	621.1	948.4	5.	1.90256E+11	.0076	917.1	2.57849E+09
43	3.30071E+10	.1040	621.1	572.5	4.	1.90061E+11	.0101	554.5	3.43189E+09
44	3.16000E+10	.1547	621.1	291.1	3.	1.89436E+11	.0145	282.5	4.89007E+09
45	2.81905E+10	.2304	621.1	103.3	2.	1.88791E+11	.0197	100.7	6.49545E+09
46	3.46902E+10	.0926	593.3	104.9	2.	1.91236E+11	.0093	101.4	3.21163E+09
47	3.61824E+10	.0506	593.3	578.4	4.	1.92468E+11	.0053	558.0	1.83076E+09
48	3.75493E+10	.0363	593.3	958.6	5.	1.92712E+11	.0039	923.0	1.36368E+09
49	1.48589E+10	.0871	593.3	1436.7	6.	2.09241E+11	.0038	1434.0	1.29468E+09

50	3.92636E+10	.0215	565.6	1447.4	6.	1.97153E+11	.0024	1392.0	8.45929E+08
51	3.93948E+10	.0208	565.6	966.5	5.	1.95141E+11	.0023	928.8	8.17830E+08
52	3.83232E+10	.0269	565.6	583.3	4.	1.94751E+11	.0029	561.3	1.03264E+09
53	3.95741E+10	.0302	565.6	297.5	3.	1.93752E+11	.0034	285.7	1.15384E+09
54	3.76797E+10	.0441	565.6	105.9	2.	1.93468E+11	.0047	102.0	1.66102E+09
55	3.87686E+10	.0276	537.8	106.6	2.	1.95790E+11	.0030	102.6	1.07140E+09
56	4.06901E+10	.0183	537.8	299.4	3.	1.95928E+11	.0021	287.3	7.45934E+08
57	3.95092E+10	.0183	537.8	587.1	4.	1.96908E+11	.0020	564.4	7.23569E+08
58	4.00448E+10	.0132	537.8	972.6	5.	1.97502E+11	.0015	934.4	5.28115E+08
59	4.04645E+10	.0161	537.8	1456.6	6.	1.99226E+11	.0018	1399.3	6.53333E+08
60	6.34481E+09	.1204	787.8	95.6	2.	1.73123E+11	.0028	96.4	7.64166E+08
61	6.83866E+09	.2403	787.8	268.1	3.	1.73299E+11	.0060	270.2	1.64356E+09
62	7.20128E+09	.1951	787.8	526.6	4.	1.73965E+11	.0051	530.5	1.40497E+09
63	7.71107E+09	.2339	787.8	873.3	5.	1.74776E+11	.0065	879.0	1.80366E+09
64	3.70028E+10	.0615	593.3	295.0	3.	1.91723E+11	.0065	284.2	2.27729E+09


FREQUENCY F HZ
TEMPERATURE T DEG. C
550
650
750
850
950
MODULUS
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA



TEMPERATURE T DEG. C
550
650
750
850
950
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-46-3

Date 1/11/79

Damping Material 74.5% SiO_2 + 10.75% CaO + 12.75% Na_2O + 2% Co_2O_3

Material Thickness 0.0155 cm Material Density 2.34 g/cc

Fixture No. 2 Beam Thickness 0.0960 cm

Beam Density 9.13 g/cc Beam Length 20.95 cm

Temperature Test Range: Between 815 °C and 540 °C

Frequency Test Range: Between 95 Hz and 1,460 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.35		Temperature	670 °C
	1,000 Hz	η_D 0.35		Temperature	725 °C
Range	100 Hz	635 °C	765 °C		
	1,000 Hz	640 °C	715 °C		

Complex Modulus E_D":

Peak	100 Hz	6.9×10^9 PAS		Temperature	630 °C
	1,000 Hz	6.9×10^9 PAS		Temperature	680 °C
Range	100 Hz	630 °C	665 °C		
	1,000 Hz	640 °C	715 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-11  AFTER 314 HRS. @ 1400@0F.
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N;
  T0          FROM          MROM         N          ML
               A1            A2          A3         A4
   550.0  7.0600E-02  1.9946E+10      .741  9.5945E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH        FROL        C
            B1        B2        B3        B4         B5
   550.0     .360     .450    -.500  3.3000E-02     .920
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J85-11, test 3. Retest of 01-46-1 after 314 hours at 760°C. Surface further deteriorated; very rough, but the entire surface was still coated.

TABLE 21-B

[illegible] No. 01-16-3

°F		ε_c	ε_n	ε_L	ε_R	$\Delta\varepsilon$	η_s	η_c	[illegible]
[illegible]	[illegible]								
1500	2	95.52	95.63	95.26	95.92	.66	.00691	.00286	
	3	267.50	268.1	266.38	268.56	2.18	.00815	.00575	
	4	526.51	526.5	525.08	527.75	2.67	.00507	.00394	
	5	872.56	872.3	869.82	875.30	5.48	.00628	.00507	
	6	1305.21	1307.0	1299.8	1310.62	10.82	.00829	.00730	
1450	2	96.22	96.45	95.97	96.55	.58	.00603	.00333	
	3	269.30	270.2	268.12	270.49	2.37	.00830	.00719	
	4	529.86	530.5	527.84	531.46	3.62	.00683	.00558	
	5	878.82	879.0	875.45	882.12	6.67	.00759	.00670	
	6	1315.59	1317.0	1308.20	1321.68	13.48	.01025	.00949	
1400	2	97.12	97.21	96.84	97.41	.57	.00587	.00367	
	3	271.98	272.4	270.44	273.27	2.83	.01041	.00911	
	4	534.16	534.6	532.50	535.47	5.84	.01093	.01038	
	5	886.45	885.5	880.80	891.04	10.24	.01155	.01078	
	6	1328.1	1327.0	1317.77	1336.90	19.13	.01440	.01378	
1350	2	97.95	97.98	97.68	98.36	.68	.00694	.00521	
	3	274.11	274.57	271.31	273.21	3.73	.01362	.01250	
	4	539.92	538.7	537.97	541.87	7.66	.01420	.01372	
	5	895.52	892.0	887.24	902.79	15.55	.01736	.01672	
	6	1343.81	1337.2	1335.98	1350.78	29.08	.02164	.02112	

°F		ε_c	ε_n	ε_L	ε_R	$\Delta\varepsilon$	η_s	η_c	[illegible]
[illegible]	[illegible]								
1300	2	98.85	98.68	98.35	99.61	1.26	.01275	.01125	
	3	279.17	276.7	278.08	280.44	4.64	.01661	.01561	
	4	547.09	542.8	543.82	549.96	12.06	.02206	.02163	
	5	908.41	898.4	898.26	918.56	20.30	.02235	.02176	
	6	1364.10	1347.3	1356.68	1372.84	31.76	.02328	.02282	
1250	2	100.36	99.39	99.56	101.84	2.28	.02272	.02139	
	3	283.47	278.76	282.05	295.50	6.78	.02392	.02301	
	4	557.38	546.9	553.72	561.05	14.40	.02584	.02545	
	5	925.97	904.9	916.40	935.54	19.14	.02067	.02011	
	6	1393.8	1357.0	1386.[illegible]	1401.71	29.36	.02106	.02065	
1200	2	101.56	100.07	100.90	102.19	2.52	.02477	.02356	
	3	293.14	280.64	288.15	292.13	7.82	.02696	.02612	
	4	568.27	550.7	565.42	571.60	12.14	.02137	.02098	
	5	943.50	911.0	940.14	946.86	13.21	.01400	.01346	
	6	1411.36	1367.0	1405.94	1416.10	21.93	.01554	.01516	
1150	2	103.48	100.72	102.94	104.06	2.20	.02127	.02014	
	3	292.61	282.5	290.42	294.12	3.70	.01264	.01186	
	4	575.08	554.5	572.70	577.73	5.03	.00875	.00832	
	5	952.17	917.1	949.70	956.16	6.46	.00678	.00625	
	6	1428.22	1376.0	1424.00	1433.12	9.12	.00639	.00603	

TABLE 21-B (Concluded)

Beam No. 01-46-3

°F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	2	105.47	101.37	105.04	105.64	1.18	.01113	.01014	
	3	295.88	284.2	295.05	296.67	1.62	.00548	.00474	
	4	580.66	558.0	579.43	581.85	2.12	.00417	.00364	
	5	961.87	923.0	960.32	963.54	3.22	.00335	.00283	
	6	1441.19	1384.5	1438.94	1443.72	4.78	.00332	.00296	
1050	2	106.70	101.96	106.50	106.95	.45	.00442	.00332	
	3	298.50	285.7	298.09	299.00	.91	.00305	.00235	
	4	585.12	561.3	584.52	585.91	1.39	.00238	.00186	
	5	969.30	928.8	968.28	970.13	1.85	.00191	.00139	
	6	1452.04	1392.0	1450.76	1453.62	2.86	.00197	.00161	
1000	2	107.46	102.57	107.32	107.60	.28	.00261	.00167	
	3	300.46	287.3	300.24	300.82	.58	.00193	.00127	
	4	588.95	564.4	588.53	589.46	.93	.00158	.00098	
	5	975.32	934.4	974.71	975.88	1.17	.00120	.00060	
	6	1461.00	1399.3	1459.86	1461.92	2.06	.00141	.00105	

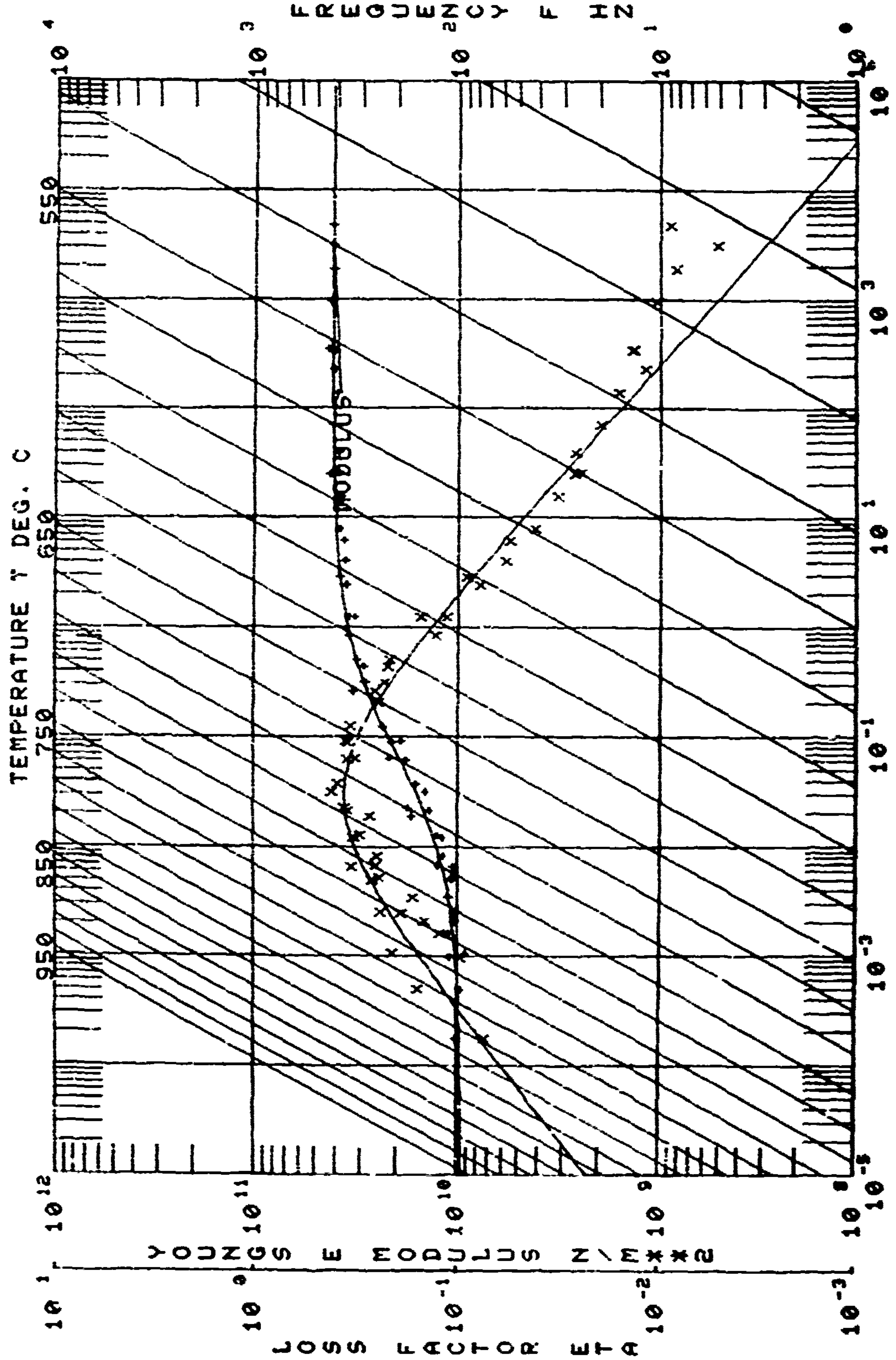
EXPERIMENTAL CODE : 45
MATERIAL :J85-11 AFTER 314 HRS. @ 1400@@F.
DATA SOURCES

01-46-3

MANUFACTURER :N
AFML :UDRI BEAM COATED ONE SIDE
OTHER :COATING: 74.5% SI O2 + 12.75% NA2 O + 10.75% CA O + CO2

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.05097E+10	.1947	815.6	1305.2	6.	1.73R10E+11	.0073	130[illegible].0	2.04575E+09
2	1.11291E+10	.0982	815.6	526.5	4.	1.71351E+11	.0039	526.5	1.09310E+09
3	9.83674E+09	.1604	815.6	267.5	3.	1.70616E+11	.0057	268.1	1.57759E+09
4	1.04106E+10	.0754	815.6	95.5	2.	1.70192E+11	.0029	95.6	7.85317E+08
5	9.90522E+09	.0936	787.8	96.2	2.	1.73123E+11	.0033	96.4	9.26674E+08
6	9.38221E+09	.2129	787.8	269.3	3.	1.73299E+11	.0072	270.2	1.99708E+09
7	1.06108E+10	.1476	787.8	529.9	4.	1.73965E+11	.0056	530.5	1.56590E+09
8	1.12287E+10	.1687	787.8	878.8	5.	1.74776E+11	.0067	879.0	1.89474E+09
9	1.08418E+10	.2493	787.8	1315.6	6.	1.76480E+11	.0095	1317.0	2.70277E+09
10	1.21093E+10	.3309	760.0	1328.1	6.	1.79170E+11	.0138	1327.0	4.00739E+09
11	1.21280E+10	.2561	760.0	886.4	5.	1.77371E+11	.0108	885.5	3.10576E+09
12	1.09928E+10	.2694	760.0	534.2	4.	1.76664E+11	.0104	534.6	2.96152E+09
13	1.05418E+10	.2453	760.0	272.0	3.	1.76133E+11	.0091	272.4	2.58560E+09
14	1.08811E+10	.0958	760.0	97.1	2.	1.75862E+11	.0037	97.2	1.04199E+09
15	1.14153E+10	.1319	732.2	97.9	2.	1.78659E+11	.0052	98.0	1.50561E+09
16	1.06475E+10	.3384	732.2	274.1	3.	1.78950E+11	.0125	274.6	3.60331E+09
17	1.29594E+10	.3095	732.2	539.9	4.	1.79384E+11	.0137	538.7	4.01208E+09
18	1.39993E+10	.3522	732.2	895.5	5.	1.79984E+11	.0167	892.0	4.93100E+09
19	1.47427E+10	.4284	732.2	1343.8	6.	1.81935E+11	.0211	1337.2	6.31513E+09
20	1.95437E+10	.3626	704.4	1364.1	6.	1.84694E+11	.0228	1347.3	7.08623E+09
21	1.85013E+10	.3596	704.4	908.4	5.	1.82576E+11	.0218	898.4	6.65237E+09
22	1.70905E+10	.2761	704.4	279.2	3.	1.81737E+11	.0156	276.7	4.71869E+09
23	1.27735E+10	.2598	704.4	98.9	2.	1.81221E+11	.0113	98.7	3.31804E+09
24	1.78051E+10	.3683	676.7	100.4	2.	1.83838E+11	.0214	99.4	6.55753E+09
25	2.22418E+10	.3252	676.7	283.5	3.	1.84454E+11	.0230	278.8	7.23199E+09
26	2.36914E+10	.3407	676.7	557.4	4.	1.84887E+11	.0254	546.9	8.07234E+09
27	2.58352E+10	.2499	676.7	925.3	5.	1.85228E+11	.0201	904.9	6.45543E+09
28	2.90805E+10	.2338	676.7	1393.8	6.	1.87363E+11	.0206	1357.0	6.79932E+09
29	3.29865E+10	.1560	648.9	1411.4	6.	1.90135E+11	.0152	1367.0	5.14734E+09
30	3.46819E+10	.1314	648.9	943.5	5.	1.87734E+11	.0135	911.0	4.55674E+09
31	3.33377E+10	.2627	648.9	290.1	3.	1.86950E+11	.0261	280.6	8.75685E+09
32	2.12108E+10	.3506	648.9	10[illegible].6	2.	1.86362E+11	.0236	100.1	7.43589E+09
33	2.94847E+10	.2268	621.1	103.5	2.	1.88791E+11	.0201	100.7	6.68764E+09
34	3.50630E+10	.1156	621.1	292.6	3.	1.89436E+11	.0119	282.5	4.05272E+09
35	3.60640E+10	.0794	621.1	575.1	4.	1.90061E+11	.0083	554.5	2.86394E+09
36	3.68534E+10	.0586	621.1	952.2	5.	1.90256E+11	.0062	917.1	2.16096E+09
37	3.71133E+10	.0568	621.1	1428.2	6.	1.92647E+11	.0060	1376.0	2.10918E+09
38	3.96130E+10	.0267	593.3	1441.2	6.	1.95034E+11	.0030	1384.5	1.05764E+09
39	3.99374E+10	.0251	593.3	961.9	5.	1.92712E+11	.0028	923.0	1.00269E+09
40	3.88719E+10	.0330	593.3	580.7	4.	1.92468E+11	.0036	558.0	1.28224E+09
41	3.90585E+10	.0426	593.3	295.9	3.	1.91723E+11	.0047	284.2	1.66578E+09
42	3.85055E+10	.0921	593.3	105.5	2.	1.91236E+11	.0101	101.4	3.54723E+09
43	4.31039E+10	.0269	565.6	106.7	2.	1.93468E+11	.0032	102.0	1.16059E+09
44	4.20091E+10	.0201	565.6	298.5	3.	1.93752E+11	.0024	285.7	8.43970E+08
45	4.05826E+10	.0164	565.6	585.1	4.	1.94751E+11	.0019	561.3	6.66632E+08
46	4.14700E+10	.0121	565.6	969.3	5.	1.95141E+11	.0014	928.8	5.00941E+08
47	4.15855E+10	.0141	565.6	1452.0	6.	1.97153E+11	.0016	1392.0	5.85418E+08
48	4.26882E+10	.0091	537.8	1461.0	6.	1.99226E+11	.0011	1399.3	3.86908E+08
49	4.20236E+10	.0052	537.8	975.2	5.	1.97502E+11	.0006	934.4	2.18898E+08

50	4.17762E+10	.0085	537.8	588.9	4.	1.96908E+11	.0010	564.4	3.56273E+08
51	4.31697E+10	.0107	537.8	300.5	3.	1.95928E+11	.0013	287.3	4.62603E+08
52	4.44471E+10	.0138	537.8	107.5	2.	1.95790E+11	.0017	102.6	6.11320E+08
53	1.13304E+10	.1248	815.6	872.6	5.	1.72122E+11	.0051	872.3	1.41409E+09
54	1.65188E+10	.3955	704.4	547.1	4.	1.82125E+11	.0216	542.8	6.53234E+09
55	3.21773E+10	.2179	648.9	568.3	4.	1.87465E+11	.0210	550.7	7.01211E+09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FREQUENCY F HZ
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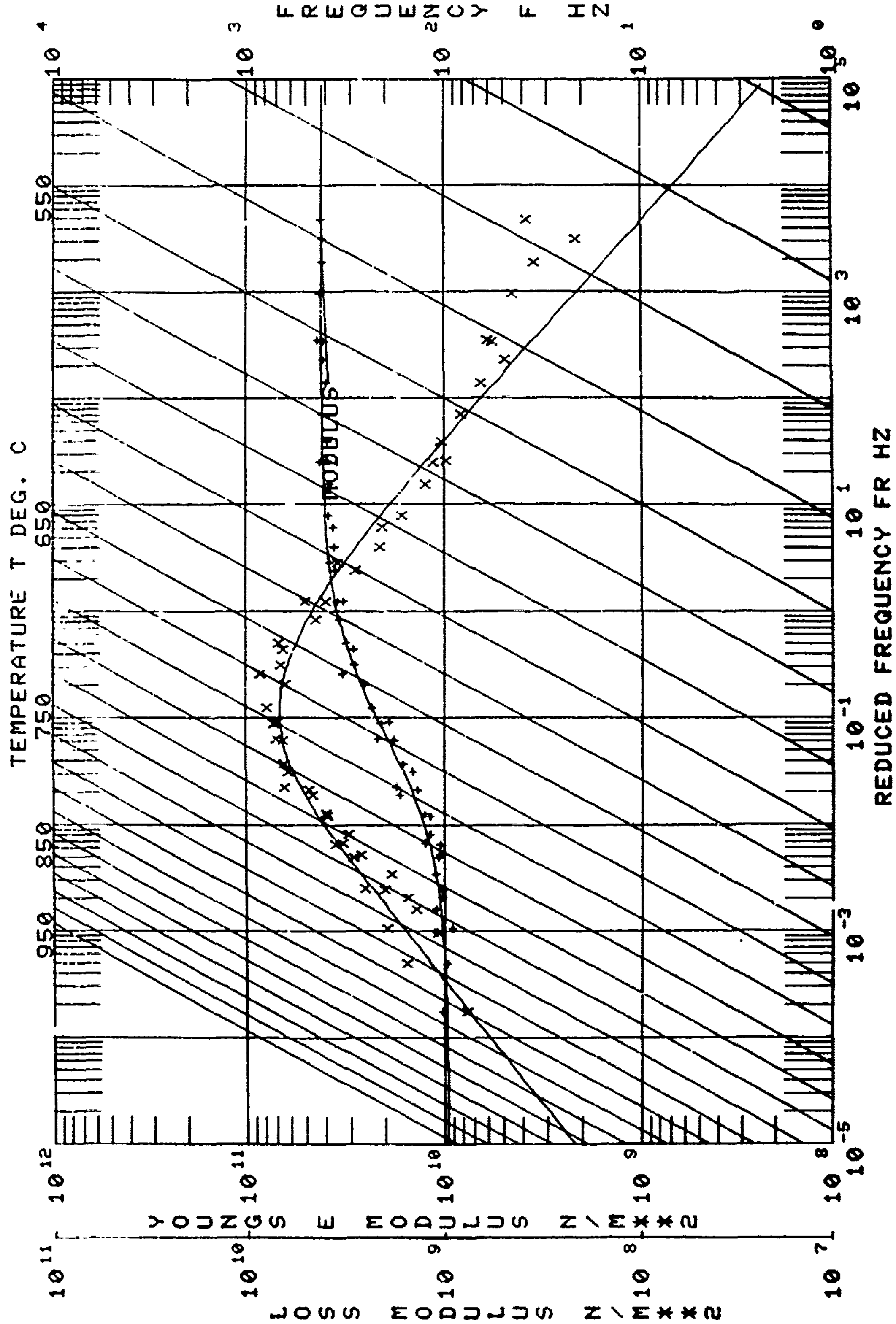
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS


TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-46-4

Date 3/79

Damping Material Pemco 79 R 465

Material Thickness 0.0145 cm Material Density 2.50 g/cc

Fixture No. 1 Beam Thickness 0.0960 cm

Beam Density 9.13 g/cc Beam Length 20.95 cm

Temperature Test Range: Between 870 °C and 565 °C

Frequency Test Range: Between 92 Hz and 1,470 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.90		Temperature	630 °C
	1,000 Hz	η_D 0.90		Temperature	745 °C
Range	100 Hz	660 °C	710 °C		
	1,000 Hz	710 °C	775 °C		

Complex Modulus E_D'':

Peak	100 Hz	1×10^{10} PAS		Temperature	645 °C
	1,000 Hz	1×10^{10} PAS		Temperature	690 °C
Range	100 Hz	610 °C	685 °C		
	1,000 Hz	645 °C	745 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-17 INITIAL TEST
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM         N          ML
               A1            A2          A3         A4
   550.0  5.8564E-02  1.4854E+10      .837  4.2435E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH         FROL        C
            B1       B2        B3          B4         B5
   550.0    .900     .700    -.500  1.4030E-02      .400
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS:

TABLE 22-B

Beam No. 01-46-4

°F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	[illegible]
1600	2	92.12	93.90	91.59	92.59	1.00	.01086	.00376	
	3	260.25	263.73	259.45	261.51	2.06	.00792	.00132	
	4	508.96	518.16	507.31	510.28	2.97	.00584	.00319	
	5	842.80	858.76	840.65	845.26	4.59	.00545	.00303	
	6	1260.23	1287.2	1256.61	1263.46	6.79	.00539	.00358	
1550	2	92.92	94.75	92.51	93.39	.88	.00947	.00267	
	3	262.52	265.80	261.59	263.48	1.89	.00720	.00267	
	4	512.6[illegible]	522.20	511.2	514.03	2.77	.00540	.00370	
	5	848.85	865.40	846.78	851.1[illegible]	4.36	.0051[illegible]	.00354	
	6	1270.50	1297.40	1266.50	1273.80	7.30	.00575	.00445	
1500	2	93.80	95.63	93.47	94.13	.66	.00704	.00274	
	3	265.10	269.10	264.38	266.06	1.68	.00636	.00314	
	4	517.05	526.50	515.54	518.33	2.29	.00540	.00421	
	5	856.65	872.30	854.21	859.31	5.16	.00595	.00473	
	6	1280.80	1307.00	1276.10	1285.40	9.30	.00726	.00625	
1450	2	94.65	96.45	94.35	94.94	.59	.00623	.00323	
	3	267.11	270.20	266.25	267.99	1.73	.00648	.00423	
	4	521.47	530.50	517.94	523.88	3.94	.00756	.00665	
	5	864.21	879.[illegible]	859.95	867.60	7.65	.00885	.00787	
	6	1291.70	1317.0	1282.98	1297.51	14.52	.01125	.01043	

°F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	[illegible]
1400	2	95.37	97.21	95.02	95.74	.72	.00755	.00545	
	3	269.18	272.4	268.21	270.36	2.15	.00799	.00642	
	4	526.22	534.65	522.96	528.82	5.86	.01114	.01042	
	5	871.87	885.5	866.22	877.72	11.50	.01319	.01237	
	6	1304.50	1327.0	1293.36	1318.49	25.33	.01942	.01873	
1350	2	96.21	97.98	95.70	96.72	1.02	.01060	.00897	
	3	271.70	274.57	270.20	273.90	3.70	.01362	.01221	
	4	532.83	538.70	527.21	537.21	10.00	.01877	.01818	
	5	884.38	892.0	873.60	893.74	19.94	.02255	.02185	
	6	1327.64	1337.2	1313.10	1349.41	36.31	.02735	.02675	
1300	2	97.50	98.68	96.56	98.36	1.80	.01846	.01705	
	3	275.68	276.7	273.21	279.30	6.09	.02209	.02089	
	4	541.94	542.80	534.58	548.94	14.36	.02650	.02601	
	5	901.70	898.4	887.30	914.21	26.91	.02984	.02925	
	6	1354.10	1347.30	1338.40	1370.11	31.71	.02342	.02288	
1250	2	99.11	99.39	97.73	100.50	2.77	.02795	.02665	
	3	281.29	278.76	279.74	283.96	8.25	.02935	.02833	
	4	553.94	546.96	543.47	560.78	17.31	.03125	.03082	
	5	921.16	904.90	907.86	934.05	26.19	.02843	.02791	
	6	1380.20	1357.0	1371.57	1389.30	34.84	.02524	.02474	

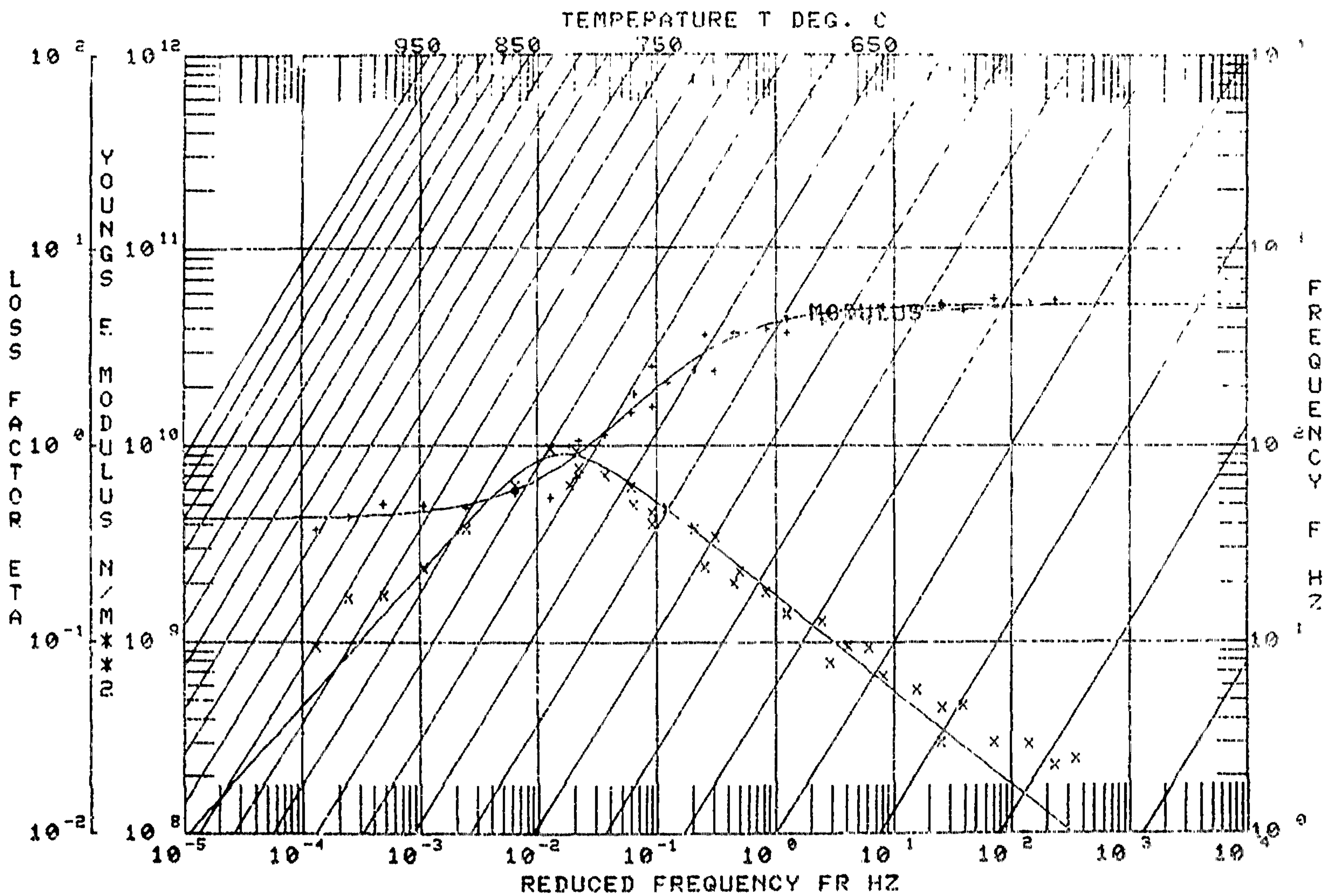
TABLE 22-B (Concluded)

[illegible] No. 01-46-4

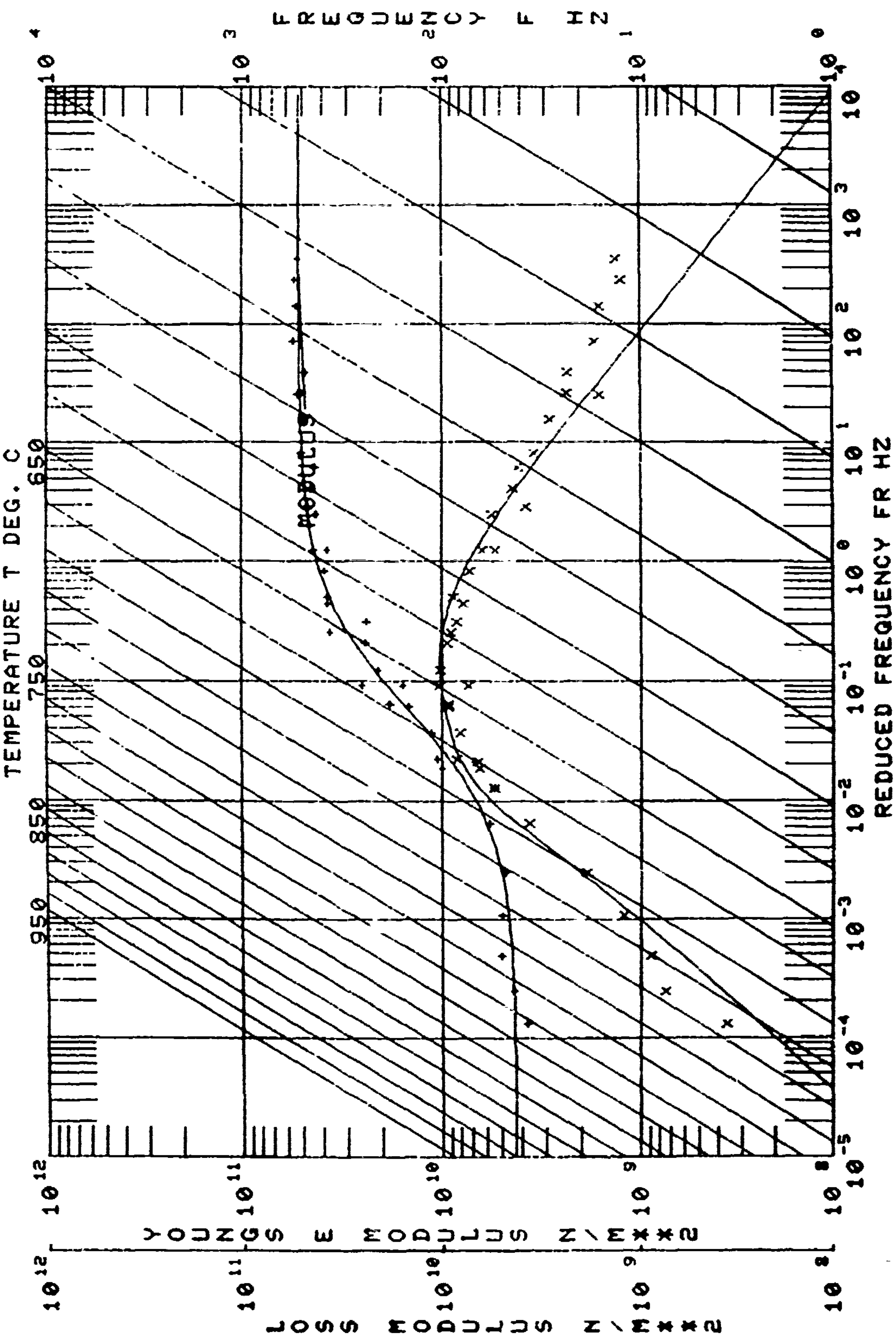
[illegible]	[illegible]	f_c	f_n	f_L	f_R	Δf	n_s	n_c	[illegible]
1200	2	102.01	100.07	100.44	103.67	3.23	.03166	.03044	
	3	290.50	280.64	287.28	294.79	7.51	.02585	.02495	
	4	571.00	550.70	565.74	579.82	14.08	.02466	.02426	
	5	946.70	911.00	935.65	954.95	19.28	.02037	.01983	
	6	1416.20	1366.75	1405.82	1427.26	21.44	.01514	.01468	
1150	2	104.42	100.72	103.30	105.64	2.34	.02241	.02129	
	3	295.30	282.50	292.93	298.11	5.18	.01754	.01665	
	4	578.52	554.50	575.13	584.00	8.87	.01533	.01494	
	5	960.03	917.10	954.23	965.86	11.63	.01211	.01167	
	6	1435.90	1376.0	1426.0	1442.30	16.30	.01135	.01092	
1100	2	106.35	101.37	105.75	106.92	1.17	.01100	.00986	
	3	299.44	284.2	298.09	300.97	2.88	.00962	.00891	
	4	586.80	558.0	584.60	589.14	4.54	.00774	.00756	
	5	972.42	923.0	969.23	975.53	6.30	.00648	.00606	
	6	1453.24	1384.5	1447.65	1456.85	9.20	.00633	.00592	
1050	2	107.60	101.96	107.32	107.88	.56	.00520	.00407	
	3	302.75	285.70	302.08	303.55	1.47	.00486	.00424	
	4	592.98	561.30	591.62	594.23	2.61	.00440	.00402	
	5	982.42	928.80	980.60	984.13	3.53	.00359	.00313	
	6	1467.7	1392.0	1465.0	1470.4	5.40	.00368	.00329	

EXPERIMENTAL CODE : 59
MATERIAL :J85-17 INITIAL TEST 01-46-4
DATA SOURCES
MANUFACTURER :PEMCO 79 R [illegible] 465
AFML :UDRI BEAM COATED ONE SIDE MARCH 27,1979
OTHER :N

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	3.80705E+09	.0970	871.1	260.2	3.	1.65124E+11	.0013	263.7	3.69297E+08
2	1.33895E+09	.6505	871.1	509.0	4.	1.65927E+11	.0031	518.1	8.71010E+08
3	8.46036E+08	.9960	871.1	842.8	5.	1.66797E+11	.0030	858.7	8.42631E+08
4	4.40777E+09	.1726	843.3	262.5	3.	1.67701E+11	.0027	265.8	7.60822E+08
5	5.15310E+09	.1773	815.6	265.1	3.	1.70616E+11	.0031	268.1	9.13468E+08
6	1.20494E+09	.9999	815.6	517.1	4.	1.71351E+11	.0042	526.5	1.20487E+09
7	5.09431E+09	.2452	787.8	267.1	3.	1.73299E+11	.0042	270.2	1.24902E+09
8	4.93395E+09	.3900	760.0	269.2	3.	1.76133E+11	.0064	272.4	1.92432E+09
9	5.85866E+09	.6373	732.2	271.7	3.	1.78950E+11	.0122	274.6	3.73393E+09
10	5.60404E+09	.9932	732.2	532.8	4.	1.79384E+11	.0182	538.7	5.56571E+09
11	7.07518E+09	.9554	732.2	884.4	5.	1.79984E+11	.0219	892.0	6.75959E+09
12	1.60962E+10	.4704	704.4	1354.1	6.	1.84694E+11	.0229	1347.3	7.57100E+09
13	1.50066E+10	.6349	704.4	901.7	5.	1.82576E+11	.0292	898.4	9.52738E+09
14	1.15893E+10	.7176	704.4	541.9	4.	1.82125E+11	.0260	542.8	8.31703E+09
15	1.02238E+10	.6478	704.4	275.7	3.	1.81737E+11	.0209	276.7	6.62305E+09
16	1.08930E+10	.7867	676.7	99.1	2.	1.83838E+11	.0267	99.4	8.56920E+09
17	1.86056E+10	.5091	676.7	281.2	3.	1.84454E+11	.0283	278.8	9.47207E+09
18	2.12329E+10	.4923	676.7	553.9	4.	1.84927E+11	.0308	547.0	1.04533E+10
19	2.47206E+10	.3886	676.7	921.2	5.	1.85228E+11	.0279	904.9	9.63355E+09
20	2.44716E+10	.3520	676.7	1380.2	6.	1.87363E+11	.0247	1357.0	8.61468E+09
21	3.83432E+10	.1433	648.9	1416.2	6.	1.90065E+11	.0147	1366.7	5.49494E+09
22	4.00370E+10	.1848	648.9	946.7	5.	1.87734E+11	.0198	911.0	7.39920E+09
23	3.83157E+10	.2343	648.9	571.0	4.	1.87465E+11	.0243	550.7	8.97562E+09
24	3.69820E+10	.2476	648.9	290.5	3.	1.86950E+11	.0250	280.6	9.15734E+09
25	2.59098E+10	.4098	648.9	102.0	2.	1.86362E+11	.0304	100.1	1.06168E+10
26	3.84780E+10	.2056	621.1	104.4	2.	1.88791E+11	.0212	100.7	7.91025E+09
27	4.48551E+10	.1424	621.1	295.3	3.	1.89436E+11	.0156	282.5	6.38630E+09
28	4.35351E+10	.1313	621.1	578.5	4.	1.90061E+11	.0149	554.5	5.71456E+09
29	4.61458E+10	.0979	621.1	960.0	5.	1.90256E+11	.0117	917.1	4.51585E+09
30	4.42827E+10	.0957	621.1	1435.9	6.	1.92647E+11	.0109	1376.0	4.23642E+09
31	4.94631E+10	.0479	593.3	1453.2	6.	1.95034E+11	.0059	1384.5	2.36866E+09
32	5.02988E+10	.0581	593.3	586.8	4.	1.92468E+11	.0074	558.0	2.92352E+09
33	5.18298E+10	.0687	593.3	299.4	3.	1.91723E+11	.0089	284.2	3.54720E+09
34	4.81912E+10	.0802	593.3	106.4	2.	1.91236E+11	.0099	101.4	3.86344E+09
35	5.33706E+10	.0308	565.6	107.6	2.	1.93468E+11	.0041	102.0	1.64335E+09
36	5.68814E+10	.0306	565.6	302.7	3.	1.93752E+11	.0042	285.7	1.73744E+09
37	5.45909E+10	.0300	565.6	593.0	4.	1.94751E+11	.0040	561.3	1.63956E+09
38	5.57816E+10	.0230	565.6	982.4	5.	1.95141E+11	.0031	928.8	1.28421E+09
39	5.36595E+10	.0252	565.6	1467.7	6.	1.97153E+11	.0033	1392.0	1.34988E+09
40	5.18288E+10	.0468	593.3	972.4	5.	1.92712E+11	.0061	923.0	2.42437E+09



TEMPERATURE T DEG. C
950
850
750
650
LOSS FACTOR ETA
YOUNGS E MODULUS N/M**2
FREQUENCY F HZ
MODULUS
REDUCED FREQUENCY FR HZ


TEMPERATURE T DEG. C
650
750
850
950
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-46-5

Date 7/30/79

Damping Material Pemco 79 R 2633

Material Thickness 0.0170 cm Material Density 2.73 g/cc

Fixture No. 1 Beam Thickness 0.0960 cm

Beam Density 9.13 g/cc Beam Length 20.95 cm

Temperature Test Range: Between 535 °C and 730 °C

Frequency Test Range: Between 100 Hz and 1,500 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.50		Temperature	750 °C
	1,000 Hz	η_D 0.50		Temperature	675 °C
Range	100 Hz	645 °C	* °C		
	1,000 Hz	600 °C	* °C		

Complex Modulus E_D'':

Peak	100 Hz	9×10^9 PAS		Temperature	570 °C
	1,000 Hz	9×10^9 PAS		Temperature	620 °C
Range	100 Hz	535 °C	685 °C		
	1,000 Hz	565 °C	615 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :PEMCO 79R-2636
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0         FROM          MROM         N          ML
              A1            A2          A3         A4
   525.0  3.5297E-02  1.0569E+10    .776  2.9180E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH         FROL        C
            B1       B2        B3          B4         B5
   525.0    .425    .360    -.571  6.7830E-02    5.574
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: After test, the coating appeared to be wrinkled and molted, with sharp peaks of crystalline material resembling sand paper.

* Not measured.

TABLE 23-B

Beam No. 01-46-5

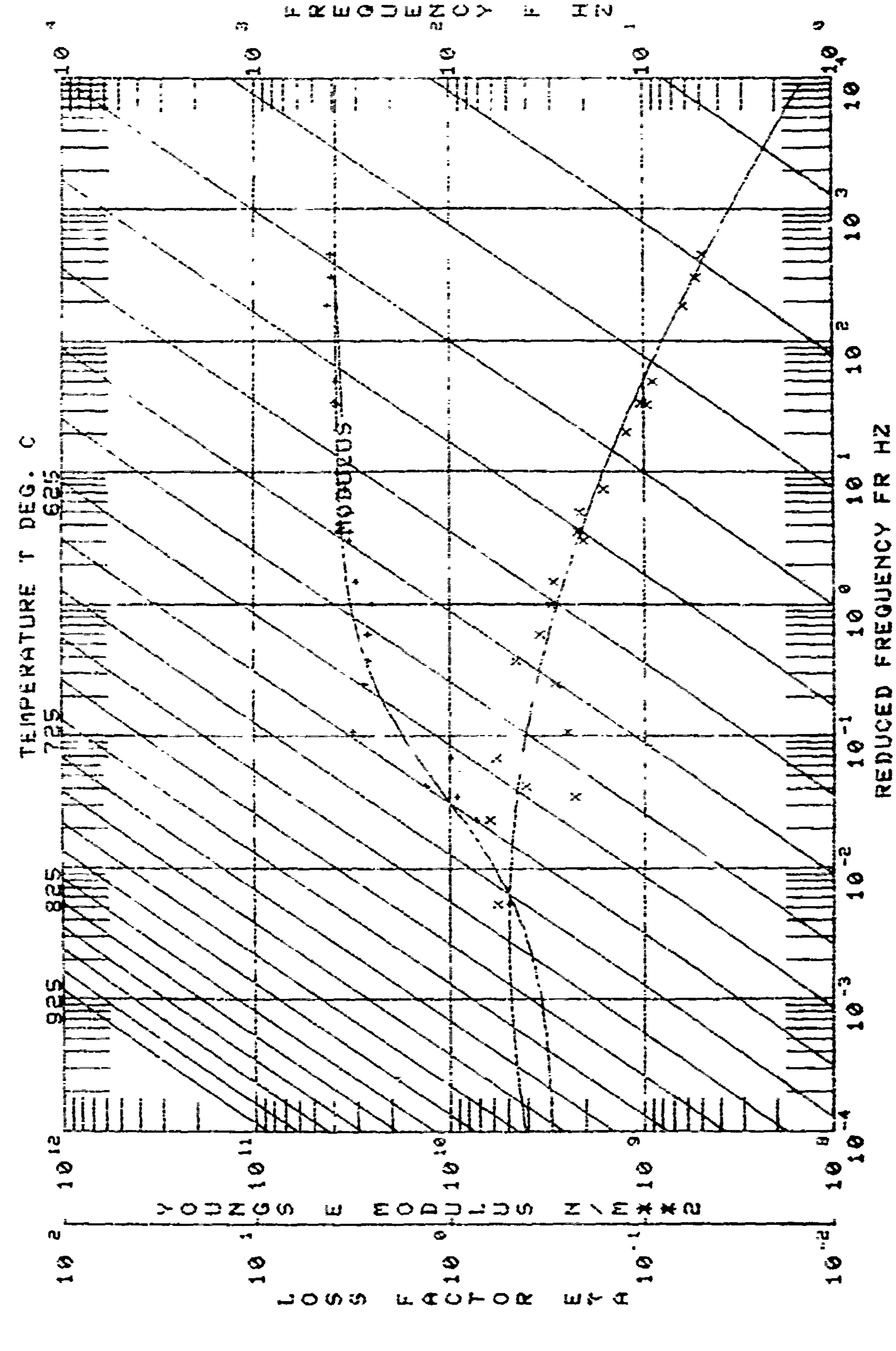
°F		f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
Temp.	Mode								
1350	2	94.31	97.98	93.65	94.99	1.338	0.0142	0.01257	
1350	3	265.13	274.57	252.75	268.55	5.797	0.0218	0 02039	
1350	4	523.82	538.70	519.38	526.08	6.70	0.01279	0.0122	
1350	5	867.49	892.00	854.49	883.58	29.096	0.03354	0.03284	
1350	6	1297.16	1337.20	1245.05	1323.94	78.89	0.06082	0.06022	
1300	2	95.38	98.68	94.32	96.54	2.394	0.0251	0.0237	
1300	3	269.83	276.68	264.14	274.50	10.36	0.0384	0.0372	
1300	4	537.11	542.80	525.92	550.72	2.481	0.00452	0.0041	
1300	5	887.86	898.40	879.90	897.03	17.136	0.0193	0.0187	
1300	6	1329.58	1347.30	1244.62	1363.54	11.886	0.00892	0.0084	
1250	2	85.63	99.39	84.25	93.26	9.018	0.1053	0.1040	
1250	3	275.91	278.76	268.51	282.21	13.70	0.0497	0.0486	
1250	4	543.28	546.96	531.43	553.66	22.24	0.0409	0.0405	
1250	5	915.57	904.90	890.94	944.14	53.80	0.0588	0.0583	
1250	6	1376.66	1357.00	1347.84	1394.74	46.90	0.0341	0.0356	
1200	2	99.66	100.07	97.31	102.26	4.949	0.0497	0.0484	
1200	3	283.54	280.64	277.13	291.67	14.541	0.0513	0.0504	
1200	4	556.44	550.70	549.99	564.21	14.21	0.0255	0.0251	
1200	5	952.65	911.00	930.94	964.73	25.79	0.0271	0.0266	
1200	6	1425.50	1366.75	1400.12	1459.75	59.63	0.0418	0.0414	
1150	2	102.06	100.72	99.25	104.28	4.967	0.0487	0.0475	
1150	3	290.58	282.50	279.70	296.20	16.50	0.0568	0.0559	
1150	4	581.23	554.50	572.07	588.22	18.45	0.0312	0.0308	X

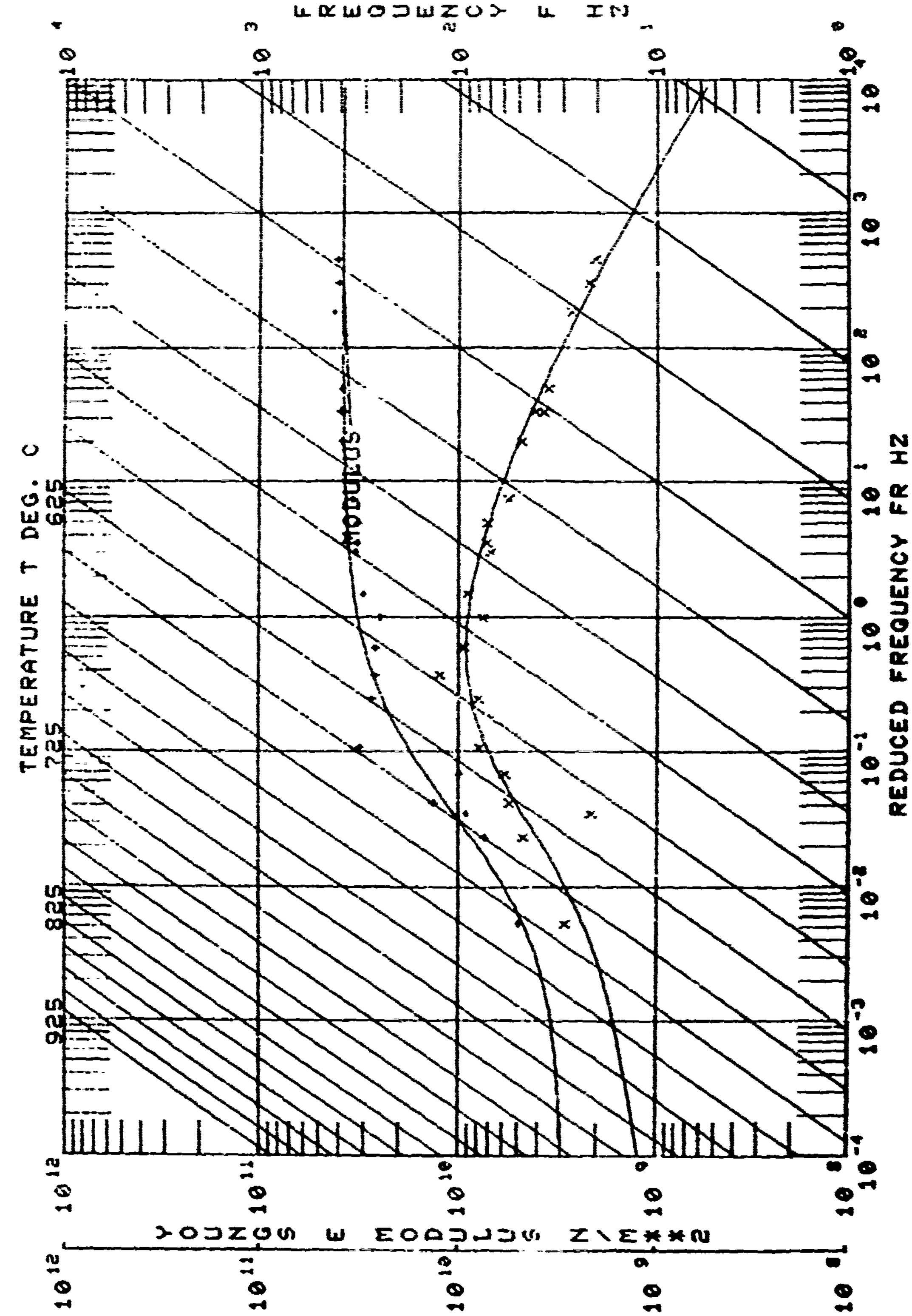
°F		f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
Temp.	Mode								
1150	5	960.14	917.10	945.21	970.12	24.486	0.0255	0.0251	X
1150	6	1450.98	1376.00	1432.25	1474.69	42.44	0.0292	0.0288	
1100	2	105.61	101.37	103.01	107.27	4.264	0.0404	0.0393	
1100	3	299.40	284.20	293.37	303.36	9.99	0.0334	0.00327	
1100	4	592.17	558.00	585.02	598.02	13.005	0.0220	0.0216	
1100	5	980.73	923.00	969.25	991.54	22.29	0.0227	0.0223	
1100	6	1472.83	1384.50	1459.21	1485.17	25.96	0.0175	0.0172	
1050	2	108.37	101.96	106.90	109.48	2.582	0.0238	0.0227	
1050	3	305.89	285.70	303.05	308.68	5.63	0.0184	0.0178	
1050	4	602.27	561.30	298.04	603.98	8.945	0.0149	0.0145	
1050	5	997.06	928.80	990.86	1002.50	11.64	0.0117	0.0113	
1050	6	1494.28	1392.00	1486.89	1503.26	16.37	0.0110	0.0106	
1000	2	110.26	102.57	109.67	111.03	1.353	0.0123		
1000	3	310.15	287.30	308.62	311.62	3.002	0.0097		
1000	4	609.99	564.40	606.44	611.25	4.81	0.0079		
1000	5	1007.27	934.40	1004.09	1010.54	6.45	0.0064		
1000	6	1508.56	1399.30	1504.69	1513.53	8.84	0.0059		

EXPERIMENTAL CODE :139
MATERIAL :PEMCO 79R-2830
DATA SOURCES
MANUFACTURER :PEMCO CO.
AFML :UDRI ;BEAM COATED ONE SIDE
OTHER :NONE

01-46-5

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	4.00029E+10	.1054	537.8	110.3	2.	2.09499E+11	.0123	106.1	4.21590E+09
2	4.32704E+10	.0639	537.8	610.0	4.	2.11183E+11	.0079	584.5	2.76584E+09
3	4.11342E+10	.0542	537.8	1007.3	5.	2.12136E+11	.0064	968.4	2.22751E+09
4	4.12148E+10	.0502	537.8	1508.6	6.	2.14220E+11	.0059	1451.0	2.07068E+09
5	3.29221E+10	.2259	565.6	108.4	2.	2.06351E+11	.0227	105.3	7.43573E+09
6	3.91786E+10	.1256	565.6	602.3	4.	2.07944E+11	.0145	580.0	4.92118E+09
7	3.87246E+10	.0992	565.6	997.1	5.	2.08950E+11	.0113	961.1	3.84238E+09
8	3.93255E+10	.0926	565.6	1494.3	6.	2.10955E+11	.0106	1439.9	3.64271E+09
9	3.01309E+10	.0345	593.3	299.4	3.	2.02253E+11	.0033	291.9	1.03909E+09
10	3.31629E+10	.2118	593.3	592.2	4.	2.04303E+11	.0216	574.9	7.02409E+09
11	3.29425E+10	.2208	593.3	980.7	5.	2.05314E+11	.0223	952.7	7.27436E+09
12	3.47244E+10	.1643	593.3	1472.8	6.	2.07366E+11	.0172	1427.6	5.70540E+09
13	2.70541E+10	.3534	621.1	581.2	4.	2.00272E+11	.0308	569.2	9.55979E+09
14	2.53080E+10	.3064	621.1	960.1	5.	2.01197E+11	.0251	943.1	7.75472E+09
15	3.07237E+10	.3001	621.1	1451.0	6.	2.03347E+11	.0288	1413.7	9.22024E+09
16	8.54769E+09	.8093	648.9	556.4	4.	1.95237E+11	.0251	562.0	6.91797E+09
17	2.79363E+10	.2913	648.9	952.7	5.	1.95941E+11	.0266	930.7	8.13750E+09
18	2.70263E+10	.4710	648.9	1425.5	6.	1.98117E+11	.0414	1395.4	1.27283E+10
19	1.36215E+10	.4159	676.7	550.4	4.	1.87193E+11	.0208	550.3	5.66580E+09
20	1.01699E+10	.5860	676.7	908.2	5.	1.89013E+11	.0221	914.1	5.95955E+09
21	3.19602E+10	.2531	676.7	1413.0	6.	1.90859E+11	.0265	1369.6	8.09055E+09
22	1.12417E+10	.0943	704.4	537.1	4.	1.79517E+11	.0041	538.9	1.05980E+09
23	7.52624E+09	.6374	704.4	887.9	5.	1.82211E+11	.0187	897.5	4.79756E+09
24	9.36800E+09	.2329	704.4	1329.6	6.	1.82507E+11	.0084	1339.3	2.18152E+09
25	5.10452E+09	.5808	732.2	523.8	4.	1.74818E+11	.0122	531.8	2.96461E+09


TEMPERATURE T DEG. C
625
725
825
925
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
625
725
825
925
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-47-1

Date 1/9/79

Damping Material 70% SiO_2 + 30% Na_2O + 2% Co_2O_3

Material Thickness 0.0196 cm Material Density 2.50 g/cc

Fixture No. 2 Beam Thickness 0.0960 cm

Beam Density 9.13 g/cc Beam Length 20.836 cm

Temperature Test Range: Between 870 °C and 480 °C

Frequency Test Range: Between 90 Hz and 1,500 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.84		Temperature	595 °C
	1,000 Hz	η_D 0.84		Temperature	665 °C
Range	100 Hz	570 °C	625 °C		
	1,000 Hz	645 °C	700 °C		

Complex Modulus E_D'':

Peak	100 Hz	1.2×10^{10} PAS		Temperature	555 °C
	1,000 Hz	1.2×10^{10} PAS		Temperature	700 °C
Range	100 Hz	540 °C	575 °C		
	1,000 Hz	585 °C	645 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :( .-47-SI  70% SIO2, 30%NA20
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0         FROM          MROM         N          ML
              A1            A2          A3         A4
   400.0  1.3909E-03  1.0626E+10   1.213  2.5594E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH         FROL        C
            B1       B2        B3          B4         B5
   400.0    .850     .950   -1.100  1.6950E-03     .450
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS:

TABLE 24-B

Beam No. 01-47-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1600	2	92.63	94.76	92.21	92.99	.78	00842	.00122	
1600	3	259.82	266.16	258.99	260.55	1.56	.00600	.01600	
1600	4	510.77	522.92	509.68	511.80	2.12	.00415	.00145	
1600	5	846.78	866.43	845.25	848.26	3.01	.00355	.00105	
1600	6	1266.83	1296.67	1264.66	1268.99	4.33	.00342	.00171	
1550	2	93.53	95.52	93.20	93.87	0.67	.00716	.00121	
1550	3	262.27	268.10	261.68	262.83	1.15	.00438	.00150	
1550	4	515.43	526.60	514.52	516.14	1.62	.00314	.00134	
1550	5	854.04	871.20	852.96	855.46	2.50	.00293	.00126	
1550	6	1277.76	1306.00	1275.83	1279.69	3.86	.00302	.00172	
1500	2	94.40	96.30	94.13	94.60	0.47	.00498	.00058	
1500	3	264.45	270.15	264.04	264.96	0.92	.00348	.00111	
1500	4	519.68	530.60	519.05	520.43	1.38	.00266	.00136	
1500	5	861.36	878.20	860.13	862.51	2.38	.00276	.00152	
1500	6	1288.56	1316.00	1286.62	1290.60	3.98	.00309	.00209	
1450	2	95.16	97.04	94.96	95.36	0.40	.00419	.00138	
1450	3	266.82	272.25	266.42	267.22	0.80	.00300	.00150	
1450	4	524.05	534.60	523.35	524.77	1.42	.00271	.00172	
1450	5	868.52	885.00	867.09	869.84	2.75	.00284	.00186	
1450	6	1299.09	1325.80	1296.71	1301.43	4.72	.00363	.00291	
1400	2	95.97	97.85	95.82	96.12	0.30	.00313	.00109	
1400	3	268.70	274.20	268.29	269.19	0.90	.00335	.00211	
1400	4	528.04	538.59	527.12	528.85	1.73	.00328	.00258	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1400	5	874.98	892.12	873.11	876.79	3.68	.00421	.00352	
1400	6	1309.15	1334.84	1305.68	1312.51	6.83	.00522	.00543	
1350	2	96.80	98.55	96.67	97.03	0.36	.00372	.00204	
1350	3	270.87	276.75	270.30	271.58	1.28	.00473	.00363	
1350	4	532.40	542.25	531.10	533.90	2.80	.00526	.00460	
1350	5	882.62	898.60	979.40	985.78	6.38	.00723	.00655	
1350	6	1320.42	1345.20	1313.65	1326.40	12.75	.00966	.00907	
1300	2	97.62	99.30	97.41	97.84	0.43	.00439	.00296	
1300	3	273.09	280.30	272.02	274.29	2 27	00351	.00731	
1300	4	537.10	546.00	534.30	539.73	5.43	.01011	.00957	
1300	5	890.04	905.20	884.25	896.45	12.20	.01371	.01303	
1300	6	1331.80	1354.80	1317.98	1343.15	25.17	.01890	.01840	
1250	2	98.58	100.40	98.42	98.99	0.73	.00741	.00611	
1250	3	275.78	280.25	273.89	280.60	6.71	.02433	.02339	
1250	4	542.83	549.75	537 17	549.18	12.01	.02212	.02168	
1250	5	902.55	912.00	889.48	916.06	26.58	.02945	.02890	
1250	6	1347.70	1364.20	1317.34	1368.50	51.56	.03826	.03782	
1200	2	99.43	100.72	98.66	100.27	1.61	.01619	.01498	
1200	3	279.89	282.20	278.00	282.09	8.04	.02872	.02780	X
1200	4	555.18	553.50	549.04	560.14	21.81	.03929	.03890	X
1200	5	926.46	918.60	914.74	938 18	46.06	.04972	.04919	X
1200	6	1367.00	1373.80	1335.98	1399.35	124.53	.09110	.09071	
1150	2	100.69	101.34	98.70	102.68	3.98	.03953		

TABLE 24-B (Concluded)

Beam No. 01-47-1

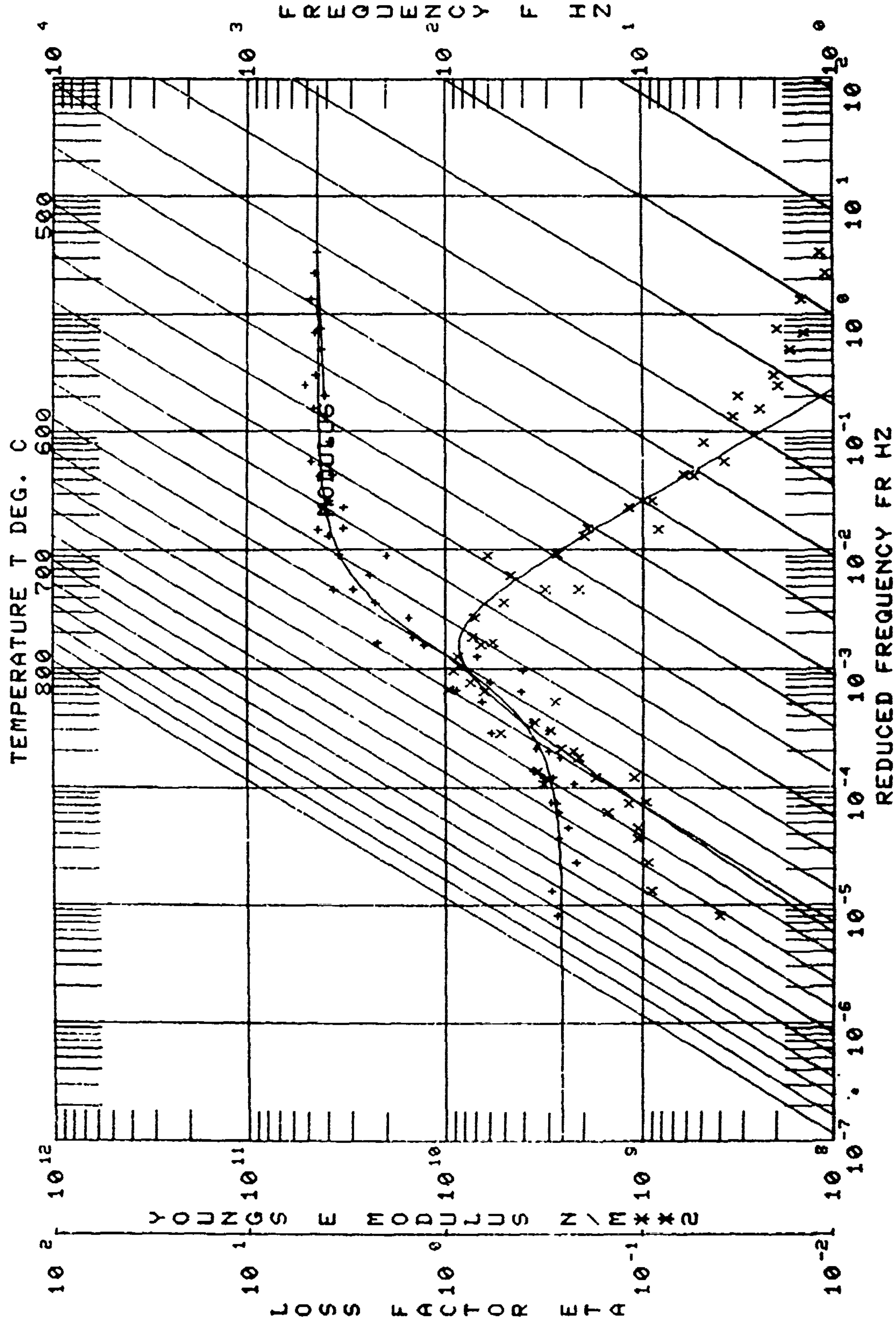
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1150	3	286.06	284.05	279.11	293.00	13.89	.04856		
1150	4	571.02	557.40	557.10	584.94	27.84	.04875		
1150	5	950.15	924.80	929.78	974.79	45.01	.04737		
1150	6	1407.10	1383.00	1388.59	1425.60	72.73	.05169		X
1100	2	104.31	101.98	101.22	106.92	5.70	.05464		
1100	3	296.54	285.80	290.46	301.60	11.14	.03757		
1100	4	587.92	561.10	577.19	598.64	21.45	.03648		
1100	5	971.46	930.80	959.57	983.34	23.77	.02447		
1100	6	1452.15	1391.60	1441.10	1463.20	22.10	.01522		
1050	2	108.01	102.59	106.32	109.58	3.26	.03018		
1050	3	303.87	287.60	300.73	307.09	6.36	.02930		
1050	4	596.23	564.60	592.85	600.75	7.90	.01325		
1050	5	985.48	936.20	981.16	989.80	8.64	.00877		
1050	6	1473.10	1399.90	1463.92	1480.48	16.56	.01124		
1000	2	109.94	103.18	109.16	110.63	1.47	.01337		
1000	3	307.99	289.40	306.75	309.43	2.68	.00870		
1000	4	603.28	572.90	601.20	608.38	4.18	.00695		
1000	5	994.81	941.70	992.56	997.58	5.02	.00505		
1000	6	1489.60	1408.20	1484.63	1491.72	7.09	.00476		
950	2	11.10	103.74	110.83	111.55	0.72	.00648		
950	3	311.22	291.20	310.54	311.81	1.27	.00408		
950	4	608.95	571.00	607.73	609.96	2.23	.00366		
950	5	1003.66	946.60	1002.55	1005.16	2.61	.00260		

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
950	6	1501.57	1415.70	1499.00	1503.60	4.60	.00306		
900	2	112.24	104.30	112.08	112.47	0.39	.00347		
900	3	314.02	294.75	313.68	314.41	0.73	.00232		
900	4	614.03	573.90	613.34	614.86	1.52	.00248		
900	5	1011.54	949.10	101.90	1012.70	1.80	.00178		
900	6	1513.29	1423.10	1511.54	1514.32	2.78	.00184		

EXPERIMENTAL CODE : 44
MATERIAL :01-47-SI 70% SIO2, 30%NA2O
DATA SOURCES
MANUFACTURER :N
AFML :UDRI BEAM COATED ONE
OTHER :N

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	5.19377E+10	.0201	482.2	112.2	2.	1.98069E+11	.0035	104.3	1.04208E+09
2	4.68568E+10	.0147	482.2	314.0	3.	2.01758E+11	.0023	294.7	6.87629E+08
3	4.87693E+10	.0151	482.2	614.0	4.	1.99186E+11	.0025	573.9	7.35446E+08
4	4.65263E+10	.0112	482.2	1011.5	5.	1.99354E+11	.0018	949.1	5.21927E+08
5	4.57106E+10	.0119	482.2	1513.3	6.	2.01600E+11	.0018	1423.1	5.41742E+08
6	4.90142E+10	.0388	510.0	111.2	2.	1.95947E+11	.0065	103.7	1.90098E+09
7	4.75754E+10	.0251	510.0	311.2	3.	1.96927E+11	.0041	291.2	1.19210E+09
8	4.63870E+10	.0210	510.0	608.9	4.	1.97178E+11	.0034	571.0	9.76396E+08
9	4.32817E+10	.0172	510.0	1003.7	5.	1.98305E+11	.0026	946.6	7.46168E+08
10	4.13759E+10	.0326	537.8	1488.6	6.	1.97401E+11	.0048	1408.2	1.34717E+09
11	4.07694E+10	.0348	537.8	994.8	5.	1.96258E+11	.0050	941.7	1.41809E+09
12	3.94266E+10	.0494	537.8	603.3	4.	1.98492E+11	.0069	572.9	1.94875E+09
13	4.45652E+10	.0556	537.8	308.0	3.	1.94500E+11	.0087	289.4	2.47760E+09
14	4.50912E+10	.0845	537.8	109.9	2.	1.93837E+11	.0134	103.2	3.80874E+09
15	3.99897E+10	.2015	565.6	303.9	3.	1.92088E+11	.0293	287.6	8.05688E+09
16	3.98474E+10	.0916	565.6	596.2	4.	1.92783E+11	.0133	564.6	3.65074E+09
17	3.83572E+10	.0081	565.6	1473.1	6.	1.95081E+11	.0011	1399.9	3.09960E+08
18	3.33993E+10	.1209	593.3	1452.1	6.	1.92774E+11	.0152	1391.6	4.03647E+09
19	3.33065E+10	.1942	593.3	971.5	5.	1.91741E+11	.0245	930.8	6.46659E+09
20	3.51498E+10	.2757	593.3	587.9	4.	1.90400E+11	.0365	561.1	9.68961E+09
21	2.99102E+10	.3225	593.3	296.5	3.	1.89691E+11	.0376	285.8	9.64725E+09
22	2.26863E+10	.5911	593.3	104.3	2.	1.89355E+11	.0546	102.0	1.34102E+10
23	8.93248E+09	.9836	621.1	100.7	2.	1.86986E+11	.0395	101.3	8.78560E+09
24	1.50741E+10	.7467	621.1	286.1	3.	1.87375E+11	.0486	284.0	1.12559E+10
25	2.32661E+10	.5127	621.1	571.0	4.	1.87897E+11	.0487	557.4	1.19281E+10
26	2.48718E+10	.4736	621.1	950.2	5.	1.89277E+11	.0474	924.8	1.17785E+10
27	2.01816E+10	.6219	621.1	1407.0	6.	1.90399E+11	.0517	1383.0	1.25513E+10
28	1.57024E+10	.7269	648.9	926.5	5.	1.86747E+11	.0492	918.6	1.14136E+10
29	1.30710E+10	.6740	648.9	555.2	4.	1.85277E+11	.0389	553.5	8.80963E+09
30	6.01022E+09	.5369	648.9	99.4	2.	1.84705E+11	.0150	100.7	3.22671E+09
31	3.67855E+09	.3499	676.7	98.6	2.	1.83533E+11	.0061	100.4	1.28723E+09
32	6.08029E+09	.7607	676.7	542.9	4.	1.82775E+11	.0217	549.7	4.62534E+09
33	7.05380E+09	.8859	676.7	902.6	5.	1.84073E+11	.0289	912.0	6.24899E+09
34	4.14915E+09	.9333	704.4	1331.8	6.	1.82714E+11	.0184	1354.8	3.87224E+09
35	4.21837E+09	.6456	704.4	890.0	5.	1.81339E+11	.0130	905.2	2.72341E+09
36	3.41696E+10	.0708	704.4	573.1	4.	1.80290E+11	.0096	546.0	2.42004E+09
37	4.10179E+09	.1492	704.4	97.6	2.	1.79533E+11	.0030	99.3	6.12190E+08
38	3.69727E+09	.1121	732.2	96.8	2.	1.76832E+11	.0020	98.6	4.14543E+08
39	2.27200E+09	.3232	732.2	270.9	3.	1.77868E+11	.0036	276.7	7.34298E+08
40	3.55178E+09	.2643	732.2	532.4	4.	1.77822E+11	.0046	542.2	9.38872E+08
41	3.72405E+09	.3612	732.2	882.6	5.	1.78704E+11	.0066	898.6	1.34498E+09
42	3.08839E+09	.2976	760.0	1309.1	6.	1.77370E+11	.0045	1334.8	9.19225E+08
43	6.62459E+09	.2849	732.2	1320.4	6.	1.77359E+11	.0091	1334.8	1.88736E+09
44	3.07910E+09	.2304	760.0	875.0	5.	1.76136E+11	.0035	892.1	7.09372E+08
45	2.91493E+09	.1775	760.0	528.0	4.	1.75430E+11	.0026	538.6	5.17280E+08
46	2.70782E+09	.1553	760.0	268.7	3.	1.74605E+11	.0021	274.2	4.20464E+08
47	3.05354E+09	.0712	760.0	96.0	2.	1.7[illegible]329E+11	.0011	97.9	2.17419E+08
48	2.93791E+09	.0921	787.8	95.2	2.	1.71454E+11	.0014	97.0	2.70594E+08
49	2.72307E+09	.1083	787.8	266.8	3.	1.72131E+11	.0015	272.2	2.94789E+08

50	2.81806E+09	.1205	787.8	524.1	4.	1.72840E+11	.0017	534.6	3.39628E+08
51	3.27016E+09	.1130	787.8	868.5	5.	1.73336E+11	.0019	885.0	3.69531E+08
52	2.68327E+09	.2165	787.8	1299.1	6.	1.74975E+11	.0029	1325.8	5.80981E+08
53	3.00149E+09	.0989	815.6	861.4	5.	1.70682E+11	.0015	878.2	2.96874E+08
54	2.44009E+09	.1081	815.6	519.7	4.	1.70263E+11	.0014	530.6	2.63873E+08
55	2.22360E+09	.0963	815.6	264.5	3.	1.69485E+11	.0011	270.2	2.14050E+08
56	2.74715E+09	.0407	815.6	94.4	2.	1.68849E+11	.0006	96.3	1.11876E+08
57	4.37585E+10	.0202	510.0	1501.6	6.	1.99509E+11	.0031	1415.7	8.84535E+08
58	3.79568E+10	.2157	565.6	108.0	2.	1.91627E+11	.0302	102.6	8.18826E+09
59	3.83205E+10	.0628	565.6	985.5	5.	1.93972E+11	.0088	936.2	2.40717E+09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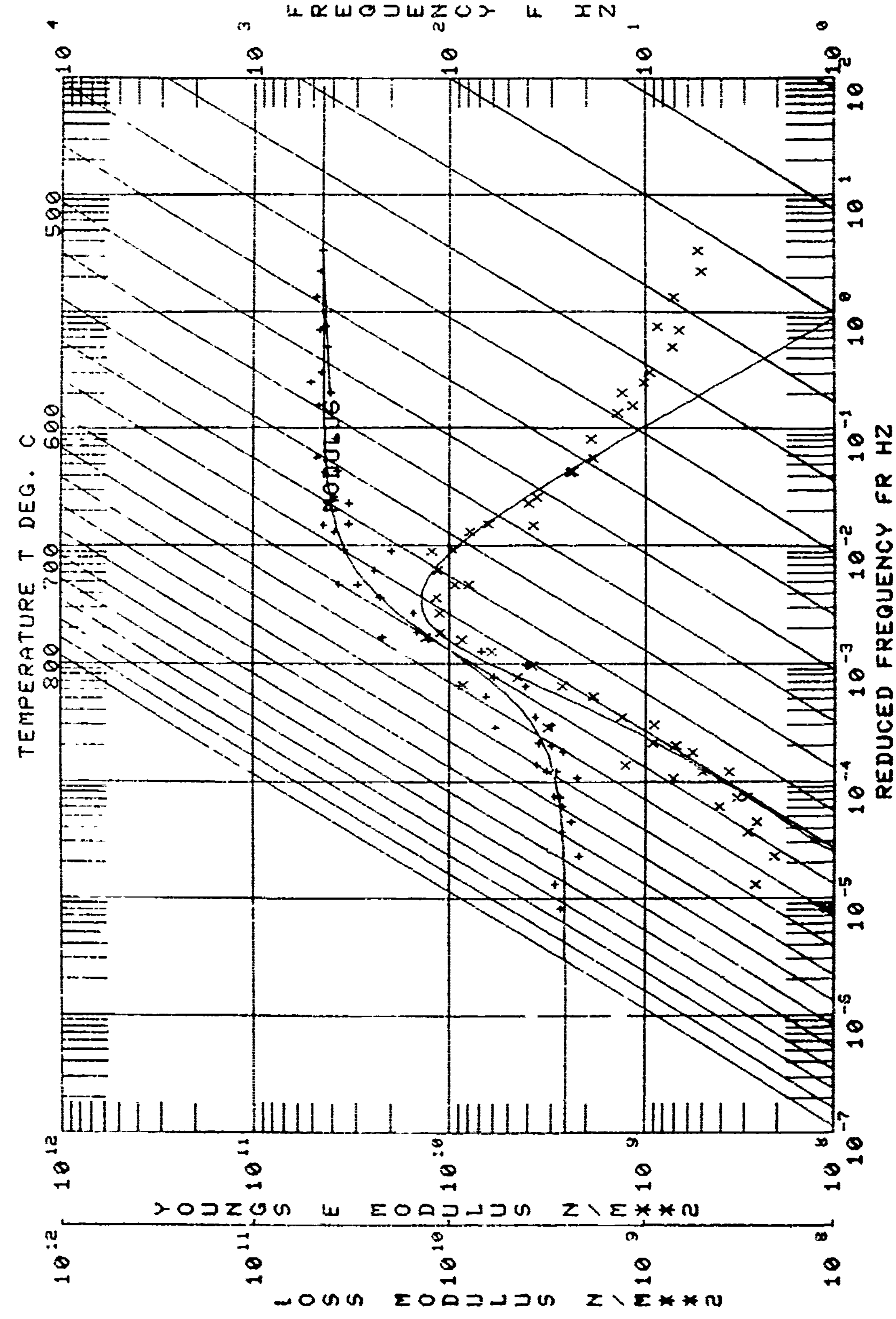
REDUCED FREQUENCY FR HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA



TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-47-2

Date 6/27/79

Damping Material Pemco 79 R 835 + 20% Al_2O_3

Material Thickness 0.0198 cm Material Density 2.50 g/cc

Fixture No. 1 Beam Thickness 0.0960 cm

Beam Density 9.18 g/cc Beam Length 20.835 cm

Temperature Test Range: Between 790 °C and 480 °C

Frequency Test Range: Between 95 Hz and [illegible],530 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.50		Temperature	645 °C
	1,000 Hz	η_D 0.50		Temperature	°C
Range	100 Hz	605 °C	°C		
	1,000 Hz	605 °C	°C		

Complex Modulus E_D'':

Peak	100 Hz	5.9×10^9 PAS		Temperature	595 °C
	1,000 Hz	5.9×10^9 PAS		Temperature	655 °C
Range	100 Hz	560 °C	635 °C		
	1,000 Hz	605 °C	°C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-18 INITIAL TEST
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM          N          ML
               A1            A2           A3         A4
   475.0  8.5000E-03  1.1000E+10     .680  2.5000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL      SL        SH        FROL        C
            B1        B2        B3         B4         B5
   475.0     .500     .450     -.550  4.3000E-03     .730
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J85-18 project

TABLE 25-B

Beam No. 01-47-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1450	2	95.18	97.04	94.99	95.5	.51	.00535	.00235	
	4	524.3	534.6	523.1	525.73	2.63	.00501	.00411	
	5	868.18	885.0	866.21	870.14	3.93	.00452	.00355	
	6	1298.76	1325.8	1295.03	1301.9	6.84	.00527	.00445	
1400	2	95.98	97.85	95.75	96.26	0.51	.00531	.00321	
	3	270.42	274.2	268.87	271.97	3.10	.01146	.00971	
	4	529.49	538.59	528.02	531.2	3.18	.00600	.00528	
	5	876.81	892.12	873.3	879.65	6.35	.00724	.00742	
	6	1310.14	1334.84	1305.54	1317.05	11.51	.00878	.00809	
1350	2	96.92	98.55	96.56	97.19	0.63	.00650	.00987	
	3	273.14	276.75	271.45	274.67	3.22	.01178	.01037	
	4	534.87	542.25	532.43	536.89	4.41	.00829	.00765	
	5	886.02	898.6	881.36	890.81	9.45	.01066	.0996	
	6	1325.26	1345.2	1317.61	1336.7	19.09	.01440	.01380	
1300	2	98.04	99.3	97.53	98.37	0.84	.00857	.00715	
	3	276.15	280.3	274.36	277.73	3.37	.01220	.01100	
	4	540.86	546.0	535.76	544.13	8.37	.01547	.01598	
	5	879.99	905.2	890.75	905.03	14.88	.01657	.01598	
	6	1346.07	1354.8	1335.29	1359.49	24.7	.01835	.01781	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1250	2	99.19	100.4	98.45	99.76	1.31	.01321	.01191	
	3	279.58	280.25	277.0	281.95	4.95	.01270	.01668	
	4	549.53	549.75	541.59	555.37	13.78	.02507	.02464	
	5	914.55	912.0	903.32	926.64	23.32	.02550	.02498	
	6	1369.21	1364.2	1361.09	1380.9	38.93	.02843	.02793	X
1200	2	100.76	100.72	99.51	101.74	2.23	.02213	.02091	
	3	284.58	282.2	281.16	288.57	7.41	.02603	.02514	
	4	562.24	553.15	553.61	569.73	16.12	.02867	.02827	
	5	933.73	918.6	921.29	951.21	29.92	.03204	.03156	
1150	2	103.31	101.34	101.53	104.73	2.99	.02894	.02777	
	3	292.9	284.05	288.12	296.76	8.69	.02950	.02861	
	4	577.26	557.4	568.77	584.24	15.47	.02680	.02290	
	5	958.03	924.8	947.22	964.38	17.16	.01791	.01747	
1100	2	106.52	101.98	105.39	108.09	2.7	.02535	.02421	
	3	299.71	285.0	296.5	302.71	6.21	.02070	.02001	
	4	590.31	561.1	585.06	596.11	11.05	.01872	.01834	
	5	978.03	930.8	970.6	984.5	13.9	.01421	.01379	
1050	2	108.76	102.59	108.22	109.46	1.29	.01190	.01027	
	3	305.56	287.6	304.27	306.94	2.67	.00873	.00818	
	4	599.93	564.6	597.8	602.88	5.08	.00847	.00908	
	5	993.68	936.2	990.24	996.38	6.14	.00618	.00579	
	6	1494.9	1399.9	1491.9	[illegible]	[illegible]	[illegible]	[illegible]	X

TABLE 25-B (Concluded)

Beam No. [illegible]

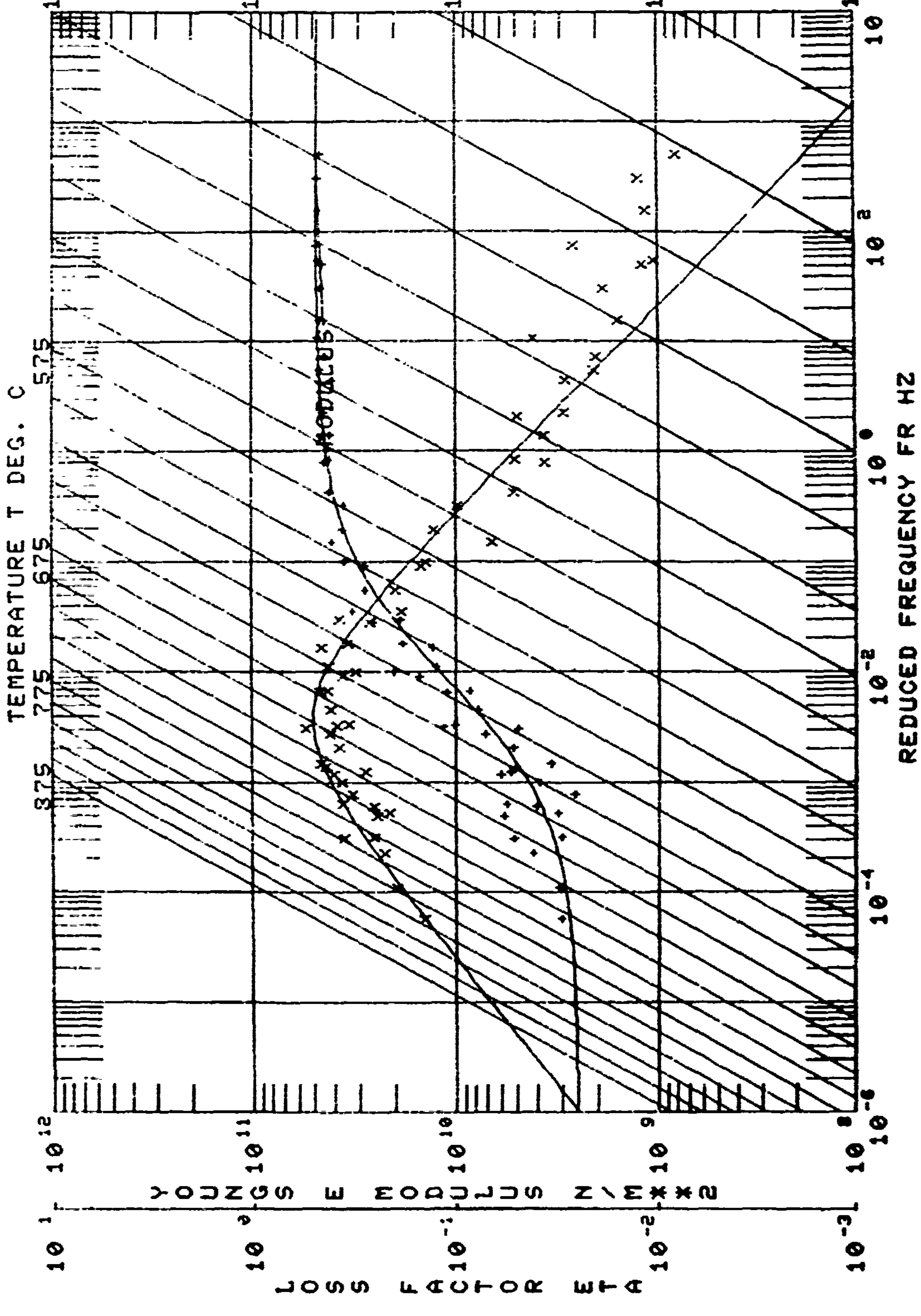
°F	[illegible]	E_c	[illegible]	E_L	E_R	ΔE	[illegible]	[illegible]	[illegible]
1000	2	109.99	103.18	109.72	110.37	0.65	.00591	.00591	
	3	309.0	289.4	308.39	309.88	1.49	.00482	.00482	
	4	606.21	572.9	604.81	607.48	2.67	.00440	.00440	
	5	1002.76	941.7	1001.16	1004.46	3.3	.00329	.00329	
	6	1509.7	1408.2	1502.5	1513.28	10.78	.00714	.00714	
950	2	111.0	103.75	110.88	111.27	0.39	.00351	.00351	
	3	311.54	291.2	311.17	312.01	0.84	.00269	.00269	
	4	610.65	571	609.75	611.68	1.93	.00316	.00316	
	5	1010.28	947	1009.26	1011.24	1.98	.00196	.00195	
	6	1518.76	1416	1514.75	1521.66	6.91	.00455	.00455	
900	2	111.72	104.3	111.63	111.83	0.2	.00179	.00179	
	3	313.45	293	313.19	318.8	0.61	.00195	.0019[illegible]	
	4	614.56	574	613.83	615.16	1.3	.00211	.00211	
	5	1016.25	951.5	1015.37	1016.73	1.36	.00134	.00134	

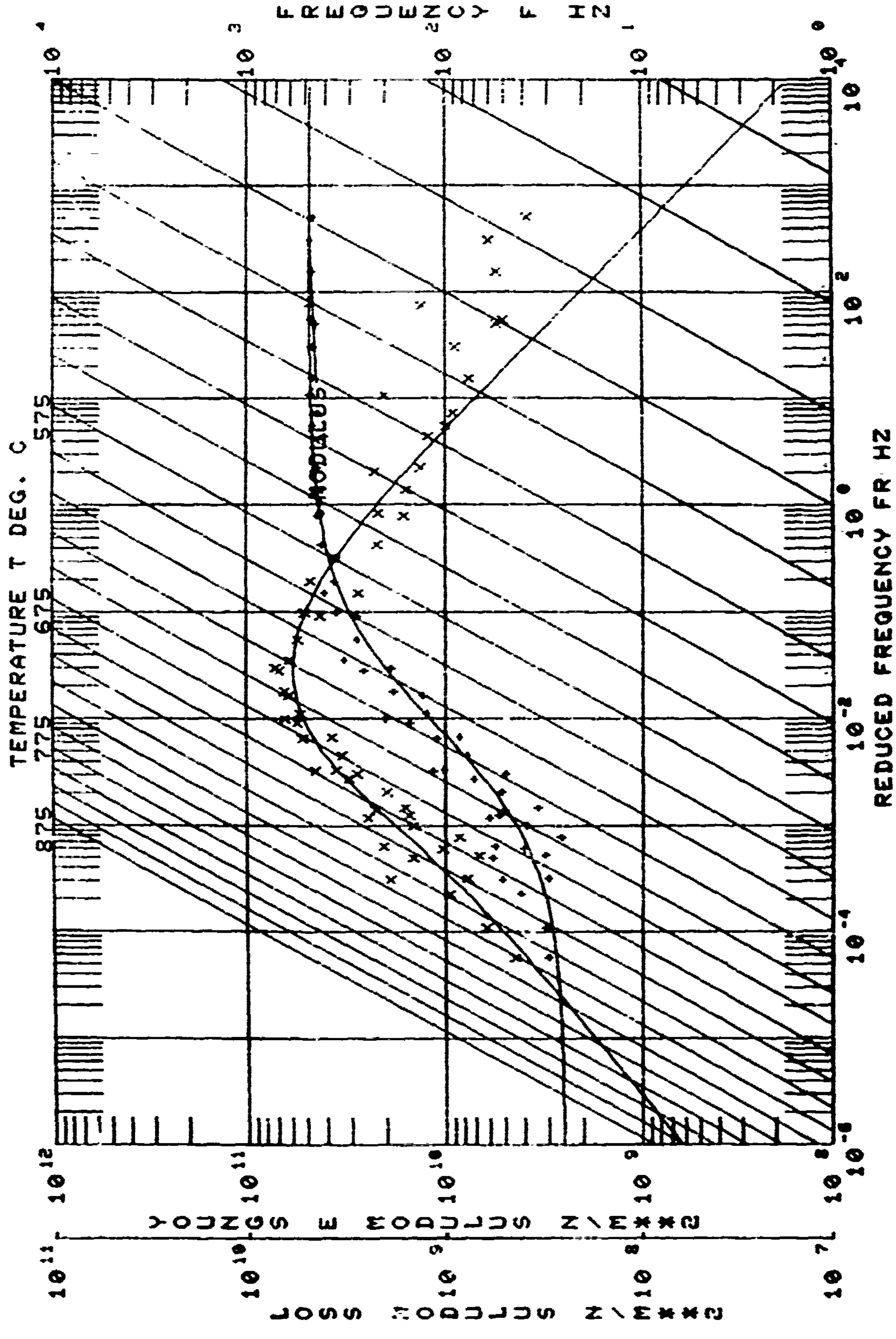
EXPERIMENTAL CODE : 58
MATERIAL :J85-18 INITIAL TEST
DATA SOURCES
MANUFACTURER :N
AFML :UDRI BEAM COATED ONE SIDE MARCH 26,1979
OTHER :PEMCO 79R835 +20%A-1 ALUMINA

01-47-2

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	3.09449E+09	.1465	787.8	95.2	2.	1.71454E+11	.0024	97.0	4.53498E+08
2	3.07973E+09	.2595	787.8	524.3	4.	1.72840E+11	.0041	534.6	7.99310E+08
3	3.19113E+09	.2171	787.8	868.2	5.	1.73336E+11	.0036	885.0	6.92913E+08
4	2.66334E+09	.3279	787.8	1298.8	6.	1.74975E+11	.0044	1325.8	8.73178E+08
5	3.47532E+09	.4657	760.0	1310.1	6.	1.77370E+11	.0081	1334.8	1.61829E+09
6	3.98966E+09	.3709	760.0	876.8	5.	1.76136E+11	.0074	892.1	1.47977E+09
7	4.08324E+09	.2571	760.0	529.5	4.	1.75430E+11	.0053	538.6	1.04961E+09
8	5.32116E+09	.3644	760.0	270.4	3.	1.74605E+11	.0097	274.2	1.93904E+09
9	3.16930E+09	.1988	760.0	96.0	2.	1.74329E+11	.0032	97.9	6.29951E+08
10	4.26121E+09	.2292	732.2	96.9	2.	1.76832E+11	.0049	98.6	9.76882E+08
11	5.72466E+09	.3693	732.2	273.1	3.	1.77868E+11	.0104	276.7	2.11415E+09
12	5.48934E+09	.2836	732.2	534.9	4.	1.77822E+11	.0077	542.2	1.55660E+09
13	5.35794E+09	.3797	732.2	886.0	5.	1.78704E+11	.0100	898.6	2.03437E+09
14	5.05733E+09	.5604	732.2	1325.3	6.	1.80133E+11	.0138	1345.2	2.83431E+09
15	8.69778E+09	.4373	704.4	1346.1	6.	1.82714E+11	.0178	1354.8	3.80359E+09
16	7.98848E+09	.4221	704.4	898.0	5.	1.81339E+11	.0160	905.2	3.37194E+09
17	7.33179E+09	.4268	704.4	540.9	4.	1.80290E+11	.0150	546.0	3.12921E+09
18	5.12866E+09	.4462	704.4	276.2	3.	1.82460E+11	.0110	280.3	2.28851E+09
19	5.92582E+09	.2486	704.4	98.0	2.	1.79533E+11	.0071	99.3	1.47288E+09
20	6.11817E+09	.4101	676.7	99.1	2.	1.83533E+11	.0119	102.4	2.50914E+09
21	1.04275E+10	.3451	676.7	279.6	3.	1.82395E+11	.0167	280.2	3.59900E+09
22	1.13205E+10	.4734	676.7	549.5	4.	1.82775E+11	.0246	549.7	5.35933E+09
23	1.28049E+10	.4314	676.7	914.6	5.	1.84073E+11	.0250	912.0	5.52385E+09
24	1.32771E+10	.4694	676.7	1369.2	6.	1.85258E+11	.0279	1364.2	6.23209E+09
25	1.91916E+10	.3841	648.9	933.7	5.	1.86747E+11	.0316	918.6	7.37228E+09
26	1.87299E+10	.3491	648.9	562.2	4.	1.85277E+11	.0283	553.5	6.53859E+09
27	1.53764E+10	.3694	648.9	284.6	3.	1.84942E+11	.0251	282.2	5.67936E+09
28	1.17862E+10	.3909	648.9	100.8	2.	1.84705E+11	.0209	100.7	4.60677E+09
29	2.05870E+10	.3183	621.1	103.3	2.	1.86986E+11	.0278	101.3	6.55242E+09
30	2.61246E+10	.2680	621.1	292.9	3.	1.87375E+11	.0286	284.0	7.00227E+09
31	2.83408E+10	.2009	621.1	577.3	4.	1.87897E+11	.0229	557.4	5.69505E+09
32	2.86920E+10	.1527	621.1	958.0	5.	1.89277E+11	.0175	924.8	4.38036E+09
33	3.64344E+10	.1004	593.3	978.0	5.	1.91741E+11	.0138	930.8	3.65857E+09
34	3.68431E+10	.1317	593.3	590.3	4.	1.90400E+11	.0183	561.1	4.85048E+09
35	3.62837E+10	.1443	593.3	299.7	3.	1.88631E+11	.0200	285.0	5.23626E+09
36	3.28996E+10	.1893	593.3	106.5	2.	1.89355E+11	.0242	102.0	6.22827E+09
37	4.12006E+10	.0679	565.6	108.8	2.	1.91627E+11	.0103	102.6	2.79929E+09
38	4.24932E+10	.0530	565.6	305.6	3.	1.92088E+11	.0082	287.6	2.25019E+09
39	4.27166E+10	.0522	565.6	599.9	4.	1.92783E+11	.0081	564.6	2.23160E+09
40	4.23616E+10	.0378	565.6	993.7	5.	1.93972E+11	.0058	936.2	1.60064E+09
41	4.60157E+10	.0506	565.6	1494.9	6.	1.95081E+11	.0082	1399.9	2.32749E+09
42	4.88408E+10	.0425	537.8	1509.7	6.	1.97401E+11	.0071	1408.2	2.07625E+09
43	4.46867E+10	.0208	537.8	1002.8	5.	1.96258E+11	.0033	941.7	9.31199E+08
44	4.16130E+10	.0297	537.8	606.2	4.	1.98492E+11	.0044	572.9	1.23500E+09
45	4.58083E+10	.0298	537.8	309.0	3.	1.94500E+11	.0048	289.4	1.36351E+09
46	4.47410E+10	.0371	537.8	110.0	2.	1.93837E+11	.0059	103.2	1.65773E+09
47	4.73114E+10	.0213	510.0	111.0	2.	1.95985E+11	.0035	103.7	1.00686E+09
48	4.75258E+10	.0163	510.0	311.5	3.	1.96927E+11	.0027	291.2	7.75290E+08
49	4.73595E+10	.0192	510.0	610.7	4.	1.97178E+11	.0032	571.0	9.10785E+08

50	4.62546E+10	.0122	510.0	1010.3	5.	1.98473E+11	.0020	947.0	5.64279E+08
51	4.96589E+10	.0270	510.0	1518.8	6.	1.99594E+11	.0045	1416.0	1.33977E+09
52	4.73672E+10	.0083	482.2	1016.2	5.	2.00364E+11	.0013	951.5	3.90868E+08
53	4.85266E+10	.0127	482.2	614.6	4.	1.99255E+11	.0021	574.0	6.16771E+08
54	4.80824E+10	.0118	482.2	313.5	3.	1.99369E+11	.0019	293.0	5.68882E+08
55	4.84980E+10	.0107	482.2	111.7	2.	1.98069E+11	.0018	104.3	5.20848E+08


TEMPERATURE T DEG. C
375
775
675
575
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
575
675
775
875
MODULUS
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
FREQUENCY F IN

Beam No. 01-47-3

Date 3/79

Damping Material Pemco 79 R 2635

Material Thickness 0.0221 cm Material Density 2.50 g/cc

Fixture No. 1 Beam Thickness 0.0960 cm

Beam Density 9.13 g/cc Beam Length 20.835 cm

Temperature Test Range: Between 732 °C and 540 °C

Frequency Test Range: Between 95 Hz and 1,540 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.82	Temperature	630 °C
	1,000 Hz	η_D 0.82	Temperature	685 °C
Range	100 Hz	610 °C	650 °C	
	1,000 Hz	660 °C	720 °C	

Complex Modulus E_D":

Peak	100 Hz	8.5×10^9 PAS	Temperature	590 °C
	1,000 Hz	8.5×10^9 PAS	Temperature	640 °C
Range	100 Hz	565 °C	620 °C	
	1,000 Hz	605 °C	680 °C	

NOMOGRAPH CURVE FIT EQUATION·

```
MATERIAL :01-47-2 PEMCO
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0         FROM        MROM        N         ML
              A1          A2         A3        A4
  500.0  3.8241E-02  9.5000E+09    .915  1.9016E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH        FROL        C
            B1       B2        B3         B4         B5
  500.0    .829     .600     -.559  2.1033E-02     .253
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS:

TABLE 26-B

Beam No. 01-47-3

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1350	2	95.99	98.55	95.75	96.12	.37	.00385	.00175	
	3	270.12	276.75	269.61	270.86	1.25	.00463	.00288	
	4	530.06	542.25	528.82	531.75	2.93	.00553	.00481	
	5	877.06	898.6	873.98	880.16	6.18	.00705	.00623	
	6	1318.41	1345.2	1310.70	1324.66	13.96	.01059	.00990	
1300	2	96.78	44.3	96.60	97.12	.52	.00537	.00396	
	3	272.56	280.3	271.48	273.56	2.12	.00778	.00658	
	4	535.59	546.0	532.41	538.54	6.13	.01145	.01096	
	5	886.69	905.2	879.34	893.08	13.71	.01550	.01491	
	6	1329.75	1354.8	1305.16	1340.77	35.61	.002687	.02624	
1300	2	96.92	99.30	96.53	97.19	.66	.00681	.00540	
	3	272.50	280.3	271.44	273.61	2.17	.00796	.00676	
	4	535.55	546.0	533.01	539.94	6.93	.01294	.01245	
	5	886.53	905.2	878.11	893.20	15.09	.01702	.01643	
	6	1328.62	1354.8	1315.64	1341.60	25.96	.01954	.01900	
1250	2	97.81	100.4	97.20	98.34	1.14	.01166	.01036	
	3	275.48	280.25	272.58	277.84	5.26	.01909	.01807	
	4	542.52	549.75	536.23	547.46	11.23	.02070	.02022	
	5	900.64	912.0	884.52	916.09	31.57	.03505	.03453	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1200	2	99.11	100.8	97.66	100.64	2.98	.03007	.02885	
	3	281.67	282.2	275.73	286.78	11.05	.03923	.03833	
	4	559.54	553.5	544.25	574.20	29.95	.05362	.05322	
	5	937.13	918.6	903.79	956.66	52.87	.05642	.05594	
	6	1409.20	1373.8	1397.4	1426.90	58.35	.04140	.04094	
1150	2	102.56	101.4	99.83	105.52	5.69	.05548	.05431	
	3	292.57	284.05	284.30	299.20	14.90	.05093	.05004	
	4	584.50	557.4	574.21	598.80	24.59	.04207	.04168	
	5	967.90	924.8	959.15	978.11	37.26	.03850	.03806	X
	6	1449.21	1383.0	1426.68	1469.48	42.80	.02953	.02910	
1100	2	107.46	102.0	105.61	109.41	3.80	.03536	.03423	
	3	303.92	285.8	298.79	308.17	9.38	.03086	.03022	
	4	600.00	561.1	594.02	606.09	12.07	.02012	.01974	
	5	996.44	930.3	987.45	1005.21	17.76	.01782	.01742	
	6	1492.90	1391.6	1486.20	1503.66	24.16	.01618	.01579	
1050	2	109.89	102.6	109.16	110.80	1.64	.01494	.01380	
	3	309.88	287.6	308.25	311.72	3.47	.01120	.01059	
	4	610.22	564.6	606.68	612.53	5.85	.00959	.00921	
	5	1010.21	936.2	1006.13	1014.65	8.52	.00843	.00801	
	6	1514.40	1340.0	1508.56	1519.44	10.88	.00718	.00777	

TABLE 26-B (Concluded)

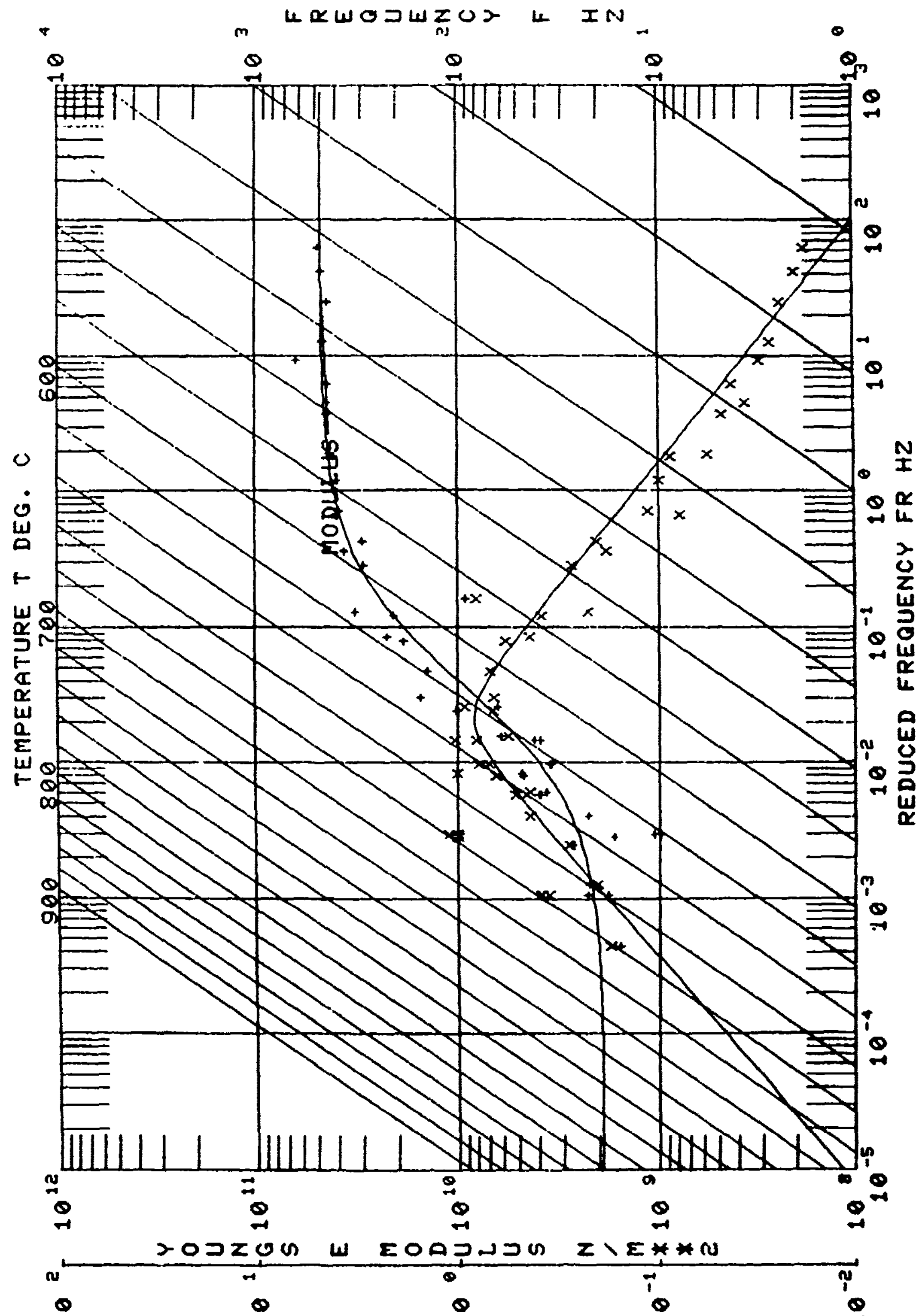
Beam No. 01-47-3

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1000	2	111.44	103.3	111.00	111.76	.76	.00682	.00682	
	3	314.00	289.4	313.08	314.73	1.65	.00525	.00525	
	4	617.29	572.9	616.06	618.78	2.72	.00441	.00441	
	5	1022.15	941.7	1019.87	1023.82	4.01	.00393	.00393	
	6	1532.51	1408.2	1329.04	1534.57	5.53	.00361	.00361	

4-1

EXPERIMENTAL CODE : 94
MATERIAL :01-47-2 PEMCO
DATA SOURCES
MANUFACTURER :NONE
AFML :UDRI BARE BEAM COATED ONE SIDE
OTHER :NONE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	4.76895E+10	.0275	537.8	314.0	3.	1.94500E+11	.0053	289.4	1.31011E+09
2	4.51574E+10	.0243	537.8	617.3	4.	1.98492E+11	.0044	572.9	1.09895E+09
3	4.83184E+10	.0205	537.8	1022.2	5.	1.96258E+11	.0039	941.7	9.90790E+08
4	4.99322E+10	.0185	537.8	1532.5	6.	1.97401E+11	.0036	1408.2	9.22950E+08
5	6.37805E+10	.0318	565.6	1514.4	6.	1.78743E+11	.0078	1340.0	2.02914E+09
6	4.48438E+10	.0437	565.6	1010.2	5.	1.93972E+11	.0080	936.2	1.95949E+09
7	4.53615E+10	.0496	565.6	610.2	4.	1.92783E+11	.0092	564.6	2.25061E+09
8	4.37004E+10	.0584	565.6	309.9	3.	1.92088E+11	.0106	287.6	2.55383E+09
9	4.07566E+10	.0800	565.6	109.9	2.	1.91664E+11	.0138	102.6	3.25971E+09
10	3.27717E+10	.2318	593.3	107.5	2.	1.89429E+11	.0342	102.0	7.59680E+09
11	3.70185E+10	.1867	593.3	303.9	3.	1.89691E+11	.0302	285.8	6.91029E+09
12	3.97344E+10	.1160	593.3	600.0	4.	1.90400E+11	.0197	561.1	4.60907E+09
13	4.05348E+10	.1014	593.3	996.4	5.	1.91741E+11	.0174	930.8	4.11002E+09
14	4.17628E+10	.0903	593.3	1492.9	6.	1.92774E+11	.0158	1391.6	3.77017E+09
15	3.05540E+10	.2090	621.1	1449.2	6.	1.90399E+11	.0291	1383.0	6.38584E+09
16	2.98526E+10	.2771	621.1	967.9	5.	1.89277E+11	.0381	924.8	8.27276E+09
17	9.30012E+09	.8318	621.1	554.5	4.	1.87897E+11	.0417	557.4	7.73544E+09
18	2.28295E+10	.4491	621.1	292.6	3.	1.87375E+11	.0500	284.0	1.02531E+10
19	1.55546E+10	.6778	621.1	102.6	2.	1.87207E+11	.0543	101.4	1.05423E+10
20	4.95865E+09	1.0278	648.9	99.1	2.	1.84998E+11	.0289	100.8	5.09636E+09
21	1.03806E+10	.6811	648.9	281.7	3.	1.84942E+11	.0383	282.2	7.07030E+09
22	1.88921E+10	.5881	648.9	937.1	5.	1.86747E+11	.0559	918.6	1.11111E+10
23	2.12069E+10	.3921	648.9	1409.2	6.	1.87874E+11	.0409	1373.8	8.31474E+09
24	6.48327E+09	.9481	676.7	900.6	5.	1.84073E+11	.0345	912.0	6.14648E+09
25	6.18940E+09	.5777	676.7	542.5	4.	1.82775E+11	.0203	549.7	3.57542E+09
26	4.79690E+09	.6556	676.7	275.5	3.	1.82395E+11	.0181	280.2	3.14476E+09
27	1.83155E+09	.3614	704.4	96.8	2.	1.79533E+11	.0040	99.3	6.61912E+08
28	1.08287E+09	1.0255	704.4	272.6	3.	1.82460E+11	.0066	280.3	1.11044E+09
29	4.02820E+09	.4652	704.4	535.6	4.	1.80290E+11	.0110	546.0	1.87412E+09
30	3.56628E+09	.7161	704.4	886.7	5.	1.81339E+11	.0149	905.2	2.55397E+09
31	4.28789E+09	1.0616	704.4	1329.7	6.	1.82714E+11	.0262	1354.8	4.55224E+09
32	3.73124E+09	.4522	732.2	1318.4	6.	1.80133E+11	.0099	1345.2	1.68721E+09
33	2.30832E+09	.4509	732.2	877.1	5.	1.78704E+11	.0062	898.6	1.04086E+09
34	2.80046E+09	.2868	732.2	530.1	4.	1.77822E+11	.0048	542.2	8.03126E+08
35	2.29752E+09	.2084	732.2	270.1	3.	1.77868E+11	.0029	276.7	4.78917E+08
36	1.60507E+09	.1792	732.2	96.0	2.	1.76832E+11	.0018	98.6	2.87611E+08
37	2.31903E+09	.3908	704.4	96.9	2.	1.79533E+11	.0054	99.3	9.06378E+08
38	1.01210E+09	1.1265	704.4	272.5	3.	1.82460E+11	.0068	280.3	1.14014E+09
39	4.00023E+09	.5321	704.4	535.6	4.	1.80290E+11	.0125	546.0	2.12840E+09
40	3.50297E+09	.8030	704.4	886.5	5.	1.81339E+11	.0164	905.2	2.81284E+09
41	3.99022E+09	.8245	704.4	1328.6	6.	1.82714E+11	.0190	1354.8	3.29008E+09
42	4.48040E+10	.0373	537.8	111.4	2.	1.94289E+11	.0068	103.3	1.66991E+09
43	1.45103E+10	.6998	648.9	558.5	4.	1.85277E+11	.0532	553.5	1.01550E+10
44	1.72997E+09	1.0221	676.7	97.8	2.	1.83533E+11	.0104	100.4	1.76813E+09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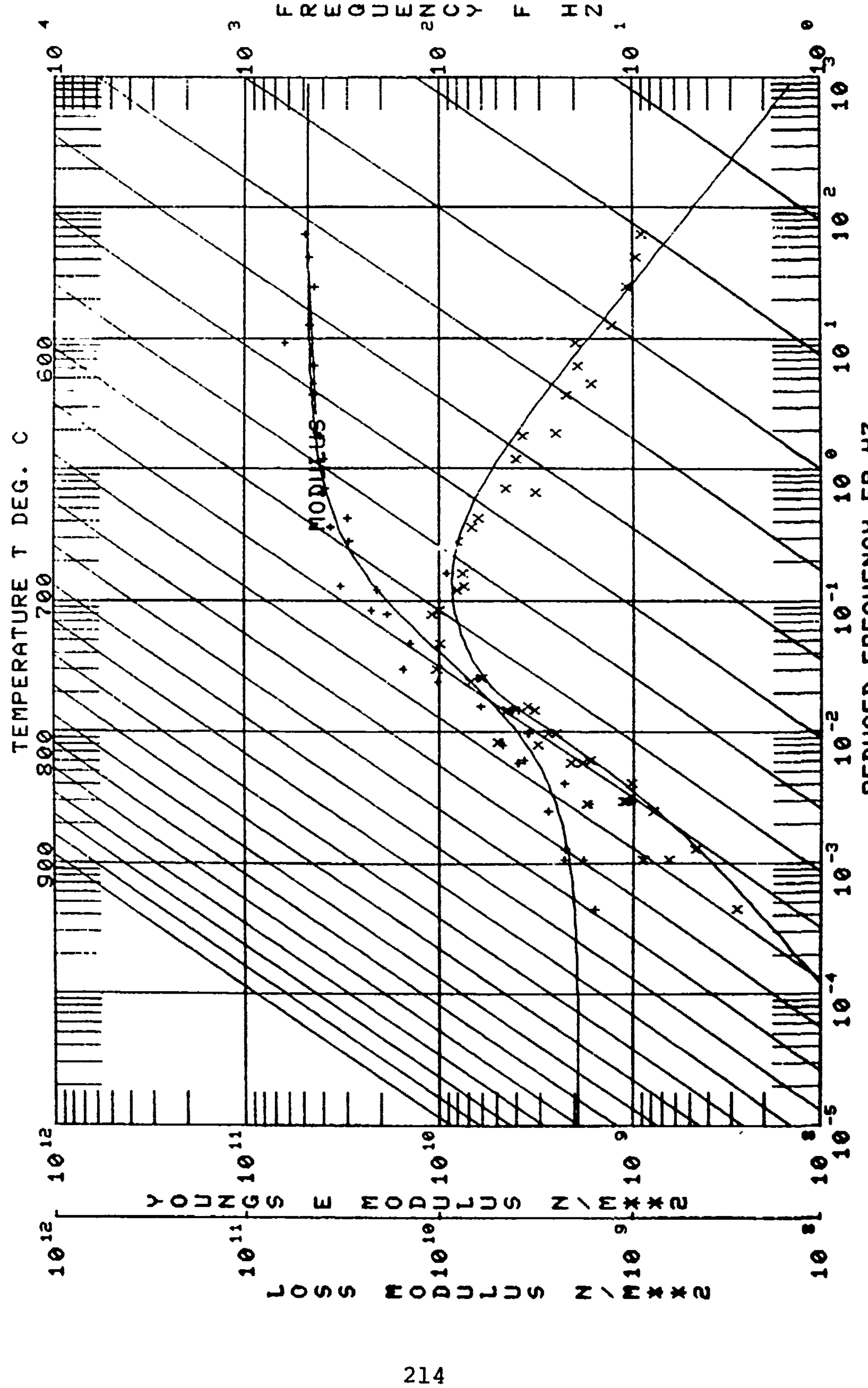
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-48-1

Date 12/21/79

Damping Material Corning 0010 + 7.5% Al_2O_3 + 1% Co_2O_3

Material Thickness 0.0180 cm Material Density 2.89 g/cc

Fixture No. 2 Beam Thickness 0.0942 cm

Beam Density 9.13 g/cc Beam Length 21.031 cm

Temperature Test Range: Between 84r °C and 650 °C

Frequency Test Range: Between 91 Hz and 1,413 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.60	Temperature	770 °C
	1,000 Hz	η_D 0.60	Temperature	850 °C
Range	100 Hz	720 °C	810 °C	
	1,000 Hz	800 °C	850 °C	

Complex Modulus E_D":

Peak	100 Hz	7.6×10^9 PAS	Temperature	730 °C
	1,000 Hz	7.6×10^9 PAS	Temperature	785 °C
Range	100 Hz	665 °C	790 °C	
	1,000 Hz	715 °C	865 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-9 INITIAL TEST
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM          N          ML
              A1            A2            A3         A4
  600.0  4.5000E-03  1.2000E+10      .500  3.5000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH         FROL        C
           B1        B2        B3          B4         B5
  600.0    .600     .500     -.450  4.0000E-03    1.000
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J85-9, test 1. Coating Corning matrix M-12; beam was retested as 01-48-2.

TABLE 27-B

Beam No. 01-48-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1550	2	92.59	93.94	93.21	91.98	1.23	.01328	.0102	
	3	260.14	263.2	257.88	262.22	4.34	.01668	.0224	
	4	510.7	517.68	505.21	516.23	11.02	.02158	.0199	
	5	850.46	857.57	839.14	861.98	22.84	.02686	.0252	
	6	1279.3	1283.32	1265.55	1290.48	24.93	.01949	.01609	
	6	1279.3	1283.32	1275.51	1287.60	12.09	.01843	.01503	X
1500	2	93.52	94.75	92.78	94.27	1.49	.01593	.01383	
	3	262.70	265.34	258.37	265.75	7.38	.02809	.02399	
	4	517.75	521.54	513.36	522.49	9.13	.03438	.0[illegible]32	
	5	863.89	864.06	848.91	878.37	29.46	.03410	.03283	
1450	2	94.83	95.52	93.71	95.77	2.06	.02172	.0201	
	3	267.6	267.4	265.44	269.73	4.29	.03126	.0282	
	4	528.88	525.5	526.06	531.98	5.92	.02183	.0209	
	5	882.28	870.2	865.75	898.62	32.87	.03726	.03624	
	6	1320.10	1302.5	1308.20	1330.04	21.84	.03226	.0306	
1400	2	96.19	96.36	94.79	97.73	2.94	.0306	.0292	
	3	270.94	268.96	268.19	273.12	4.93	.03548	.033	
	4	533.04	529.47	527.54	538.53	10.99	.04020	.0395	
	5	897.30	877.05	882.46	912.00	29.5	.03292	.0321	
	6	1341.20	1312.48	1336.27	1348.00	11.73	.01705	.0158	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1350	2	98.03	96.98	96.34	99.87	3.53	.03601	.0347	
	3	278.55	271.25	276.61	280.89	4.28	.02996	.0287	
	4	546.5	533.4	540.39	552.57	12.18	.04346	.0429	
	5	911.40	883.00	900.85	921.70	20.85	.0229	.0222	
	6	1361.94	1321.3	1347.55	1374.73	27.18	.01996	.0192	
1300	2	100.56	97.68	99.70	101.49	1.79	.0347	.0334	
	3	283.8	273.14	282.06	285.97	3.91	.02687	.0251	
	5	923.19	889.37	915.99	930.33	14.34	.01553	.0149	
	6	1382.5	1330.74	1370.29	1370.08	19.79	.01431	.0135	
1300	2	100.20	97.68	98.55	101.82	3.27	.03264	.0314	
	3	283.16	273.14	280.00	286.17	6.17	.0218	.0200	
	4	557.95	537.0	553.14	568.47	15.33	.02748	.027	
	5	923.26	889.87	916.52	930.05	13.53	.01465	.0140	
	6	1381.18	1330.74	1367.49	1390.00	22.51	.01630	.01552	
1250	2	102.03	98.34	100.93	103.34	2.41	.02362	.0224	
	4	566.5	541.1	563.6	569.4	5.79	.020	.0196	
	5	933.38	895.4	929.10	937.48	8.38	.008978	.00841	
	6	1397.1	1340.0	1390.7	1402.49	11.79	.00844	.00778	

TABLE 27-B (Concluded)

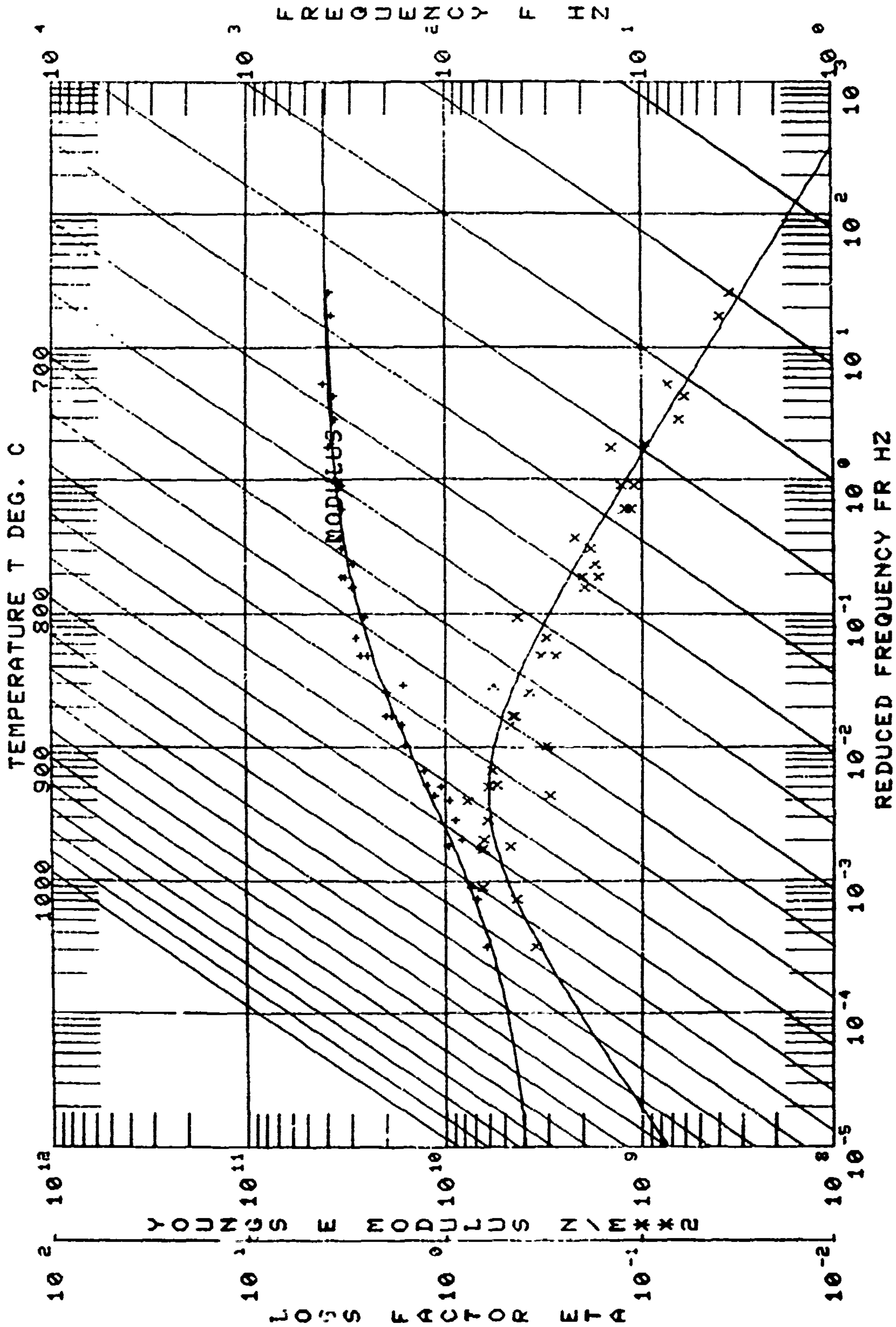
Beam No. 01-48-1

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	ΔdB
1200	2	103.38	99.00	104.15	102.70	1.45	.0140	.0127	
	3	291.11	276.75	289.20	292.72	3.52	.0121	.0107	
	5	941.86	901.7	939.23	944.64	5.41	.00574	.00521	
	6	1410.49	1349.00	1406.42	1413.86	7.44	.00527	.00467	

EXPERIMENTAL CODE : 37
MATERIAL :J85-9 INITIAL TEST
DATA SOURCES
MANUFACTURER :NONE
AFML :BEAM COATED ONE SIDE (UDRI)
OTHER :M-1+1%Co2O3

01-48-1

NO.	MODULUS LB/IN**2	LOSS FACTOR	TEMP. DEG. F	FREQ. HZ	MODE NO.	BEAM MOD. LB/IN**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. LB/IN**2
1	9.78180E+05	.6563	1550.0	510.7	4.	2.53312E+07	.0199	517.7	6.41949E+05
2	1.09276E+06	.6601	1550.0	260.1	3.	2.51444E+07	.0224	263.2	7.21306E+05
3	9.12833E+05	.3564	1550.0	92.6	2.	2.51128E+07	.0102	93.9	3.25343E+05
4	1.32482E+06	.6259	1550.0	850.5	5.	2.54383E+07	.0252	857.6	8.29154E+05
5	1.68175E+06	.3008	1550.0	1279.3	6.	2.56235E+07	.0150	1283.3	5.05904E+05
6	1.40869E+06	.7862	1500.0	517.7	4.	2.57104E+07	.0332	521.5	1.10750E+06
7	1.22188E+06	.6458	1500.0	262.7	3.	2.55550E+07	.0240	265.3	7.89078E+05
8	1.02060E+06	.4416	1500.0	93.5	2.	2.55478E+07	.0138	94.7	4.50649E+05
9	1.42608E+06	.4749	1450.0	94.8	2.	2.59647E+07	.0201	95.5	6.77241E+05
10	1.56039E+06	.6123	1450.0	266.0	3.	2.59533E+07	.0282	267.4	9.55406E+05
11	2.37780E+06	.3101	1450.0	528.9	4.	2.61023E+07	.0209	525.5	7.37442E+05
12	2.91450E+06	.4502	1450.0	882.3	5.	2.61931E+07	.0362	870.2	1.31204E+06
13	2.91586E+06	.3825	1450.0	1320.2	6.	2.63951E+07	.0306	1302.5	1.11542E+06
14	3.57168E+06	.1678	1400.0	1341.2	6.	2.68012E+07	.0158	1312.5	5.99450E+05
15	3.63449E+06	.3339	1400.0	897.3	5.	2.66071E+07	.0321	877.1	1.21339E+06
16	2.43624E+06	.5813	1400.0	533.0	4.	2.64982E+07	.0395	529.5	1.41620E+06
17	2.47357E+06	.4752	1400.0	271.0	3.	2.62570E+07	.0330	269.0	1.17534E+06
18	1.83053E+06	.5560	1400.0	96.2	2.	2.64234E+07	.0292	96.4	1.01774E+06
19	2.75567E+06	.4616	1350.0	98.0	2.	2.67645E+07	.0347	97.0	1.27203E+06
20	3.93163E+06	.2801	1350.0	278.5	3.	2.67060E+07	.0287	271.2	1.10134E+06
21	3.78349E+06	.4351	1350.0	546.5	4.	2.68930E+07	.0429	533.4	1.64626E+06
22	4.36948E+06	.2000	1350.0	911.4	5.	2.69693E+07	.0222	883.0	8.73893E+05
23	4.29336E+06	.1766	1350.0	1361.9	6.	2.71626E+07	.0192	1321.3	7.58047E+05
24	4.91322E+06	.1292	1300.0	1381.2	6.	2.75521E+07	.0155	1330.7	6.34879E+05
25	4.89474E+06	.1163	1300.0	923.3	5.	2.73599E+07	.0140	889.4	5.69050E+05
26	4.94785E+06	.2216	1300.0	557.9	4.	2.72573E+07	.0270	537.0	1.09632E+06
27	4.73508E+06	.1692	1300.0	283.2	3.	2.70795E+07	.0200	273.1	8.01217E+05
28	3.91287E+06	.0000	1300.0	100.2	2.	2.71522E+07	.0000	97.7	0.00000E+00
29	4.19399E+06	.3131	1300.0	100.6	2.	2.71522E+07	.0334	97.7	1.31317E+06
30	4.91558E+06	.2060	1300.0	283.8	3.	2.70795E+07	.0251	273.1	1.01252E+06
31	4.88866E+06	.1239	1300.0	923.2	5.	2.73599E+07	.0149	889.4	6.05492E+05
32	4.99158E+06	.1110	1300.0	1382.5	6.	2.75521E+07	.0135	1330.7	5.53885E+05
33	5.36047E+06	.0611	1250.0	1397.1	6.	2.79369E+07	.0078	1340.0	3.27263E+05
34	5.30516E+06	.0662	1250.0	933.4	5.	2.77321E+07	.0084	895.4	3.50963E+05
35	5.65827E+06	.1462	1250.0	566.5	4.	2.76751E+07	.0196	541.1	8.27341E+05
36	4.87822E+06	.1874	1250.0	102.0	2.	2.75204E+07	.0224	98.3	9.14257E+05
37	5.48305E+06	.0977	1200.0	103.4	2.	2.78910E+07	.0127	99.0	5.35935E+05
38	6.08653E+06	.0756	1200.0	291.1	3.	2.78000E+07	.0107	276.7	4.60422E+05
39	5.55379E+06	.0400	1200.0	941.9	5.	2.81237E+07	.0052	901.7	2.21896E+05
40	5.67680E+06	.0354	1200.0	1410.5	6.	2.83134E+07	.0047	1349.0	2.00860E+05
41	1.89464E+06	.5930	1500.0	863.9	5.	2.58248E+07	.0328	864.1	1.12352E+06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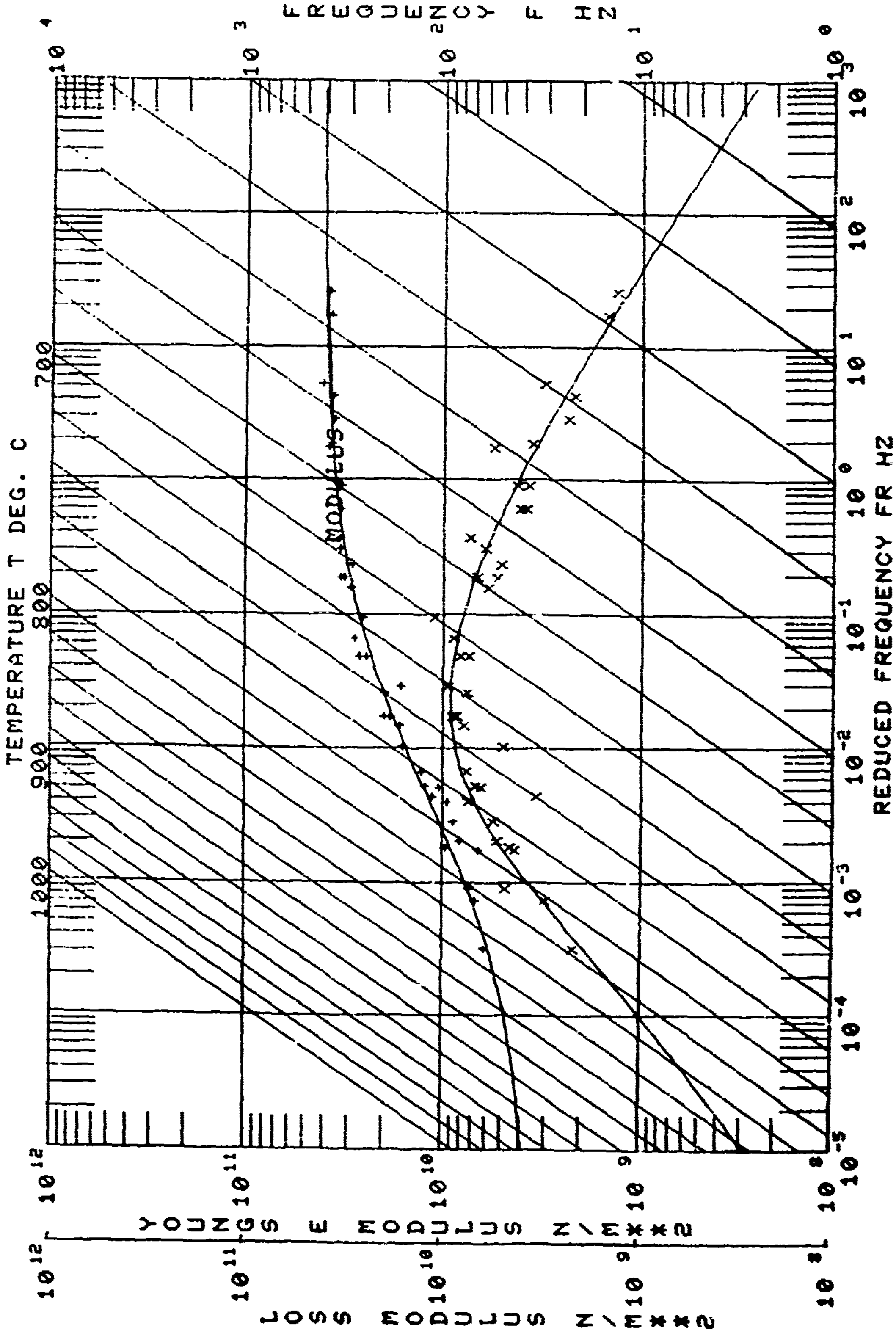
MODULUS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800
900
1000
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-48-2

Date 1/8/79

Damping Material Corning 0010 + 7.5% Al_2O_3 + 1% Co_2O_3

Material Thickness 0.0180 cm Material Density 2.86 g/cc

Fixture No. 2 Beam Thickness 0.0942 cm

Beam Density 9.13 g/cc Beam Length 21.031 cm

Temperature Test Range: Between 870 °C and 565 °C

Frequency Test Range: Between 92 Hz and 1,450 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.50	Temperature	765 °C
	1,000 Hz	η_D 0.50	Temperature	845 °C
Range	100 Hz	710 °C	810 °C	
	1,000 Hz	770 °C	880 °C	

Complex Modulus E_D'':

Peak	100 Hz	8.3×10^9 PAS	Temperature	680 °C
	1,000 Hz	8.3×10^9 PAS	Temperature	720 °C
Range	100 Hz	650 °C	725 °C	
	1,000 Hz	685 °C	775 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-9 M-1 + 1 % COBALT OXIDE
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM         MROM        N         ML
               A1           A2         A3        A4
  550.0  2.0269E-03  1.9000E+10     .940  7.4000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH        FROL        C
           B1        B2        B3         B4         B5
  550.0     .430    1.150     -.495  2.2876E-04    1.085
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J85-9, test 2. Corning matrix M-12; retest of beam 01-48-1 after 166.5 hours at 760°C. Coating lost glossy appearance after thermal soak, but showed no signs of deterioration. After test, specimen was thermal soaked for additonal 163 hours at 760°C. After ten to fifteen minutes at room temperature, entire coating fragmented and came off entire surface of beam.

TABLE 28-B

Beam No. 01-48-2

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1600	2	92.12	93.01	91.51	92.76	1.25	.01357	.00677	
1600	3	259.10	260.77	257.07	260.87	3.79	.01463	.00983	
1600	4	510.08	513.40	506.13	514.68	8.55	.01676	.01369	
1600	5	847.97	850.77	838.26	856.66	18.40	.02170	.01930	
1600	6	1269.20	1272.71	1258.70	1280.07	42.00	.03309	.02819	X
1550	6	1283.51	1283.32	1270.79	1294.71	47.00	.03662	.03352	X
1550	5	857.91	857.57	844.55	869.25	24.70	.02879	.02716	
1550	4	516.37	517.68	509.39	521.81	12.42	.02405	.02235	
1550	2	93.13	93.94	92.45	93.77	1.32	.01417	.00847	
1500	2	93.89	94.75	93.08	94.69	1.61	.01715	.01305	
1500	3	264.36	265.34	262.66	265.86	6.28	.02379	.02177	X
1500	4	524.88	521.54	517.89	531.87	13.69	.02663	.02545	
1500	5	870.00	864.06	856.22	885.00	28.78	.03308	.03184	
1500	6	1305.86	1293.12	1296.28	1315.18	36.77	.02788	.02548	X
1450	6	1321.45	1302.50	1310.56	1332.40	42.93	.03248	.03078	
1450	5	884.57	870.20	877.29	891.85	28.61	.03285	.02853	X
1450	4	529.47	525.50	523.08	535.85	12.77	.02412	.23230	
1450	3	269.84	267.40	267.99	271.68	7.25	.02687	.02520	X
1450	2	95.13	95.52	94.08	96.15	2.07	.02176	.01866	
1400	2	96.56	96.36	95.08	97.88	2.80	.02900	.02650	
1400	3	274.33	268.96	272.25	276.30	7.96	.02901	.02761	
1400	4	542.10	529.47	533.47	550.48	17.01	.03138	.03067	

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1400	5	901.16	877.05	888.47	915.86	27.39	.03039	.02954	
1400	6	1344.48	1312.48	1332.77	1354.34	42.39	.03153	.03030	X
1350	6	1364.95	1321.30	1356.36	1373.54	33.76	.02474	.02377	X
1350	5	914.56	883.00	905.71	925.74	20.03	.02190	.02117	
1350	4	551.13	533.40	544.33	559.40	15.07	.02734	.02676	
1350	3	280.57	271.25	278.51	282.25	7.36	.02627	.02497	X
1350	2	98.32	96.98	96.53	99.77	3.24	.03295	.03085	
1300	2	100.06	97.98	98.38	101.63	3.25	.03295	.03068	
1300	3	282.89	273.14	281.00	284.68	7.23	.02556	.02430	X
1300	4	558.58	537.00	553.28	564.33	11.05	.01979	.01929	
1300	5	927.41	889.37	913.16	935.30	16.14	.01740	.01677	
1300	6	1367.72	1330.74	1378.28	1390.65	24.31	.01752	.01676	X
1250	6	1403.00	1340.00	1399.01	1405.31	12.38	.00882	.00816	X
1250	5	936.00	895.40	931.30	941.38	10.08	.01077	.01019	
1250	4	564.60	541.10	561.11	568.77	7.66	.01357	.01312	
1250	3	287.48	275.00	284.19	289.92	5.73	.01993	.01868	
1250	2	101.69	98.34	100.40	102.87	2.47	.02429	.02269	
1200	2	103.31	99.00	102.45	104.52	2.07	.02000	.01860	
1200	3	291.15	276.75	289.33	292.67	3.34	.01147	.01021	
1200	4	571.14	544.75	568.43	573.20	4.77	.00835	.07930	
1200	5	945.12	901.70	942.40	948.51	6.11	.00646	.00593	
1200	6	1414.60	1349.00	1410.70	1418.57	7.87	.00556	.00496	

TABLE 28-B (Concluded)

Beam No. 01-48-2

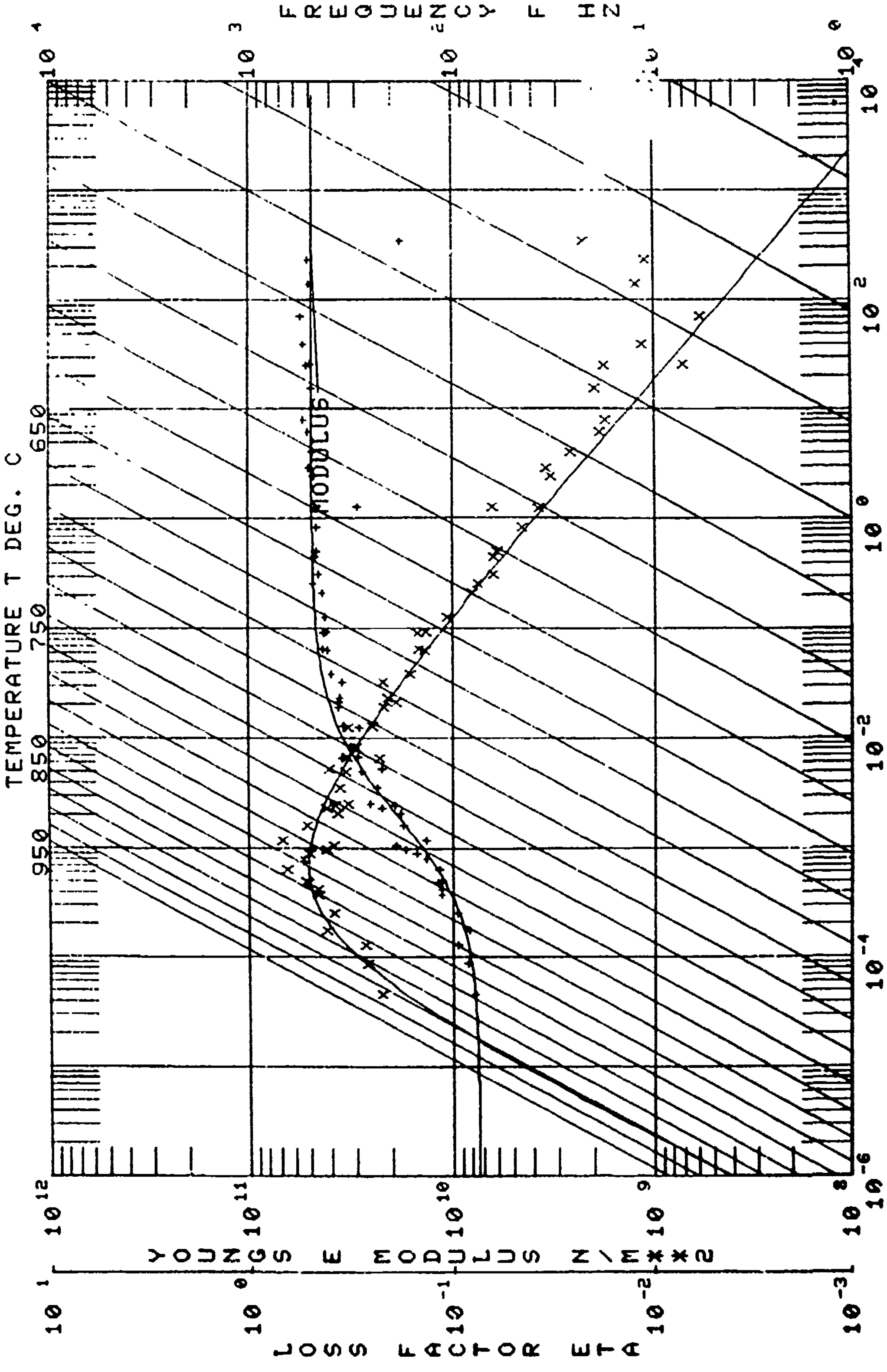
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1150	6	1427.20	1353.70	1424.90	1429.50	4.60	.00322	.00264	
1150	5	953.51	907.80	951.65	955.45	3.80	.00399	.00349	
1150	4	576.02	548.80	574.74	577.48	2.74	.00476	.00435	
1150	3	294.00	288.30	293.02	294.99	1.97	.00670	.00540	
1150	2	104.57	99.62	104.01	105.02	1.01	.00966	.00834	
1100	2	105.56	100.28	105.16	105.80	0.64	.00606	.00474	
1100	3	296.34	280.10	295.72	296.90	1.18	.00398	.00256	
1100	4	580.49	552.50	579.62	581.40	1.78	.00307	.00268	
1100	5	960.56	913.40	959.30	961.96	1.40	.00146	.00098	
1100	6	1437.40	1358.20	1435.90	1439.26	3.30	.00230	.00170	
1050	6	1447.90	1367.10	1446.28	1448.90	2.62	.00181	.00113	
1050	5	967.73	919.20	966.81	968.74	1.93	.00191	.00153	
1050	4	584.86	556.0[illegible]	584.37	585.58	1.21	.00207	.00168	
1050	3	298.63	281.70	298.32	299.12	0.80	.00268	.00088	
1050	2	106.35	100.86	106.19	106.60	0.41	.00386	.00251	

EXPERIMENTAL CODE : 42
MATERIAL :J85-9 M-1 + 1 % COBALT OXIDE
DATA SOURCES
MANUFACTURER :N
AFML :UDRI BEAM COATED ONE SIDE
OTHER :AFTER 166.5 HRS. @ 1400*F.

01-48-2

NO.	MODULUS LB/IN**2	LOSS FACTOR	TEMP. DEG. F	FREQ. HZ	MODE NO.	BEAM MOD. LB/IN**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. LB/IN**2
1	1.15186E+06	.2297	1600.0	92.1	2.	2.46180E+07	.0068	93.0	2.64568E+05
2	1.40648E+06	.2765	1600.0	259.1	3.	2.46823E+07	.0098	260.8	3.88885E+05
3	1.41535E+06	.3938	1600.0	510.1	4.	2.49141E+07	.0140	513.[illegible]	5.57368E+05
4	1.67971E+06	.4655	1600.0	848.0	5.	2.50365E+07	.0193	850.8	7.81871E+05
5	1.73470E+06	.6638	1600.0	1269.2	6.	2.52015E+07	.0282	1272.7	1.15142E+06
6	2.00487E+06	.7007	1550.0	1283.5	6.	2.56235E+07	.0335	1283.3	1.40473E+06
7	2.01254E+06	.5618	1550.0	857.9	5.	2.54383E+07	.0272	857.6	1.13055E+06
8	1.75246E+06	.5238	1550.0	516.3	4.	2.53312E+07	.0223	517.7	9.17885E+05
9	1.25159E+06	.2706	1550.0	93.1	2.	2.51128E+07	.0085	93.9	3.38634E+05
10	1.23765E+06	.4283	1500.0	93.9	2.	2.55478E+07	.0130	94.7	5.30080E+05
11	1.68110E+06	.5348	1500.0	264.4	3.	2.55550E+07	.0218	265.3	8.99098E+05
12	2.54259E+06	.4289	1500.0	524.9	4.	2.57104E+07	.0254	521.5	1.09041E+06
13	2.59440E+06	.5289	1500.0	870.0	5.	2.58248E+07	.0318	864.1	1.37223E+06
14	2.86979E+06	.3890	1500.0	1305.9	6.	2.6016[illegible]E+07	.0255	1293.1	1.11626E+06
15	3.32784E+06	.4170	1450.0	1321.4	6.	2.6395[illegible]E+07	.0308	1302.5	1.38775E+06
16	3.47582E+06	.3694	1450.0	884.6	5.	2.6193[illegible]E+07	.0285	870.2	1.28407E+06
17	2.68141E+06	.3782	1450.0	529.5	4.	2.610[illegible]E+07	.0232	525.5	1.01402E+06
18	2.79952E+06	.3925	1450.0	269.8	3.	2.59533E+07	.0252	267.4	1.09888E+06
19	1.67412E+06	.4671	1450.0	95.1	2.	2.59647E+07	.0187	95.5	7.82053E+05
20	2.23552E+06	.5152	1400.0	96.6	2.	2.64234E+07	.0265	96.4	1.15164E+06
21	3.79087E+06	.3320	1400.0	274.3	3.	2.62570E+07	.0276	269.0	1.25876E+06
22	4.17894E+06	.3417	1400.0	542.1	4.	2.64982E+07	.0307	529.5	1.42788E+06
23	4.52995E+06	.3082	1400.0	901.2	5.	2.66071E+07	.0295	877.1	1.39624E+06
24	4.27576E+06	.3342	1400.0	1344.5	6.	2.68012E+07	.0303	1312.5	1.42909E+06
25	5.14756E+06	.2266	1350.0	1364.9	6.	2.71626E+07	.0238	1321.3	1.16635E+06
26	5.36707E+06	.1938	1350.0	914.6	5.	2.69693E+07	.0212	883.0	1.03987E+06
27	5.11522E+06	.2543	1350.0	551.1	4.	2.68930E+07	.0268	533.4	1.30082E+06
28	5.18436E+06	.2333	1350.0	280.6	3.	2.67060E+07	.0250	271.2	1.20946E+06
29	3.30678E+06	.4255	1350.0	98.3	2.	2.67645E+07	.0309	97.0	1.40716E+06
30	4.32940E+06	.3386	1300.0	100.1	2.	2.71522E+07	.0307	97.7	1.46585E+06
31	5.38427E+06	.2226	1300.0	282.9	3.	2.70795E+07	.0243	273.1	1.19831E+06
32	5.85186E+06	.1659	1300.0	558.6	4.	2.72573E+07	.0193	537.0	9.70587E+05
33	6.12419E+06	.1394	1300.0	927.4	5.	2.73599E+07	.0168	889.4	8.53578E+05
34	6.17202E+06	.1390	1300.0	1387.7	6.	2.75521E+07	.0167	1330.7	8.58165E+05
35	6.67933E+06	.0643	1250.0	1403.0	6.	2.79369E+07	.0082	1340.0	4.29587E+05
36	6.46365E+06	.0820	1250.0	936.0	5.	2.77321E+07	.0102	895.4	5.29839E+05
37	6.26227E+06	.1081	1250.0	564.6	4.	2.76751E+07	.0131	541.1	6.76887E+05
38	6.40257E+05	.1502	1250.0	287.5	3.	2.74495E+07	.0187	275.0	9.61529E+05
39	5.31368E+06	.2129	1250.0	101.7	2.	2.75204E+07	.0227	98.3	1.13151E+06
40	6.32086E+06	.1530	1200.0	103.3	2.	2.78910E+07	.0186	99.0	9.67385E+05
41	7.15286E+06	.0759	1200.0	291.2	3.	2.78000E+07	.0102	276.7	5.43077E+05
42	6.85050E+06	.0615	1200.0	571.1	4.	2.80497E+07	.0079	544.7	4.20976E+05
43	6.84163E+06	.0461	1200.0	945.1	5.	2.81237E+07	.0059	901.7	3.15381E+05
44	6.93464E+06	.0383	1200.0	1414.6	6.	2.83134E+07	.0050	1349.0	2.65940E+05
45	7.56931E+06	.0192	1150.0	1427.2	6.	2.85110E+07	.0026	1353.7	1.44996E+05
46	7.16052E+06	.0264	1150.0	953.5	5.	2.85055E+07	.0035	907.8	1.89383E+05
47	7.37180E+06	.0333	1150.0	576.0	4.	2.84683E+07	.0044	548.3	2.35194E+05
48	4.33724E+06	.0652	1150.0	294.0	3.	3.01689E+07	.0054	288.3	2.82714E+05
49	7.01545E+06	.0638	1150.0	104.6	2.	2.82415E+07	.0083	99.6	4.47330E+05

50	5.12134E+10	.0350	593.3	105.6	2.	1.97307E+11	.0047	100.3	1.79278E+09
51	5.47781E+10	.0179	593.3	296.3	3.	1.96343E+11	.0026	280.1	9.79099E+08
52	5.01807E+10	.0202	593.3	580.5	4.	1.98938E+11	.0027	552.5	1.01582E+09
53	5.08999E+10	.0073	593.3	960.6	5.	1.98971E+11	.0010	913.4	3.72625E+08
54	5.54672E+10	.0118	593.3	1437.4	6.	1.97886E+11	.0017	1358.2	6.55996E+08
55	1.82799E+10	.0227	565.6	1447.9	6.	2.24384E+11	.0011	1446.3	4.15805E+08
56	5.23911E+10	.0113	565.6	967.7	5.	2.01506E+11	.0015	919.2	5.91213E+08
57	5.13978E+10	.0126	565.6	584.6	4.	2.01466E+11	.0017	556.0	6.46421E+08
58	5.69631E+10	.0060	565.6	298.6	3.	1.98592E+11	.0009	281.7	3.42615E+08
59	5.30944E+10	.0182	565.6	106.4	2.	1.99596E+11	.0025	100.9	9.65500E+08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TEMPERATURE T DEG. C
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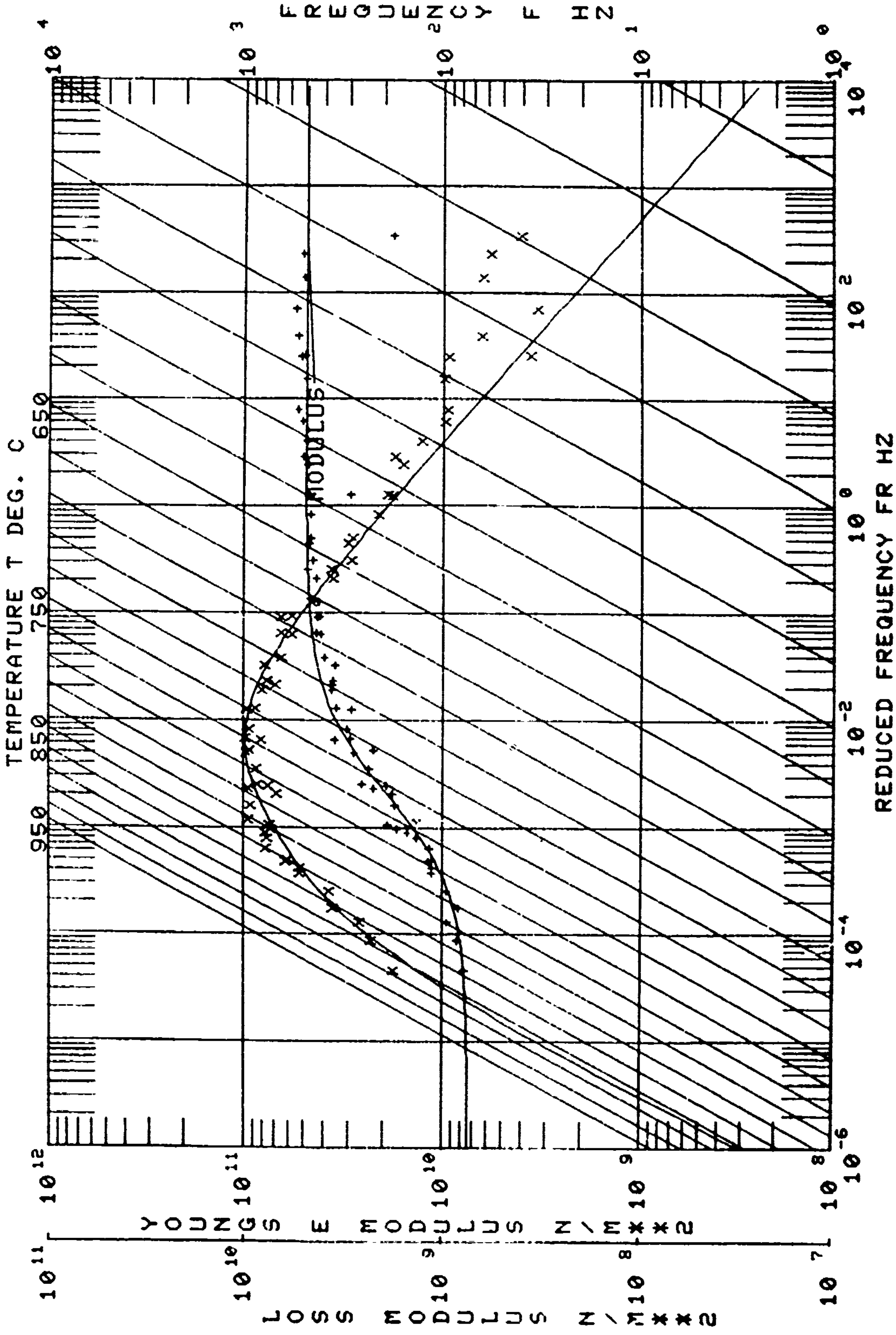
750
850
950
MODULUS
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
650
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950
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-48-3

Date 4/2/79

Damping Material Owens Illinois CV-79

Material Thickness 0.0315 cm Material Density 6.30 g/cc

Fixture No. 2 Beam Thickness 0.0942 cm

Beam Density 9.13 g/cc Beam Length 21.031 cm

Temperature Test Range: Between 480 °C and 595 °C

Frequency Test Range: Between 90 Hz and 1,450 Hz

Loss Factor η_D:

Peak	100 Hz	η_D ______	Temperature ______ °C	
	1,000 Hz	η_D ______	Temperature ______ °C	
Range	100 Hz	______ °C	______ °C	
	1,000 Hz	______ °C	______ °C	

Complex Modulus E_D":

Peak	100 Hz	______ PAS	Temperature ______ °C	
	1,000 Hz	______ PAS	Temperature ______ °C	
Range	100 Hz	______ °C	______ °C	
	1,000 Hz	______ °C	______ °C	

NOMOGRAPH CURVE FIT EQUATION:

REMARKS: Project: F-107-1; crystallizing glass. Coating deteriorated rapidly during test between 480°C and 595°C. No meaningful data could be taken.

TABLE 29-B

Beam No. 01-48-3

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	2	90.61	100.28	90.39	90.81	0.42	0.00464		
	3	251.78	280.10	251.31	252.25	1.85	0.00734		
	4	499.32	552.50	498.12	500.01	1.89	0.00379		
	5	825.30	913.40	824.00	826.57	2.57	0.00311		
	6	1235.50	1358.20	1231.65	1239.60	7.95	0.00643		
1075		COATING DETERIORATED TO POINT WHERE NO MEANINGFUL DATA COULD BE OBTAINED							
1000	2	97.33	101.46	96.58	98.25	1.67	0.01716		
	3	275.17	283.40	274.16	276.18	3.97	0.01443		
	4	535.90	555.95	530.56	539.86	9.30	0.01735		
	5	886.81	922.40	882.91	892.71	9.80	0.01105		
900	2	101.04	102.44	100.75	101.30	0.55	0.00544		
	3	282.74	286.35	282.24	283.56	1.32	0.00467		
	4	557.10	564.40	555.55	558.65	3.10	0.00556		
	5	916.50	934.50	914.84	919.20	4.36	0.00410		
	6	1380.54	1386.60	1375.96	1385.12	9.16	0.00664		
850	2	105.24	102.97	100.06	105.43	0.37	0.00352		
	3	290.70	287.90	290.20	291.19	0.99	0.00341		
	4	568.70	567.10	567.42	570.00	2.58	0.00454		
	5	940.00	939.20	938.33	941.65	3.32	0.00353		
	6	1409.80	1405.40	1406.30	1413.37	7.07	0.00501		

Beam No. 01-48-4

Date 4/79

Damping Material Corning 7570 + 2% Na_2O + 2% $KHCO_3$

Material Thickness 0.0472 cm Material Density 5.19 g/cc

Fixture No. 2 Beam Thickness 0.0942 cm

Beam Density 9.13 g/cc Beam Length 21.031 cm

Temperature Test Range: Between 495 °C and 345 °C

Frequency Test Range: Between 90 Hz and 1,500 Hz

Loss Factor η_D:

Peak 100 Hz	η_D 0.50	Temperature	425 °C
1,000 Hz	η_D 0.50	Temperature	450 °C
Range 100 Hz	445 °C	410 °C	
1,000 Hz	460 °C	430 °C	

Complex Modulus E_D'':

Peak 100 Hz	5×10^9 PAS	Temperature	405 °C
1,000 Hz	5×10^9 PAS	Temperature	430 °C
Range 100 Hz	440 °C	395 °C	
1,000 Hz	455 °C	410 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :BEAM NO. 01-48
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0         FROM          MROM        N          ML
              A1            A2         A3         A4
   450.0  2.4500E+03  1.0300E+10    .600  4.0900E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH        FROL        C
            B1       B2        B3         B4         B5
   450.0    .460    .850     -.450  5.9000E+02     .900
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: F-107-2 project. Coating smooth and glossy with no visible signs of deterioration. Coating was retested: 01-48-5.

TABLE 30-B

Beam No. 01-48-4

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
925	2	93.39	102.18	93.29	93.53	0.24	.0026		
925	3	260.45	295.60	260.06	260.87	0.81	.0031		
925	4	511.48	562.90	510.44	512.52	2.08	.0041		
925	5	843.11	932.10	840.91	845.69	4.78	.0057		
925	6	1257.30	1394.90	1252.52	1263.12	10.60	.0084		
900	2	93.66	102.44	93.51	93.81	0.30	.00035	.0033	
900	3	161.34	286.35	260.79	262.07	1.28	.0049		
900	4	513.42	564.40	511.33	515.51	4.18	.0081		
900	5	846.36	934.50	842.14	851.93	9.79	.0116		
900	6	1263.65	1398.60	1256.23	1276.54	20.31	.0161		
900	2	93.83	102.44	93.62	93.95	0.33	.0035		
900	3	261.34	286.35	260.92	261.58	1.30	.0050		X
900	4	512.82	564.40	510.84	515.00	4.16	.0081		
900	5	846.51	834.50	841.32	853.46	12.14	.0143		
900	6	1264.88	1398.60	1253.80	1276.25	22.45	.0177		
875	2	94.11	102.71	93.64	84.36	0.52	.0055		
875	3	262.51	287.15	260.94	263.66	2.67	.0102		
875	4	515.82	565.60	511.31	520.64	9.33	.0181		
875	5	855.12	937.00	843.72	868.02	24.30	.0284		
875	6	1279.14	1402.00	1267.14	1286.53	38.11	.0296		X
850	2	94.45	102.97	93.91	95.04	1.13	.0120		
850	3	264.27	287.90	259.08	267.65	8.58	.0325		
850	4	526.10	567.10	514.13	536.08	21.95	.0417		
950	5	864.71	939.20	846.48	884.39	37.91	.0438		
850	6	1313.30	1405.40	1289.20	1368.12	78.92	.0601		
825	2	95.88	103.22	94.17	97.62	3.45	.0360		
825	3	268.06	288.75	264.00	270.72	13.21	.0493		X
825	4	534.81	568.60	521.36	552.33	30.97	.0579		
825	5	895.74	941.60	881.03	921.94	40.91	.0550		
825	6	1383.66	1409.10	1354.43	1413.64	59.21	.0428		
800	2	97.91	103.46	96.67	98.96	4.50	.0460		X
800	3	283.79	289.40	278.74	288.21	18.61	.0652		X
800	4	567.21	570.00	551.64	583.69	32.05	.0565		
800	5	936.27	943.80	912.69	966.13	53.44	.0471		
800	6	1416.40	1412.50	1395.50	1437.30	41.80	.0318		
800	2	98.49	103.46	95.79	101.19	5.40	.0548		
800	3	275.68	289.40	271.37	281.47	19.85	.0720		X
800	4	557.00	570.00	540.22	573.42	33.20	.0596		
800	5	920.94	943.80	884.84	939.29	54.45	.0591		
800	6	1397.43	1412.50	1378.42	1419.93	41.51	.0297		
775	2	101.30	103.72	100.25	103.07	5.54	.0547		X
775	3	286.78	290.25	281.41	290.01	16.90	.0589		X
775	4	576.08	571.40	563.16	597.97	34.81	.0604	.0470	
775	5	944.41	946.00	935.18	948.67	26.51	.0281	.0370	X

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TABLE 30-B (Concluded)

Beam No. 01-48-4

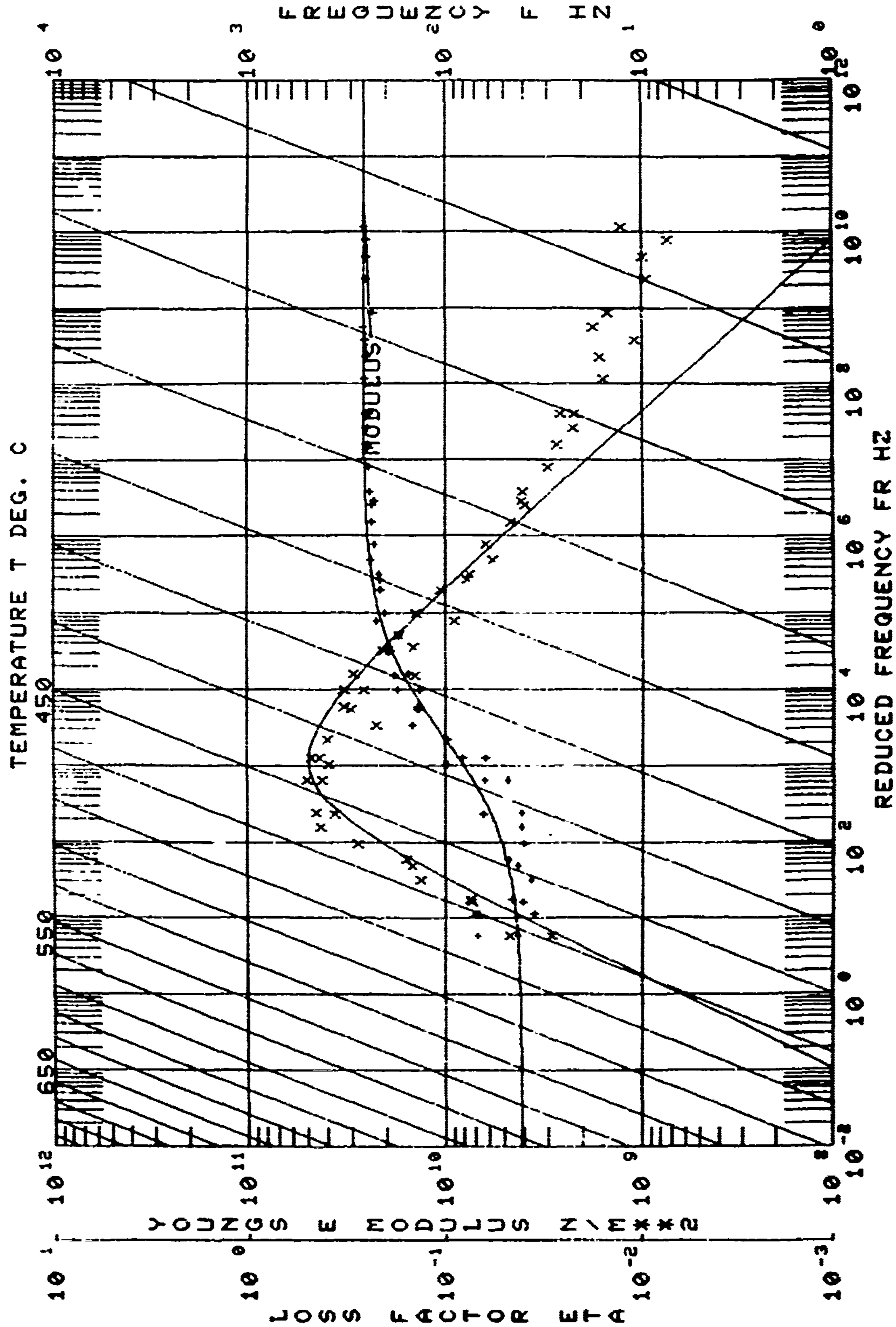
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
775	6	1454.35	1416.00	1443.68	1468.48	25.00	.0172	.0230	
750	2	104.78	103.98	102.96	106.48	3.52	.00336		
750	3	297.28	291.00	295.38	299.27	7.64	.0257		X
750	4	37.03	572.70	580.95	593.85	15.90	.0271		
750	5	971.30	948.70	963.02	980.67	17.65	.0182		
750	6	1462.42	1419.20	1452.86	1474.65	21.79	.0149		
750	2	105.01	103.98	103.36	106.92	3.56	.0339	.0338	
750	3	295.88	291.00	290.42	300.53	10.11	.0342		
750	4	585.92	572.75	579.39	594.88	15.49	.0264	.0266	
750	5	970.72	948.20	960.54	980.14	19.60	.0202	.0199	
750	6	1469.60	1419.20	1459.63	1482.90	23.27	.0158	.0153	
725	2	106.69	104.21	105.47	107.55	2.08	.0195		
725	3	301.24	291.80	299.18	304.11	4.93	.0164		
725	4	593.38	574.10	589.67	596.99	7.32	.0123		
725	5	982.31	950.50	876.18	986.40	10.22	.0104		
725	6	1473.61	1422.60	1466.53	1482.46	15.93	.0108		
700	2	107.65	104.46	107.10	108.24	1.14	.0106		
700	3	304.55	292.55	303.27	305.76	2.49	.0082		
700	4	598.48	575.40	596.75	500.09	4.34	.0073		
700	5	990.70	952.60	987.22	993.26	6.04	.0061		
700	6	1485.75	1425.80	1481.25	1491.48	10.59	.0071		
675	2	108.60	104.70	107.82	108.86	1.04	.0096	.0059	

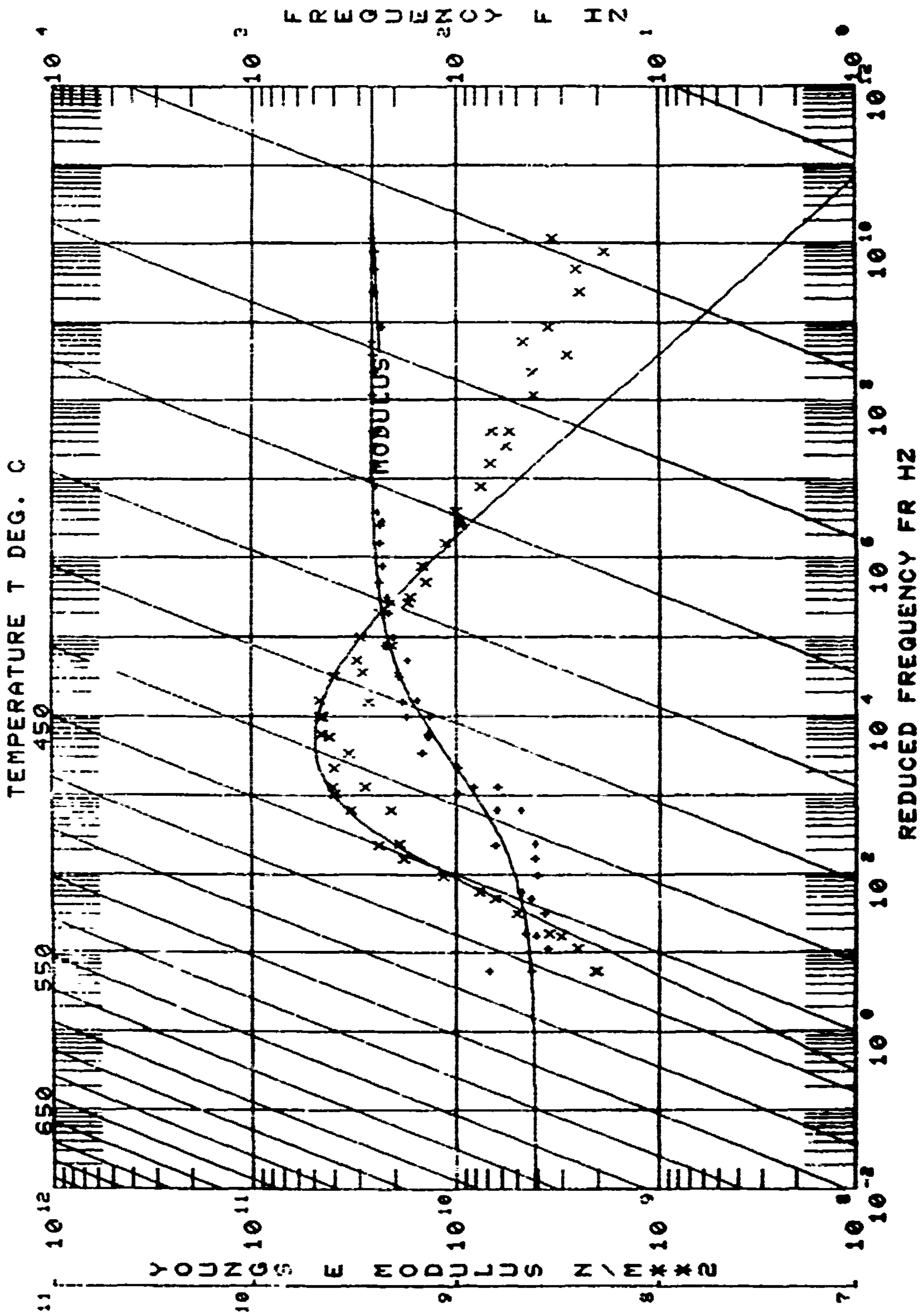
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
675	3	306.80	293.30	306.20	307.56	1.36	.0044		
675	4	602.05	578.00	601.05	603.75	2.70	.0045		
675	5	996.37	954.70	995.30	998.32	3.02	.0030		
675	6	1493.14	1429.00	1489.90	1497.25	7.35	.0049		
650	2	108.32	104.95	108.15	108.57	0.42	.0039		
650	3	306.59	294.30	306.31	307.10	0.79	.0026		
650	4	602.10	578.50	601.12	602.73	7.61	.0027		
650	5	995.57	957.00	994.90	996.93	2.03	.0020		
650	6	1493.70	1432.00	1489.94	1496.54	6.60	.0044	.0035	

EXPERIMENTAL CODE : 70
MATERIAL :BEAM NO. 01-48-4
DATA SOURCES
MANUFACTURER :N
AFML :UDRI BEAM COATED ONE SIDE 4/27
OTHER :7570 + 2% NA2O + 2% KHCO3

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.85229E+10	.1465	426.7	1416.4	6.	2.14025E+11	.0318	1412.5	2.71414E+09
2	2.62775E+09	.2005	496.1	1257.3	6.	2.08724E+11	.0084	1394.9	5.26924E+08
3	3.04803E+09	.1175	496.1	843.1	5.	2.07201E+11	.0057	932.1	3.58177E+08
4	3.61045E+09	.0720	496.1	511.5	4.	2.06498E+11	.0041	562.9	2.59796E+08
5	6.99095E+09	.0298	496.1	266.5	3.	2.04129E+11	.0031	285.6	2.08000E+08
6	4.38865E+09	.0483	482.2	93.7	2.	2.05898E+11	.0033	102.4	2.11870E+08
7	4.14538E+09	.0753	482.2	261.3	3.	2.05203E+11	.0049	286.3	3.12080E+08
8	3.77388E+09	.1371	482.2	513.4	4.	2.07600E+11	.0081	564.4	5.17506E+08
9	3.22566E+09	.2279	482.2	846.4	5.	2.08270E+11	.0116	934.5	7.35106E+08
10	2.94341E+09	.3471	482.2	1263.6	6.	2.09833E+11	.0161	1398.6	1.02157E+09
11	4.21818E+09	.4620	468.3	1279.1	6.	2.10855E+11	.0298	1402.0	1.94863E+09
12	4.22356E+09	.4369	468.3	855.1	5.	2.09386E+11	.0284	937.0	1.84543E+09
13	4.11645E+09	.2840	468.3	515.8	4.	2.08483E+11	.0181	565.6	1.16898E+09
14	4.38351E+09	.1497	468.3	262.5	3.	2.06351E+11	.0102	287.2	6.56116E+08
15	4.69146E+09	.0761	468.3	94.1	2.	2.06985E+11	.0055	102.7	3.56979E+08
16	4.85578E+09	.1617	454.4	94.4	2.	2.08034E+11	.0120	103.0	7.85002E+08
17	1.49710E+10	.2294	440.6	1383.7	6.	2.12996E+11	.0428	1409.1	3.43393E+09
18	1.00193E+10	.4016	440.6	895.7	5.	2.11447E+11	.0550	941.6	4.02414E+09
19	8.35547E+09	.4903	440.6	534.8	4.	2.10701E+11	.0579	568.6	4.09673E+09
20	6.47196E+09	.5157	440.6	268.1	3.	2.08657E+11	.0493	288.7	3.33770E+09
21	6.56370E+09	.3726	440.6	95.9	2.	2.09046E+11	.0360	103.2	2.44556E+09
22	2.38791E+10	.0152	343.3	108.3	2.	2.16112E+11	.0039	104.9	3.63991E+08
23	2.57155E+10	.0097	343.3	306.6	3.	2.16755E+11	.0026	294.3	2.49801E+08
24	1.39311E+10	.3338	426.7	920.9	5.	2.12436E+11	.0591	943.8	4.64952E+09
25	1.41140E+10	.3324	426.7	557.0	4.	2.11740E+11	.0596	570.0	4.69183E+09
26	1.00539E+10	.3968	426.7	98.5	2.	2.10019E+11	.0548	103.5	3.98986E+09
27	1.58110E+10	.3008	412.8	286.8	3.	2.10830E+11	.0589	290.2	4.75671E+09
28	1.93269E+10	.2094	412.8	576.1	4.	2.12818E+11	.0470	571.4	4.04737E+09
29	1.77205E+10	.1756	412.8	944.4	5.	2.13427E+11	.0370	946.0	3.11120E+09
30	2.28657E+10	.0922	412.8	1454.4	6.	2.15087E+11	.0230	1416.0	2.10762E+09
31	2.22034E+10	.0775	398.9	970.7	5.	2.14421E+11	.0190	948.2	1.72009E+09
32	2.20047E+10	.1089	398.9	585.9	4.	2.13788E+11	.0266	572.7	2.39610E+09
33	2.07313E+10	.1448	398.9	295.9	3.	2.11921E+11	.0342	291.2	3.00266E+09
34	1.95730E+10	.1490	398.9	105.0	2.	2.12135E+11	.0338	104.0	2.91563E+09
35	2.46712E+10	.0415	385.0	1473.6	6.	2.17096E+11	.0108	1422.6	1.02287E+09
36	2.40522E+10	.0404	385.0	982.3	5.	2.15463E+11	.0104	950.5	9.71278E+08
37	2.39989E+10	.0477	385.0	593.4	4.	2.14797E+11	.0123	574.1	1.14553E+09
38	2.35885E+10	.0640	385.0	301.2	3.	2.13088E+11	.0164	291.8	1.51021E+09
39	2.20721E+10	.0795	385.0	106.7	2.	2.13075E+11	.0195	104.2	1.75449E+09
40	2.33755E+10	.0418	371.1	107.6	2.	2.14098E+11	.0106	104.5	9.75940E+08
41	2.52756E+10	.0307	371.1	304.5	3.	2.14185E+11	.0082	292.5	7.76941E+08
42	2.53510E+10	.0230	371.1	990.7	5.	2.16416E+11	.0061	952.6	5.82382E+08
43	2.59255E+10	.0265	371.1	1485.7	6.	2.18074E+11	.0071	1425.8	6.86834E+08
44	2.65727E+10	.0181	357.2	1493.1	6.	2.19054E+11	.0049	1429.0	4.79794E+08
45	2.61380E+10	.0111	357.2	996.4	5.	2.17371E+11	.0030	954.7	2.90523E+08
46	2.58026E+10	.0168	357.2	602.1	4.	2.17725E+11	.0045	578.0	4.34107E+08
47	2.63258E+10	.0161	357.2	306.8	3.	2.15285E+11	.0044	293.3	4.24723E+08
48	2.46949E+10	.0225	357.2	108.6	2.	2.15083E+11	.0059	104.7	5.55689E+08
49	2.56967E+10	.0101	343.3	602.1	4.	2.18102E+11	.0027	578.5	2.60344E+08

50	2.56426E+10	.0075	343.3	995.6	5.	2.18420E+11	.0020	957.0	1.92872E+08
51	2.63457E+10	.0130	343.3	1493.7	6.	2.19975E+11	.0035	1432.0	3.42485E+08
52	2.38791E+10	.0152	343.3	108.3	2.	2.16112E+11	.0039	104.9	3.62991E+08
53	2.57155E+10	.0097	343.3	306.6	3.	2.16755E+11	.0026	294.3	2.49801E+08
54	1.78398E+10	.2651	426.7	936.3	5.	2.08404E+11	.0571	934.8	4.73016E+09
55	4.32156E+09	.0384	496.1	93.4	2.	2.04854E+11	.0026	102.2	1.65930E+08
56	1.39853E+10	.3065	412.8	101.3	2.	2.11076E+11	.0547	103.7	4.28637E+09
57	2.44907E+10	.0588	398.9	1469.6	6.	2.16060E+11	.0153	1419.2	1.44080E+09
58	2.52966E+10	.0275	371.1	598.5	4.	2.15771E+11	.0073	575.4	6.95088E+08
59	4.95127E+09	.4291	454.4	264.3	3.	2.07430E+11	.0325	287.3	2.12451E+09
60	6.40680E+09	.4418	454.4	526.1	4.	2.09591E+11	.0417	567.1	2.83067E+09
61	5.40490E+09	.5413	454.4	864.7	5.	2.10370E+11	.0438	939.2	2.92563E+09
62	7.48343E+09	.5617	454.4	1313.3	6.	2.11879E+11	.0601	1405.4	4.20352E+09


TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
450
550
650
MODULUS
REDUCED FREQUENCY FR HZ

Beam No. 01-48-5

Date 4/79

Damping Material Corning 7570 + 2% Na_2O + 2% $KHCO_3$

Material Thickness 0.0472 cm Material Density 5.19 g/cc

Fixture No. 2 Beam Thickness 0.0942 cm

Beam Density 9.13 g/cc Beam Length 21.031 cm

Temperature Test Range: Between 480 °C and 315 °C

Frequency Test Range: Between 100 Hz and 1,530 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.60		Temperature	370 °C
	1,000 Hz	η_D 0.60		Temperature	380 °C
Range	100 Hz	345 °C	410 °C		
	1,000 Hz	360 °C	435 °C		

Complex Modulus E_D'':

Peak	100 Hz	1.4×10^9 PAS		Temperature	370 °C
	1,000 Hz	1.4×10^9 PAS		Temperature	380 °C
Range	100 Hz	340 °C	410 °C		
	1,000 Hz	345 °C	435 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-48 CORNING 7570
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0        FROM        MROM        N         ML
             A1          A2         A3        A4
   420.0  6.5000E+02  2.3000E+10   .170  1.6000E+13
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL       SH        FROL       C
            B1       B2       B3         B4        B5
   420.0    .050     .352    -.450  1.5000E+04   3.400
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: F-107-2 retest. Retest of 01048-4 after 121 hours at 480°C.

TABLE 31-B

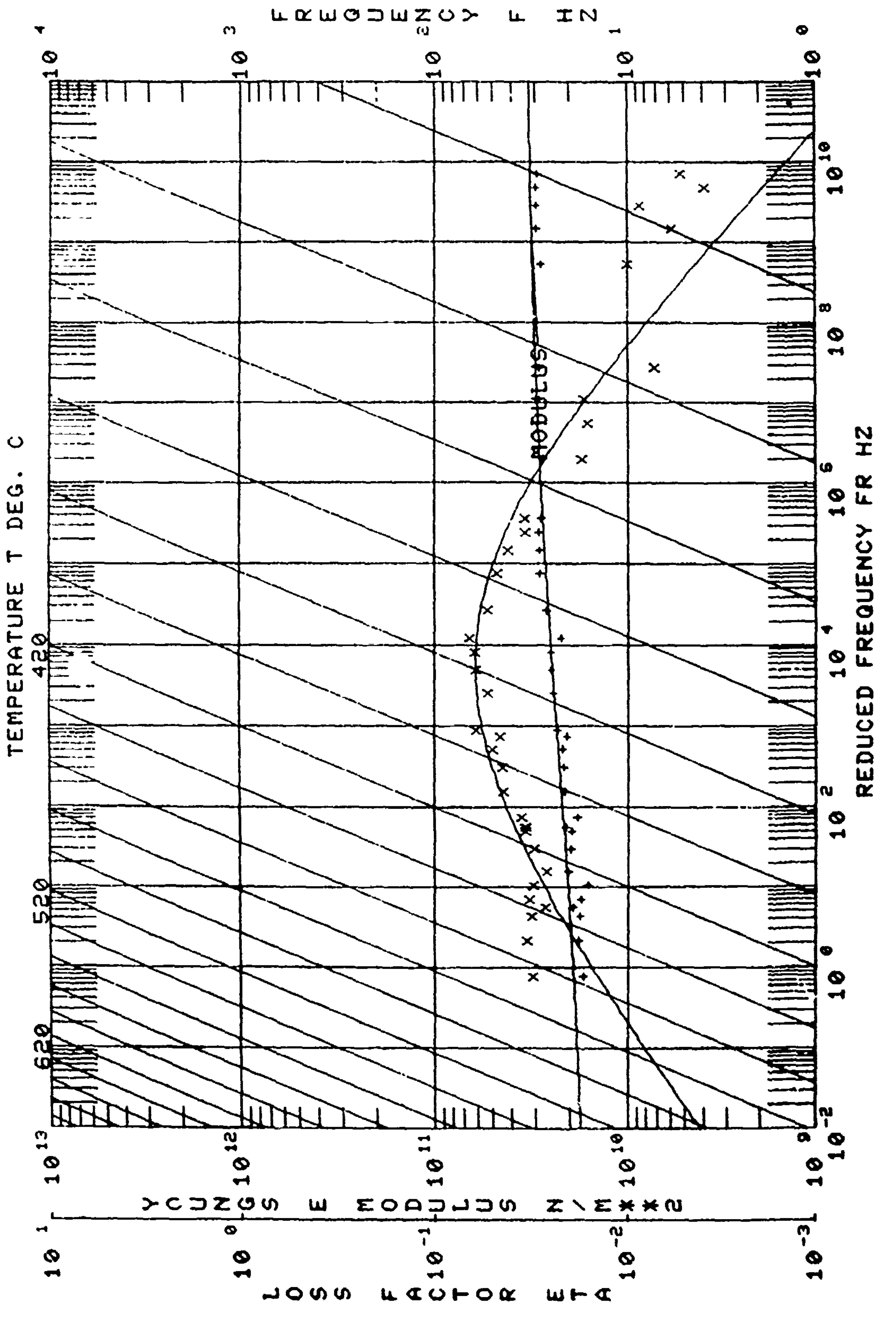
Beam No. 01-48-5

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
900	2	102.45	102.44	102.29	102.98	0.69	.00673		
900	3	298.38	286.35	2[illegible]7.30	289.49	2.19	.00759		
900	4	566.41	564.40	564.72	568.67	3.95	.01697		
900	5	936.47	93[illegible].50	832.48	939.13	6.65	.00710		
900	6	1389.27	1398.60	1385.16	1394.12	8.96	.00645		
850	2	104.37	102.97	103.96	104.62	0.66	.00632		
850	3	293.46	287.90	292.36	294.25	1.88	.00641		
850	4	575.74	567.10	573.92	578.13	4.21	.00731		
850	5	951.66	939.20	948.23	955.84	7.61	.00800		
850	6	1412.75	1405.40	1407.04	1418.24	11.20	.00793		
800	2	105.60	103.46	105.15	106.04	0.89	.00843		
800	3	296.15	289.40	296.52	298.18	3.26	.01102		X
800	4	583.91	570.00	581.43	587.99	6.56	.01123		
800	5	966.84	943.80	961.17	973.33	12.17	.01259		
800	6	1437.[illegible]3	1412.50	1429.71	1445.75	16.04	.01116		
750	2	107.38	103.98	106.57	103.28	1.71	.01592		
750	3	302.43	291.00	300.57	304.93	4.36	.01492		
750	4	596.34	572.40	591.86	601.90	10.04	.01684		
750	5	933.34	948.20	978.09	994.73	16.64	.01684		
750	6	1455.28	1419.20	1441.71	1465.99	24.18	.01661		
700	2	109.66	104.46	108.97	110.62	1.65	.01505		
700	3	310.61	292.55	308.35	312.17	4.41	.01420		
700	4	610.43	575.40	607.05	614.59	7.54	.01235		
700	5	1011.76	952.60	1006.42	1016.71	10.29	.01017		
700	6	1507.97	1425.80	1500.62	1515.56	14.94	.00991		
650	2	110.77	104.99	110.57	111.12	0.55	.00497		
650	3	312.87	294.10	312.06	313.58	1.52	.00486		
650	4	614.51	578.50	613.12	615.88	2.76	.00499		
650	5	1016.20	957.00	1015.00	1017.37	2.37	.00233		
650	6	1516.35	1432.00	1515.34	1518.58	3.24	.00214		
600	2	111.55	105.44	111.41	111.74	0.33	.00295		
600	3	314.87	295.60	314.60	315.15	0.55	.00175		
600	4	618.43	580.50	617.47	619.08	1.61	.00260		
600	5	1022.06	960.80	1021.46	1022.65	1.19	.00116		
600	6	1525.09	1438.75	1524.18	1526.53	2.35	.00154		

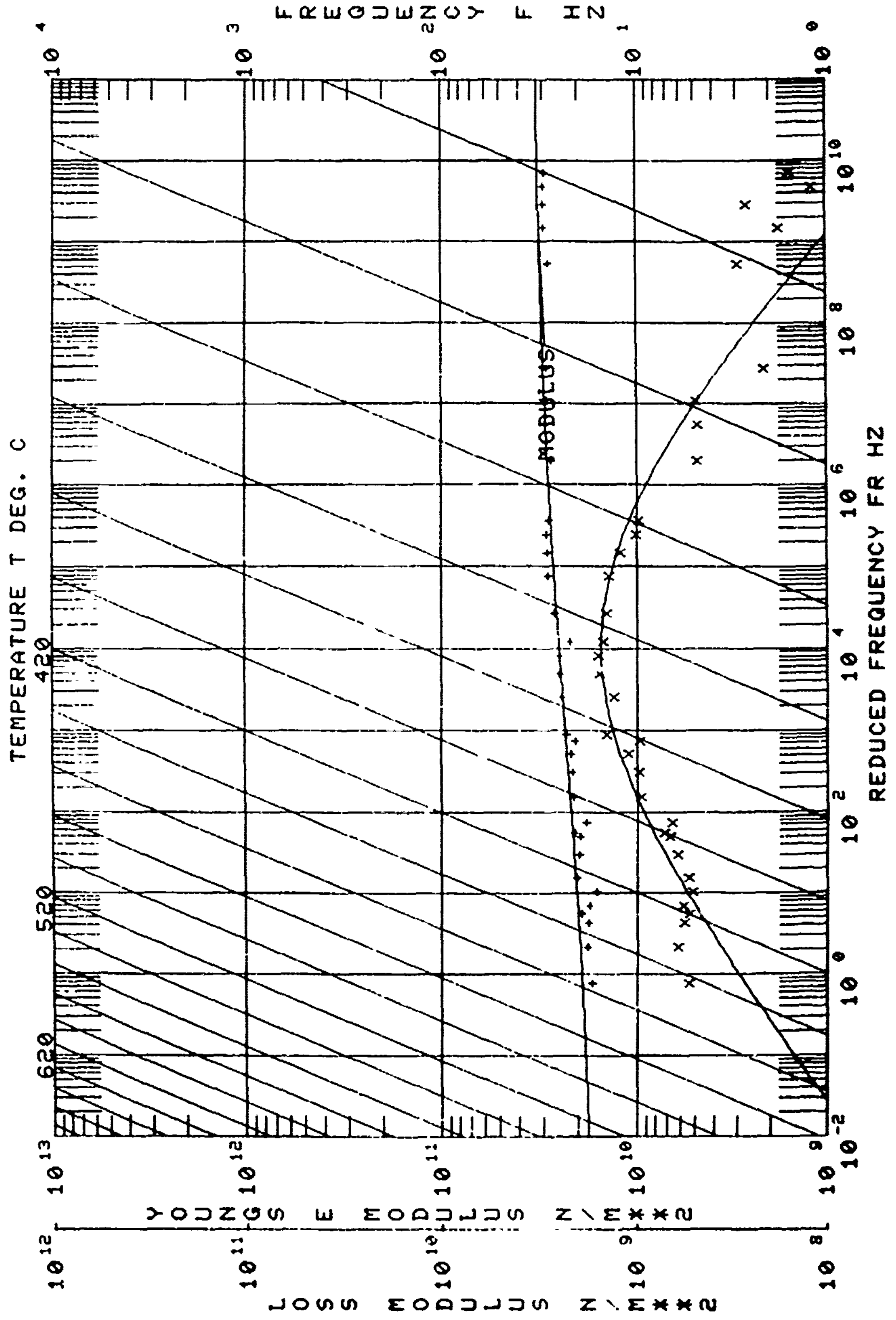
EXPERIMENTAL CODE : 74
MATERIAL :01-48 CORNING 7570
DATA SOURCES
MANUFACTURER :CORNING 7570 + 2% KHCO3 + 2% NA2 0
AFML :UDRI BEAM COATED ONE SIDE 8 MAY 1979
OTHER :AFTER 121 HOURS AT 900 F.

01-48-5

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.73844E+10	.0316	482.2	102.4	2.	2.05898E+11	.0067	102.4	5.48594E+08
2	1.84695E+10	.0340	482.2	288.4	3.	2.05203E+11	.0076	286.3	6.28493E+08
3	1.81000E+10	.0320	482.2	566.4	4.	2.07600E+11	.0070	564.4	5.78304E+08
4	1.79085E+10	.0329	482.2	936.4	5.	2.08270E+11	.0071	934.5	5.88564E+08
5	1.65994E+10	.0317	482.2	1389.3	6.	2.09833E+11	.0065	1398.6	5.25994E+08
6	1.87545E+10	.0360	454.4	1412.7	6.	2.11879E+11	.0079	1405.4	6.74574E+08
7	2.02415E+10	.0312	454.4	575.7	4.	2.09591E+11	.0073	567.1	6.32098E+08
8	2.07225E+10	.0268	454.4	293.5	3.	2.07430E+11	.0064	287.9	5.54665E+08
9	1.98149E+10	.0273	454.4	104.4	2.	2.08034E+11	.0063	103.0	5.40026E+08
10	2.12173E+10	.0349	426.7	105.6	2.	2.10019E+11	.0084	103.5	7.41316E+08
11	2.16304E+10	.0450	426.7	296.2	3.	2.09597E+11	.0110	289.4	9.74084E+08
12	2.20400E+10	.0456	426.7	583.9	4.	2.11740E+11	.0112	570.0	1.00573E+09
13	2.21133E+10	.0512	426.7	966.8	5.	2.12436E+11	.0126	943.8	1.13125E+09
14	2.10542E+10	.0471	426.7	1437.1	6.	2.14025E+11	.0112	1412.5	9.91344E+08
15	2.26724E+10	.0671	398.9	1455.3	6.	2.16060E+11	.0166	1419.2	1.52211E+09
16	2.55430E+10	.0628	398.9	988.3	5.	2.14421E+11	.0168	948.2	1.60293E+09
17	2.53437E+10	.0629	398.9	596.3	4.	2.13527E+11	.0168	572.4	1.59411E+09
18	2.46958E+10	.0545	398.9	302.4	3.	2.11921E+11	.0144	291.0	1.34552E+09
19	2.35446E+10	.0620	398.9	107.4	2.	2.12135E+11	.0159	104.0	1.46082E+09
20	2.68716E+10	.0543	371.1	109.7	2.	2.14098E+11	.0150	104.5	1.45938E+09
21	2.91142E+10	.0489	371.1	310.6	3.	2.14185E+11	.0142	292.5	1.42238E+09
22	2.91685E+10	.0426	371.1	610.4	4.	2.15771E+11	.0124	575.4	1.24340E+09
23	2.94885E+10	.0349	371.1	1011.8	5.	2.16416E+11	.0102	952.6	1.03034E+09
24	2.88586E+10	.0346	371.1	1508.0	6.	2.18074E+11	.0099	1425.8	9.99653E+08
25	2.93550E+10	.0074	343.3	1516.4	6.	2.19975E+11	.0021	1432.0	2.18493E+08
26	2.97462E+10	.0171	343.3	614.5	4.	2.18102E+11	.0050	578.5	5.09682E+08
27	2.98230E+10	.0166	343.3	312.9	3.	2.16461E+11	.0049	294.1	4.94746E+08
28	2.81334E+10	.0176	343.3	110.8	2.	2.16276E+11	.0050	105.0	4.93777E+08
29	2.89266E+10	.0103	315.6	111.6	2.	2.18134E+11	.0030	105.4	2.97909E+08
30	3.03929E+10	.0059	315.6	314.9	3.	2.18674E+11	.0018	295.6	1.80631E+08
31	3.05523E+10	.0088	315.6	618.4	4.	2.19613E+11	.0026	580.5	2.69625E+08
32	3.03199E+10	.0040	315.6	1022.1	5.	2.20158E+11	.0012	960.8	1.20084E+08
33	2.98477E+10	.0053	315.6	1525.1	6.	2.22054E+11	.0015	1438.7	1.59190E+08
34	1.99810E+10	.0346	454.4	951.7	5.	2.10370E+11	.0080	939.2	6.90632E+08
35	2.93550E+10	.0074	343.3	1516.4	6.	2.19975E+11	.0021	1432.0	2.18493E+08



TEMPERATURE T DEG. C
420
520
620
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS


TEMPERATURE T DEG. C
420
520
620
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-49-1

Date 12/20/78

Damping Material Corning 0010 + 7.5% Al_2O_3

Material Thickness 0.0211 cm Material Density 2.82 g/cc

Fixture No. 2 Beam Thickness 0.0947 cm

Beam Density 9.13 g/cc Beam Length 20.884 cm

Temperature Test Range: Between 845 °C and 565 °C

Frequency Test Range: Between 90 Hz and 1,450 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.62	Temperature	765 °C
	1,000 Hz	η_D 0.62	Temperature	895 °C
Range	100 Hz	715 °C	885 °C	
	1,000 Hz	840 °C	960 °C	

Complex Modulus E_D":

Peak	100 Hz	9×10^9 PAS	Temperature	720 °C
	1,000 Hz	9×10^9 PAS	Temperature	775 °C
Range	100 Hz	660 °C	770 °C	
	1,000 Hz	715 °C	840 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-6 (01-49) INITIAL
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM         N          ML
              A1            A2           A3         A4
   550.0   8.0000E-04   7.5000E+09     .660   1.5000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0      ETAFROL      SL        SH          FROL         C
            B1         B2        B3          B4           B5
   550.0     .634      .380     -.500   9.0000E-04      .800
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J85-6 test 1. Corning matrix M-12, specimen was retested as 01-49-2.

TABLE 32-B

Beam No. 01-49-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1550	2	90.74	93.10	90.12	91.44	1.32	.01455	.00835	
1550	3	256.58	261.30	254.61	259.30	4.69	.01828	.01383	
1550	4	505.98	513.64	499.58	512.38	12.80	.02530	.02260	
1550	5	841.56	851.10	831.91	856.20	24.29	.02886	.02636	
1550	6	1266.06	1274.09	1244.42	1285.44	41.02	.03240	.03070	
1500	2	91.79	93.92	91.02	92.56	1.54	.01678	.01238	
1500	3	259.70	263.41	256.52	263.04	6.52	.02511	.02313	
1500	5	857.16	857.74	836.14	875.01	38.87	.04535	.04412	
1500	6	1277.32	1283.80	1251.66	1302.98	51.32	.04018	.03945	
1450	2	92.92	94.60	91.86	94.02	2.16	.02325	.02055	
1450	3	263.70	265.32	258.86	268.15	9.29	.03523	.03373	
1450	4	526.81	521.49	514.71	537.31	22.60	.04290	.04131	
1450	5	874.30	864.01	854.32	893.08	38.76	.04433	.04372	
1400	2	93.91	95.42	92.31	95.51	3.20	.03408	.03198	
1400	3	268.74	267.58	265.85	271.80	11.60	.04317	.04194	X
1400	4	534.32	525.90	528.59	540.61	22.27	.04168	.04089	X
1400	5	893.44	871.22	875.40	911.82	36.42	.04075	.03995	
1400	6	1346.85	1304.00	1336.20	1357.41	41.35	.03076	.03012	X
1350	2	96.43	96.11	94.16	98.44	4.28	.04438	.04273	
1350	3	277.80	269.50	273.60	280.71	13.86	.05067	.04957	X
1350	4	546.01	529.69	536.78	555.59	18.81	.03445	.03381	
1350	5	911.12	877.46	897.89	924.78	26.89	.02951	.02882	
1350	6	1366.46	1313.35	1357.45	1373.70	31.69	.02319	.02260	X

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1300	2	98.78	96.82	96.59	100.79	4.20	.04252	.04108	
1300	3	282.40	271.30	279.77	284.53	9.28	.03287	.03187	X
1300	4	555.18	533.24	548.25	562.06	13.81	.02487	.02442	
1300	5	924.72	883.43	915.66	933.43	17.77	.01922	.01862	
1300	6	1382.89	1322.22	1366.66	1393.30	26.64	.01926	.01876	
1250	2	100.87	97.52	99.20	102.38	3.18	.03153	.03023	
1250	3	286.50	273.28	283.39	289.32	5.93	.02070	.01976	
1250	4	562.25	537.16	557.97	566.50	8.53	.01517	.01472	
1250	5	935.07	889.82	929.69	940.81	11.12	.01189	.01134	
1250	6	1399.05	1331.72	1394.17	1403.13	17.47	.01249	.01205	X
1200	2	102.56	98.18	101.47	103.52	2.05	.01999	01877	
1200	3	289.86	275.20	288.02	251.52	3.50	.01207	.01877	
1200	4	568.46	541.10	566.07	570.88	4.81	.00846	.00808	
1200	5	944.93	895.80	941.70	948.20	6.50	.00688	.00637	
1200	6	1414.11	1367.00	1408.91	1419.40	10.57	.00747	.00711	
1150	2	103.60	98.84	103.06	104.24	1.18	.01133		
1150	3	292.22	277.20	291.12	293.29	2.17	.00743		
1150	4	573.12	544.90	571.53	574.69	3.16	.00551		
1150	5	952.29	902.00	950.03	954.38	4.35	.00457		
1150	6	1426.00	1350.00	1424.50	1428.00	6.82	.00479		X
1100	2	104.90	99.58	104.61	105.27	0.66	00629		
1100	3	295.25	279.00	294.59	295.89	1.30	00440		
1100	4	578.97	548.42	578.07	579.95	1.88	.00325		

TABLE 32-B (Concluded)

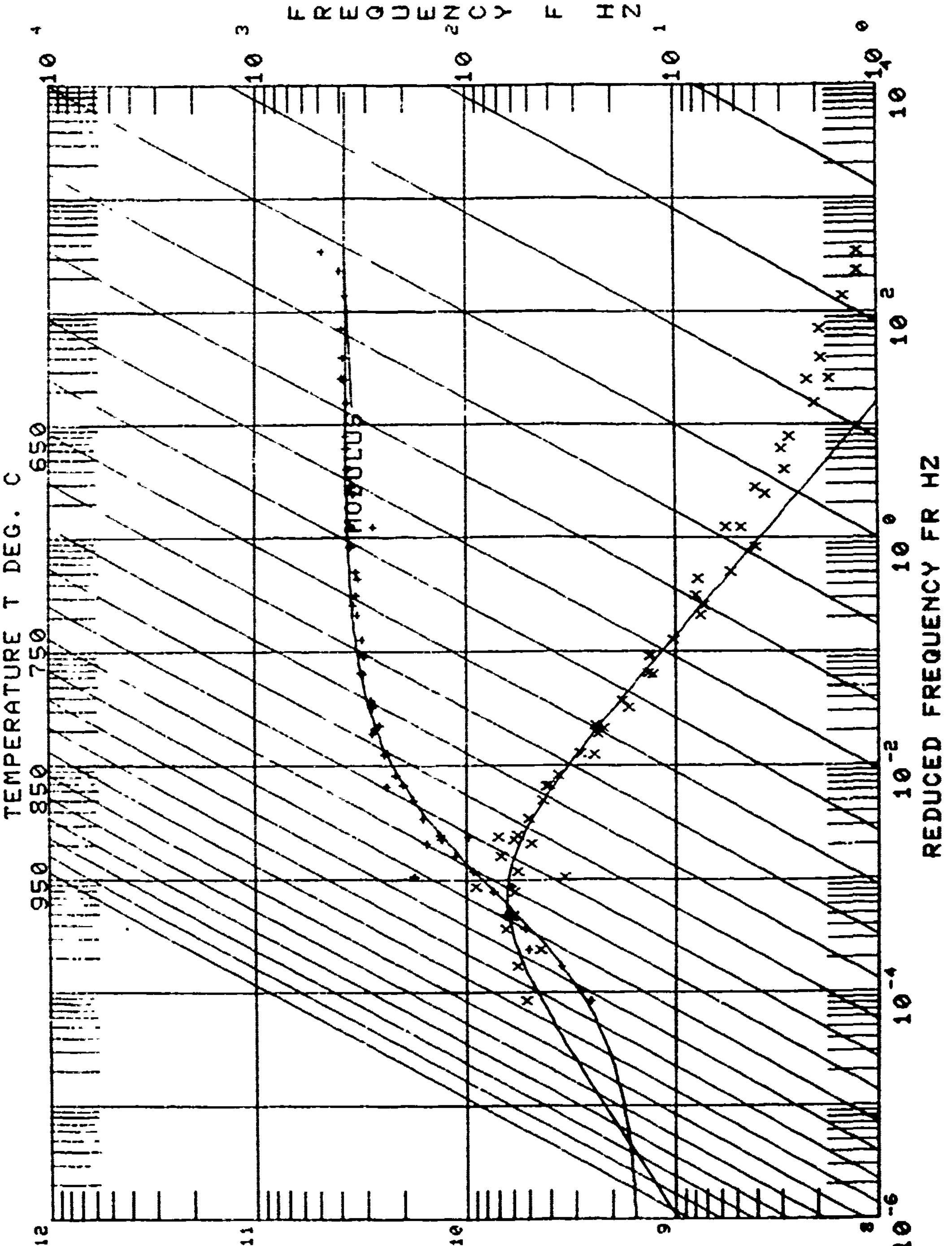
Beam No. 01-49-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	5	962.05	907.40	960.61	963.35	2.74	.00285		
1100	6	1439.46	1359.01	1437.34	144.81	4.47	.00311		
1050	2	105.88	100.10	105.67	106.05	0.38	.00359		
1050	3	297.46	280.60	297.01	297.95	0.94	.00316		
1050	4	583.50	551.60	582.85	584.24	1.39	.00238		
1050	5	969.32	912.60	968.48	970.50	2.02	.00208		
1050	6	1450.79	1340.50	1448.70	1452.25	3.55	.00245		

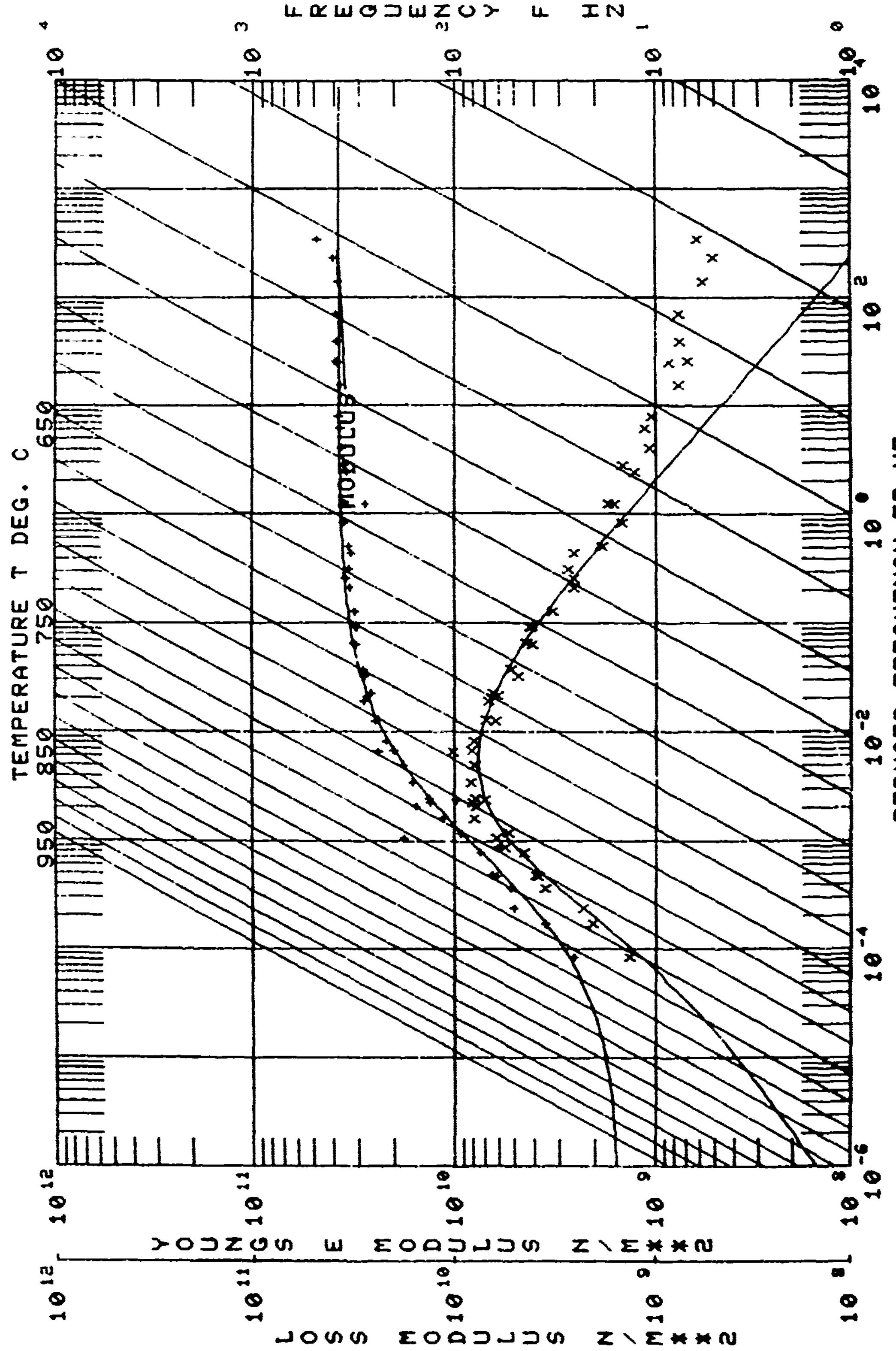
EXPERIMENTAL CODE : 35
MATERIAL :J85-6 (01-49) INITIAL
DATA SOURCES
MANUFACTURER :NONE
AFML :UDRI BEAM COATED ONE SIDE (M-1 + 1% COLBALT OXIDE)
OTHER :NONE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	2.62469E+09	.5279	843.3	90.7	2.	1.63581E+11	.0083	93.1	1.38566E+09
2	5.14642E+09	.4578	843.3	256.6	3.	1.64356E+11	.0138	261.3	2.35622E+09
3	6.28019E+09	.6227	843.3	506.0	4.	1.65382E+11	.0226	513.6	3.91062E+09
4	7.62294E+09	.6078	843.3	841.6	5.	1.66168E+11	.0264	851.1	4.63339E+09
5	9.45114E+09	.5839	843.3	1266.1	6.	1.67497E+11	.0307	1274.1	5.51880E+09
6	1.00588E+10	.7185	815.6	1277.3	6.	1.70059E+11	.0394	1283.8	7.22705E+09
7	1.15828E+10	.7015	815.6	857.2	5.	1.68771E+11	.0441	857.7	8.12515E+09
8	6.63884E+09	.6109	815.6	259.7	3.	1.67021E+11	.0232	263.4	4.05549E+09
9	3.60198E+09	.5851	815.6	91.8	2.	1.66475E+11	.0124	93.9	2.10744E+09
10	5.39526E+09	.6674	787.8	92.9	2.	1.68894E+11	.0206	94.6	3.60095E+09
11	1.80266E+10	.3487	787.8	263.7	3.	1.61301E+11	.0337	258.9	6.28510E+09
12	1.57945E+10	.5024	787.8	526.8	4.	1.70476E+11	.0413	521.5	7.93475E+09
13	1.65196E+10	.5132	787.8	874.3	5.	1.71248E+11	.0437	864.0	8.47815E+09
14	2.51661E+10	.2526	760.0	1346.4	6.	1.75453E+11	.0301	1304.0	6.35667E+09
15	2.21638E+10	.3699	760.0	893.4	5.	1.74117E+11	.0399	871.2	8.19768E+09
16	1.83261E+10	.4434	760.0	534.3	4.	1.73372E+11	.0409	525.9	8.12530E+09
17	1.37266E+10	.5832	760.0	268.7	3.	1.72351E+11	.0419	267.6	8.00502E+09
18	6.19937E+09	.9250	760.0	93.9	2.	1.71835E+11	.0320	95.4	5.73442E+09
19	1.34984E+10	.6093	732.2	96.4	2.	1.74329E+11	.0427	96.1	8.22502E+09
20	2.43929E+10	.4253	732.2	277.8	3.	1.74834E+11	.0496	269.5	1.03733E+10
21	2.45812E+10	.2896	732.2	546.0	4.	1.75846E+11	.0338	529.6	7.11863E+09
22	2.77682E+10	.2243	732.2	911.1	5.	1.76621E+11	.0288	877.5	6.22918E+09
23	2.88556E+10	.1716	732.2	1366.5	6.	1.77978E+11	.0226	1313.4	4.95238E+09
24	3.15841E+10	.1340	704.4	1382.9	6.	1.80390E+11	.0188	1322.2	4.23355E+09
25	3.17120E+10	.1318	704.4	924.7	5.	1.79032E+11	.0186	883.4	4.18074E+09
26	2.91978E+10	.1839	704.4	555.2	4.	1.78245E+11	.0244	533.2	5.37034E+09
27	2.89238E+10	.2407	704.4	282.4	3.	1.77177E+11	.0319	271.3	6.96191E+09
28	2.03908E+10	.4136	704.4	98.8	2.	1.76914E+11	.0411	96.8	8.43368E+09
29	3.25511E+10	.1375	676.7	286.5	3.	1.79773E+11	.0198	273.3	4.47648E+09
30	2.65293E+10	.2474	676.7	100.9	2.	1.79481E+11	.0302	97.5	6.56231E+09
31	3.20296E+10	.1042	676.7	562.2	4.	1.80875E+11	.0147	537.2	3.33890E+09
32	3.39739E+10	.0770	676.7	935.1	5.	1.81631E+11	.0113	889.8	2.61445E+09
33	3.40949E+10	.0820	676.7	1399.1	6.	1.82992E+11	.0120	1331.7	2.79649E+09
34	2.85519E+10	.0581	648.9	1414.1	6.	1.92816E+11	.0071	1367.0	1.65866E+09
35	3.62133E+10	.0416	648.9	944.9	5.	1.84081E+11	.0064	895.8	1.50587E+09
36	3.42012E+10	.0550	648.9	568.5	4.	1.83538E+11	.0081	541.1	1.88081E+09
37	3.51641E+10	.0739	648.9	289.9	3.	1.82307E+11	.0112	275.2	2.59845E+09
38	3.12990E+10	.1360	648.9	102.6	2.	1.81919E+11	.0188	98.2	4.25584E+09
39	3.32900E+10	.0790	621.1	103.6	2.	1.84373E+11	.0113	98.8	2.63078E+09
40	3.60908E+10	.0488	621.1	292.2	3.	1.84967E+11	.0074	277.2	1.76152E+09
41	3.52353E+10	.0370	621.1	573.1	4.	1.86125E+11	.0055	544.9	1.30533E+09
42	3.71292E+10	.0296	621.1	952.3	5.	1.86638E+11	.0046	902.0	1.09827E+09
43	3.76615E+10	.0308	621.1	1426.0	6.	1.88050E+11	.0048	1350.0	1.16171E+09
44	3.96460E+10	.0177	593.3	962.1	5.	1.88879E+11	.0028	907.4	7.02260E+08
45	3.74842E+10	.0210	593.3	579.0	4.	1.88538E+11	.0033	548.4	7.88879E+08
46	3.84196E+10	.0278	593.3	295.2	3.	1.87377E+11	.0044	279.0	1.06937E+09
47	3.61698E+10	.0416	593.3	104.9	2.	1.87144E+11	.0063	99.6	1.50545E+09
48	3.85392E+10	.0228	565.6	105.9	2.	1.89104E+11	.0036	100.1	8.79247E+08
49	3.95187E+10	.0195	593.3	1439.5	6.	1.90569E+11	.0031	1359.0	7.70861E+08

50	3.97185E+10	.0197	565.6	297.5	3.	1.89532E+11	.0032	280.6	7.81023E+08
51	3.89124E+10	.0151	565.6	583.5	4.	1.90730E+11	.0024	551.6	5.88067E+08
52	4.10074E+10	.0127	565.6	969.3	5.	1.91050E+11	.0021	912.6	5.21337E+08
53	4.92001E+10	.0128	565.6	1450.8	6.	1.85413E+11	.0025	1340.5	6.31985E+08



TEMPERATURE T DEG. C
650
750
850
950
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA



TEMPERATURE T DEG. C
650
750
850
950
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-49-2

Date 1/3/79

Damping Material Corning 0010 + 7.5% Al_2O_3

Material Thickness 0.0211 cm Material Density 2.82 g/cc

Fixture No. 2 Beam Thickness 0.0947 cm

Beam Density 9.13 g/cc Beam Length 20.884 cm

Temperature Test Range: Between 845 °C and 595 °C

Frequency Test Range: Between 91 Hz and 1,450 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.63		Temperature	760 °C
	1,000 Hz	η_D 0.63		Temperature	835 °C
Range	100 Hz	720 °C	820 °C		
	1,000 Hz	790 °C	890 °C		

Complex Modulus E_D'':

Peak	100 Hz	1×10^{10} PAS		Temperature	720 °C
	1,000 Hz	1×10^{10} PAS		Temperature	800 °C
Range	100 Hz	675 °C	775 °C		
	1,000 Hz	735 °C	900 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-6 AFTER 100 HRS. @ 1400XF.
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM          N          ML
              A1            A2            A3         A4
   550.0  8.0000E-04  1.2000E+10      .030  3.0000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH        FROL        C
           B1        B2        B3         B4         B5
   550.0    .634     .380    -.530  9.0000E-04     .610
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J-85-6, test 2. Retest of 01-49-1 after 100 hours at 760°C. Coating deteriorated slightly. Specimen was thermal soaked an additional 236 hours at 760°C. When removed from furnace, after five to ten minutes at room temperature, the entire coating fragmented and came off the beam.

TABLE 33-B

[illegible] No. 01-49-2

[illegible]		f_c	f_n	f_L	f_R	[illegible]	[illegible]	[illegible]	[illegible]
1600	2	90.86	92.36	90.20	91.46	1.26	.01387	.00667	
	3	255.49	259.05	253.08	258.32	5.24	.02051	.01608	
	4	504.76	509.55	499.31	509.11	9.80	.01942	.01680	
	5	838.88	844.0	828.63	849.14	20.51	.02445	.02197	
	6	1256.16	1263.8	1246.98	1265.55	36.88	.02936	.02766	
1550	2	91.76	93.1	91.04	92.49	1.45	.01580	.00985	
	3	259.65	261.3	256.75	262.55	5.80	.02234	.01944	
	4	511.30	513.64	503.24	516.77	13.53	.02646	02472	
	5	850.61	851.1	843.77	857.85	28.46	.03345	.03181	
	6	1270.16	1274.09	1257.07	1283.26	51.4[illegible]	.04052	.03927	
1550	2	91.71	93.1	90.99	92.43	1.44	.01570	.00975	
	3	259.61	261.3	254.79	263.19	8.40	.0[illegible]236	.02946	
	4	509.65	513.64	503.03	516.28	13.25	.02600	.02426	
	5	849.78	851.1	842.47	857.08	28.71	.03379	.03215	
	6	1270.33	1274.09	1258.56	1282.50	47.05	.03703	.03578	
1500	2	92.66	93.92	91.77	93.57	1.80	.01943	.01506	
	3	263.11	263.41	259.46	265.68	6.22	.02364	.02149	
	4	522.28	518.0	510.32	534.25	23.93	.04582	.04452	
	5	864.42	857.74	855.70	873.15	3[illegible].29	.03967	.03844	
	6	1286.56	1283.8	1266.79	1306.32	77.68	.06038	.05938	
[illegible]		f_c	f_n	f_L	f_R	[illegible]	[illegible]	[illegible]	[illegible]
1450	2	93.92	94.6	92.61	95.24	2.63	.02800	.02519	
	3	268.44	265.32	263.54	273.30	9.76	.03636	.03476	
	4	525.63	521.49	523.72	533.59	19.39	.03690	.03555	
	6	1354.58	1293.7	1348.28	1360.89	24.78	.01829	.01753	
1400	2	95.22	95.42	93.52	97.05	3.53	.03707	.03503	
	4	534.05	525.9	528.34	539.75	22.44	.04202	.04130	
	5	900.29	871.22	892.45	908.13	30.81	.03453	.03373	
1400	3	271.98	267.58	267.09	276.83	9.74	.03581	.03450	
	4	534.75	525.9	532.37	535.58	5.92	01106	.01046	
	6	1371.75	1304.0	1365.59	1376.73	21.89	.01596	.01535	
1350	2	97.74	96.11	95.59	99.63	4.04	.04133	.03965	
	4	550.60	529.69	54[illegible].28	555.98	19.06	.03462	.03393	
	5	915.97	877.46	910.09	922.01	23.43	.02557	.02493	
1350	3	277.25	269.5	269.88	281.78	11.9	.04292	.04170	
	4	549.95	529.69	542.34	558.74	16.08	.02924	.02876	
	6	1376.41	1313.35	1372.83	1381.84	17.06	.01286	.01234	
1300	2	99.95	96.82	98.29	101.83	3.54	.03542	.03392	
	3	283.20	271.3	279.32	286.52	7.2	.02542	.02442	
	4	559.13	533.24	555.78	562.41	13.03	02330	.0228[illegible]	
	5	929.93	883.43	924.61	933.19	16.86	.01813	.01754	
	6	1393.35	1322.22	1384.34	1409.83	24.99	.01794	.01749	

TABLE 33-B (Concluded)

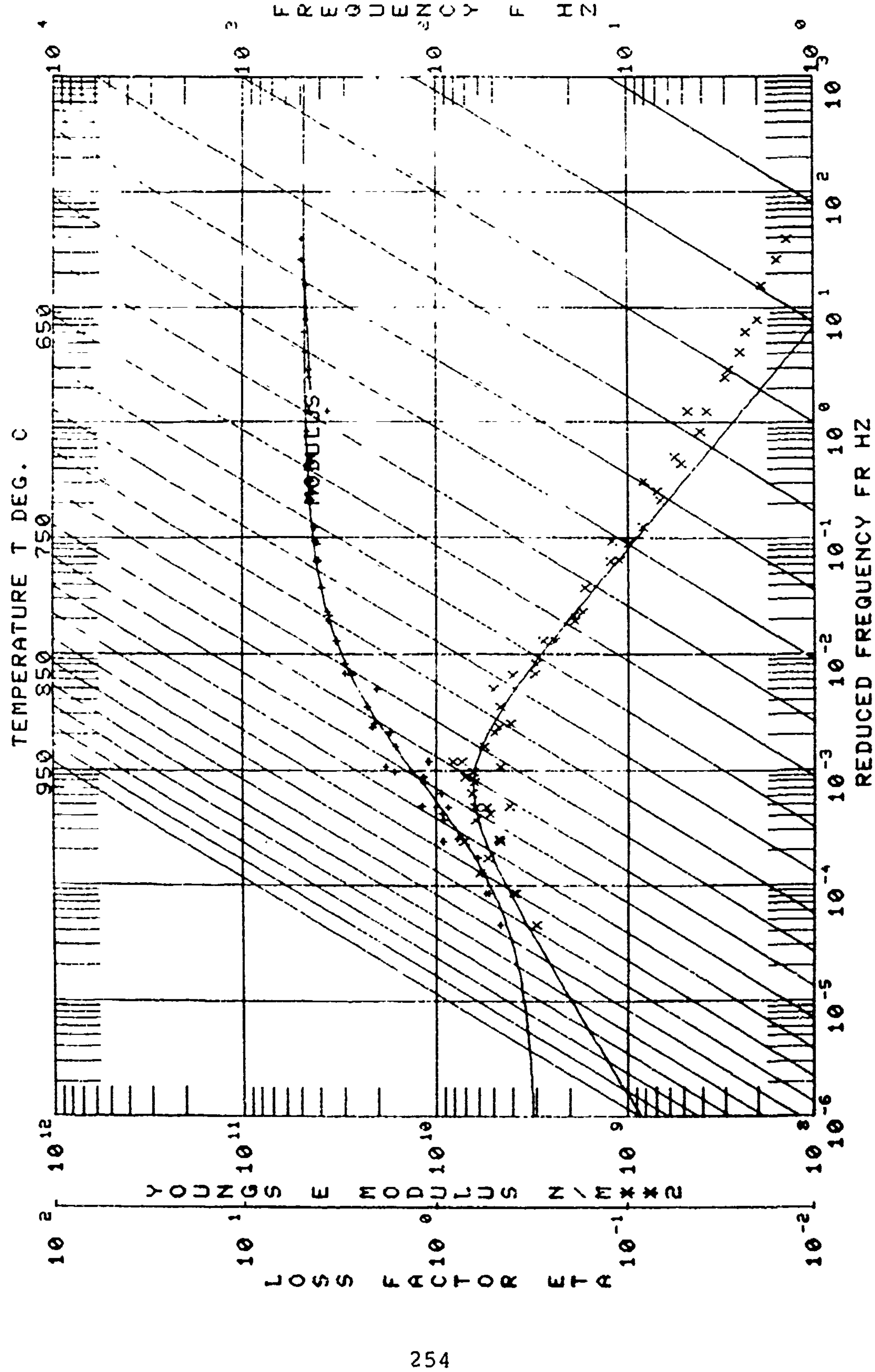
Beam No. 01-49-2

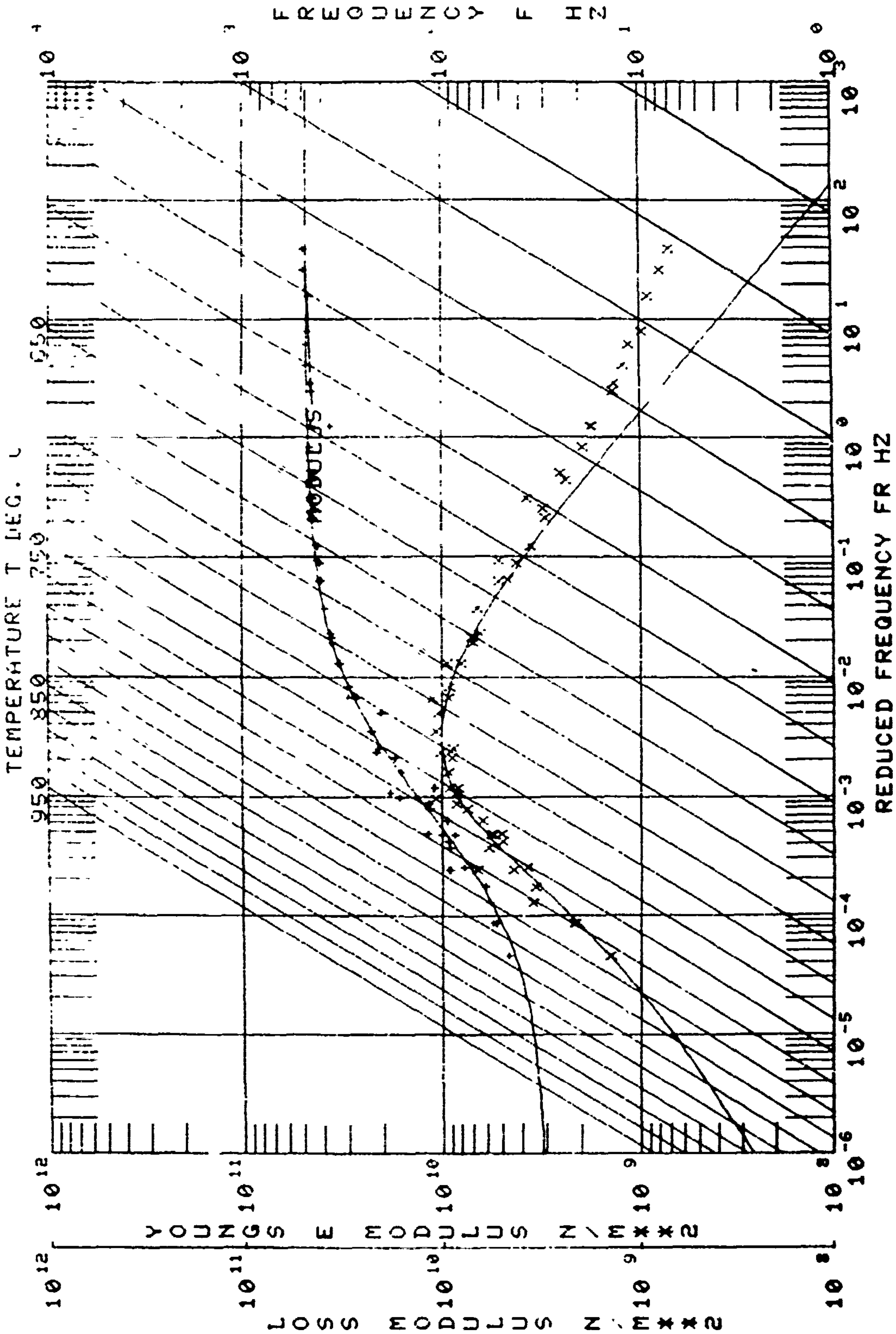
°F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	ldB
1250	2	101.81	97.52	100.72	103.13	2.41	.02367	.02233	
	3	287.38	273.33	284.99	289.76	4.77	.01660	.0157	
	4	566.29	537.16	563.11	570.14	7.03	.01241	.01202	
	5	940.6	989.82	938.08	943.13	9.92	.01055	.00990	
	6	1407.9	1331.72	1405.11	1412.17	17.80	.01265	.01222	
1200	2	103.26	98.18	102.46	104.04	[illegible].58	.01530	.01408	
	3	290.47	275.2	288.82	292.05	3.23	.01112	.01028	
	4	571.14	541.1	568.77	573.71	4.94	.00865	.00826	
	5	949.05	895.8	946.10	952.57	6.47	.00682	.00628	
	6	1420.89	1367.0	1418.24	1422.72	8.80	.0062	.00582	
1150	2	104.40	98.84	103.86	104.79	.93	.00891	.00769	
	3	293.22	277.2	292.22	294.11	1.89	.00645	.00567	
	4	575.68	544.9	574.52	577.33	2.81	.00488	.00446	
	5	956.65	902.0	954.31	9[illegible]8.51	4.20	.00433	.00386	
	6	1431.54	1350.0	1428.91	1434.57	5.66	.00395	.00359	
1100	2	105.30	99.53	105.04	105.61	.57	.00541	.00436	
	3	295.8	279.0	295.16	296.3	1.14	.00385	.00311	
	4	580.66	548.42	599.83	581.82	1.99	.00343	.00290	
	5	964.31	902.4	96[illegible].0	965.88	2.88	.00299	.00247	
	6	1443.24	1359.01	1441.03	1444.70	3.67	.00254	.00218	

EXPERIMENTAL CODE : 41 01-49-2
MATERIAL :J85-6 AFTER 100 HRS. @ 1400*F.
DATA SOURCES
MANUFACTURER :N
AFML :UDRI BEAM COATED ONE SIDE
OTHER :COATING:M-1 + 1% COLBALT OXIDE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	5.67571E+09	.3903	843.3	91.8	2.	1.63581E+11	.0098	93.1	2.21501E+09
2	9.43851E+09	.4768	843.3	259.7	3.	1.64356E+11	.0194	261.3	4.50064E+09
3	1.03212E+10	.5609	843.3	511.3	4.	1.65382E+11	.0247	513.6	5.78927E+09
4	1.11629E+10	.8382	843.3	1270.2	6.	1.67497E+11	.0393	1274.1	9.35617E+09
5	9.58677E+09	.6703	871.1	1256.2	6.	1.64802E+11	.0277	1263.8	6.42614E+09
6	9.49629E+09	.5329	871.1	838.9	5.	1.63407E+11	.0220	844.0	5.06070E+09
7	7.93032E+09	.4812	871.1	504.8	4.	1.62759E+11	.0168	509.5	3.81607E+09
8	5.90081E+09	.6063	871.1	255.5	3.	1.61538E+11	.0161	259.0	3.57791E+09
9	4.75626E+09	.3086	871.1	90.9	2.	1.60990E+11	.0067	92.4	1.46794E+09
10	5.43220E+09	.4030	843.3	91.7	2.	1.63581E+11	.0097	93.1	2.18899E+09
11	9.36323E+09	.7281	843.3	259.6	3.	1.64356E+11	.0295	261.3	6.81710E+09
12	8.81567E+09	.6383	843.3	509.7	4.	1.65382E+11	.0243	513.6	5.62686E+0
13	1.17974E+10	.6471	843.3	849.8	5.	1.66168E+11	.0322	851.1	7.63398E+09
14	1.12875E+10	.7558	843.3	1270.5	6.	1.67497E+11	.0358	1274.1	8.53137E+09
15	1.65335E+10	.5767	815.6	864.4	5.	1.68771E+11	.0384	857.7	9.53447E+09
16	1.67089E+10	.6596	815.6	522.3	4.	1.68202E+11	.0445	518.0	1.10209E+10
17	1.20492E+10	.4262	815.6	263.1	3.	1.67021E+11	.0215	263.4	5.13515E+09
18	6.23365E+09	.5545	815.6	92.7	2.	1.66475E+11	.0151	93.9	3.45677E+09
19	9.28329E+09	.6439	787.8	93.9	2.	1.68894E+11	.0252	94.6	5.97719E+09
20	1.85697E+10	.4718	787.8	268.4	3.	1.69452E+11	.0348	265.3	8.76038E+09
21	1.77254E+10	.5106	787.8	526.6	4.	1.70476E+11	.0359	521.5	9.05020E+09
22	2.32277E+10	.4732	787.8	881.7	5.	1.71248E+11	.0420	864.0	1.09909E+10
23	3.75035E+10	.1335	787.8	1354.6	6.	1.72692E+11	.0175	1293.7	5.00512E+09
24	4.08355E+10	.1107	760.0	1371.7	6.	1.75453E+11	.0154	1304.0	4.51862E+09
25	3.03860E+10	.3067	760.0	900.3	5.	1.74117E+11	.0337	871.2	9.31979E+09
26	2.15900E+10	.1268	760.0	534.7	4.	1.73372E+11	.0105	525.9	2.73843E+09
27	2.09150E+10	.5149	760.0	534.1	4.	1.73372E+11	.0413	525.9	1.07698E+10
28	2.12656E+10	.4217	760.0	272.0	3.	1.72351E+11	.0345	267.6	8.96856E+09
29	1.19341E+10	.7196	760.0	95.2	2.	1.71835E+11	.0350	95.4	8.58749E+09
30	2.17891E+10	.4793	732.2	97.7	2.	1.74329E+11	.0397	96.1	1.04425E+10
31	2.80585E+10	.4067	732.2	277.2	3.	1.74834E+11	.0417	269.5	1.14113E+10
32	3.40166E+10	.2835	732.2	550.6	4.	1.75879E+11	.0339	529.7	9.64495E+09
33	3.33419E+10	.2443	732.2	549.9	4.	1.75879E+11	.0288	529.7	8.14514E+09
34	3.65971E+10	.1970	732.2	916.0	5.	1.76621E+11	.0249	877.5	7.21123E+09
35	4.30381E+10	.1237	704.4	1393.4	6.	1.80390E+11	.0175	1322.2	5.3224[illegible]E+09
36	4.20478E+10	.1256	704.4	929.9	5.	1.79032E+11	.0175	883.4	5.27910E+09
37	3.95462E+10	.1713	704.4	559.1	4.	1.78245E+11	.0229	533.2	6.77566E+09
38	3.66920E+10	.1931	704.4	283.2	3.	1.77177E+11	.0244	271.3	7.08518E+09
39	3.03068E+10	.3132	704.4	99.9	2.	1.[illegible]6914E+11	.0339	96.8	9.49304E+09
40	4.56590E+10	.0835	676.7	1407.9	6.	1.82992E+11	.0122	1331.7	3.81097E+09
41	4.52477E+10	.0682	676.7	940.6	5.	1.81631E+11	.0100	889.8	3.08811E+09
42	4.34023E+10	.0846	676.7	566.3	4.	1.80875E+11	.0120	537.2	3.67242E+09
43	4.16350E+10	.1136	676.7	287.4	3.	1.79773E+11	.0157	273.3	4.73035E+09
44	3.72412E+10	.1763	676.7	101.8	2.	1.79481E+11	.0223	97.5	6.56557E+09
45	3.72481E+10	.0487	648.9	1420.9	6.	1.92816E+11	.0058	1367.0	1.81331E+09
46	4.72702E+10	.0420	648.9	949.1	5.	1.84081E+11	.0063	895.8	1.98346E+09
47	4.44767E+10	.0714	648.9	290.5	3.	1.82307E+11	.0103	275.2	3.17752E+09
48	4.22154E+10	.1017	648.9	103.3	2.	1.81919E+11	.0141	98.2	4.29474E+09
49	4.54451E+10	.0530	621.1	104.4	2.	1.84373E+11	.0077	98.8	2.40953E+09

50	4.65022E+10	.0385	621.1	293.2	3.	1.84967E+11	.0057	277.2	1.79049E+09
51	4.60155E+10	.0307	621.1	575.7	4.	1.86125E+11	.0045	544.9	1.41172E+09
52	4.86214E+10	.0255	621.1	956.7	5.	1.86638E+11	.0039	502.0	1.24032E+09
53	4.88709E+10	.0238	621.1	1431.5	6.	1.88050E+11	.0036	1350.0	1.16161E+09
54	5.04964E+10	.0142	593.3	1443.2	6.	1.90569E+11	.0022	1359.0	7.18188E+08
55	5.05138E+10	.0160	593.3	964.3	5.	1.88879E+11	.0025	907.4	8.08338E+08
56	4.80153E+10	.0195	593.3	580.7	4.	1.88538E+11	.0029	548.4	9.36272E+08
57	4.85779E+10	.0206	593.3	295.8	3.	1.87377E+11	.0031	279.0	1.00212E+09
58	4.68353E+10	.0297	593.3	105.3	2.	1.87144E+11	.0044	99.6	1.39154E+09
59	3.91117E+10	.0931	732.2	1376.4	6.	1.78032E+11	.0123	1313.6	3.64091E+09
60	4.47979E+10	.0574	648.9	571.1	4.	1.83538E+11	.0083	541.1	2.57066E+09


TEMPERATURE T DEG. C
650
750
850
950
FREQUENCY F HZ
MODULUS
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
950
850
750
650
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-49-3

Date 4/3/79

Damping Material Owens Illinois CV-101

Material Thickness 0.0297 cm Material Density 6.74 g/cc

Fixture No. 2 Beam Thickness 0.0947 cm

Beam Density 9.13 g/cc Beam Length 20.884 cm

Temperature Test Range: Between 480 °C and 595 °C

Frequency Test Range: Between 90 Hz and 1,400 Hz

Loss Factor η_D:

Peak	100 Hz	η_D *		Temperature	* °C
	1,000 Hz	η_D *		Temperature	* °C
Range	100 Hz	* °C	* °C		
	1,000 Hz	* °C	* °C		

Complex Modulus E_D'':

Peak	100 Hz	1.6×10^9 PAS		Temperature	495 °C
	1,000 Hz	1.6×10^9 PAS		Temperature	520 °C
Range	100 Hz	455 °C	530 °C		
	1,000 Hz	480 °C	560 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01.-49
LOG(M)=LOG(ML)+(2LOG(MROM/ML:)/(1+(FROM/FR)**N)
  T0         FROM        MROM         N          ML
             A1          A2           A3         A4
  500.0   2.0807E+00   5.0001E+09    .471    6.7816E+08
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0      ETAFROL     SL      SH        FROL          C
            B1        B2      B3        B4            B5
  500.0    .200      .500    -.250    1.4000E-01    1.000
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Crystallizing glass. Thermal soaked for 100 hours at 760°C. Coating deteriorated; could not be retested.

* Could not be measured.

TABLE 34-B

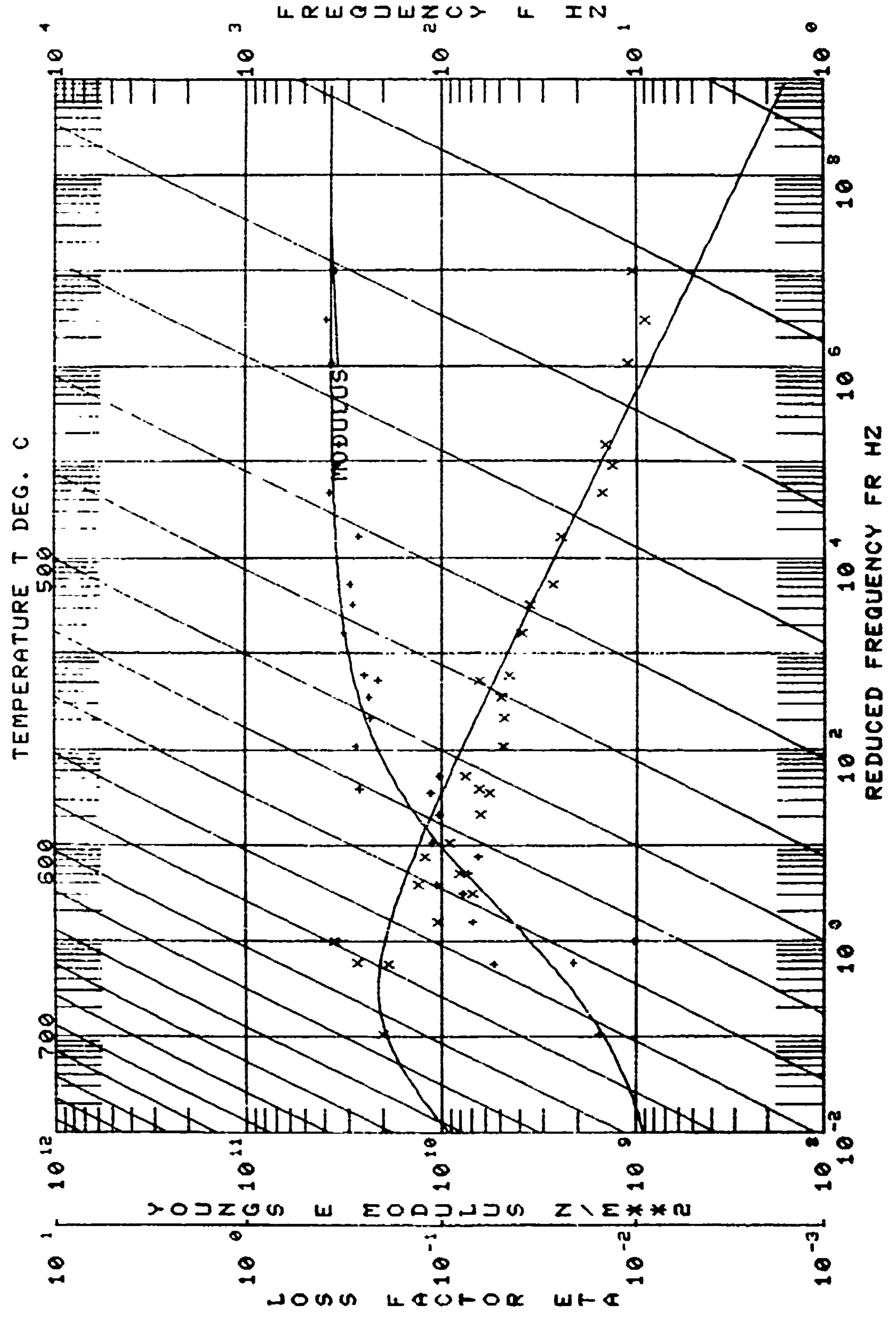
Beam No. 01-49-3

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	2	91.23	99.48	91.13	91.36	0.26	.00285		
1100	3	255.89	279.00	255.48	256.17	0.69	.00269		
1100	4	500.92	545.00	499.40	501.68	2.28	.00455		
1100	5	830.48	907.40	829.38	831.81	2.43	.00292		
1100	6	1240.97	1359.00	1238.20	1243.20	5.00	.00403		
1050	2	93.12	100.08	92.95	93.66	0.71	.00762		
1050	3	262.62	280.60	261.75	263.17	1.42	.00541		
1050	4	514.87	548.40	513.62	515.70	2.08	.00404		
1050	5	854.90	912.60	853.08	856.80	3.72	.00435		
1050	6	1276.41	1367.00	1273.81	1281.22	7.41	.00580		
1000	2	95.37	100.62	94.92	95.87	0.95	.00996		
1000	3	267.73	282.00	266.74	268.74	2.00	.00722		
1000	4	524.83	554.50	523.32	525.76	2.44	.00465		
1000	5	871.72	917.80	869.54	873.50	3.96	.00454		
1000	6	1300.14	1374.50	1297.11	1304.20	7.09	.00545		
950	2	100.79	101.16	100.28	101.54	1.26	.01025		
950	3	282.80	283.10	281.76	284.00	2.24	.00792		
950	4	549.66	557.40	547.19	550.96	3.77	.00680		
950	5	911.00	922.40	908.88	915.49	6.61	.00725		
950	6	1353.34	1381.60	1348.65	1360.29	11.64	.00860		
900	2	100.82	101.68	100.46	101.16	0.70	.00694		
900	3	287.64	284.30	286.69	288.76	2.07	.00719		

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
900	4	560.97	560.20	559.45	562.79	3.34	.00595		
900	5	930.15	927.00	928.31	932.62	4.31	.00463		
900	6	1373.99	1388.60	1369.04	1379.95	10.91	.00794		
850	2	103.95	102.14	103.80	104.19	0.39	.00375		
850	3	292.84	285.30	292.33	293.23	0.90	.00307		
850	4	572.10	562.60	571.38	572.85	1.47	.00257		
850	5	944.70	831.40	843.55	946.10	2.55	.00270		
850	6	1391.88	1394.80	1388.58	1399.01	10.43	.00749		
800	2	104.85	102.62	104.68	104.91	0.23	.00219		
800	3	294.88	286.30	294.55	295.11	0.56	.00190		
800	4	575.83	565.50	575.18	576.54	1.36	.00236		
800	5	951.60	936.00	950.82	952.74	1.92	.00201		
800	6	1399.34	1401.00	1394.47	1405.90	11.43	.00817		

EXPERIMENTAL CODE : 65
MATERIAL :01.-49-3
DATA SOURCES
MANUFACTURER :OWENS ILLINOIS CV - 101 - A
AFML :UDRI BEAM COATED OBE SIDE 4 APRIL 1979
OTHER :F-107

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	2.55934E+10	.0465	482.2	100.8	2.	1.95121E+11	.0069	101.7	1.18928E+09
2	3.25760E+10	.0400	482.2	287.6	3.	1.94564E+11	.0072	284.3	1.30415E+09
3	2.92634E+10	.0362	482.2	561.0	4.	1.96724E+11	.0060	560.2	1.05853E+09
4	3.00451E+10	.0276	482.2	930.2	5.	1.97127E+11	.0046	927.0	8.30366E+08
5	3.43002E+10	.0147	454.4	944.7	5.	1.99003E+11	.0027	931.4	5.04891E+08
6	3.51591E+10	.0137	454.4	572.1	4.	1.98413E+11	.0026	562.6	4.82876E+08
7	3.82347E+10	.0153	454.4	292.8	3.	1.95935E+11	.0031	285.3	5.85947E+08
8	2.71666E+10	.0251	454.4	103.9	2.	2.07477E+11	.0038	104.9	6.[illegible]E+08
9	3.70197E+10	.0113	426.7	104.9	2.	1.98745E+11	.0022	102.6	4.18127E+08
10	3.98335E+10	.0093	426.7	294.9	3.	1.97311E+11	.0019	286.3	3.69032E+08
11	3.55314E+10	.0108	426.7	951.6	5.	2.00973E+11	.0020	936.0	3.82284E+08
12	2.16978E+10	.0662	510.0	1353.3	6.	1.96957E+11	.0086	1381.6	1.43532E+09
13	2.42572E+10	.0506	510.0	911.0	5.	1.95176E+11	.0072	922.4	1.22839E+09
14	2.36847E+10	.0487	510.0	549.7	4.	1.94763E+11	.0069	557.4	1.15459E+09
15	2.69812E+10	.0654	510.0	100.8	2.	1.93130E+11	.0103	101.2	1.76359E+09
16	1.08814E+10	.1347	537.8	95.4	2.	1.91074E+11	.0100	100.6	1.46626E+09
17	1.13936E+10	.0939	537.8	267.7	3.	1.91428E+11	.0072	282.0	1.06994E+09
18	1.05590E+10	.0651	537.8	524.8	4.	1.92741E+11	.0046	554.5	6.87757E+08
19	1.16235E+10	.0585	537.8	871.7	5.	1.93234E+11	.0045	917.8	6.79929E+08
20	1.04941E+10	.0776	537.8	1300.1	6.	1.94938E+11	.0055	1374.5	8.13826E+08
21	6.62572E+09	.1246	565.6	1276.4	6.	1.92816E+11	.0058	1367.0	8.25766E+08
22	7.96131E+09	.0717	565.6	514.9	4.	1.88593E+11	.0040	548.5	5.71056E+08
23	7.17017E+09	.1063	565.6	262.6	3.	1.89532E+11	.0054	280.6	7.62150E+08
24	5.51724E+09	.1909	565.6	93.1	2.	1.89028E+11	.0076	100.1	1.05306E+09
25	1.57489E+09	.2040	593.3	91.2	2.	1.86769E+11	.0025	99.5	3.21218E+08
26	2.78525E+10	.0493	510.0	282.8	3.	1.92924E+11	.0079	283.1	1.37183E+09
27	7.48658E+09	.0827	565.6	854.9	5.	1.91050E+11	.0044	912.6	6.19322E+08
28	2.15348E+09	.2779	593.3	500.9	4.	1.86194E+11	.0045	545.0	5.98417E+08
29	1.06068E+09	.3630	593.3	830.5	5.	1.88879E+11	.0029	907.4	3.84999E+08
30	3.51661E+10	.0137	454.4	572.1	4.	1.98413E+11	.0026	562.6	4.82903E+08
31	7.17017E+09	.1063	565.6	262.6	3.	1.89532E+11	.0054	280.6	7.62150E+08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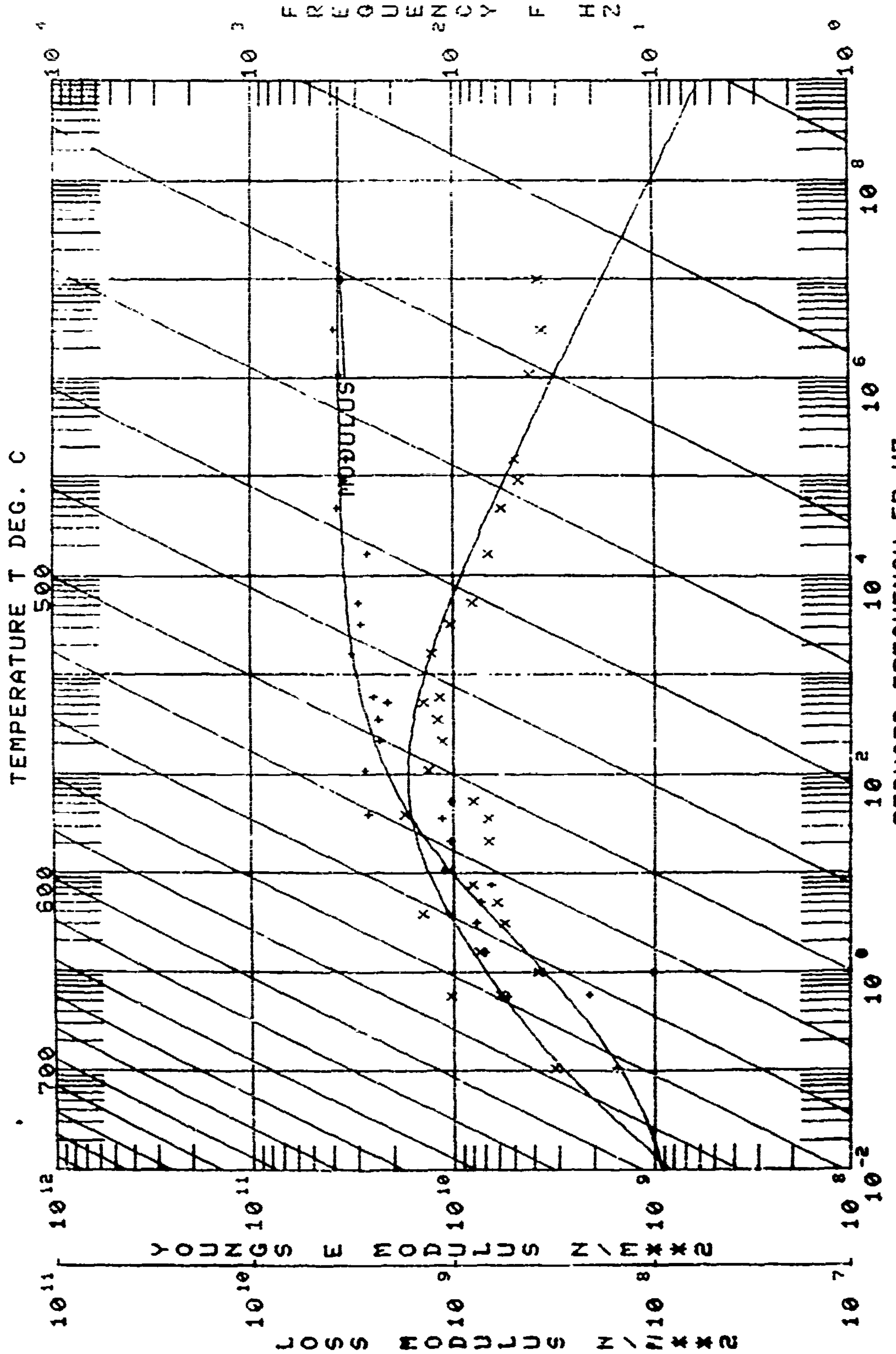
600
700
MODULUS
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
500
600
700
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-49-4

Date 4/25/79

Damping Material Corning 7570 + 6% Na_2O + 6% $KHCO_3$

Material Thickness 0.0183 cm Material Density 5.04 g/cc

Fixture No. 2 Beam Thickness 0.0947 cm

Beam Density 9.13 g/cc Beam Length 20.884 cm

Temperature Test Range: Between 525 °C and 426 °C

Frequency Test Range: Between 95 Hz and 1,450 Hz

Loss Factor η_D:

Peak 100 Hz η_D ______ Temperature ______ °C

1,000 Hz η_D ______ Temperature ______ °C

Range 100 Hz ______ °C ______ °C

1,000 Hz ______ °C ______ °C

Complex Modulus E_D":

Peak 100 Hz ______ PAS Temperature ______ °C

1,000 Hz ______ PAS Temperature ______ °C

Range 100 Hz ______ °C ______ °C

1,000 Hz ______ °C ______ °C

NOMOGRAPH CURVE FIT EQUATION:

REMARKS: F-107-4. Coating deteriorated during test. No meaningful data obtained.

TABLE 35-B

Beam No. 01-49-4

°F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1000	2	98.77	95.37	98.50	99.16	.66	.0067		
	3	278.55	267.73	277.95	299.55	1.60	.0057		
	4	545.52	554.50	544.2	547.28	3.07	.0056		
	5	901.60	917.80	899.73	904.79	5.06	.0056		
	6	1352.30	1374.50	1348.70	1357.95	9.25	.0068		
975	2	99.97	98.26	99.72	100.28	.56	.0056		
	3	281.93	275.20	281.26	282.54	1.28	.0045		
	4	553.41	555.95	551.70	554.46	2.76	.0050		
	5	915.50	920.10	913.53	917.94	4.41	0048		
	6	1374.79	1378.05	1371.57	1379.09	7.52	.0055		
950	2	101.30	101.16	100.93	101.53	.55	.0054		
	3	285.88	283.10	285.02	286.40	1.38	.0048		
	4	559.95	557.4	958.85	961.30	2.45	.0044		
	5	926.43	922.40	924.05	928.16	4.09	.0044		
	6	1392.85	1391.60	1388.75	1396.94	8.19	.0059		
925	2	98.87	101.42	98.44	99.54	1.10	.0111		
	3	279.49	283.70	278.04	281.87	3.83	.0137		
	4	549.58	558.80	545.15	553.73	8.58	.0156		
	5	910.48	924.70	905.48	921.23	15.75	.0173		
	6	1377.55	1385.10	1371.04	1384.48	25.63	.0186		

°F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
925	2	102.05	101.42	101.83	102.30	.47	.0046		
	3	288.08	283.70	287.46	288.46	1.60	.0035		
	4	564.43	558.80	563.55	565.78	2.23	.0040		
	5	933.52	924.70	932.10	935.54	3.44	.0037		
	6	1406.42	1385.10	1402.00	1409.47	7.47	.0056		
900	2	102.79	101.69	102.59	102.99	.40	.0039		
	3	289.87	284.30	289.43	290.46	1.03	.0036		
	4	568.05	560.20	567.18	569.17	1.99	.0035		
	5	939.58	927.00	937.71	941.33	6.38	.0068		
	6	1413.85	1388.60	1410.67	1416.90	6.23	.0044		
800	2	104.77	104.85	104.49	104.93	.44	.0042		
	3	295.58	294.88	295.12	296.15	1.03	.00348		
	4	576.08	575.83	574.97	580.19	5.22	.00906		
	5	958.07	951.61	956.42	960.16	3.74	.00390		
	6	1442.70	1399.34	1439.35	1446.16	6.81	.00472		

Beam No. 01-52-1

Date 11/28/78

Damping Material Corning 0010 + 10% Al_2O_3 + 1% Co_2O_3

Material Thickness 0.0163 cm Material Density 2.82 g/cc

Fixture No. 1 Beam Thickness 0.0960 cm

Beam Density 9.13 g/cc Beam Length 20.900 cm

Temperature Test Range: Between 925 °C and 620 °C

Frequency Test Range: Between 90 Hz and 1,375 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.50	Temperature	795 °C
	1,000 Hz	η_D 0.50	Temperature	865 °C
Range	100 Hz	755 °C	835 °C	
	1,000 Hz	820 °C	910 °C	

Complex Modulus E_D":

Peak	100 Hz	7.6×10^9 PAS	Temperature	765 °C
	1,000 Hz	7.6×10^9 PAS	Temperature	835 °C
Range	100 Hz	710 °C	825 °C	
	1,000 Hz	750 °C	895 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-1
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0        FROM        MROM       N        ML
             A1          A2        A3       A4
   600.0  2.0000E-03  1.5100E+10   .550  5.5000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL    SL      SH      FROL       C
           B1       B2      B3       B4        B5
   600.0   .500    .460   -.330  1.1500E-03   .340
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
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REMARKS: J-85-1. After test thermal soaked for 100 hours at 925°C. The coating deteriorated by approximately 60 percent; was discolored and the surface was very rough.

TABLE 36-B

Beam No. 01-52-1

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1700	2	91.44	92.50	91.09	91.70	1.19	.0130	.0040	X
1700	3	256.88	258.70	255.96	257.81	3.61	.0140	.0074	X
1700	4	503.91	508.50	499.48	508.34	8.86	.0176	.0119	
1700	5	837.22	834.00	829.41	844.68	15.27	.0182	.0133	
1700	6	1255.85	1262.00	1242.40	1270.17	27.77	.0221	.0186	
1650	2	92.32	94.95	91.98	92.62	1.25	.0135	.0049	X
1650	3	259.83	265.80	258.57	260.93	4.60	.0177	.0125	X
1650	4	510.25	521.30	504.65	515.70	11.05	.0217	.0177	
1650	5	847.71	864.10	837.34	856.69	19.35	.0228	.0197	
1650	6	1273.36	1272.40	1255.04	1291.27	36.23	.0285	.0263	
1600	2	93.31	94.06	92.84	93.70	1.68	.0180	.0120	X
1600	3	262.84	263.70	261.47	264.27	5.46	.0208	.0170	X
1600	4	516.12	516.20	510.46	523.62	13.16	.0255	.0237	
1600	5	859.65	857.00	853.46	865.57	23.61	.0275	.0255	X
1600	6	1292.54	1283.00	1277.16	1315.60	38.54	.0298	.0283	
1500	2	95.22	95.68	94.14	96.42	2.00	.0294		
1500	3	258.54	268.04	266.77	270.05	2.94	.0196		X
1500	4	531.48	525.50	523.09	539.40	16.31	.0307		
1500	2	95.87	95.68	94.87	97.86	2.99	.0312		
1500	2	95.89	95.68	95.31	96.68	1.37	.0279		X
1500	4	531.50	525.50	523.19	539.43	16.24	.0306		
1500	6	1303.00	1328.45	1312.31	1344.45	32.14	.0242		
1450	2	97.45	96.42	96.64	98.23	3.10	.0318		X

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1450	3	273.90	270.20	272.14	275.49	6.35	.0238		X
1450	4	540.00	529.50	532.25	548.09	15.84	.0293		
1450	6	1350.13	1313.00	1334.80	1364.30	29.50	.0218		
1450	4	551.14	529.50	545.30	558.72	13.58	.0246	.0328	
1450	5	903.71	877.30	892.96	914.79	21.38	.0242	.0234	
1450	6	1373.96	1313.00	1363.21	1387.04	23.83	.0173	.0168	
1400	2	99.10	97.19	98.12	100.20	4.06	.0409		X
1400	4	548.50	533.40	541.80	555.03	13.23	.0241		
1400	5	910.55	884.00	905.66	915.34	18.88	.0207		X
1400	6	1367.90	1322.70	1348.97	1378.62	19.65	.0144		
1350	2	100.72	97.53	99.75	101.62	3.65	.0362		X
1350	3	282.46	274.20	281.34	283.58	4.37	.0155		X
1350	4	556.33	537.40	551.44	561.30	9.86	.0177		
1350	5	923.25	890.70	920.05	926.65	12.87	.0139		X
1350	6	1383.58	1332.50	1375.34	1391.94	15.60	.0113		
1300	2	102.38	99.68	101.84	103.01	2.28	.0223		X
1300	3	285.33	276.10	285.04	287.45	4.70	.0164		X
1300	4	562.66	541.30	559.40	566.03	6.63	.0118		
1300	5	927.20	932.86	930.75	935.05	8.38	.0090		X
1300	6	1396.67	1342.00	1391.98	1402.07	10.09	.0072		
1250	2	103.62	99.39	103.00	104.46	1.46	.0141		
1250	3	289.82	275.00	288.24	291.15	2.86	.0099		
1250	4	[illegible]	[illegible]	[illegible]	[illegible]	4.14	[illegible]		

TABLE 36-B (Concluded)

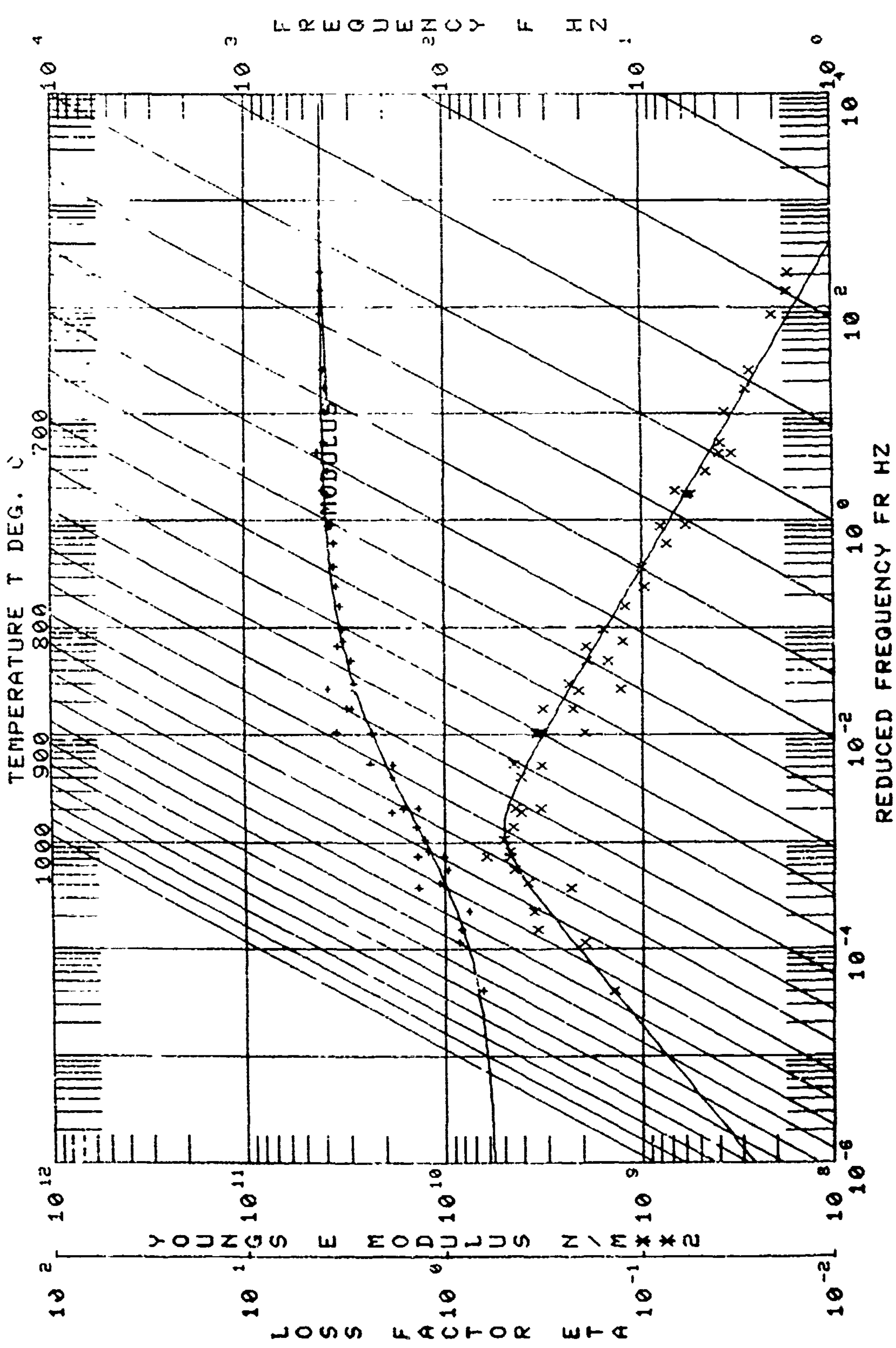
Beam No. 01-52-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1250	5	941.70	903.40	938.89	944.31	5.42	.0058		
12[illegible]	[illegible]	1409.28	1342.00	1406.02	413.59	7.57	.0054		
[illegible]	[illegible]	568.42	545.00	566.35	570.26	3.91	.0069		
[illegible]	[illegible]	942.30	903.40	939.65	945.00	5.3[illegible]	.0057		
[illegible]	[illegible]	1411.33	1342.00	1408.11	1414.68	6.57	.0047		
[illegible]	2	104.66	100.10	104.27	105.18	0.91	.0087		
1200	3	292.63	279.98	291.68	293.14	1.46	.0050		
1200	4	573.26	549.00	571.92	574.62	2.70	.0047		
1200	5	949.33	909.90	947.60	951.03	3.43	.0036		
1200	6	1421.02	1361.30	1418.67	1423.54	4.87	.0034		
1150	4	578.27	552.70	577.43	579.00	1.57	.0027		
1150	5	957.42	915.80	956.34	958.48	2.14	.0022		
1150	6	1433.20	1370.00	1431.66	1434.82	3.16	.0022		

EXPERIMENTAL CODE : 31
MATERIAL :J85-1
DATA SOURCES
MANUFACTURER :NONE
AFML :BEAM COATED ONE SIDE (UDRI DEC 5 78)
OTHER :NONE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.04582E+10	.6334	815.6	95.2	2.	1.68641E+11	.0258	95.7	6.62445E+09
2	1.39337E+10	.3331	815.6	268.5	3.	1.68809E+11	.0177	268.0	4.64187E+09
3	1.89839E+10	.4198	815.6	531.5	4.	1.68969E+11	.0295	525.5	7.96982E+09
4	1.9008[illegible]E+10	.4193	815.6	531.5	4.	1.68969E+11	.0295	525.5	7.97092E+09
5	1.39810E+10	.4836	815.6	95.9	2.	1.68641E+11	.0258	95.7	6.76177E+09
6	1.40911E+10	.4802	815.6	95.9	2.	1.68641E+11	.0258	95.7	6.76608E+09
7	2.36517E+10	.3531	815.6	1328.4	6.	1.70995E+11	.0298	1303.0	8.35025E+09
8	2.89529E+10	.2139	787.8	1350.1	6.	1.73630E+11	.0212	1313.0	6.19359E+09
9	2.39028E+10	.3343	787.8	540.0	4.	1.71551E+11	.0284	529.5	7.99142E+09
10	1.88687E+10	.4214	787.8	97.4	2.	1.71260E+11	.0291	96.4	7.95180E+09
11	1.87254E+10	.3300	787.8	273.0	3.	1.71541E+11	.0226	270.2	6.17974E+09
12	2.41439E+10	.4561	760.0	99.1	2.	1.74006E+11	.0386	97.2	1.10110E+10
13	2.90417E+10	.2370	760.0	548.5	4.	1.74087E+11	.0235	533.4	6.88407E+09
14	3.01674E+10	.1952	760.0	910.6	5.	1.74977E+11	.0199	884.0	5.88945E+09
15	3.27946E+10	.1279	760.0	1367.9	6.	1.76205E+11	.0139	1322.7	4.19482E+09
16	3.17608E+10	.3236	732.2	100.7	2.	1.75226E+11	.0344	97.5	1.02781E+10
17	3.05212E+10	.1518	732.2	282.5	3.	1.76658E+11	.0155	274.2	4.63286E+09
18	3.35035E+10	.1604	732.2	556.3	4.	1.76708E+11	.0177	537.4	5.37384E+09
19	3.44660E+10	.1236	732.2	923.2	5.	1.77639E+11	.0139	890.7	4.25942E+09
20	3.57597E+10	.0980	732.2	1383.6	6.	1.78826E+11	.0113	1332.5	3.50460E+09
21	3.77318E+10	.0605	704.4	1396.7	6.	1.81385E+11	.0072	1342.0	2.28143E+09
22	3.68926E+10	.0766	704.4	932.9	5.	1.80242E+11	.0090	897.2	2.82534E+09
23	3.65272E+10	.1008	704.4	562.7	4.	1.79282E+11	.0118	541.3	3.68150E+09
24	3.53636E+10	.1957	704.4	102.4	2.	1.79383E+11	.0223	98.7	6.92000E+09
25	3.89629E+10	.1157	676.7	103.6	2.	1.81973E+11	.0141	99.4	4.50682E+09
26	3.88540E+10	.0813	676.7	289.8	3.	1.81588E+11	.0099	278.0	3.15725E+09
27	3.90715E+10	.0597	676.7	568.3	4.	1.81742E+11	.0073	545.0	2.33216E+09
28	3.90346E+10	.0477	676.7	941.7	5.	1.82741E+11	.0058	903.4	1.86085E+09
29	4.35073E+10	.0405	676.7	1409.3	6.	1.81385E+11	.0054	1342.0	1.76016E+09
30	4.07878E+10	.0274	648.9	1421.0	6.	1.86639E+11	.0034	1361.3	1.11903E+09
31	4.01765E+10	.0292	648.9	949.3	5.	1.85380E+11	.0036	909.9	1.17496E+09
32	4.05032E+10	.0378	648.9	573.3	4.	1.84419E+11	.0047	549.0	1.52997E+09
33	4.10794E+10	.0397	648.9	292.6	3.	1.84184E+11	.0050	280.0	1.63049E+09
34	8.52304E+09	.3460	871.1	93.3	2.	1.62979E+11	.0100	94.1	2.94909E+09
35	1.24406E+10	.4796	871.1	516.1	4.	1.63041E+11	.0237	516.2	5.96652E+09
36	1.65701E+10	.4474	871.1	1292.5	6.	1.65786E+11	.0283	1283.0	7.41288E+09
37	1.29031E+10	.5146	898.9	1273.4	6.	1.63058E+11	.0263	1272.4	6.64013E+09
38	3.22562E+09	1.4893	898.9	847.7	5.	1.67188E+11	.0197	864.1	4.80386E+09
39	2.11058E+09	2.0202	898.9	510.2	4.	1.66279E+11	.0177	521.3	4.26380E+09
40	1.49299E+09	2.0058	898.9	259.8	3.	1.66000E+11	.0125	265.8	2.99470E+09
41	6.58499E+09	.1429	926.7	91.4	2.	1.57618E+11	.0040	92.5	9.40744E+08
42	8.67965E+09	.2027	926.7	256.9	3.	1.57250E+11	.0074	258.7	1.75975E+09
43	7.76889E+09	.3643	926.7	503.9	4.	1.58213E+11	.0119	508.5	2.82997E+09
44	1.38154E+10	.2343	926.7	837.2	5.	1.55743E+11	.0133	834.0	3.23734E+09
45	9.91246E+09	.4582	926.7	1255.9	6.	1.60404E+11	.0186	1262.0	4.54150E+09
46	3.91769E+10	.0563	676.7	568.4	4.	1.81742E+11	.0069	545.0	2.20551E+09
47	1.35409E+10	.1282	676.7	939.7	5.	1.98818E+11	.0057	942.3	1.73583E+09
48	4.43230E+10	.0347	676.7	1411.0	6.	1.81385E+11	.0047	1342.0	1.53805E+09
49	4.27504E+10	.0173	621.1	1433.2	6.	1.89033E+11	.0022	1370.0	7.38344E+08

50	4.20477E+10	.0174	621.1	957.4	5.	1.87792E+11	.0022	915.8	7.32037E+08
51	4.23660E+10	.0212	621.1	578.3	4.	1.86913E+11	.0027	552.7	8.96393E+08
52	2.97618E+10	.2292	787.8	903.7	5.	1.72335E+11	.0234	877.3	6.82252E+09
53	3.57608E+10	.1995	787.8	551.1	4.	1.71551E+11	.0238	529.5	7.13534E+09
54	3.94560E+10	.1314	787.8	1374.0	6.	1.73630E+11	.0168	1313.0	5.18385E+09
55	4.13959E+10	.0688	648.9	104.7	2.	1.84582E+11	.0087	100.1	2.84630E+09
56	1.09027E+10	.3897	871.1	262.8	3.	1.63387E+11	.0170	263.7	4.24869E+09
57	1.42062E+10	.4603	871.1	859.7	5.	1.64452E+11	.0255	857.0	6.53924E+09
58	6.58499E+09	.1429	926.7	91.4	2.	1.57618E+11	.0040	92.5	3.40744E+08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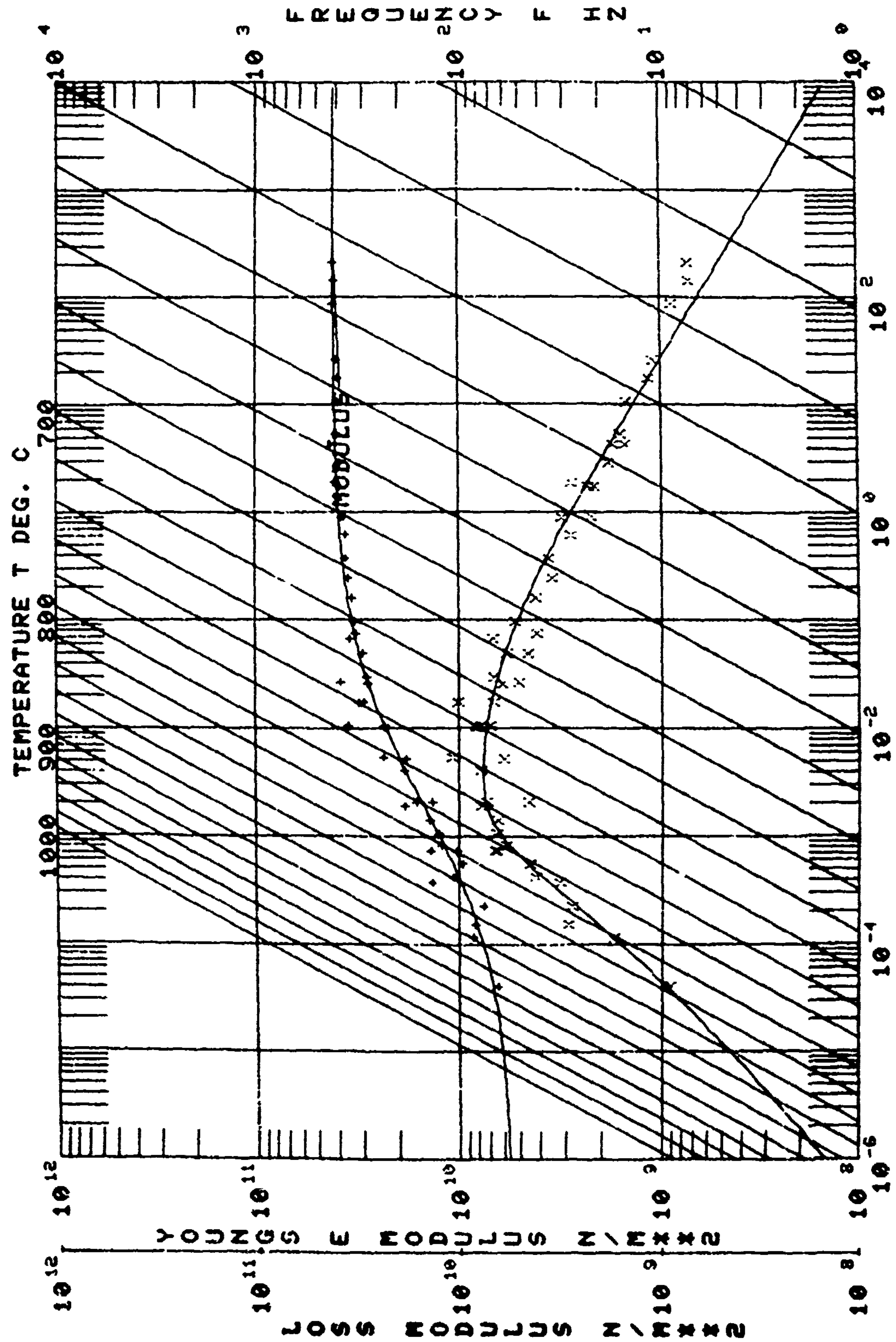
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS



TEMPERATURE T DEG. C
700
800
900
1000
MODULUS
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-53-1

Date 12/1/79

Damping Material Corning 0010 + 10% Al_2O_3 + 6% Na_2O + 1% Co_2O_3

Material Thickness 0.0188 cm Material Density 2.82 g/cc

Fixture No. 1 Beam Thickness 0.0963 cm

Beam Density 9.13 g/cc Beam Length 20.914 cm

Temperature Test Range: Between 925 °C and 620 °C

Frequency Test Range: Between 92 Hz and 1,370 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.50	Temperature	720 °C
	1,000 Hz	η_D 0.50	Temperature	790 °C
Range	100 Hz	685 °C	760 °C	
	1,000 Hz	740 °C	825 °C	

Complex Modulus E_D'':

Peak	100 Hz	6.3×10^9 PAS	Temperature	710 °C
	1,000 Hz	6.3×10^9 PAS	Temperature	745 °C
Range	100 Hz	645 °C	755 °C	
	1,000 Hz	685 °C	805 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J35-2
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM         MROM          N          ML
               A1           A2           A3         A4
   550.0  3.3900E-03  1.1500E+10       .683  3.8610E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL          SH          FROL         C
            B1       B2          B3          B4           B5
   550.0    .490     .460      -.420  3.8000E-03        .420
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Thermal soaked for 121.75 hours at 815°C. Beam was physically damaged and could not be retested. The coating was glossy with some signs of deterioration.

TABLE 37-B

Beam No. 1-53-1

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1700	2	92.30	90.00	89.78	90.28	0.50	.0056	.0021	
1700	3	258.20	253.53	252.44	254.77	2.33	.0092	.0026	
1700	4	508.00	498.53	496.07	500.58	4.51	.0090	.0033	
1700	5	842.60	826.99	823.22	830.94	7.72	.0093	.0044	
1700	6	1260.00	1239.23	1235.36	1245.84	10.48	.0085	.0050	
1650	3	260.62	256.47	255.35	257.58	2.23	.0087	.0035	
1650	4	512.80	503.30	501.68	505.85	4.17	.0083	.0043	
1650	5	849.60	835.48	834.00	836.90	5.65	.0068	.0036	X
1650	6	1271.00	1252.76	1247.65	1258.50	10.85	.0087	.0065	
1600	3	262.90	258.97	257.89	260.05	2.16	.0083	.0045	
1600	4	517.50	508.48	506.36	510.70	4.34	.0085	.0059	
1600	5	856.80	843.72	838.85	847.83	8.98	.0106	.0086	
1600	6	1281.00	1265.24	1258.74	1272.80	14.06	.0111	.0096	
1600	2	94.11	92.55	92.86	92.36	0.975	.0105	.0059	X
1600	3	262.90	259.28	258.78	260.03	2.44	.0094	.0040	X
1600	4	517.50	509.05	508.12	510.25	4.15	.0082	.0056	X
1600	5	856.80	844.81	840.93	848.65	7.72	.0091	.0071	
1600	6	1281.00	1265.10	1258.50	1271.70	13.20	.0104	.0089	
1550	2	94.97	93.70	93.43	93.98	1.07	.0114	.0087	X
1550	3	265.15	261.70	259.96	263.07	3.11	.0119	.0092	
1550	4	522.20	513.53	510.67	516.50	5.83	.0114	.0100	
1550	5	863.50	852.80	847.03	858.03	11.16	.0131	.0117	
1550	6	1291.00	1276.94	1267.54	1285.80	18.26	.0143	.0133	

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1500	2	95.80	94.10	93.65	94.37	1.40	.0149	.0113	X
1500	3	267.30	264.32	263.15	264.93	3.47	.0131	.0111	X
1500	4	526.80	519.17	515.35	523.32	7.97	.0154	.0142	
1500	5	870.00	863.00	857.80	866.81	17.57	.0204	.0194	X
1500	6	1301.60	1288.93	1282.42	1295.42	25.35	.0197	.0189	X
1450	3	267.50	266.92	265.66	268.09	4.73	.0178	.0164	X
1450	4	531.20	525.94	519.43	532.42	12.99	.0247	.0238	
1450	5	877.00	874.85	869.16	879.72	20.59	.0235	.0226	X
1450	6	1311.40	1295.25	1276.48	1317.69	41.21	.0318	.0312	
1400	4	535.40	528.23	533.95	[illegible]	12.65	.0239	.0321	
1350	2	98.04	97.50	96.73	98.05	2.57	.0264	.0246	X
1350	3	273.45	276.18	274.18	278.16	7.76	.0281	.0272	X
1350	4	539.40	545.61	537.08	555.50	18.42	.0338	.0332	
1350	5	890.00	909.40	902.72	915.21	24.36	.0268	.0260	X
1350	6	1331.20	1365.28	1355.90	1374.38	36.04	.0264	.0259	X
1300	2	98.75	98.96	98.35	99.58	2.40	.0242	.0227	X
1300	3	275.40	280.41	278.28	282.27	7.78	.0277	.0270	X
1300	4	543.00	553.19	546.09	561.64	15.10	.0273	.0269	
1300	5	896.40	920.36	914.32	926.35	23.46	.0255	.0251	X
1300	6	1341.00	1380.68	1369.80	1393.26	23.46	.0170	.0165	
1250	3	277.30	285.13	283.62	286.71	6.02	.0211	.0204	X
1250	4	546.60	561.48	556.29	567.20	10.91	.0194	.0190	
1250	5	900.30	934.57	926.54	940.93	14.30	.0154	.0147	

TABLE 37-B (Concluded)

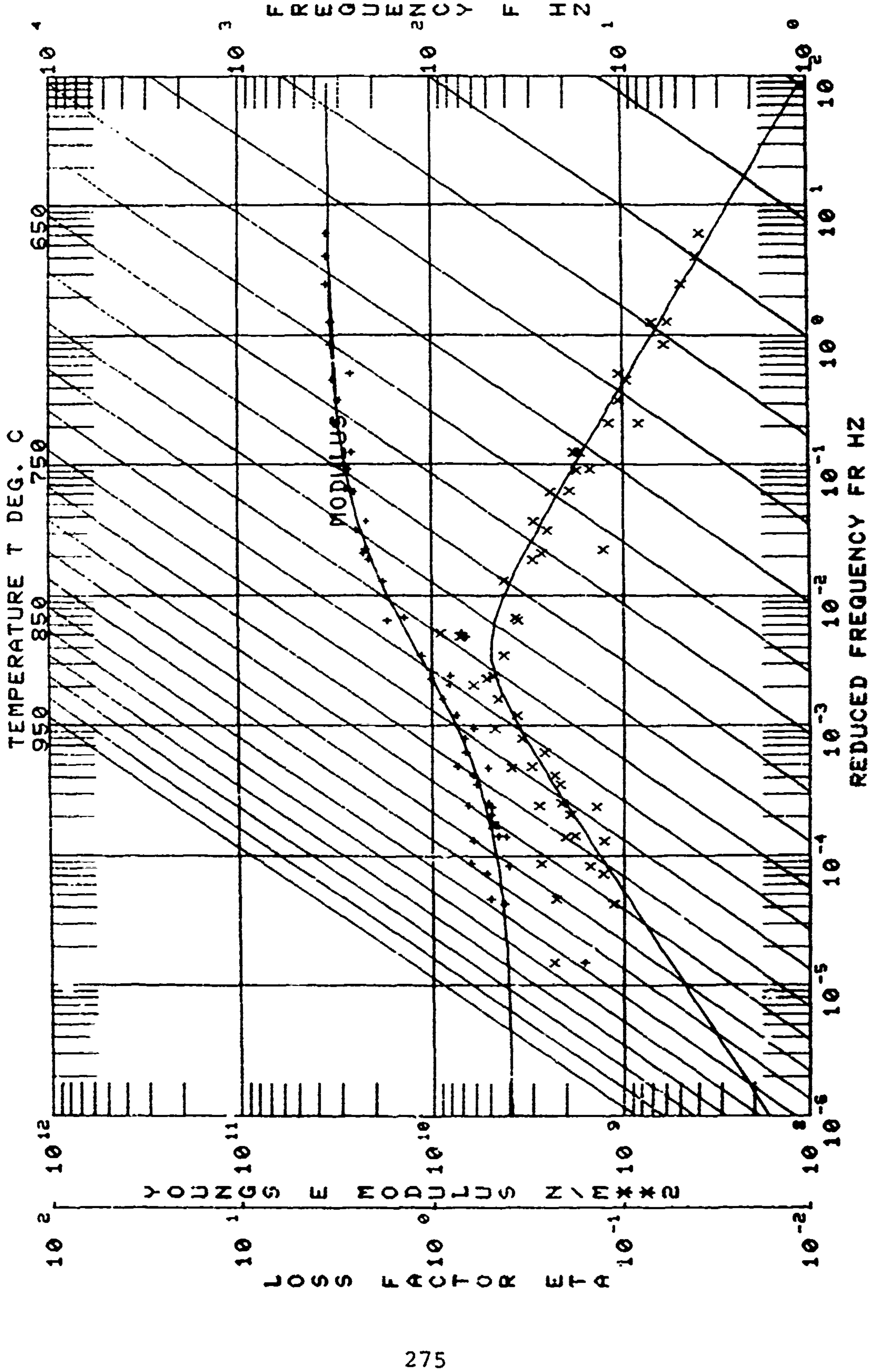
Beam No. 1-53-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1250	6	1350.60	1398.46	1389.08	1407.26	18.18	.0130	.0126	
1250	2	99.42	101.30	100.96	101.64	1.32	.0131	.0117	
1250	4	546.60	561.45	555.93	566.20	10.27	.0183	.0179	
1250	5	900.30	936.12	933.34	938.66	10.37	.0111	.0104	X
1200	2	100.06	103.20	102.68	103.72	2.02	.0197		X
1200	4	553.50	568.10	565.14	571.40	6.26	.0110		
1200	5	909.20	945.91	943.98	947.70	7.25	.0077		X
1200	6	1360.90	1415.28	1413.30	1418.70	10.53	.0074		X
1150	2	100.72	104.63	104.05	105.29	1.24	.0119		
1150	3	280.80	292.52	291.67	293.03	2.65	.0091		
1150	4	550.10	574.46	572.54	576.28	3.74	.0065		
1150	5	915.60	955.38	953.85	956.43	5.03	.0053		X
1150	6	1369.50	1428.50	1426.50	1430.20	7.21	.0051		X

EXPERIMENTAL CODE : 32
MATERIAL :J85-2
DATA SOURCES
MANUFACTURER :NONE
AFML :BEAM COATED ONE SIDE (UDRI DEC 1 78)
OTHER :NONE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.65744E+09	.2381	926.7	90.0	2.	1.56642E+11	.0021	92.3	3.94713E+08
2	4.29613E+09	.1159	926.7	253.5	3.	1.56348E+11	.0026	258.2	4.97855E+08
3	4.11092E+09	.1547	926.7	498.5	4.	1.57636E+11	.0033	508.0	6.35907E+08
4	4.19081E+09	.2038	926.7	827.0	5.	1.58673E+11	.0044	842.6	8.53955E+08
5	5.02679E+09	.1954	926.7	1239.2	6.	1.59595E+11	.0050	1260.0	9.82018E+08
6	5.98076E+09	.2186	898.9	1252.8	6.	1.62394E+11	.0065	1271.0	1.30731E+09
7	5.02820E+09	.1421	898.9	835.5	5.	1.61320E+11	.0036	849.6	7.14414E+08
8	4.63026E+09	.1830	898.9	503.8	4.	1.60598E+11	.0043	512.8	8.47132E+08
9	5.25858E+09	.1307	898.9	256.5	3.	1.59280E+11	.0035	260.6	6.87304E+08
10	4.49266E+10	.1574	871.1	259.0	2.	1.27083E+12	.0045	262.9	7.07016E+09
11	1.32881E+10	.2486	871.1	508.5	3.	6.28060E+11	.0059	517.5	4.54721E+09
12	1.54819E+10	.3076	871.1	843.7	4.	4.48335E+11	.0086	856.8	4.76220E+09
13	1.54017E+10	.2849	871.1	1265.2	5.	3.66739E+11	.0096	1281.0	4.38726E+09
14	5.08910E+09	.2323	871.1	92.6	2.	1.63846E+11	.0059	94.1	1.18203E+09
15	6.20895E+09	.1296	871.1	259.3	3.	1.62092E+11	.0040	262.9	8.04416E+08
16	5.21861E+09	.2161	871.1	509.0	4.	1.63555E+11	.0056	517.5	1.12771E+09
17	6.19037E+09	.2333	871.1	844.8	5.	1.64066E+11	.0071	856.8	1.44424E+09
18	6.88707E+09	.2656	871.1	1265.1	6.	1.64959E+11	.0089	1281.0	1.82896E+09
19	7.64092E+09	.3650	843.3	1276.9	6.	1.67545E+11	.0133	1291.0	2.78871E+09
20	6.96415E+09	.3488	843.3	852.8	5.	1.66642E+11	.0117	863.5	2.42900E+09
21	5.19772E+09	.3942	843.3	513.5	4.	1.66540E+11	.0100	522.2	2.04880E+09
22	6.63350E+09	.2844	843.3	261.7	3.	1.64878E+11	.0092	265.2	1.88628E+09
23	6.52238E+09	.2748	843.3	93.7	2.	1.65835E+11	.0087	95.0	1.79220E+09
24	4.78216E+09	.4889	815.6	94.1	2.	1.68747E+11	.0113	95.8	2.33776E+09
25	7.52493E+09	.3091	815.6	264.3	3.	1.67563E+11	.0111	267.3	2.32575E+09
26	6.18637E+09	.4816	815.6	519.2	4.	1.69487E+11	.0142	526.8	2.97954E+09
27	8.92867E+09	.4639	815.6	863.0	5.	1.69160E+11	.0194	870.0	4.14186E+09
28	8.26283E+09	.4892	815.6	1288.9	6.	1.70307E+11	.0189	1301.6	4.04213E+09
29	7.25328E+09	.9266	787.8	1295.2	6.	1.72882E+11	.0312	1311.4	6.72119E+09
30	1.15333E+10	.4323	787.8	874.8	5.	1.71893E+11	.0226	877.0	4.98568E+09
31	8.29026E+09	.6210	787.8	525.9	4.	1.72330E+11	.0238	531.2	5.14803E+09
32	6.87105E+09	.7310	760.0	528.2	4.	1.75066E+11	.0231	535.4	5.02296E+09
33	1.84008E+10	.4290	732.2	545.6	4.	1.77691E+11	.0332	539.4	7.89352E+09
34	2.31964E+10	.2738	732.2	909.4	5.	1.77027E+11	.0260	890.0	6.35004E+09
35	2.51835E+10	.2556	732.2	1365.3	6.	1.78141E+11	.0259	1331.2	6.43806E+09
36	1.74477E+10	.3641	732.2	276.2	3.	1.75362E+11	.0272	273.5	6.35304E+09
37	1.04734E+10	.5279	732.2	97.5	2.	1.76730E+11	.0246	98.0	5.52892E+09
38	1.41553E+10	.3741	704.4	99.0	2.	1.79299E+11	.0227	98.7	5.29553E+09
39	2.15783E+10	.3038	704.4	280.4	3.	1.77872E+11	.0270	275.4	6.55489E+09
40	2.21256E+10	.2993	704.4	553.2	4.	1.80071E+11	.0269	543.0	6.62279E+09
41	2.59322E+10	.2433	704.4	920.4	5.	1.79582E+11	.0251	896.4	6.31053E+09
42	2.75204E+10	.1530	704.4	1380.7	6.	1.80774E+11	.0165	1341.0	4.21161E+09
43	3.08789E+10	.1075	676.7	1398.5	6.	1.83372E+11	.0126	1350.6	3.31963E+09
44	3.18268E+10	.1212	676.7	934.6	5.	1.81148E+11	.0147	900.3	3.85587E+09
45	2.65957E+10	.1828	676.7	561.5	4.	1.82467E+11	.0190	546.6	4.86079E+09
46	2.67879E+10	.1931	676.7	285.1	3.	1.80335E+11	.0204	277.3	5.17366E+09
47	2.24053E+10	.1298	676.7	101.3	2.	1.81741E+11	.0117	99.4	2.90858E+09
48	2.65657E+10	.1723	676.7	561.4	4.	1.82467E+11	.0179	546.6	4.57859E+09
49	3.26961E+10	.0839	676.7	936.1	5.	1.81148E+11	.0104	900.3	2.74191E+09

50	3.40096E+10	.0590	648.9	1415.3	6.	1.85933E+11	.0074	1360.0	2.00765E+09
51	3.36563E+10	.0616	648.9	945.9	5.	1.84747E+11	.0077	909.2	2.07410E+09
52	2.70335E+10	.1066	648.9	568.3	4.	1.87102E+11	.0110	553.5	2.88164E+09
53	2.89309E+10	.1779	648.9	103.2	2.	1.84088E+11	.0197	100.1	5.14792E+09
54	3.31616E+10	.0971	621.1	104.6	2.	1.85525E+11	.0119	100.7	3.22123E+09
55	3.43848E+10	.0716	621.1	292.5	3.	1.84916E+11	.0091	280.8	2.46326E+09
56	3.56916E+10	.0496	621.1	574.5	4.	1.84811E+11	.0065	550.1	1.77182E+09
57	3.57455E+10	.0409	621.1	955.4	5.	1.87357E+11	.0053	915.6	1.46102E+09
58	3.57777E+10	.0395	621.1	1428.5	6.	1.88540E+11	.0051	1369.5	1.41323E+09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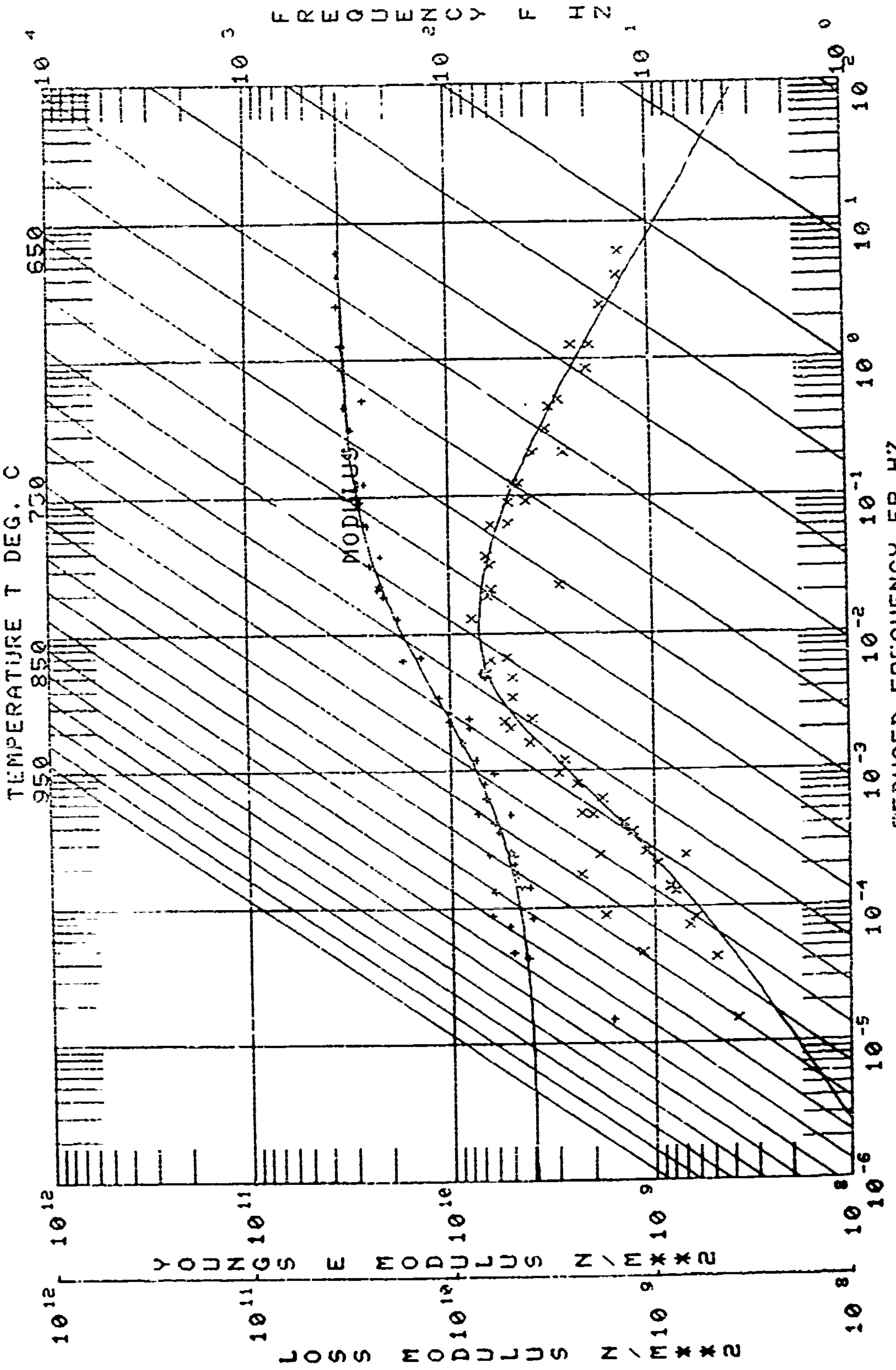
850
950
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA



TEMPERATURE T DEG. C
950
850
730
650
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-54-1

Date 12/7/78

Damping Material Corning 0010 + 12.5% Al_2O_3 + 2% Co_2O_3

Material Thickness 0.0137 cm Material Density 2.82 g/cc

Fixture No. 1 Beam Thickness 0.0958 cm

Beam Density 9.13 g/cc Beam Length 20.542 cm

Temperature Test Range: Between ______ °C and 870 °C

Frequency Test Range: Between ______ Hz and ______ Hz

Loss Factor η_D:

Peak 100 Hz η_D ______ Temperature ______ °C

1,000 Hz η_D ______ Temperature ______ °C

Range 100 Hz ______ °C ______ °C

1,000 Hz ______ °C ______ °C

Complex Modulus E_D'':

Peak 100 Hz ______ PAS Temperature ______ °C

1,000 Hz ______ PAS Temperature ______ °C

Range 100 Hz ______ °C ______ °C

1,000 Hz ______ °C ______ °C

NOMOGRAPH CURVE FIT EQUATION:

REMARKS: J-85-3. While testing above 870°C, the coating began to peel off the beam. No meaningful data was taken.

Beam No. 01-55-2

Date 3/79

Damping Material 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 6% Al_2O_3

Material Thickness 0.0160 cm Material Density 2.63 g/cc

Fixture No. 1 Beam Thickness 0.0963 cm

Beam Density 9.13 g/cc Beam Length 20.879 cm

Temperature Test Range: Between 870 °C and 620 °C

Frequency Test Range: Between 98 Hz and 1,500 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.73	Temperature	780 °C
	1,000 Hz	η_D 0.73	Temperature	860 °C
Range	100 Hz	760 °C	805 °C	
	1,000 Hz	800 °C	860 °C	

Complex Modulus E_D'':

Peak	100 Hz	1.3×10^{10} PAS	Temperature	755 °C
	1,000 Hz	1.3×10^{10} PAS	Temperature	805 °C
Range	100 Hz	715 °C	790 °C	
	1,000 Hz	770 °C	840 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-13
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM           FROM          N          ML
              A1             A2            A3         A4
   675.0  1.7500E-01   2.4500E+10     .900   1.1000E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL         SH          FROL         C
           B1        B2         B3          B4           B5
   675.0     .650     .475     -.400   6.0000E-02     .360
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J-85-13 test 1. Retested twice: 01-55-3 and 01-55-4.

TABLE 38-B

Beam No. 01-5F-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	n_s	n_c	1dB
1600	2	93.97	93.59	93.45	94.50	1.05	.01117	.00527	
1600	3	263.36	262.75	261.44	265.07	3.63	.01378	.01005	
1600	4	516.08	515.80	511.88	521.43	9.55	.01850	.01586	
1600	5	856.06	855.04	846.09	863.34	17.25	.02015	.01814	
1600	6	1280.43	1281.40	1270.02	1290.84	40.91	.03195	.03045	X
1550	2	94.74	94.56	94.11	96.12	2.01	.02122	.01660	
1550	3	265.40	264.30	262.68	268.12	5.44	.02050	.01779	
1550	4	521.68	520.10	515.36	529.32	13.96	.02676	.02502	
1550	5	865.72	862.50	850.67	878.43	27.76	.03207	.03066	
1550	6	1296.12	1291.20	1283.66	1309.43	50.64	.03907	.03805	X
1500	3	270.32	266.25	269.10	272.95	7.57	.02799	.02591	X
1500	5	887.43	869.40	870.36	902.41	32.05	.03612	.03501	X
1500	6	1330.30	1301.90	1313.10	1344.60	61.90	.04653	.04572	X
1450	2		96.26						
1450	3		268.55						
1450	4		528.50						
1450	5		876.30						
1450	6		1310.40						
1450	2	96.81	96.26	95.80	97.80	3.93	.04060	.03788	X
1450	3	274.71	268.55	271.68	278.55	13.50	.04915	.04772	X
1450	4	543.30	528.50	538.90	550.92	23.62	.04348	.04276	X
1450	5	906.50	876.30	896.03	916.98	41.17	.04542	.04452	X
1450	6	1369.09	1310.40	1354.92	1382.89	54.97	.04015	.03955	X

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	n_s	n_c	1dB
1400	2	99.89	97.02	98.40	101.20	5.50	.05506	.05282	X
1400	3	283.93	270.80	279.72	287.41	15.11	.05323	.05211	X
1400	4	558.84	530.26	547.74	568.67	20.93	.03745	.03697	
1400	5	928.86	883.10	913.85	943.87	30.02	.03232	.03152	
1400	6	1395.00	1319.80	1386.17	1403.82	34.69	.02486	.02435	X
1350	2	103.38	97.78	102.18	104.59	4.74	.04585	.04404	X
1350	3	289.96	273.25	285.41	294.70	9.29	.03204	.03112	
1350	4	569.13	536.60	562.77	575.49	12.72	.02235	.02179	
1350	5	945.64	890.00	936.63	953.94	17.31	.01831	.01756	
1350	6	1413.26	1329.10	1403.70	1424.16	20.46	.01448	.01402	
1300	2	105.90	98.45	105.06	106.75	3.32	.03136	.02988	X
1300	3	294.89	275.20	291.51	297.26	5.75	.01950	.01871	
1300	4	578.24	540.60	574.05	582.43	8.38	.01449	.01409	
1300	5	956.93	896.40	952.28	962.10	9.82	.01026	.00954	
1300	6	1426.50	1338.30	1424.03	1334.98	10.95	.00766	.00723	
1250	2	106.95	99.13	106.38	107.61	1.23	.01150	.01030	
1250	3	298.80	277.25	297.70	300.02	2.32	.00776	.00704	
1250	4	582.72	544.20	581.55	583.97	4.75	.00816	.00771	X
1250	5	967.78	903.00	964.92	970.12	5.29	.00537	.00467	
1250	6	1443.55	1347.40	1441.07	1446.43	4.96	.00344	.00302	
1200	2	107.94	99.80	107.58	108.45	0.87	.00806	.00766	
1200	3	301.84	279.30	300.70	302.7[illegible]	2.0[illegible]	.00666	.006[illegible]	
[illegible]	[illegible]	586.41	548.20	585.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

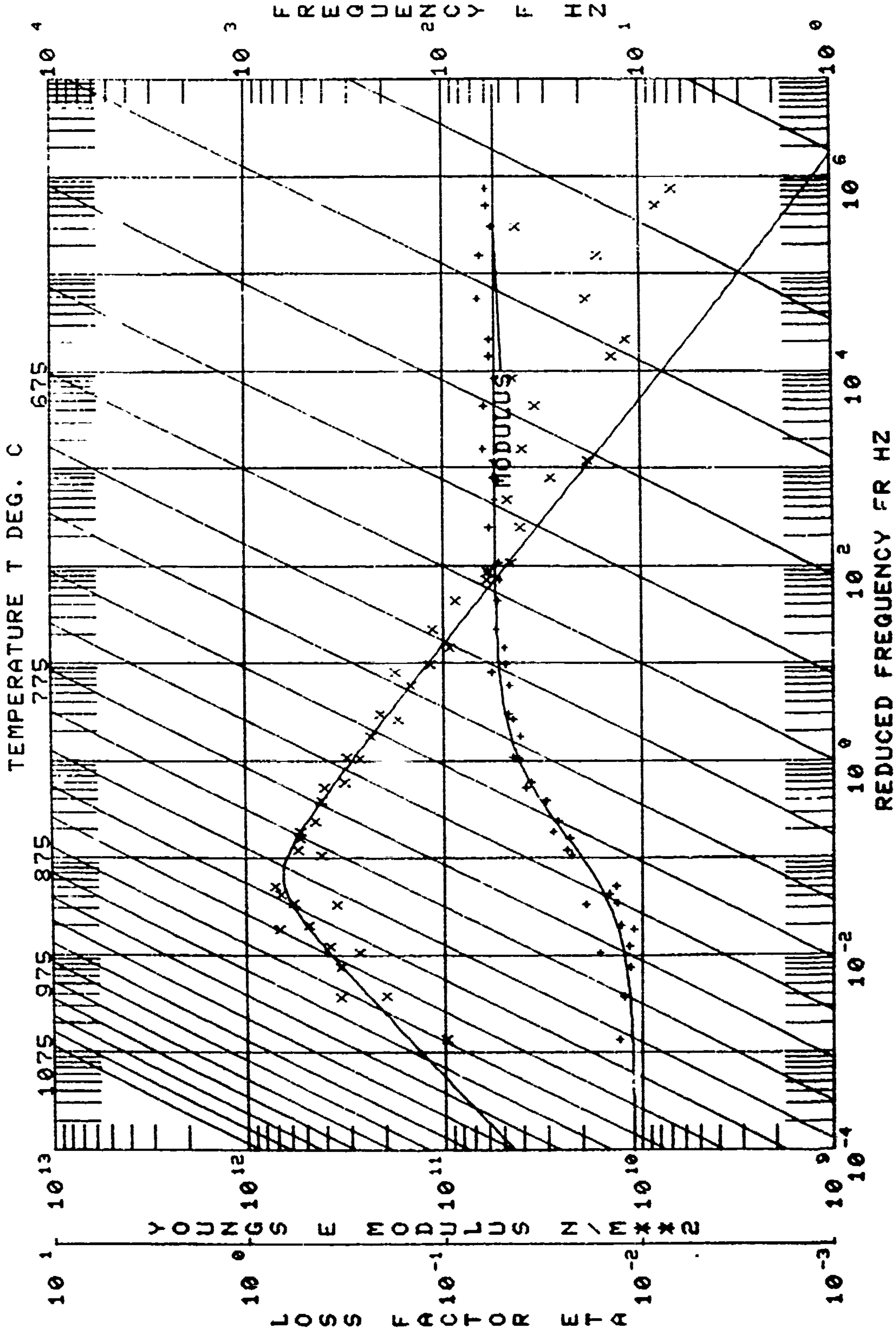
TABLE 38-B (Concluded)

Beam No. 01-55-2

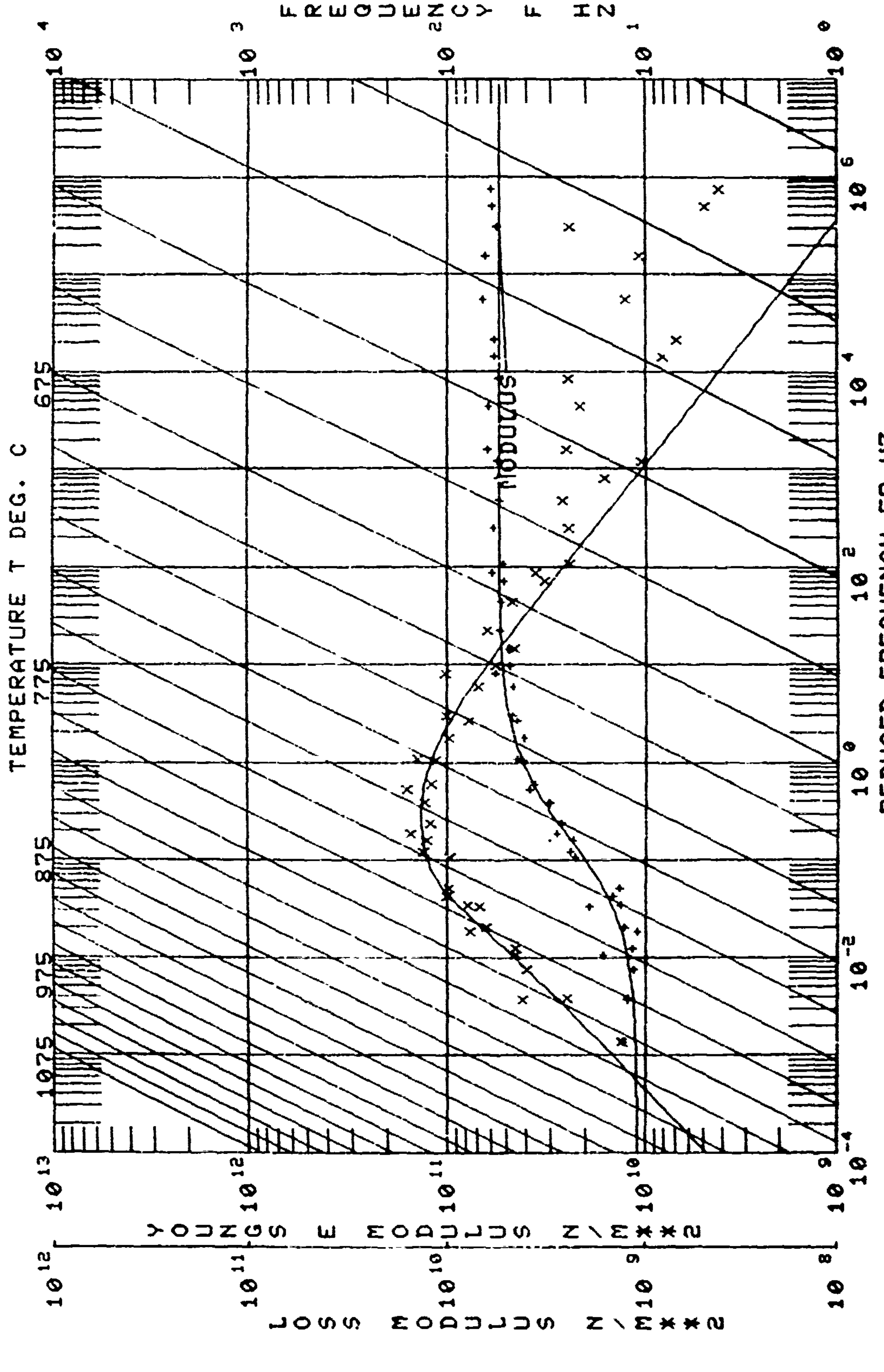
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1200	5	976.04	909.02	974.67	977.60	2.93	.00300	.00232	
1200	6	1456.26	1356.20	1454.48	1457.94	3.46	.00238	.00197	
1150	2	109.05	100.45	108.81	109.32	0.51	.00466	.00344	
1150	3	304.70	281.25	304.06	305.17	1.09	.00358	.00294	
1150	4	590.55	551.50	589.67	591.86	4.30	.00729	.00687	X
1150	5	984.90	915.80	983.89	985.89	2.00	.00203	.00139	
1150	6	1468.76	1365.20	1467.61	1469.94	2.33	.00159	.00116	

EXPERIMENTAL CODE : 48
MATERIAL :J85-13
DATA SOURCES
01-55-2
MANUFACTURER :N
AFML :UDRI BEAM COATED ONE SIDE
OTHER :COATING: 74.5% SI O2, 12.75% NA2 O, 10.75% CA 0, 6% AL2 O3,

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.50466E+10	.6808	787.8	96.8	2.	1.69215E+11	.0379	96.3	1.02430E+10
2	2.42879E+10	.5556	787.8	274.7	3.	1.67986E+11	.0477	268.5	1.34934E+10
3	2.73397E+10	.4529	787.8	543.3	4.	1.69425E+11	.0428	528.5	1.23824E+10
4	3.11919E+10	.4240	787.8	906.5	5.	1.70455E+11	.0445	876.3	1.32254E+10
5	3.73965E+10	.3260	787.8	1369.1	6.	1.71447E+11	.0395	1310.4	1.21903E+10
6	4.53210E+10	.1743	760.0	1395.0	6.	1.73916E+11	.0243	1319.8	7.89773E+09
7	4.19758E+10	.2387	760.0	928.9	5.	1.73110E+11	.0315	883.1	1.00192E+10
8	4.25946E+10	.2735	760.0	558.8	4.	1.70555E+11	.0370	530.3	1.16506E+10
9	3.94452E+10	.4102	760.0	283.9	3.	1.70813E+11	.0521	270.8	1.61817E+10
10	2.86378E+10	.5445	760.0	99.9	2.	1.71898E+11	.0528	97.0	1.55925E+10
11	4.56770E+10	.3142	732.2	103.4	2.	1.74602E+11	.0440	97.8	1.43528E+10
12	4.79014E+10	.2134	732.2	290.0	3.	1.73918E+11	.0311	273.2	1.02215E+10
13	4.77644E+10	.1502	732.2	569.1	4.	1.74658E+11	.0218	536.6	7.17567E+09
14	4.92779E+10	.1188	732.2	945.6	5.	1.75826E+11	.0176	890.0	5.85483E+09
15	4.99413E+10	.0941	732.2	1413.3	6.	1.76375E+11	.0140	1329.1	4.70055E+09
16	5.37344E+10	.0464	704.4	1429.5	6.	1.78825E+11	.0072	1338.3	2.49362E+09
17	5.31919E+10	.0616	704.4	956.9	5.	1.78364E+11	.0095	896.4	3.27566E+09
18	5.42086E+10	.0891	704.4	578.2	4.	1.77272E+11	.0141	540.6	4.82842E+09
19	5.51843E+10	.1165	704.4	294.9	3.	1.76409E+11	.0187	275.2	6.43136E+09
20	5.80369E+10	.1798	704.4	105.9	2.	1.77003E+11	.0299	98.4	1.04341E+10
21	6.09569E+10	.0604	676.7	106.9	2.	1.79456E+11	.0103	99.1	3.68192E+09
22	6.00491E+10	.0417	676.7	298.8	3.	1.79047E+11	.0070	277.2	2.50206E+09
23	5.56903E+10	.0483	676.7	582.7	4.	1.79641E+11	.0077	544.2	2.69251E+09
24	5.67334E+10	.0290	676.7	967.8	5.	1.81000E+11	.0047	903.0	1.64789E+09
25	5.65761E+10	.0188	676.7	1443.6	6.	1.81266E+11	.0030	1347.4	1.06605E+09
26	5.89376E+10	.0120	648.9	1456.3	6.	1.83641E+11	.0020	1356.2	7.09664E+08
27	5.87185E+10	.0142	648.9	976.0	5.	1.83494E+11	.0023	909.2	8.34433E+08
28	5.58005E+10	.0452	648.9	586.4	4.	1.82291E+11	.0071	548.2	2.52207E+09
29	6.29405E+10	.0347	648.9	301.8	3.	1.81705E+11	.0060	279.3	2.18356E+09
30	6.35870E+10	.0406	648.9	107.9	2.	1.81890E+11	.0071	99.8	2.57863E+09
31	6.72088E+10	.0192	621.1	109.1	2.	1.84267E+11	.0034	100.4	1.28851E+09
32	6.56636E+10	.0167	621.1	304.7	3.	1.84251E+11	.0029	281.2	1.09374E+09
33	5.72088E+10	.0431	621.1	590.6	4.	1.84493E+11	.0069	551.5	2.46412E+09
34	6.08821E+10	.0084	621.1	984.9	5.	1.86168E+11	.0014	915.8	5.10163E+08
35	6.11316E+10	.0070	621.1	1468.8	6.	1.86086E+11	.0012	1365.2	4.26079E+08
36	1.12245E+10	.6969	871.1	1280.4	6.	1.63943E+11	.0305	1281.4	7.82255E+09
37	1.18938E+10	.3900	871.1	856.1	5.	1.62421E+11	.0181	855.4	4.63810E+09
38	1.17042E+10	.3440	871.1	516.1	4.	1.61380E+11	.0159	515.8	4.02644E+09
39	1.25666E+10	.2034	871.1	263.4	3.	1.60809E+11	.0101	262.7	2.55615E+09
40	1.33743E+10	.1002	871.1	94.0	2.	1.59958E+11	.0053	93.6	1.34029E+09
41	1.25439E+10	.3413	843.3	94.7	2.	1.63291E+11	.0166	94.6	4.28184E+09
42	1.66755E+10	.2779	843.3	265.4	3.	1.60723E+11	.0178	262.7	4.63370E+09
43	1.31939E+10	.4932	843.3	521.7	4.	1.64082E+11	.0250	520.1	6.50731E+09
44	1.36390E+10	.5896	843.3	865.7	5.	1.65128E+11	.0307	862.5	8.04181E+09
45	1.37879E+10	.7298	843.3	1296.1	6.	1.66460E+11	.0381	1291.2	1.00629E+10
46	2.38468E+10	.5443	815.6	1330.3	6.	1.69230E+11	.0457	1301.9	1.29798E+10
47	2.30531E+10	.4261	815.6	887.4	5.	1.67781E+11	.0350	869.4	9.82234E+09
48	1.97486E+10	.3563	815.6	270.3	3.	1.65121E+11	.0259	266.2	7.03706E+09



TEMPERATURE T DEG. C
675
775
875
975
1075
FREQUENCY F HZ
MODULUS
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
675
775
875
975
1075
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-55-3

Date 3/79

Damping Material 74.5% SiO_2 + 12.75% Na_2O + 10.75% CaO + 6% Al_2O_3 + 2% Co_2O_3

Material Thickness 0.0160 cm Material Density 2.63 g/cc

Fixture No. 1 Beam Thickness 0.0963 cm

Beam Density 9.13 g/cc Beam Length 20.879 cm

Temperature Test Range: Between 870 °C and 620 °C

Frequency Test Range: Between 75 Hz and 1,450 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.60	Temperature	745 °C
	1,000 Hz	η_D 0.60	Temperature	815 °C
Range	100 Hz	745 °C	775 °C	
	1,000 Hz	790 °C	865 °C	

Complex Modulus E_D":

Peak	100 Hz	9.7 10 PAS	Temperature	745 °C
	1,000 Hz	9.7 10 PAS	Temperature	800 °C
Range	100 Hz	705 °C	805 °C	
	1,000 Hz	740 °C	870 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-13 SECOND TEST
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM          N         ML
               A1            A2           A3         A4
   530.0  1.0114E-03  2.8585E+10    1.088  1.3140E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL         SH         FROL         C
            B1       B2         B3          B4          B5
   530.0    .600     .600     -.500   3.0000E-04     .250
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J-85-13 test 2. Retest of 01-55-2 after 100 hours at 815°C.

TABLE 39-B

Beam No. 01-55-3

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1650	2	92.85	92.51	92.27	93.49	1.22	.01314	.00554	
1650	3	261.34	259.48	259.34	263.35	4.01	.01534	.00984	
1650	4	514.40	515.70	509.65	519.46	9.81	.01907	.01507	
1650	5	851.50	848.40	841.69	859.62	17.63	.02106	.01786	
1650	6	1280.28	1271.60	1276.94	1292.80	31.16	.02434	.02204	X
1600	2	94.09	93.59	93.36	94.85	1.49	.01584	.00984	
1600	3	264.40	262.75	261.36	266.64	5.28	.01997	.01617	
1600	4	521.40	575.80	515.49	536.11	20.62	.03955	.03685	
1600	5	863.35	855.40	850.72	876.70	25.98	.03009	.02809	
1600	6	1204.20	1281.40	1294.00	1314.40	40.09	.03074	.02924	
1600	2	93.68	93.59	93.15	94.59	1.44	.01537	.00937	
1600	3	264.28	262.75	261.87	266.59	4.72	.01786	.01406	
1600	4	520.50	515.80	514.90	531.84	16.94	.03255	.02985	
1600	5	863.75	855.40	847.48	874.48	27.42	.03175	.02975	
1600	6	1298.18	1281.40	1282.16	1325.75	43.59	.03358	.03205	
1550	2	94.92	94.56	94.13	95.84	1.71	.01802	.01332	
1550	3	267.05	264.30	263.44	270.74	7.30	.02734	.02464	
1550	4	528.53	520.10	520.70	541.97	21.27	.04024	.03844	
1550	5	874.70	862.50	859.21	880.80	21.59	.02468	.02328	
1550	6	1324.81	1291.20	1298.[illegible]	1355.34	67.59	.05129	.05029	
1550	2	94.81	94.56	94.12	95.68	1.56	.01645	.01175	
1550	3	267.47	264.30	264.48	271.26	6.68	.02497	.02227	
1550	4	528.28	520.10	523.20	532.10	17.49	.03311	.03131	X

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
155.	5	873.69	862.50	866.61	878.78	23.92	.02737	.02597	X
1550	6	1323.78	1291.20	1312.20	1340.60	54.83	.04142	.04042	
1500	2	96.11	95.44	95.00	97.41	2.41	.02508	.02148	
1500	4	536.09	524.40	530.44	544.52	27.67	.05161	.05041	X
1500	5	887.82	869.40	877.83	905.57	27.24	.03125	.03015	
1500	6	1353.00	1301.90	1330.29	1389.52	59.23	.04378	.03618	
1450	2	97.75	96.26	96.11	99.67	3.56	.03642	.03362	
1450	4	553.32	528.50	547.67	559.86	23.[illegible]	.04329	.04241	X
1450	5	912.55	876.30	902.50	931.12	28.62	.03136	.03046	
1450	6	1382.90	1310.40	1371.78	1396.31	48.20	.03486	.03426	X
1400	2	99.64	97.02	97.30	102.16	4.86	.04878	.04648	
1400	3	283.45	270.80	280.16	287.80	15.04	.05297	.04229	X
1400	4	565.10	530.26	554.61	577.26	22.65	.04008	.03940	
1400	5	940.98	883.10	934.11	945.57	22.52	.02393	.02313	X
1400	6	1406.30	1319.80	1389.25	1426.78	37.53	.02669	.02619	
1350	4	573.68	536.60	565.88	582.00	16.12	.02809	.02753	
1350	5	950.40	890.00	941.89	958.97	17.08	.01797	.01722	
1350	6	1421.20	1329.10	1408.90	1432.80	23.90	.01682	.01637	
1300	2	104.80	98.45	10.28	106.75	3.47	.03311	.03161	
1300	4	580.53	540.60	576.31	585.63	9.32	.01605	.01557	
1300	5	960.75	896.40	958.24	963.36	10.06	.01047	.00975	X
1300	6	1434.51	1338.30	1428.08	1441.85	13.77	.00960	.00918	
1250	2	106.82	99.13	105.96	107.77	[illegible].81	.01694	.01574	

TABLE 39-B (Concluded)

Beam No. 01-55-3

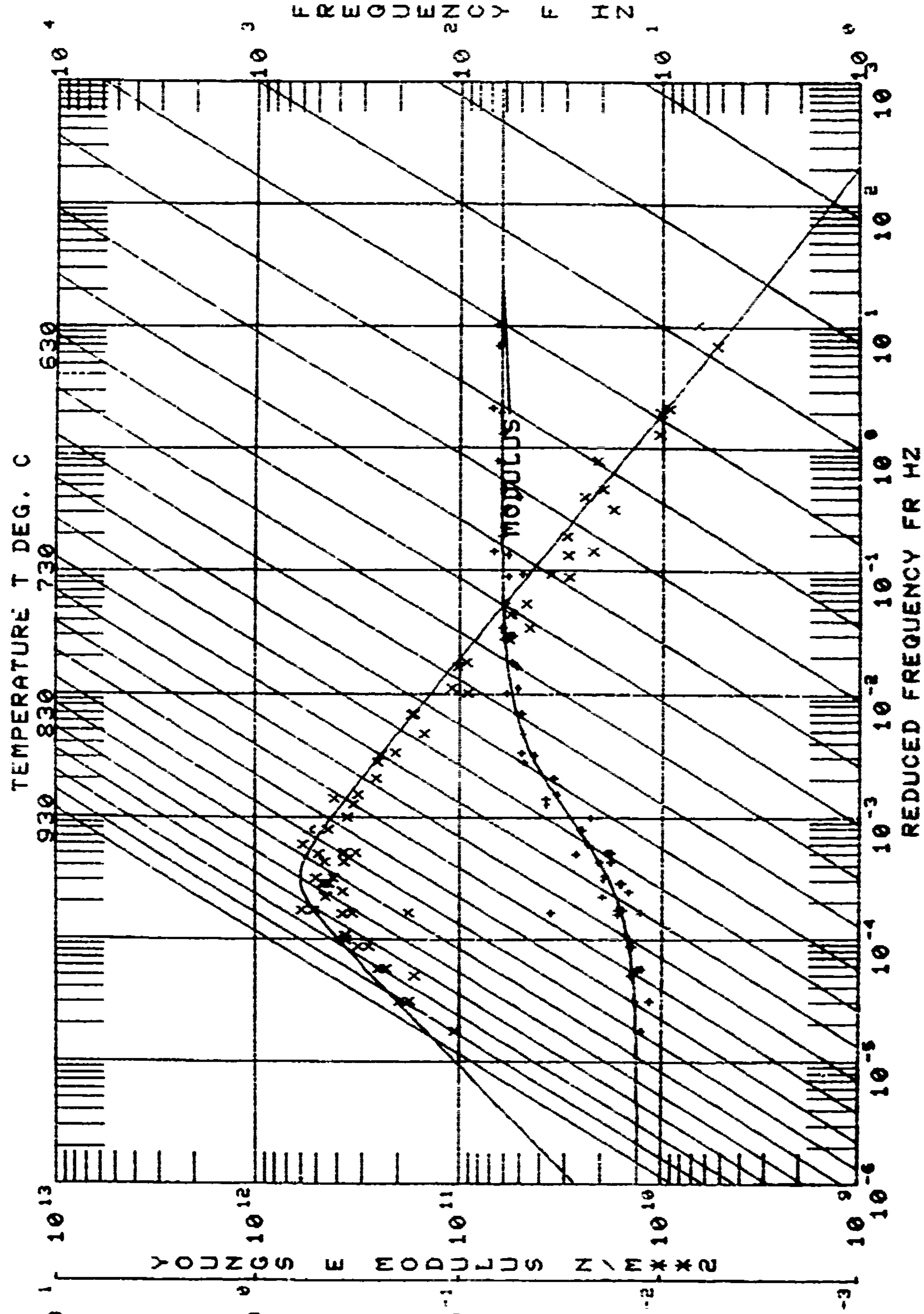
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1250	3	299.46	277.25	297.85	301.07	3.22	.01075	.01003	
1250	4	586.73	544.20	584.52	589.56	5.04	.00859	.00814	
1250	5	970.84	903.00	968.90	971.75	5.60	.00577	.00487	X
1250	6	1448.25	1347.40	1444.36	1452.15	7.79	.00538	.00497	
1200	2	107.93	99.80	107.51	108.48	0.97	.00899	.0079[illegible]	
1200	3	296.27	279.30	295.37	297.12	1.75	.00591	.00523	
1200	4	592.46	548.20	590.67	594.04	3.37	.00569	.00526	
1200	5	978.23	909.20	976.22	979.80	3.58	.00366	.00298	
1200	6	1460.41	1356.20	1457.93	1463.53	5.60	.00383	.00341	
1150	2	109.30	100.45	108.99	109.53	0.54	.00494	.00414	
1150	3	299.20	281.25	298.52	299.82	1.30	.00434	.00370	
1150	4	598.32	551.50	597.06	599.59	2.53	.00423	.00382	
1150	5	988.04	915.80	987.08	989.54	2.46	.00249	.00181	
1150	6	1474.32	1365.20	1472.82	1476.10	3.28	.00222	.00179	
1100	2	110.33	102.40	110.17	110.47	0.30	.00272	.00206	
1100	3	308.44	283.20	308.28	308.65	0.72	.00236	.00174	X
1100	4	604.25	555.00	602.84	605.89	3.00	.00496	.00455	
1100	5	996.85	921.80	996.06	997.65	1.59	.00[illegible]60	.00094	
1100	6	1487.11	1374.00	1485.74	1988.17	2.43	.00163	.00118	

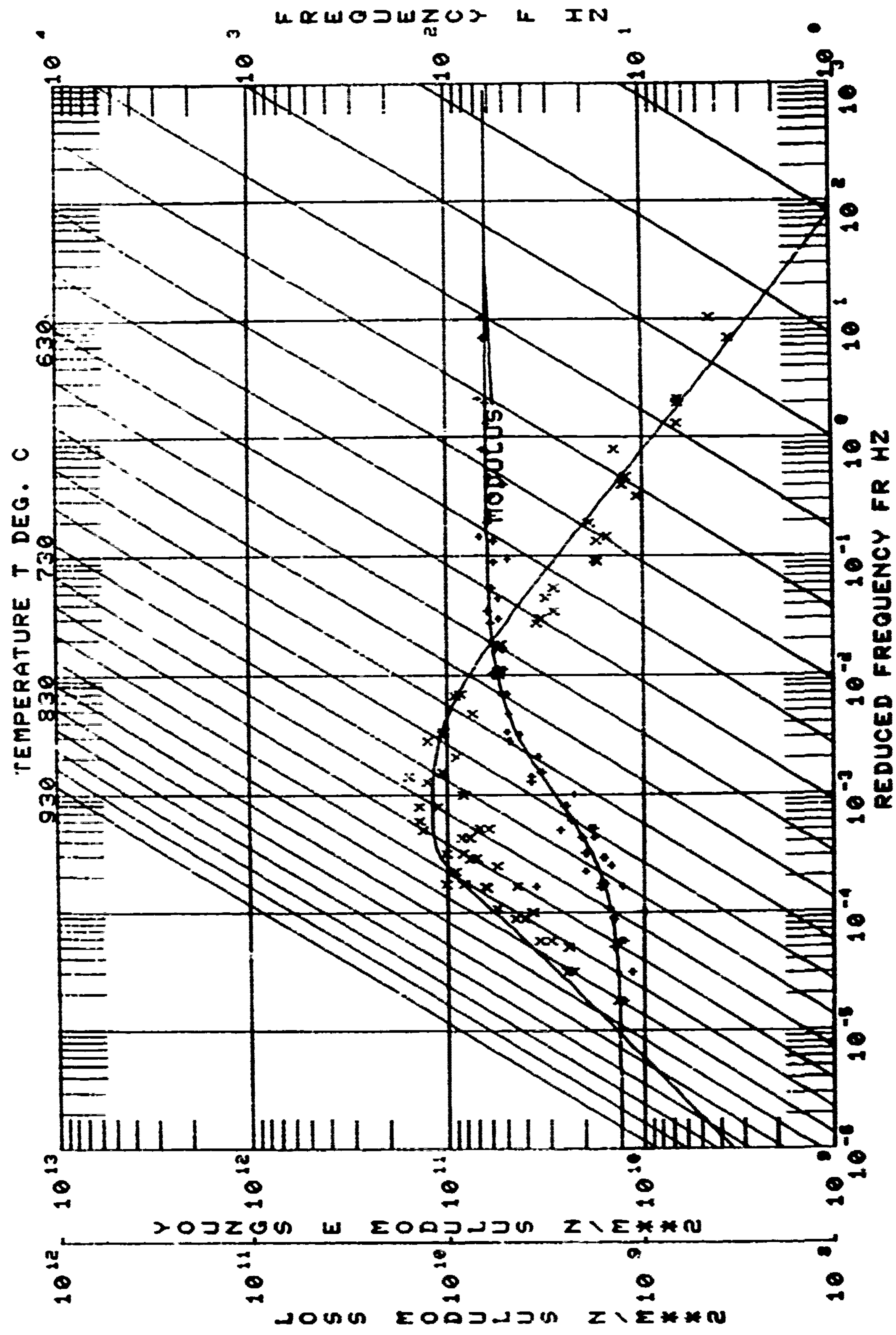
EXPERIMENTAL CODE : 55
MATERIAL :JB5-13 SECOND TEST
DATA SOURCES
MANUFACTURER :NONE
AFML : UDRI BEAM COATED ONE SIDE
OTHER :N

01-55-3

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.28844E+10	.1067	898.9	92.9	2.	1.56288E+11	.0055	92.5	1.37509E+09
2	1.46677E+10	.1689	898.9	261.3	3.	1.56831E+11	.0098	259.5	2.47688E+09
3	1.01506E+10	.3733	898.9	514.4	4.	1.61318E+11	.0151	515.7	3.78912E+09
4	1.31593E+10	.3444	898.9	851.5	5.	1.59773E+11	.0179	848.4	4.53157E+09
5	1.49228E+10	.3823	898.9	1280.3	6.	1.61445E+11	.0220	1271.6	5.70509E+09
6	2.09899E+10	.3786	871.1	1304.3	6.	1.63943E+11	.0292	1281.4	7.94678E+09
7	1.62937E+10	.4523	871.1	863.3	5.	1.62421E+11	.0281	855.4	7.36989E+09
8	1.69956E+10	.6095	871.1	521.4	4.	1.61380E+11	.0395	515.8	1.03588E+10
9	1.45878E+10	.2853	871.1	264.4	3.	1.60809E+11	.0162	262.7	4.16235E+09
10	1.40362E+10	.1790	871.1	94.1	2.	1.59958E+11	.0098	93.6	2.51244E+09
11	1.35255E+10	.2555	843.3	94.9	2.	1.63291E+11	.0133	94.6	3.45561E+09
12	1.68945E+10	.3846	843.3	267.0	3.	1.62712E+11	.0246	264.3	6.49778E+09
13	2.01111E+10	.5173	843.3	528.5	4.	1.64082E+11	.0384	520.1	1.04031E+10
14	1.91436E+10	.3292	843.3	874.7	5.	1.65128E+11	.0233	862.5	6.30142E+09
15	2.57696E+10	.5519	843.3	1324.8	6.	1.66460E+11	.0503	1291.2	1.42231E+10
16	1.18134E+10	.1998	871.1	93.7	2.	1.59958E+11	.0094	93.6	2.36085E+09
17	1.43493E+10	.3199	871.1	264.3	3.	1.60809E+11	.0179	262.7	4.59090E+09
18	1.60885E+10	.5271	871.1	520.5	4.	1.61380E+11	.0325	515.8	8.48035E+09
19	1.65346E+10	.4727	871.1	863.7	5.	1.62421E+11	.0298	855.4	7.81635E+09
20	1.84430E+10	.4655	871.1	1298.2	6.	1.63943E+11	.0320	1281.4	8.58537E+09
21	2.53277E+10	.4503	843.3	1323.8	6.	1.66460E+11	.0404	1291.2	1.14040E+10
22	1.85119E+10	.3784	843.3	873.7	5.	1.65128E+11	.0260	862.5	7.00445E+09
23	1.98677E+10	.4259	843.3	528.3	4.	1.64082E+11	.0313	520.1	8.46185E+09
24	3.62025E+10	.1806	843.3	276.5	3.	1.62712E+11	.0223	264.3	6.53936E+09
25	1.29264E+10	.2350	843.3	94.8	2.	1.63291E+11	.0117	94.6	3.03763E+09
26	3.37026E+10	.3212	815.6	1353.0	6.	1.69230E+11	.0362	1301.9	1.08252E+10
27	2.32889E+10	.3637	815.6	887.8	5.	1.67781E+11	.0302	869.4	8.46977E+09
28	2.37657E+10	.5944	815.6	536.1	4.	1.66807E+11	.0504	524.4	1.41266E+10
29	1.54796E+10	.3703	815.6	96.1	2.	1.66345E+11	.0215	95.4	5.73229E+09
30	2.03440E+10	.4602	787.8	97.7	2.	1.69215E+11	.0336	96.3	9.36291E+09
31	3.82253E+10	.3402	787.8	553.3	4.	1.69425E+11	.0424	528.5	1.30024E+10
32	3.51840E+10	.2626	787.8	912.6	5.	1.70455E+11	.0305	876.3	9.23872E+09
33	4.36873E+10	.2495	787.8	1382.9	6.	1.71447E+11	.0343	1310.4	1.09003E+10
34	5.06298E+10	.1722	760.0	1406.3	6.	1.73916E+11	.0262	1319.8	8.71644E+09
35	5.03953E+10	.1520	760.0	941.0	5.	1.73110E+11	.0231	883.1	7.66238E+09
36	4.97448E+10	.2586	760.0	565.1	4.	1.70555E+11	.0394	530.3	1.28655E+10
37	3.83918E+10	.4207	760.0	283.5	3.	1.70813E+11	.0523	270.8	1.61508E+10
38	2.71617E+10	.5012	760.0	99.6	2.	1.71898E+11	.0465	97.0	1.36146E+10
39	5.30822E+10	.1752	732.2	573.7	4.	1.74658E+11	.0275	536.6	9.30035E+09
40	5.26546E+10	.1108	732.2	950.4	5.	1.75826E+11	.0172	890.0	5.83461E+09
41	5.36866E+10	.1041	732.2	1421.1	6.	1.76375E+11	.0164	1329.1	5.58675E+09
42	5.61496E+10	.0570	704.4	1434.5	6.	1.78825E+11	.0092	1338.3	3.20185E+09
43	5.59489E+10	.0606	704.4	960.7	5.	1.78364E+11	.0097	896.4	3.39100E+09
44	5.69488E+10	.0951	704.4	580.5	4.	1.77272E+11	.0156	54[illegible]	5.41573E+09
45	5.08652E+10	.2098	704.4	104.8	2.	1.77003E+11	.0316	98.4	1.06735E+10
46	6.01023E+10	.0933	676.7	106.8	2.	1.79456E+11	.0157	99.1	5.60474E+09
47	6.16286E+10	.0583	676.7	299.5	3.	1.79047E+11	.0100	277.2	3.59043E+09
48	6.05427E+10	.0480	676.7	586.7	4.	1.79641E+11	.0081	544.2	2.90649E+09
49	5.89802E+10	.0254	676.7	970.8	5.	1.81000E+11	.0049	903.0	1.73612E+09

50	5.88827E+10	.0301	676.7	1448.2	6.	1.81266E+11	.0050	1347.4	1.77289E+09
51	6.10020E+10	.0203	648.9	1460.4	6.	1.83641E+11	.0034	1356.2	1.23978E+09
52	6.03372E+10	.0179	648.9	978.2	5.	1.83494E+11	.0030	909.2	1.07561E+09
53	6.31722E+10	.0304	648.9	592.5	4.	1.82291E+11	.0053	543.2	1.92065E+09
54	4.97907E+10	.0360	648.9	296.3	3.	1.81705E+11	.0052	279.3	1.79269E+09
55	6.35160E+10	.0459	648.9	107.9	2.	1.81890E+11	.0080	99.8	2.91739E+09
56	6.89207E+10	.0227	621.1	109.3	2.	1.84267E+11	.0041	100.4	1.56228E+09
57	5.25021E+10	.0247	621.1	299.2	3.	1.84251E+11	.0037	281.2	1.29726E+09
58	6.67869E+10	.0214	621.1	598.3	4.	1.84493E+11	.0038	551.5	1.42945E+09
59	6.32366E+10	.0106	621.1	988.0	5.	1.86168E+11	.0018	915.8	6.71215E+08
60	6.39354E+10	.0104	621.1	1474.3	6.	1.86086E+11	.0018	1365.2	6.65618E+08
61	6.64251E+10	.0067	593.3	1487.1	6.	1.88493E+11	.0012	1374.0	4.47652E+08
62	6.58349E+10	.0054	593.3	996.8	5.	1.88615E+11	.0009	921.8	3.55867E+08
63	7.03357E+10	.0248	593.3	604.2	4.	1.86842E+11	.0045	555.0	1.74436E+09
64	7.06026E+10	.0095	593.3	308.4	3.	1.86814E+11	.0017	283.2	6.67765E+08


TEMPERATURE T DEG. C
630
730
830
930
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
930
830
730
630
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F IN HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-55-4

Date

Damping Material $74.5\%\ SiO_2 + 12.75\%\ Na_2O + 10.75\%\ CaO + 2\%\ Co_2O_3$

Material Thickness 0.0160 cm Material Density 2.63 g/cc

Fixture No. 1 Beam Thickness 0.0963 cm

Beam Density 9.13 g/cc Beam Length 20.879 cm

Temperature Test Range: Between 870 °C and 595 °C

Frequency Test Range: Between 95 Hz and 1,450 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.51		Temperature	760 °C
	1,000 Hz	η_D 0.51		Temperature	825 °C
Range	100 Hz	725 °C	795 °C		
	1,000 Hz	795 °C	855 °C		

Complex Modulus E_D'':

Peak	100 Hz	1.4×10^{10} PAS		Temperature	720 °C
	1,000 Hz	1.4×10^{10} PAS		Temperature	795 °C
Range	100 Hz	455 °C	530 °C		
	1,000 Hz	480 °C	560 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL J-85-13 AFTER 300 HRS HEAT SOAK
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0        FROM        MROM        N         ML
             A1          A2         A3        A4
  550.0  1.3000E-03  2.9000E+10    .850  1.3000E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0    ETAFROL     SL        SH        FROL        C
           B1       B2        B3         B4        B5
  550.0    .446    .700    -.600  8.0000E-04     .750
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J-85-13 test 3. Retest of 01-55-2 after 300 hours at 815°C.

TABLE 40-B

Beam No. 91 55-4

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1600	2	94.14	93.59	93.76	94.43	1.32	.01399	.00799	X
1600	3	265.14	262.75	262.58	267.30	4.42	.01667	.01287	
1600	4	522.82	515.80	516.67	528.28	11.61	.02221	.01951	
1600	6	1299.00	1281.40	1288.09	1310.40	43.31	.03334	.03184	
1550	3	268.71	264.30	866.06	271.79	5.73	.02132	.01862	
1550	4	529.51	520.10	522.52	538.00	15.56	.02939	.02759	
1550	5	870.51	862.50	847.20	881.83	34.63	.03978	.03838	
1550	2	95.12	94.56	94.30	95.95	1.65	.01735	.01265	
1550	4	528.40	520.10	520.30	537.12	17.11	.03238	.03058	
1550	5	881.90	862.50	866.05	894.90	28.85	.03271	.03131	
1500	2	96.23	95.44	95.16	97.39	2.23	.02317	.01957	
1500	3	272.52	266.25	270.10	274.24	8.13	.02985	.02785	X
1500	4	539.01	524.40	529.83	551.84	22.01	.04083	.03963	
1500	4	537.40	524.40	525.99	548.69	22.70	.04224	.04104	
1450	2	97.61	96.26	96.58	98.12	3.03	.03101	.02821	X
1450	3	275.38	268.55	272.64	278.12	10.77	.03911	.03761	X
1450	2	97.55	96.26	96.18	99.29	3.11	.03188	.02908	
1450	3	277.44	268.55	275.14	280.67	10.97	.03917	.03767	X
1450	4	551.07	528.50	544.61	557.64	25.30	.04647	.04559	X
1450	5	927.22	876.30	919.49	935.75	31.95	.03446	.03356	X
1400	2	99.37	97.02	96.95	101.46	4.51	.04539	.04398	
1400	3	285.73	270.80	280.64	287.82	14.11	.04938	.04818	X
1400	4	569.20	530.26	555.08	578.50	23.42	.04115	.04047	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1400	5	938.89	883.10	924.56	949.63	25.07	.02607	.02590	
1400	6	1411.50	1319.80	1396.70	1436.10	39.40	.02791	.02741	
1350	2	102.39	97.78	101.51	104.43	5.74	.05604	.05424	X
1350	3	292.16	273.25	289.78	295.20	10.65	.03646	.03554	X
1350	4	573.59	536.60	565.20	592.02	16.87	.02943	.02885	
1350	5	955.47	890.00	943.81	967.04	23.23	.02431	.02356	
1300	2	104.94	98.45	104.00	105.78	3.50	.03333	.03183	X
1300	3	295.57	275.20	293.16	296.75	7.06	.02387	.02309	X
1300	4	581.40	540.60	576.30	586.09	9.78	.01682	.01634	
1300	5	965.64	896.40	958.62	972.92	14.30	.01481	.01409	
1300	6	1451.62	1338.30	1446.79	1456.85	10.06	.00693	.00651	
1250	2	107.39	99.13	106.71	108.07	2.67	.02489	.02369	X
1250	3	299.43	277.25	298.36	300.66	4.52	.01510	.01438	X
1250	4	587.32	544.20	584.29	590.48	6.19	.01054	.01009	
1250	5	974.84	903.00	970.98	978.43	7.50	.00769	.00699	
1250	6	1459.43	1347.90	1450.97	1464.48	13.51	.00926	.00885	
1200	2	108.20	99.80	107.77	108.88	1.11	.01020	.00926	
1200	3	302.94	279.30	301.62	303.78	2.16	.00713	.00645	
1200	5	982.74	909.20	980.60	985.00	4.40	.00448	.00380	
1200	6	1463.69	1350.20	1460.53	1466.97	[illegible]	.00406	.00364	
1150	2	109.27	100.45	109.00	109.50	0.50	.00547	.00463	
1150	3	305.72	281.25	304.96	306.21	[illegible]	.00409	.00345	
1150	4	600.54	551.50	598.95	[illegible]	[illegible]	[illegible]	.00487	

TABLE 40-B (Concluded)

Beam No. [illegible]

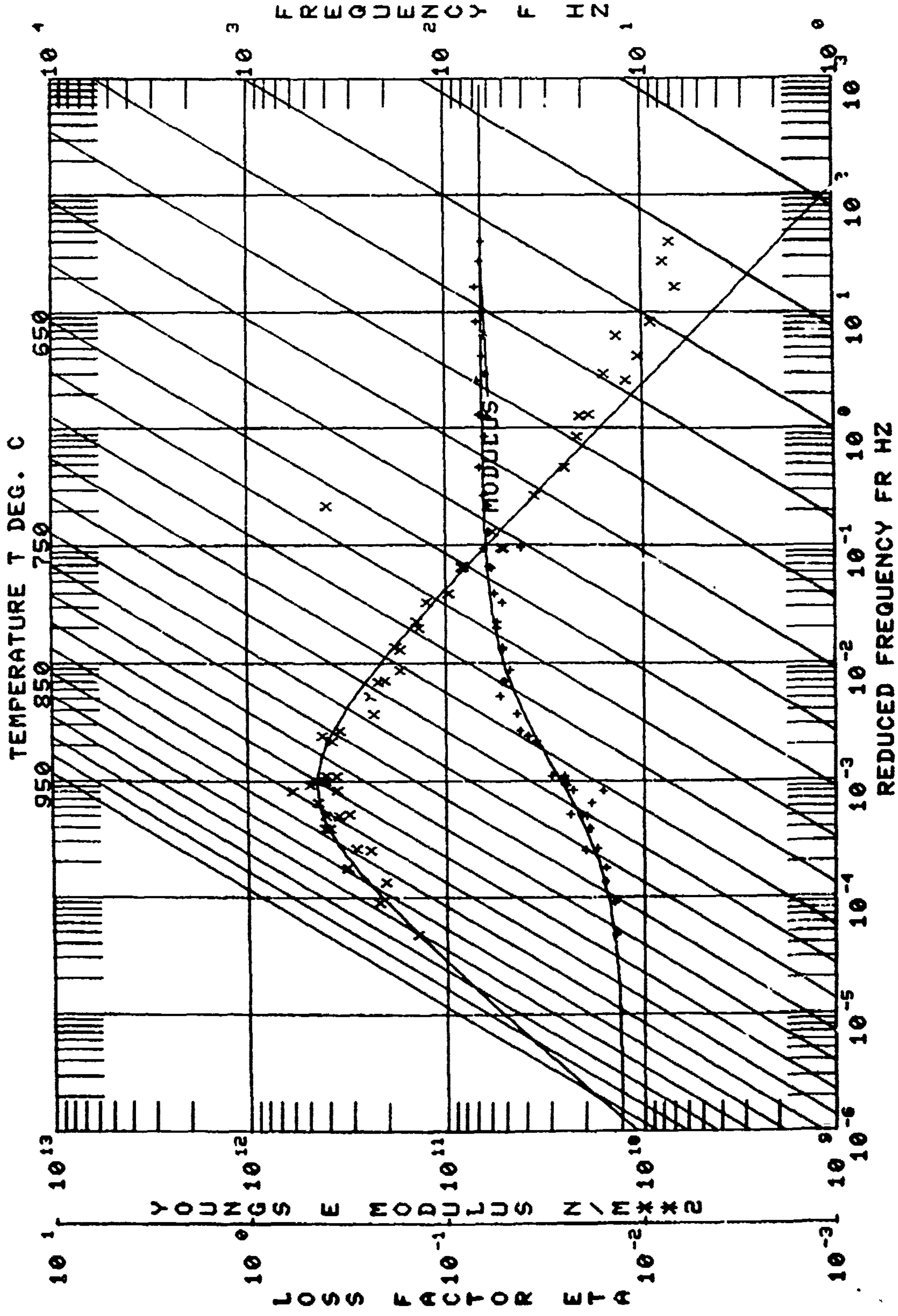
Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1150	5	991.41	915.80	990.47	993.00	2.53	.00255	.00187	
1150	6	1476.58	1365.20	1474.84	1479.04	4.20	.00284	.0024[illegible]	
1100	2	110.29	102.40	110.08	110.45	0.37	.00335	.00269	
1100	3	308.17	283.20	307.89	308.60	0.71	.00250	.00168	
1100	4	605.76	555.00	603.94	606.49	2.55	.00421	.00386	
1100	5	999.49	921.80	998.17	1000.24	2.07	.00207	.00141	
1100	6	1486.55	1374.00	1486.00	1488.56	2.56	.00172	.00127	

EXPERIMENTAL CODE : 69
MATERIAL :J-85-13 AFTER 300 HRS HEAT SOAK
DATA SOURCES
MANUFACTURER :N
AFML :UDRI BEAM COATED ONE SIDE 24 APRL 1979
OTHER :N

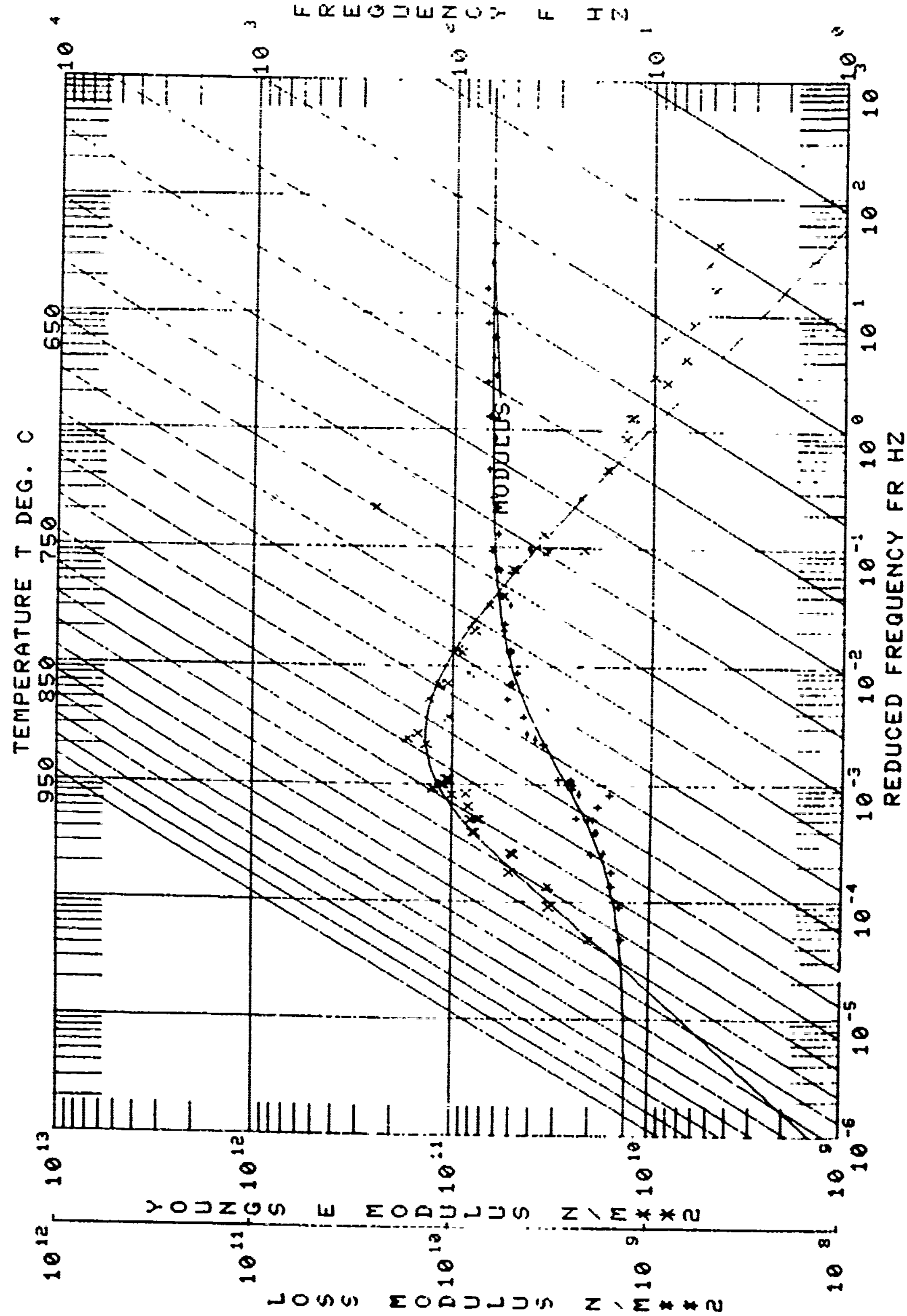
01-55-4

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.42984E+10	.1429	871.1	94.1	2.	1.59958E+11	.0080	93.6	2.04327E+09
2	1.60315E+10	.2084	871.1	265.1	3.	1.60809E+11	.0129	262.7	3.34118E+09
3	1.76256E+10	.2910	871.1	522.0	4.	1.61380E+11	.0195	515.8	5.12876E+09
4	1.87885E+10	.4548	871.1	1299.0	6.	1.63943E+11	.0318	1281.4	8.54595E+09
5	1.65653E+10	.6180	843.3	870.5	5.	1.65128E+11	.0384	862.5	1.02375E+10
6	2.11231E+10	.3555	843.3	529.5	4.	1.64082E+11	.0276	520.1	7.50963E+09
7	2.01972E+10	.2478	843.3	268.7	3.	1.62712E+11	.0186	264.3	5.00435E+09
8	1.46218E+10	.2259	843.3	95.1	2.	1.63291E+11	.0126	94.6	3.30286E+09
9	1.99830E+10	.4138	843.3	528.4	4.	1.64082E+11	.0306	520.1	8.26996E+09
10	2.36297E+10	.3678	843.3	881.9	5.	1.65128E+11	.0313	862.5	8.69079E+09
11	2.51331E+10	.4610	815.6	537.4	4.	1.66807E+11	.0410	524.4	1.15874E+10
12	2.42088E+10	.3172	815.6	272.5	3.	1.65121E+11	.0276	266.2	7.67981E+09
13	1.61419E+10	.3248	815.6	96.2	2.	1.66345E+11	.0196	95.4	5.24231E+09
14	2.68260E+10	.4210	815.6	539.0	4.	1.66807E+11	.0396	524.4	1.12931E+10
15	2.56780E+10	.4173	787.8	275.4	3.	1.67986E+11	.0376	268.5	1.07154E+10
16	1.95514E+10	.4001	787.8	97.6	2.	1.69215E+11	.0282	96.3	7.82202E+09
17	1.92079E+10	.4190	787.8	97.6	2.	1.69215E+11	.0291	96.3	8.04797E+09
18	2.99665E+10	.3665	787.8	277.4	3.	1.67986E+11	.0377	268.5	1.09831E+10
19	4.50978E+10	.2374	787.8	927.2	5.	1.70455E+11	.0336	876.3	1.07045E+10
20	2.55781E+10	.4994	760.0	99.4	2.	1.71898E+11	.0440	97.0	1.27746E+10
21	4.34057E+10	.3516	760.0	285.7	3.	1.70813E+11	.0482	270.8	1.52633E+10
22	5.45249E+10	.2481	760.0	569.2	4.	1.70555E+11	.0405	530.3	1.35260E+10
23	4.89223E+10	.1741	760.0	938.9	5.	1.73110E+11	.0259	883.1	8.51895E+09
24	5.30873E+10	.1739	760.0	1411.5	6.	1.73916E+11	.0274	1319.8	9.23061E+09
25	5.31634E+10	.1274	732.2	1420.0	6.	1.76375E+11	.0199	1329.1	6.77473E+09
26	5.62922E+10	.1443	732.2	955.5	5.	1.75826E+11	.0236	890.0	8.12075E+09
27	5.29731E+10	.1839	732.2	573.6	4.	1.74658E+11	.0289	536.6	9.74122E+09
28	5.29250E+10	.2260	732.2	292.2	3.	1.73918E+11	.0355	273.2	1.19593E+10
29	3.95022E+10	.4341	732.2	102.4	2.	1.74602E+11	.0542	97.8	1.71468E+10
30	5.17634E+10	.2085	704.4	104.9	2.	1.77003E+11	.0318	98.4	1.07935E+10
31	5.67680E+10	.1409	704.4	295.6	3.	1.76409E+11	.0231	275.2	7.99592E+09
32	5.79868E+10	.0985	704.4	581.4	4.	1.77272E+11	.0163	540.6	5.71096E+09
33	5.94301E+10	.0838	704.4	965.5	5.	1.78364E+11	.0141	896.4	4.97967E+09
34	4.25158E+10	.0531	704.4	1451.6	6.	1.92437E+11	.0065	1388.3	2.25774E+09
35	6.19334E+10	.4077	676.7	974.8	5.	1.81000E+11	.0699	903.0	2.52532E+10
36	6.12580E+10	.0590	676.7	587.3	4.	1.79641E+11	.0101	544.2	3.61446E+09
37	6.15587E+10	.0836	676.7	299.4	3.	1.79047E+11	.0144	277.2	5.14596E+09
38	6.39130E+10	.1343	676.7	107.4	2.	1.79456E+11	.0237	99.1	8.58225E+09
39	6.53478E+10	.0522	648.9	108.2	2.	1.81890E+11	.0093	99.8	3.40872E+09
40	6.53662E+10	.0363	648.9	302.8	3.	1.81705E+11	.0065	279.3	2.37279E+09
41	6.36893E+10	.0219	648.9	982.7	5.	1.83494E+11	.0038	909.2	1.39734E+09
42	6.26364E+10	.0213	648.9	1463.7	6.	1.8[illegible]641E+11	.0036	1356.2	1.33305E+09
43	6.50685E+10	.0138	621.1	1476.6	6.	1.86[illegible]86E+11	.0024	1365.2	9.00605E+08
44	6.57800E+10	.0107	621.1	991.4	5.	1.86158E+11	.0019	915.8	7.01193E+08
45	6.99675E+10	.0125	621.1	600.5	4.	1.84253E+11	.0023	551.2	8.71848E+08
46	6.81521E+10	.0190	621.1	305.7	3.	1.84251E+11	.0035	281.2	1.29748E+09
47	6.87193E+10	.0253	621.1	109.3	2.	1.84267E+11	.0046	100.4	1.73812E+09
48	6.37591E+10	.0160	593.3	110.3	2.	1.91491E+11	.0027	102.4	1.02047E+09
49	6.99317E+10	.0092	593.3	308.2	3.	1.86814E+11	.0017	283.2	6.42894E+08

50	7.16193E+10	.0069	593.3	605.3	4.	1.86842E+11	.0013	555.0	4.93412E+08
51	6.78522E+10	.0079	593.3	999.5	5.	1.88615E+11	.0014	921.8	5.38431E+08
52	6.61455E+10	.0073	593.3	1486.6	6.	1.88493E+11	.0013	1374.0	4.81217E+08
53	3.57387E+10	.3861	787.8	551.1	4.	1.69425E+11	.0456	528.5	1.37931E+10



TEMPERATURE T DEG. C
650
750
850
950
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS


FREQUENCY F HZ
TEMPERATURE T DEG. C
650
750
850
950
MODULUS
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-57-1

Date 2/7/79

Damping Material 74.5% SiO_2 + 10.75% CaO + 6.375% Na_2O + 6.375% $KHCO_3$ + 2% Co_2O_3

Material Thickness	0.0224	cm	Material Density	2.24	g/cc
Fixture No.	2		Beam Thickness	0.0960	cm
Beam Density	9.13	g/cc	Beam Length	21.608	cm

Temperature Test Range: Between 925 °C and 620 °C

Frequency Test Range: Between 82 Hz and 1,400 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.38		Temperature 760	°C
	1,000 Hz	η_D 0.38		Temperature 790	°C
Range	100 Hz	685	°C	820	°C
	1,000 Hz	750	°C	900	°C

Complex Modulus E_D'':

Peak	100 Hz	6.9×10^9	PAS	Temperature 750	°C
	1,000 Hz	6.9×10^9	PAS	Temperature 790	°C
Range	100 Hz	670	°C	765	°C
	1,000 Hz	701	°C	815	°C

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-14  INITIAL TEST
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0         FROM         MROM        N         ML
              A1           A2         A3        A4
   583.0 10.0000E-04  8.0000E+09    .450  1.7000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0    ETAFROL    SL       SH        FROL        C
           B1      B2       B3         B4         B5
   583.0    .310    .300    -.550  2.1000E-02   1.900
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J-85-14 test 1. Beam retested twice; 01-57-2 and 01-57-3.

TABLE 41-B

Beam No. 01-57-1

Temp. (°F)	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1700	2	82.86	84.58	82.30	83.35	1.05	.0126[illegible]	.00559	
1700	3	230.35	237.46	230.03	231.67	3.22	.01399	.00717	X
1700	4	459.85	466.45	457.75	460.96	6.31	.01372	.00840	X
1700	5	763.78	773.62	760.41	767.15	13.24	.01734	.01319	X
1700	6	1141.82	1157.33	1137.44	1146.21	17.32	.01509	.01156	X
1650	2	83.88	85.24	83.26	84.51	1.25	.01490	.00704	
1650	3	233.49	239.52	232.68	234.35	3.28	.01406	.00767	X
1650	4	466.38	470.48	462.60	269.66	7.06	.01514	.01104	
1650	5	773.74	779.80	768.16	781.25	13.09	.01692	.01352	
1650	6	1157.36	1167.05	1147.20	1167.40	19.70	.01702	.01459	
1600	2	84.87	86.01	84.18	85.49	1.31	.01544	.00823	
1600	3	235.96	241.76	234.41	237.46	3.05	.01293	.00817	
1600	4	472.36	474.54	468.69	476.28	7.99	.01692	.01422	
1600	5	783.28	786.21	777.28	787.81	10.53	.01344	.01118	
1600	6	1176.30	1186.30	1164.25	1188.13	23.88	.02030	.01853	
1550	2	86.10	86.91	85.83	86.70	1.34	.01556	.00983	
1550	3	238.26	243.75	236.67	239.88	3.[illegible]1	.01347	.01019	
1550	4	479.07	478.41	474.45	483.26	8.81	.01839	.01661	
1550	5	786.25	792.57	782.46	789.59	14.01	.01782	.01621	X
1550	6	1193.17	1185.84	1179.07	1210.80	31.73	.02659	.02526	
1500	2	87.32	87.64	86.55	88.00	1.45	.01661	.01262	
1500	3	245.19	245.64	241.95	247.58	5.63	.02296	.02044	
1500	4	485.80	482.12	483.19	489.00	11.41	.02350	.02221	X
1500	5	807.11	798.59	797.75	813.94	16.19	.02005	.01877	
1500	6	1213.80	1194.89	1196.76	1234.99	38.23	.031496	.03051	
1450	2	88.55	88.33	87.75	89.37	1.62	.01829	.01546	
1450	3	248.49	247.55	245.17	251.17	6.00	.02415	.02221	
1450	4	493.51	485.93	485.65	500.00	14.35	.02907	.02812	
1450	5	823.47	804.97	819.05	828.76	19.08	.02317	.02211	X
1450	6	1235.12	1204.27	1214.51	1257.64	43.13	.03492	.03420	
1400	2	89.83	89.00	88.60	98.84	2.24	.02494	.02269	
1400	5	837.32	810.91	820.81	850.68	29.87	.03567	.03481	
1400	6	1256.56	1213.03	1234.40	1278.59	44.19	.03516	.03449	
1350	2	91.48	89.66	89.96	92.98	3.02	.03301	.03111	
1350	3	259.16	251.16	255.46	264.43	8.97	.03461	.03325	
1350	5	853.60	816.77	836.10	867.60	31.50	.03690	.03615	
1350	6	1282.81	1221.80	1258.50	1304.56	46.06	.03590	.03520	
1300	2	93.35	90.31	91.65	95.03	3.38	.03620	.03454	
1300	3	264.93	252.98	260.09	269.30	9.21	.03475	.03325	
1300	4	524.57	496.73	516.78	532.61	15.83	.03017	.02965	
1300	5	871.16	822.71	858.02	880.82	22.80	.02617	.02553	
1300	6	1302.52	1230.63	1289.18	1316.13	26.95	.02069	.02010	
1250	2	95.57	90.96	94.84	96.7[illegible]	3.7[illegible]	.03227	.0377[illegible]	X
1250	3	268.53	214.70	264.93	271.57	6.64	.02475	.0230[illegible]	
1250	4	533.75	500.22	528.66	538.[illegible]	[illegible]	.01921	.01775	
1250	5	884.22	928.47	[illegible]7.86	88[illegible]	[illegible]	[illegible]	.0127[illegible]	

TABLE 41-B (Concluded)

Beam No. 01-[illegible]7-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1250	6	1324.08	1239.28	1315.02	1330.61	15.59	.01177	.01116	
1200	2	97.68	91.61	96.85	98.70	1.85	.01893	.01751	
1200	3	273.40	256.55	270.64	275.23	4.59	.01678	.01506	
1200	4	539.71	503.80	537.45	542.38	4.93	.00913	.00873	
1200	5	893.41	834.42	890.53	897.16	6.63	.00742	.00683	
1200	6	1336.86	1248.16	1332.80	1340.44	7.64	.00571	.00508	
1150	2	98.66	92.28	98.21	99.27	1.06	.01074	.00944	
1150	3	276.26	258.18	275.22	277.10	1.88	.00681	.00506	
1150	4	544.10	507.36	542.84	545.40	2.56	.00471	.00422	
1150	5	900.47	840.47	898.94	902.38	3.44	.00382	.00323	
1150	6	1346.90	1257.15	1344.64	1348.90	4.26	.00316	.00252	

EXPERIMENTAL CODE : 50
MATERIAL :J85-14 INITIAL TEST
DATA SOURCES
MANUFACTURER :NONE
AFML :UDRI BEAM COATED ONE SIDE
OTHER :74.5%SI O2,10.75% CA O,6.375% NA2 O,6.375% K H C O3,2% CO2

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.92599E+09	.4151	926.7	82.8	2.	1.50660E+11	.0056	84.6	7.99526E+08
2	3.92222E+09	.3155	926.7	459.8	4.	1.52199E+11	.0084	466.5	1.23760E+09
3	4.37715E+09	.4488	926.7	763.8	5.	1.53205E+11	.0132	773.6	1.96434E+09
4	4.19345E+09	.4124	926.7	1141.8	6.	1.54223E+11	.0116	1157.3	1.72949E+09
5	5.84893E+09	.3852	898.9	1157.4	6.	1.56825E+11	.0146	1167.1	2.25306E+09
6	5.96982E+09	.3477	898.9	773.7	5.	1.55662E+11	.0135	779.8	2.07557E+09
7	3.39690E+09	.3054	898.9	83.9	2.	1.53020E+11	.0070	85.2	1.03728E+09
8	4.28683E+09	.2903	871.1	84.9	2.	1.55797E+11	.0082	86.0	1.24445E+09
9	7.03851E+09	.3168	871.1	472.4	4.	1.57524E+11	.0142	474.5	2.22973E+09
10	7.34626E+09	.2403	871.1	783.3	5.	1.58232E+11	.0112	786.2	1.76541E+09
11	5.48982E+09	.5376	871.1	1176.3	6.	1.62588E+11	.0185	1188.3	2.95125E+09
12	1.09476E+10	.3840	843.3	1193.2	6.	1.61724E+11	.0253	1185.1	4.20363E+09
13	6.10169E+09	.4211	843.3	786.2	5.	1.60802E+11	.0162	792.6	2.56917E+09
14	9.07705E+09	.2968	843.3	479.1	4.	1.60104E+11	.0166	478.4	2.69367E+09
15	5.61652E+09	.2728	843.3	86.1	2.	1.59075E+11	.0098	86.9	1.53215E+09
16	7.53525E+09	.2704	815.6	87.3	2.	1.61758E+11	.0126	87.6	2.03769E+09
17	8.14335E+09	.4083	815.6	245.2	3.	1.62082E+11	.0204	245.6	3.32458E+09
18	1.12904E+10	.3299	815.6	485.8	4.	1.62597E+11	.0222	482.1	3.72525E+09
19	1.23497E+10	.2582	815.6	807.1	5.	1.63254E+11	.0188	798.6	3.18894E+09
20	1.41974E+10	.3732	815.6	1213.8	6.	1.64396E+11	.0305	1194.9	5.29894E+09
21	1.78503E+10	.3477	787.8	1235.1	6.	1.66987E+11	.0342	1204.3	6.20724E+09
22	1.68090E+10	.2353	787.8	823.5	5.	1.65873E+11	.0221	805.0	3.95585E+09
23	1.41844E+10	.3457	787.8	493.5	4.	1.65177E+11	.0281	485.9	4.90370E+09
24	9.86712E+09	.3771	787.8	248.3	3.	1.64613E+11	.0222	247.5	3.72060E+09
25	9.68926E+09	.2664	787.8	88.6	2.	1.64315E+11	.0155	88.3	2.58155E+09
26	1.21657E+10	.3225	760.0	89.8	2.	1.66818E+11	.0227	89.0	3.92395E+09
27	2.04873E+10	.3172	760.0	837.3	5.	1.68330E+11	.0348	810.9	6.49825E+09
28	2.74421E+10	.2571	732.2	1282.8	6.	1.71884E+11	.0352	1221.8	7.05563E+09
29	2.54348E+10	.2791	732.2	853.6	5.	1.70772E+11	.0362	816.8	7.09903E+09
30	2.03621E+10	.3062	732.2	259.2	3.	1.69449E+11	.03[illegible]2	251.2	6.23529E+09
31	1.62013E+10	.3479	732.2	91.5	2.	1.69301E+11	.0311	89.7	5.63706E+09
32	2.13166E+10	.3096	704.4	93.4	2.	1.71765E+11	.0345	90.3	6.60066E+09
33	2.64909E+10	.2498	704.4	265.0	3.	1.71913E+11	.0332	253.0	6.61775E+09
34	2.99170E+10	.2029	704.4	524.6	4.	1.72601E+11	.0296	496.7	6.07028E+09
35	3.11431E+10	.1700	704.4	871.2	5.	1.73265E+11	.0255	822.7	5.29373E+09
36	3.11521E+10	.1345	704.4	1302.5	6.	1.74378E+11	.0201	1230.6	4.18870E+09
37	3.56320E+10	.0681	676.7	1324.1	6.	1.76838E+11	.0112	1239.3	2.42764E+09
38	3.49534E+10	.0787	676.7	884.2	5.	1.75699E+11	.0128	828.5	2.75115E+09
39	3.47075E+10	.1097	676.7	533.8	4.	1.75034E+11	.0177	500.2	3.80645E+09
40	2.53747E+10	.1845	676.7	268.5	3.	1.78388E+11	.0230	257.7	4.68275E+09
41	2.81091E+10	.2733	676.7	95.6	2.	1.74246E+11	.0377	91.0	7.68328E+09
42	3.47311E+10	.1089	648.9	97.7	2.	1.76745E+11	.0175	91.6	3.78319E+09
43	3.45122E+10	.0942	648.9	273.4	3.	1.76800E+11	.0151	256.5	3.24953E+09
44	3.69426E+10	.0520	648.9	539.7	4.	1.77549E+11	.0087	503.8	1.92239E+09
45	3.68461E+10	.0409	648.9	893.4	5.	1.78232E+11	.0068	834.4	1.50727E+09
46	3.72365E+10	.0303	648.9	1336.9	6.	1.79381E+11	.0051	1248.2	1.12950E+09
47	3.79151E+10	.0150	621.1	1346.9	6.	1.81974E+11	.0025	1257.1	5.68948E+08
48	3.76759E+10	.0192	621.1	900.5	5.	1.80826E+11	.0032	840.5	7.24646E+08
49	3.79416E+10	.0249	621.1	544.1	4.	1.80067E+11	.0042	507.4	9.45538E+08

51	3.64274E+10	.0573	621.1	98.7	2.	1.79340E+11	.0094	92.3	2.08678E+09
52	3.79781E+10	.0253	593.3	99.6	2.	1.81993E+11	.0043	93.0	9.60021E+08
53	3.72574E+10	.0097	593.3	278.4	3.	1.81936E+11	.0016	260.2	3.59557E+08
54	3.84469E+10	.0109	593.3	548.2	4.	1.82817E+11	.0018	511.2	4.12353E+08
55	3.81274E+10	.0088	593.3	1355.7	6.	1.84647E+11	.0015	1266.4	3.35980E+08
56	5.64924E+09	.2976	898.9	466.4	4.	1.54840E+11	.0110	470.5	1.68127E+09
57	2.18376E+10	.2996	760.0	1256.6	6.	1.69426E+11	.0345	1213.0	6.54328E+09
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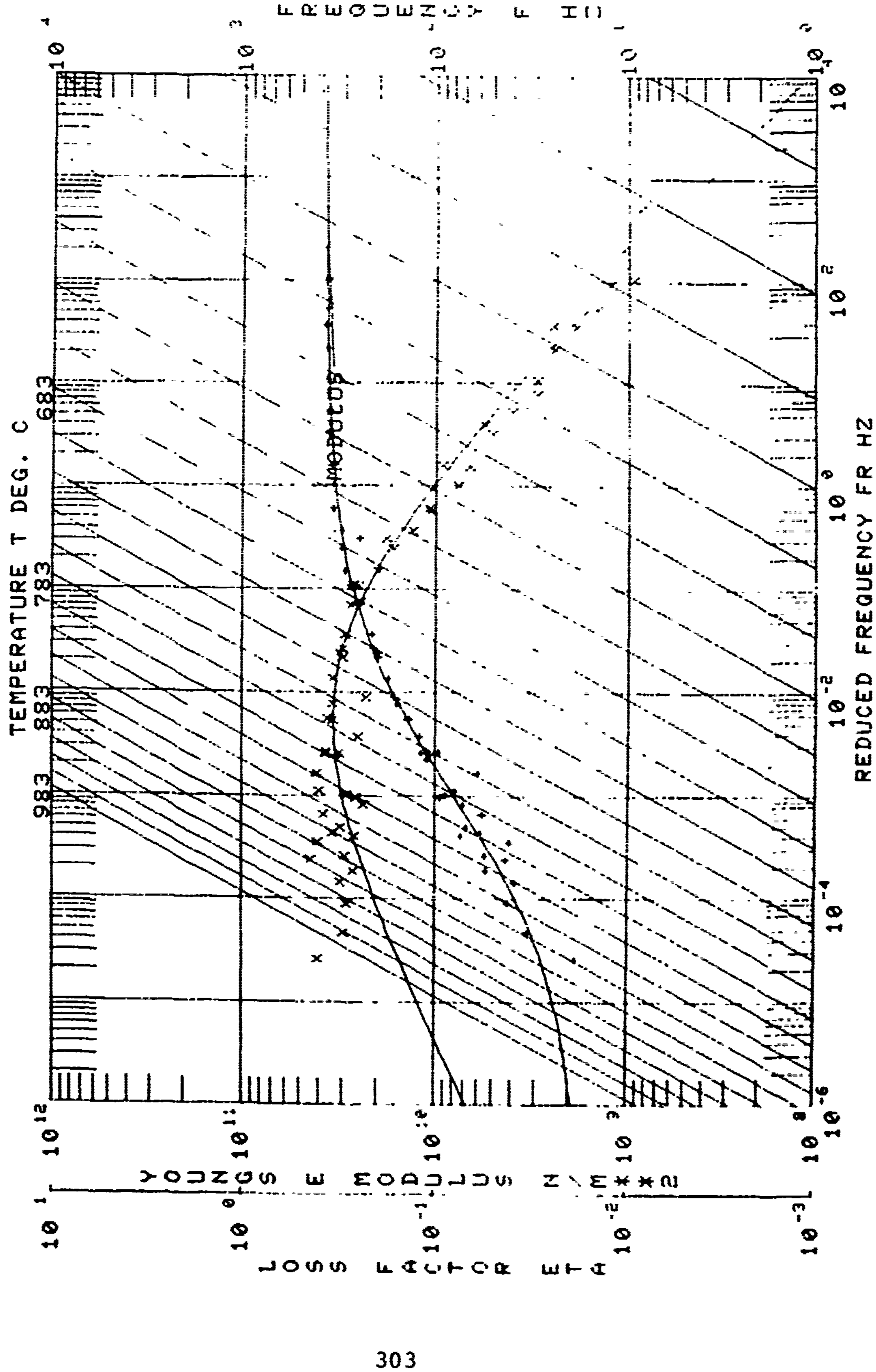
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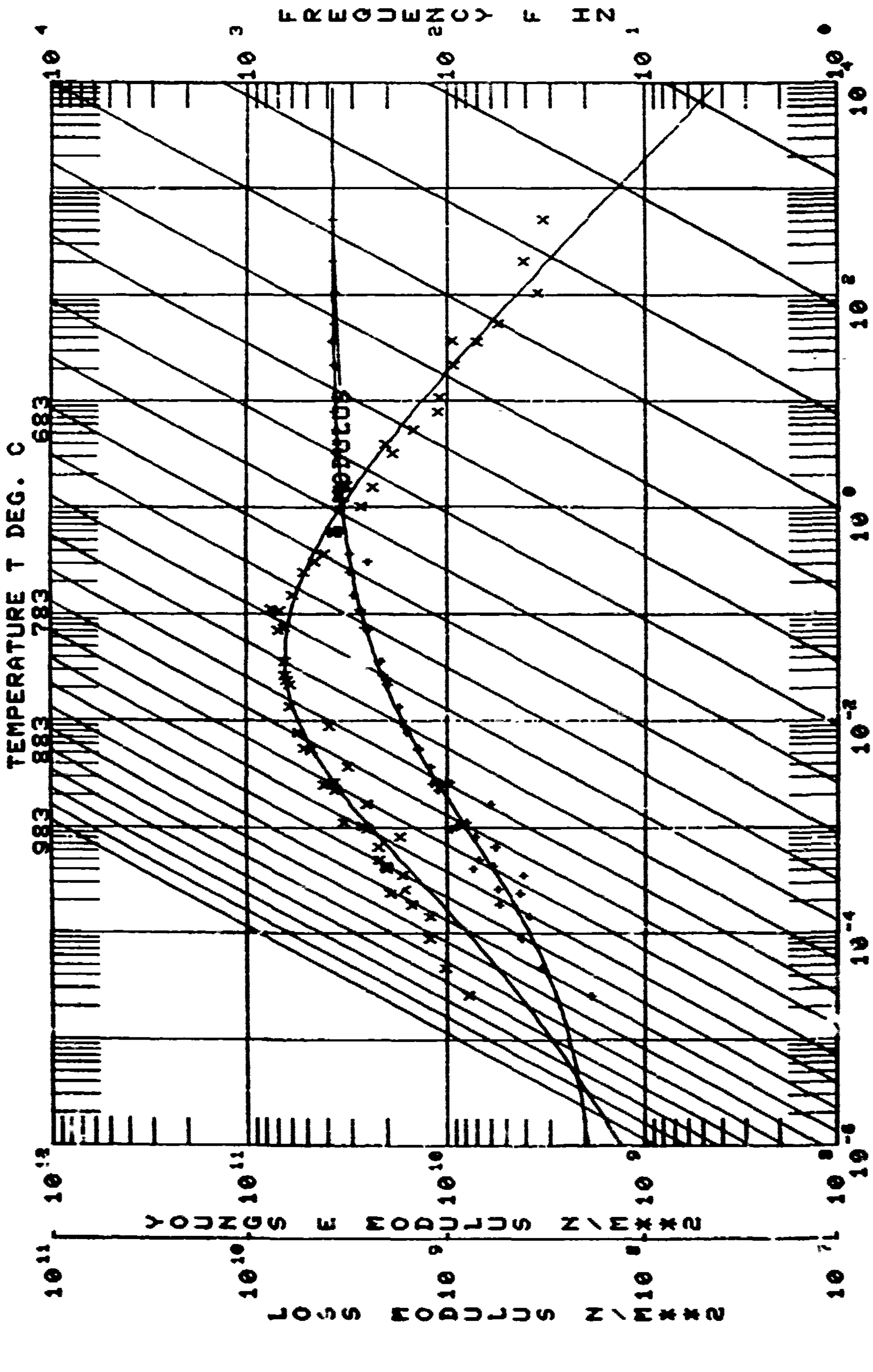
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA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REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-57-2

Date 2/79

Damping Material 74.5% SiO_2 + 10.75% CaO + 6.375% Na_2O + 6.375% $KHCO_3$ + 2% Co_2O_3

Material Thickness 0.0224 cm Material Density 2.24 g/cc

Fixture No. 2 Beam Thickness 0.0960 cm

Beam Density 9.13 g/cc Beam Length 21.608 cm

Temperature Test Range: Between 955 °C and 595 °C

Frequency Test Range: Between 82 Hz and 1,400 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.25	Temperature	695 °C
	1,000 Hz	η_D 0.25	Temperature	750 °C
Range	100 Hz	675 °C	760 °C	
	1,000 Hz	720 °C	855 °C	

Complex Modulus E_D'':

Peak	100 Hz	6.8×10^9 PAS	Temperature	720 °C
	1,000 Hz	6.8×10^9 PAS	Temperature	755 °C
Range	100 Hz	670 °C	745 °C	
	1,000 Hz	700 °C	795 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :MATERIAL: J85-14 (AFTER 112 HRS. @ 1500 F)
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0         FROM          MROM          N          ML
              A1            A2           A3          A4
   583.0 10.0000E-04  1.5000E+10    .350  5.3000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL      SL         SH          FROL         C
            B1        B2         B3           B4          B5
   583.0    .190     .300     -.500   2.4000E-02    2.000
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J-85-14 test 2. Retest of 01-57-1 after 112 hours at 815°C. Coating deterirated slightly. η_D has double peak: first peak above 925°C; second peak as listed above.

TABLE 42-B

Beam No. 01-57-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	n_s	n_c	1dB
1750	2	83.32	83.92	82.96	83.60	1.26	.01510	.00878	X
1750	3	234.56	235.15	232.78	236.43	4.03	.01718	.01042	
1750	4	462.46	461.86	459.06	465.71	6.65	.01438	.00853	
1750	5	767.46	766.20	762.40	773.30	10.90	.01420	.00842	
1750	6	1151.00	1147.05	1142.21	1159.71	17.50	.01520	.01028	
1700	2	84.53	84.58	83.92	85.21	1.29	.01526	.00817	
1700	3	238.18	237.46	236.37	240.20	3.83	.01608	.00926	
1700	4	469.64	466.45	466.29	473.11	6.82	.01452	.00920	
1700	5	779.96	773.26	772.81	784.15	11.34	.01454	.01039	
1700	6	1168.15	1157.33	1158.18	1178.13	19.95	.01708	.01355	
1650	2	85.93	85.24	85.28	86.57	1.29	.01501	.00715	
1650	3	241.77	239.52	239.90	[illegible].84	3.94	.01630	.00991	
1650	4	476.87	470.48	473.51	480.07	6.56	.01376	.00966	
1650	5	789.74	779.80	783.98	795.34	11.36	.01438	.01098	
1650	6	1186.50	1167.05	1178.70	1195.50	16.80	.01416	.01173	
1600	2	87.20	86.01	86.56	87.52	1.26	.01445	.00724	
1600	3	244.65	241.76	243.68	245.67	3.91	.01599	.01123	X
1600	4	483.11	4[illegible]4.54	479.88	486.43	6.55	.01356	.01036	
1600	5	901.25	786.21	794.98	806.90	11.92	.01488	.01262	
1600	6	1200.90	1176.30	1190.01	1210.44	20.43	.01701	.01524	
1550	2	88.30	86.91	87.72	88.89	1.17	.01325	.00750	
1550	3	246.94	243.75	246.00	248.17	4.26	.01727	.01399	X
1550	4	469.05	478.41	485.39	492.52	7.13	.01458	.01228	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	n_s	n_c	1dB
1550	5	810.10	792.57	802.40	816.97	14.57	.01795	.01638	
1550	6	1213.20	1185.84	1202.50	1225.90	23.40	.01929	.01796	
1500	2	89.40	87.64	88.79	89.94	1.15	.01286	.00887	
1500	3	248.78	245.64	246.50	251.33	4.83	.01941	.01689	
1500	4	495.20	482.12	489.83	498.98	[illegible].15	.01848	.01719	
1500	5	822.16	798.59	815.00	830.25	15.25	.01855	.01727	
1500	6	1226.90	1194.81	1206.00	1241.60	35.60	102902	.02803	
1450	2	90.64	88.33	90.04	91.32	1.28	.01412	.01129	
1450	3	250.43	247.55	248.88	252.62	3.74	.01493	.01299	
1450	4	502.84	485.93	496.34	508.11	12.07	.02400	.02305	
1450	5	835.70	804.87	823.00	845.70	22.70	.02716	.02610	
1400	2	91.49	89.00	90.78	92.38	1.60	.01749	.01524	
1400	4	508.[illegible]6	489.60	500.02	516.70	16.68	.03281	.03210	
1400	5	847.08	810.91	834.16	860.57	26.41	.03113	.03032	
1400	6		1213.03						
1350	2	92.71	89.66	91.68	94.04	2.36	.02546	.02356	
1350	4	521.92	493.14	511.90	531.94	20.04	.03840	.03781	
1350	5	863.17	816.77	849.06	876.97	27.91	.03233	.03158	
1350	6	1296.60	1221.80	1284.80	1308.48	46.53	.03583	.03519	X
1300	2	94.19	90.31	92.72	95.62	2.90	.03079	.02913	
1300	3	265.29	252.98	262.75	266.83	8.02	.03022	.02864	X
1300	4	528.80	496.73	523.73	533.44	9.71	.01836	.01784	
1300	5	876.62	822.71	868.30	886.94	18.64	.02120	.02063	

TABLE 42-B (Concluded)

Beam No. 01-57-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1300	6	1317.86	1230.63	1307.09	1332.46	25.37	.01926	.01867	
1250	2	96.31	90.96	94.78	97.66	2.88	.02990	.02836	
1250	3		254.70						
1250	4	535.75	500.22	533.04	537.90	9.55	.01789	.01737	X
1250	5	888.60	828.47	883.90	895.41	11.51	.01295	.01236	
1250	6	1329.50	1239.18	1322.05	1335.50	13.45	.01012	.00951	
1200	2	98.03	91.61	96.56	98.47	1.91	.01948	.01806	
1200	3	274.69	256.55	274.17	275.80	3.20	.01165	.00993	X
1200	4	542.41	503.80	539.58	544.74	5.16	.00951	.00911	
1200	5	896.93	834.42	893.89	899.98	6.09	.00679	.00620	
1200	6	1341.85	1248.16	1337.99	1345.59	7.60	.00566	.00503	
1150	2	99.36	92.28	98.88	99.79	0.91	.00986	.00856	
1150	3	272.11	258.18	276.78	278.17	2.73	.00986	.00809	X
1150	4	546.45	507.63	545.25	547.60	2.35	.00430	.00381	
1150	5	904.45	840.47	902.87	906.01	3.14	.00347	.00288	
1150	6	1352.20	1257.15	1350.02	1354.30	4.28	.00317	.00253	
1100	2	100.04	92.96	99.75	100.24	0.49	.00490	.00382	
1100	4	550.60	511.22	549.92	551.16	1.24	.00225	.00178	
1100	5	910.74	846.69	909.89	911.58	1.69	.00186	.00130	
1100	6	1361.40	1266.35	1360.08	1362.50	2.42	.00178	.00123	

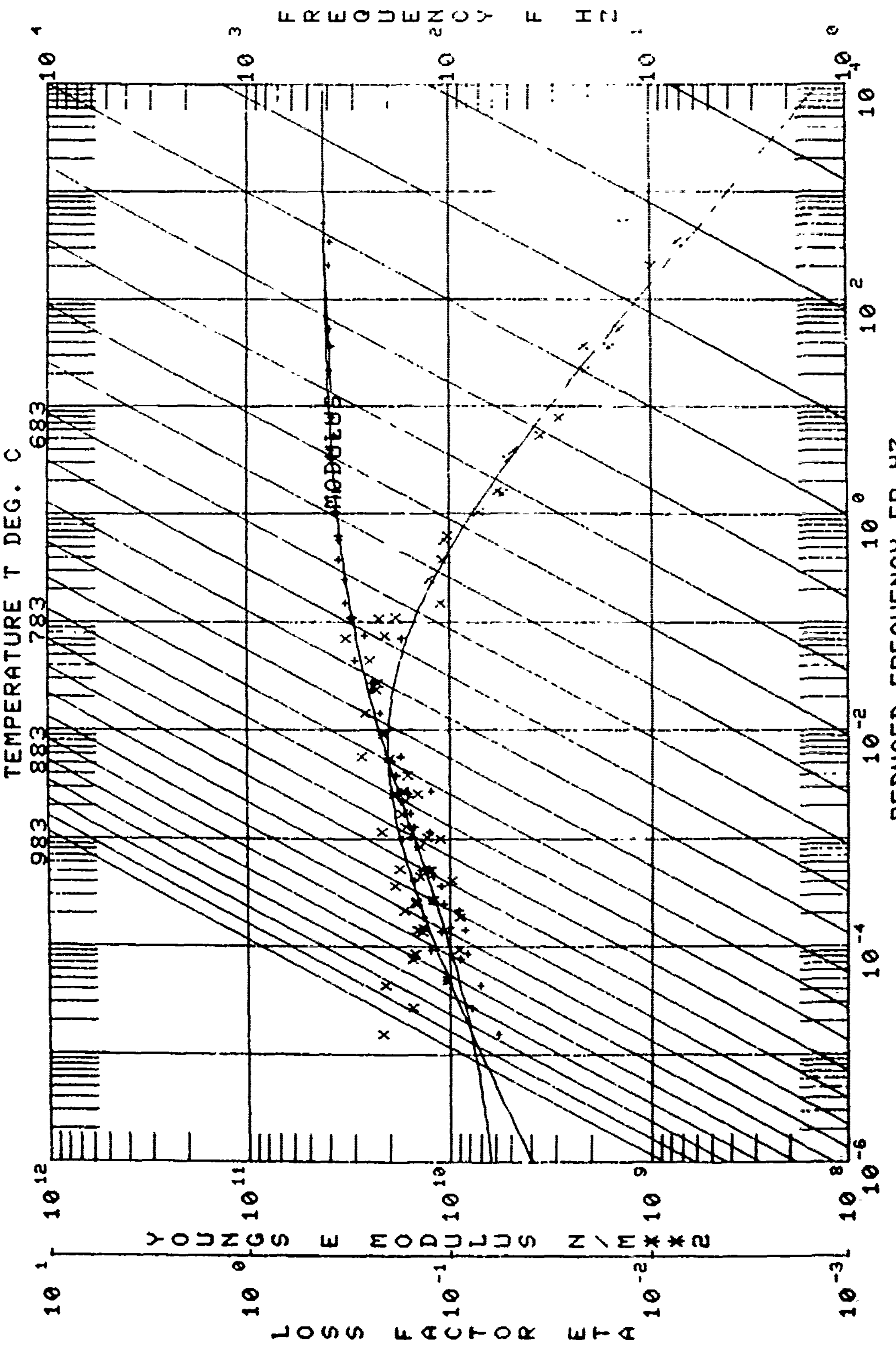
EXPERIMENTAL CODE : 53
MATERIAL :MATERIAL: J85-14 (AFTER 112 HRS. @ 1500 F)
DATA SOURCES
MANUFACTURER :MANUFACTURER:NONE

01-57-2

AFML :AFML:UDRI BEAM COATED ONE SIDE
OTHER :OTHER:74.5%SI O2,10.75%CA O,6.375%NA2 O,6.375%K H C O3,2%CO2

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	5.87475E+09	.2190	954.4	83.3	2.	1.48318E+11	.0088	83.9	1.28667E+09
2	7.25772E+09	.2136	954.4	234.6	3.	1.48535E+11	.0104	235.1	1.55004E+09
3	8.43568E+09	.1528	954.4	462.5	4.	1.49218E+11	.0085	461.9	1.28897E+09
4	8.60547E+09	.1491	954.4	767.5	5.	1 50280E+11	.0084	766.2	1.28275E+09
5	9.22843E+09	.1720	954.4	1151.0	6.	1.51496E+11	.0103	1147.1	1.58709E+09
6	1.12472E+10	.1926	926.7	1168.1	6.	1.54223E+11	.0136	1157.3	2.16639E+09
7	1.09513E+10	.1502	926.7	780.0	5.	1.53062E+11	.0104	773.3	1.64543E+09
8	1.03213E+10	.1396	926.7	469.6	4.	1.52199E+11	.0092	466.5	1.44109E+09
9	9.09759E+09	.1569	926.7	238.2	3.	1.51467E+11	.0093	237.5	1.42760E+09
10	7.94242E+09	.1561	926.7	84.5	2.	1.50660E+11	.0082	84.6	1.23964E+09
11	1.07682E+10	.1049	898.9	85.9	2.	1.53020E+11	.0071	85.2	1.13013E+09
12	1.12575E+10	.1407	898.9	241.8	3.	1.54106E+11	.0099	239.5	1.58349E+09
13	1.26495E+10	.1241	898.9	476.9	4.	1.54840E+11	.0097	470.5	1.56992E+09
14	1.24450E+10	.1438	898.9	789.7	5.	1.55662E+11	.0110	779.8	1.78952E+09
15	1.54467E+10	.1685	871.1	1200.9	6.	1.59321E+11	.0152	1176.3	2.60319E+09
16	1.47503E+10	.1444	871.1	801.2	5.	1.58232E+11	.0126	786.2	2.12989E+09
17	1.43327E+10	.1269	871.1	483.1	4.	1.57524E+11	.0109	474.5	1.81900E+09
18	1.22973E+10	.1498	871.1	244.6	3.	1.57002E+11	.0112	241.8	1.84181E+09
19	1.28099E+10	.0925	871.1	87.2	2.	1.55797E+11	.0072	86.0	1.18478E+09
20	1.38251E+10	.0912	843.3	88.3	2.	1.59038E+11	.0075	86.9	1.26114E+09
21	1.29410E+10	.1809	843.3	247.0	3.	1.59598E+11	.0140	243.7	2.34148E+09
22	1.59709E+10	.1325	843.3	489.0	4.	1.60104E+11	.0123	478.4	2.11606E+09
23	1.60014E+10	.1771	843.3	810.1	5.	1.60802E+11	.0164	792.6	2.83392E+09
24	1.64342E+10	.1909	843.3	1213.2	6.	1.61915E+11	.0180	1185.8	3.13738E+09
25	1.80109E+10	.2791	815.6	1226.9	6.	1.64371E+11	.0280	1194.8	5.02607E+09
26	1.88028E+10	.1648	815.6	822.2	5.	1.63254E+11	.0173	798.6	3.09918E+09
27	1.79023E+10	.1704	815.6	495.2	4.	1.62597E+11	.0172	482.1	3.05126E+09
28	1.29715E+10	.2210	815.6	248.8	3.	1.62082E+11	.0169	245.6	2.86659E+09
29	1.54007E+10	.0996	815.6	89.4	2.	1.61758E+11	.0089	87.6	1.53459E+09
30	1.77514E+10	.1138	787.8	90.6	2.	1.64315E+11	.0113	88.3	2.01947E+09
31	1.27798E+10	.1746	787.8	250.4	3.	1.64613E+11	.0130	247.5	2.23156E+09
32	2.09012E+10	.2033	787.8	502.8	4.	1.65177E+11	.0230	485.9	4.24984E+09
33	2.22426E+10	.2194	787.8	835.7	5.	1.65832E+11	.0261	804.9	4.88056E+09
34	2.48936E+10	.2354	760.0	847.1	5.	1.68330E+11	.0303	810.9	5.86088E+09
35	2.24975E+10	.2698	760.0	508.4	4.	1.67681E+11	.0321	489.6	6.06980E+09
36	1.86717E+10	.1490	760.0	91.5	2.	1.66818E+11	.0152	89.0	2.78228E+09
37	3.03698E+10	.2531	732.2	521.9	4.	1.70115E+11	.0378	493.1	7.68553E+09
38	1.75826E+10	.3316	732.2	836.2	5.	1.70772E+11	.0316	816.8	5.83006E+09
39	3.18018E+10	.2292	732.2	1296.6	6.	1.71884E+11	.0352	1221.8	7.28743E+09
40	3.61200E+10	.1117	704.4	1317.9	6.	1.74378E+11	.0187	1230.6	4.03310E+09
41	3.37589E+10	.1292	704.4	876.6	5.	1.73265E+11	.0206	822.7	4.36038E+09
42	3.32443E+10	.1127	704.4	528.8	4.	1.72601E+11	.0178	496.7	3.74567E+09
43	2.69584E+10	.2122	704.4	265.3	3.	1.71913E+11	.0286	253.0	5.72049E+09
44	2.47811E+10	.2308	704.4	94.2	2.	1.71765E+11	.0291	90.3	5.71846E+09
45	3.12842E+10	.1890	676.7	96.3	2.	1.74246E+11	.0284	91.0	5.91231E+09
46	3.63200E+10	.1037	676.7	535.7	4.	1.75034E+11	.0174	500.2	3.76812E+09
47	3.70854E+10	.0729	676.7	888.6	5.	1.75699E+11	.0124	828.5	2.70345E+09
48	3.74190E+10	.0560	676.7	1329.5	6.	1.76838E+11	.0095	1239.3	2.09493E+09
49	3.89035E+10	.0291	648.9	1341.9	6.	1.79381E+11	.0050	1248.2	1.13134E+09

50	3.83940E+10	.0360	648.9	896.5	5.	1.78232E+11	.0062	834.4	1.38307E+09
51	3.91547E+10	.0520	648.9	542.4	4.	1.77549E+11	.0091	503.8	2.03724E+09
52	3.68585E+10	.0591	648.9	274.9	3.	1.76800E+11	.0099	256.5	2.17851E+09
53	3.62877E+10	.1087	648.9	98.0	2.	1.76745E+11	.0181	91.6	3.94530E+09
54	3.95934E+10	.0489	621.1	99.4	2.	1.79340E+11	.0086	92.3	1.93414E+09
55	3.96865E+10	.0218	621.1	546.4	4.	1.80259E+11	.0038	507.6	8.64634E+08
56	3.96646E+10	.0165	621.1	904.4	5.	1.80826E+11	.0029	840.5	6.54984E+08
57	3.96949E+10	.0146	621.1	1352.2	6.	1.81974E+11	.0025	1257.1	5.78170E+08
58	4.28262E+10	.0138	593.3	1361.4	6.	1.81974E+11	.0025	1257.1	5.90481E+08
59	4.00453E+10	.0075	593.3	910.7	5.	1.83512E+11	.0013	846.7	2.99624E+08
60	4.04872E+10	.0101	593.3	550.6	4.	1.82817E+11	.0018	511.2	4.10339E+08
61	3.99353E+10	.0219	593.3	100.0	2.	1.81993E+11	.0038	93.0	8.74456E+08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683
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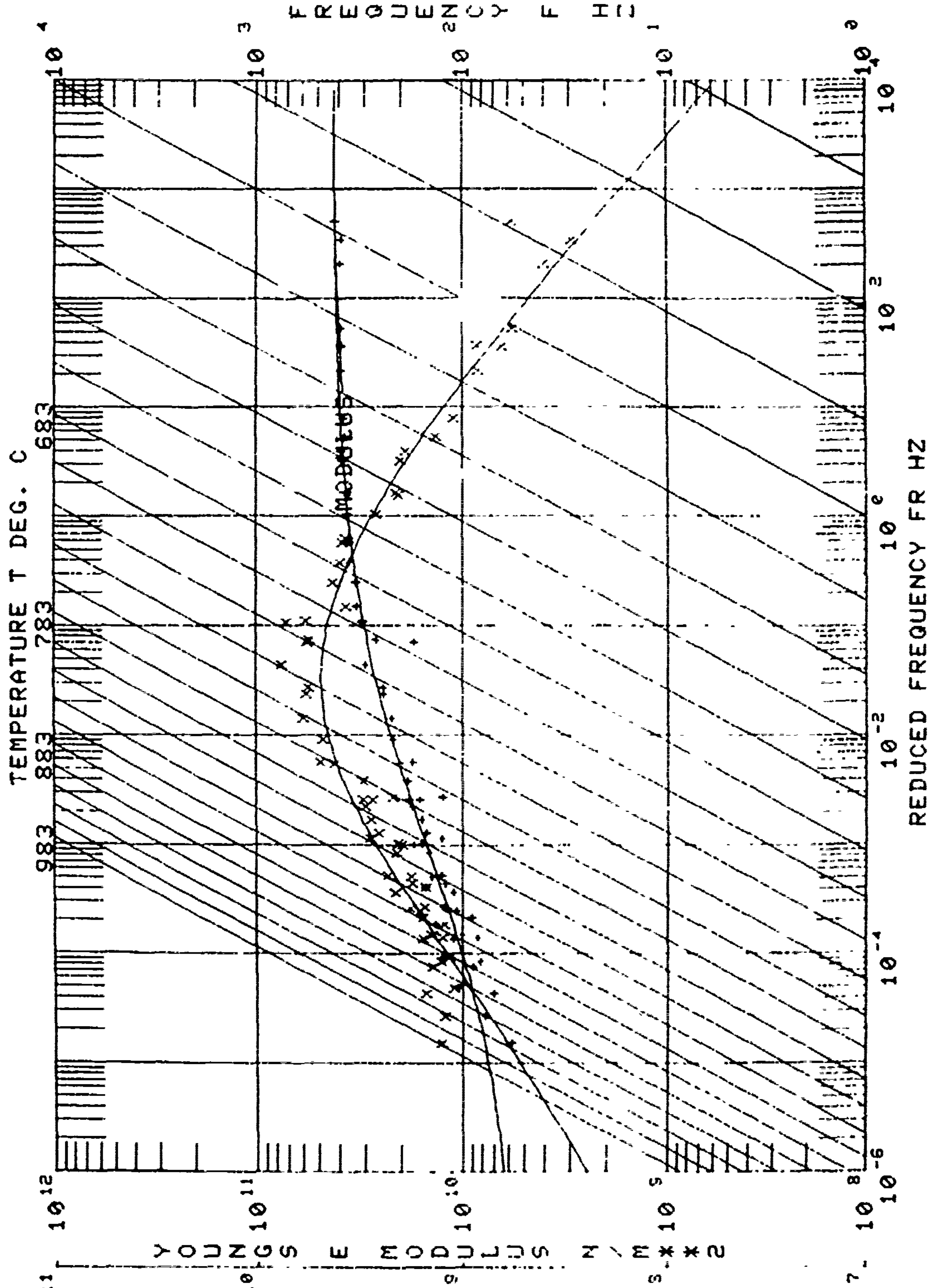
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


FREQUENCY F HZ
TEMPERATURE T DEG. C
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MODULUS
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-57-3

Date 4/8/79

Damping Material 74.5% SiO_2 + 10.75% CaO + 6.375% Na_2O + 6.375% $KHCO_3$ + 2% Co_2O_3

Material Thickness 0.0224 cm Material Density 2.24 g/cc

Fixture No. 2 Beam Thickness 0.0960 cm

Beam Density 9.13 g/cc Beam Length 21.608 cm

Temperature Test Range: Between 925 °C and 620 °C

Frequency Test Range: Between 82 Hz and 1,400 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.20	Temperature	725 °C
	1,000 Hz	η_D 0.20	Temperature	775 °C
Range	100 Hz	685 °C	770 °C	
	1,000 Hz	725 °C	840 °C	

Complex Modulus E_D":

Peak	100 Hz	5.5×10^{10} PAS	Temperature	720 °C
	1,000 Hz	5.5×10^{10} PAS	Temperature	755 °C
Range	100 Hz	675 °C	720 °C	
	1,000 Hz	715 °C	820 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J-85-14 THIRD TEST
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0         FROM         MROM         N          ML
              A1           A2          A3         A4
  583.0  4.0000E-03  2.3000E+10      .450  1.3000E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH        FROL       C
            B1       B2        B3         B4        B5
  583.0    .170     .500     -.600  2.5000E-02   1.500
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J-85-14 test 3. Retest of 01-57-1 after 308 hours at 815°C. No further deterioration.

TABLE 43-B

Beam No. 91-57-3

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1700	2	85.90	84.58	85.10	86.48	1.38	.01607	.00847	
1700	3	241.42	237.46	239.43	243.14	3.71	.01537	.00827	
1700	4	475.61	466.45	472.10	479.20	7.10	.01493	.00973	
1700	5	789.35	773.26	782.12	794.74	12.62	.01699	.01134	
1700	6	1180.97	1157.33	1170.90	1187.33	16.43	.01391	.01031	
1650	2	87.16	85.24	86.48	87.91	1.43	.01641	.00871	
1650	3	244.91	239.52	243.06	246.78	3.72	.01519	.00869	
1650	4	483.47	470.48	479.81	486.46	6.60	.01365	.00966	
1650	5	801.80	779.80	796.54	807.40	10.86	.01354	.01002	
1650	6	1197.35	1167.05	1184.86	1206.83	21.97	.01835	.01573	
1600	2	88.51	86.01	87.79	91.13	1.24	.01401	.00691	
1600	3	248.50	241.76	247.32	249.19	3.67	.01497	.00837	X
1600	4	490.00	474.54	486.47	493.10	6.63	.01353	.01083	
1600	5	810.96	786.21	804.80	819.55	14.75	.01819	.01657	
1600	6	1218.40	1176.30	1206.41	1230.40	23.99	.01969	.01788	
1550	2	90.03	86.91	89.58	90.67	1.09	.01211	.00531	
1550	3	254.50	243.75	252.83	256.78	3.95	.01552	.01099	
1550	4	497.13	478.41	493.74	501.08	7.34	.01476	.01306	
1550	5	824.58	792.57	817.59	830.93	13.34	.01618	.01458	
1550	6	1234.62	1185.84	1221.93	243.61	21.68	.01756	.01626	
1500	2	90.86	87.64	90.42	91.56	1.14	.01255	.00825	
1500	3	256.98	245.64	254.99	258.96	3.97	.01545	.01225	
1500	4	502.57	482.12	497.66	506.10	8.44	.01679	.01560	
1500	5	833.40	798.59	824.61	841.14	16.63	.01983	.01861	
1500	6	1248.25	1194.81	1230.54	1259.71	29.17	.02337	.02236	
1450	2	91.72	88.33	91.16	92.45	1.29	.01406	.01106	
1450	3	259.42	247.55	257.35	261.72	4.37	.01685	.01460	
1450	4	507.66	485.93	501.85	512.67	10.82	.02131	.02040	
1450	5	843.96	804.87	834.38	855.98	21.60	.02559	.02461	
1450	6	1264.40	1204.27	1235.81	1277.92	42.11	.03330	.03245	
1400	2	93.09	89.00	92.21	93.88	1.67	.01794	.01584	
1400	3	265.78	249.42	263.38	269.64	6.26	.02355	.02180	
1400	4	525.75	489.60	523.06	528.49	10.65	.02026	.01954	X
1400	5	858.30	810.97	846.04	870.55	24.51	.02856	.02774	
1400	6	1285.86	1213.03	1260.44	1301.91	41.47	.03225	.03156	
1350	2	94.20	89.66	93.14	95.42	2.28	.02420	.03257	
1350	3	265.38	251.16	262.05	269.17	7.12	.02683	.02542	
1350	4	524.98	493.14	518.15	532.05	13.90	.02648	.02589	
1350	5	875.20	816.77	862.64	887.33	24.69	.02821	.02751	
1350	6	1306.40	1221.80	1288.80	1318.20	29.40	.02250	.02190	
1350	2	94.54	89.66	93.66	95.95	2.29	.02422	.02259	
1350	3	268.96	251.16	265.65	272.27	6.62	.02461	.02320	
1350	4	528.61	493.14	521.26	533.92	[illegible]	.02376	.02317	
1350	5	875.56	816.77	864.30	885.9[illegible]	[illegible]	.02461	.02391	
1350	6	1312.98	1221.80	1300.53	[illegible]	[illegible]	[illegible]	.02165	
[illegible]	[illegible]	96.15	[illegible]	[illegible]	[illegible]	[illegible]	.02907	[illegible]	

TABLE 43-B (Concluded)

Beam No. 01-57-3

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1300	3	270.87	252.98	267.79	274.24	6.45	.02381	.02261	
1300	4	533.20	496.73	528.92	537.62	8.70	.01650	.01601	
1300	5	885.71	822.71	879.18	894.22	15.04	.01698	.01639	
1300	6	1327.80	1230.63	1319.56	1340.90	21.34	.01670	.01616	
1250	2	97.77	90.96	96.76	99.09	2.33	.02383	.02253	
1250	3	274.37	254.70	272.68	276..7	4.19	.01527	.01425	
1250	4	539.94	500.22	535.28	542.53	7.25	.01343	.01309	
1250	5	895.90	828.47	891.50	900.15	8.65	.00966	.00914	
1250	6	1339.45	1239.78	1335.35	1346.31	10.96	.00813	.00763	
1200	2	98.97	91.61	98.39	99.80	1.42	.01435	.01313	
1200	3	277.04	256.55	276.06	278.43	2.37	.00855	.00765	
1200	4	545.42	503.80	542.78	546.82	4.04	.00741	.00701	
1200	5	903.11	834.42	900.71	905.37	4.66	.00516	.00468	
1200	6	1349.72	1248.16	1347.24	1352.95	5.71	.00423	.00377	
1150	2	99.97	92.28	99.54	100.25	0.71	.00710	.00593	
1150	3	279.40	258.18	278.82	280.00	1.18	.00422	.00333	
1150	4	549.56	507.63	547.86	550.26	2.40	.00437	.00398	
1150	5	909.34	840.47	908.52	911.04	2.52	.00277	.00233	
1150	6	1359.09	1257.15	1347.66	1361.19	3.53	.00260	.00217	
1100	2	100.59	92.96	100.41	100.77	0.36	.00358	.00244	
1100	3	281.10	260.25	280.79	281.51	0.72	.00256	.00185	
1100	4	553.04	511.22	552.38	553.55	1.17	.00212	.00174	
1100	5	914.79	846.69	914.00	915.43	1.43	.00156	.00114	

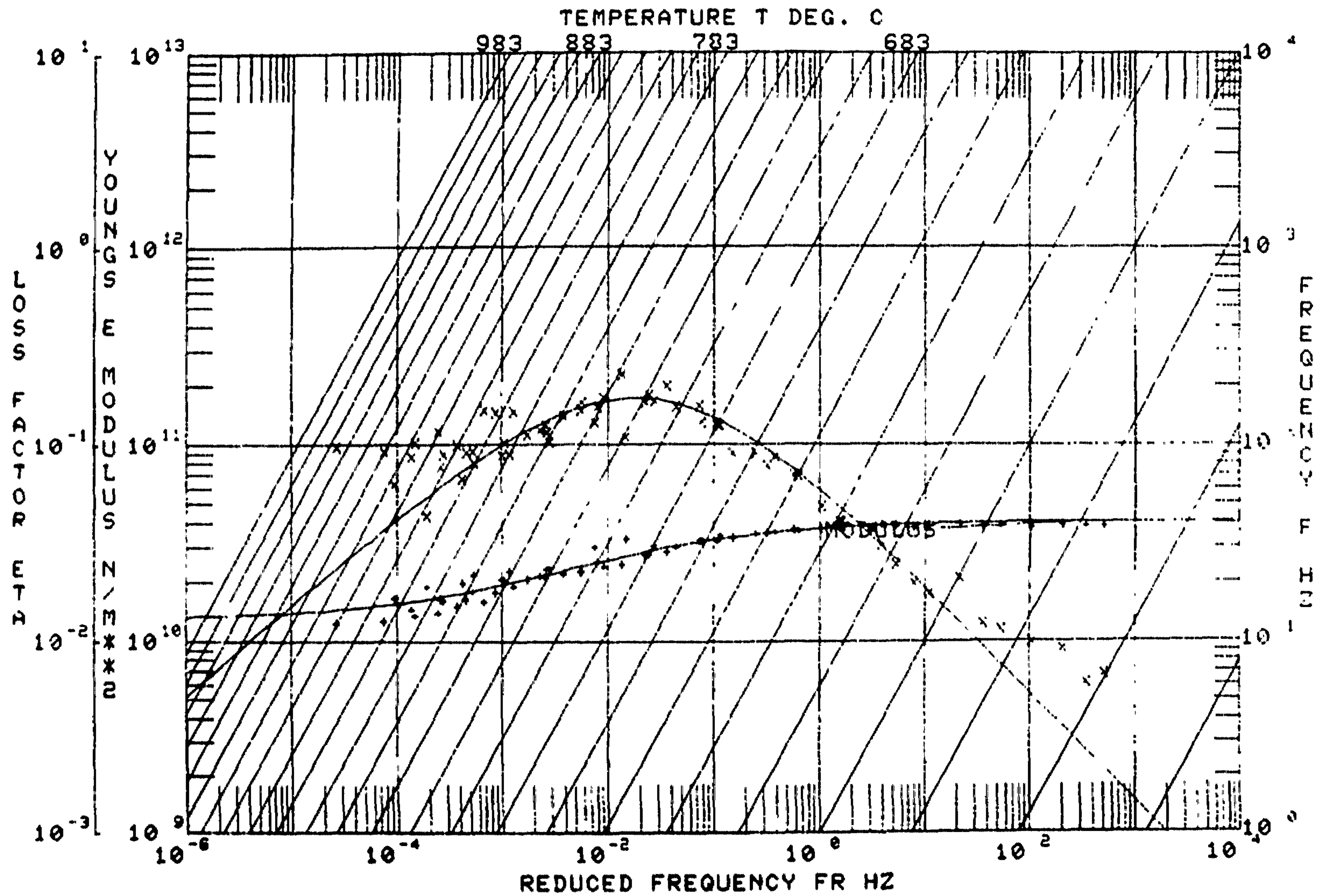
Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	6	1366.80	1266.35	1365.65	1367.95	2.30	.00168	.00127	
1050	2	101.10	93.52	101.00	101.22	0.22	.00218	.00105	
1050	3	282.40	261.50	282.11	282.58	0.47	.00166	.00104	
1050	4	555.58	514.25	555.20	555.96	0.76	.00137	.00099	
1050	5	918.83	852.00	918.50	919.45	0.95	.00103	.00063	
1050	6	1372.12	1273.90	1371.49	1373.23	1.74	.00127	.00088	

EXPERIMENTAL CODE : 68
MATERIAL :J-85-14 THIRD TEST
DATA SOURCES
MANUFACTURER IN
AFML :UDRI BEAM COATED ONE SIDE 18 APRIL, 1979
OTHER :74.5 S:O2, 10.7 Ca O, 6.38 KHCO3, 6.38 Na2 O, 2.0 Co2 O3

01-57-3

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.25453E+10	.0984	926.7	85.9	2.	1.36963E+11	.0085	84.6	1.23456E+09
2	1.29255E+10	.0941	926.7	241.4	3.	1.37697E+11	.0083	237.5	1.21570E+09
3	1.38471E+10	.1047	926.7	475.6	4.	1.38363E+11	.0097	466.5	1.44962E+09
4	1.42701E+10	.1195	926.7	789.3	5.	1.39147E+11	.0113	773.3	1.70487E+09
5	1.54502E+10	.1014	926.7	1181.0	6.	1.38994E+11	.0103	1152.3	1.56665E+09
6	1.61831E+10	.1520	898.9	1197.4	[illegible]	1.42568E+11	.0157	1167.1	2.45957E+09
7	1.67465E+10	.0935	898.9	801.8	5.	1.41511E+11	.0100	779.8	1.56535E+09
8	1.64753E+10	.0910	898.9	483.5	4.	1.40764E+11	.0097	470.5	1.49851E+09
9	1.48735E+10	.0889	898.9	244.9	3.	1.40097E+11	.0087	239.5	1.32191E+09
10	1.47743E+10	.8905	898.9	87.2	2.	1.39109E+11	.0871	85.2	1.31569E+10
11	1.95148E+10	.1498	871.1	1218.4	6.	1.44837E+11	.0179	1176.3	2.92254E+09
12	1.80387E+10	.1473	871.1	811.0	5.	1.43847E+11	.0166	786.2	2.65652E+09
13	1.82951E+10	.0948	871.1	490.0	4.	1.43204E+11	.0108	474.5	1.73398E+09
14	1.67922E+10	.0785	871.1	248.5	3.	1.42729E+11	.0084	241.8	1.31761E+09
15	1.70197E+10	.0636	871.1	88.5	2.	1.41634E+11	.0069	86.0	1.08311E+09
16	1.95199E+10	.0444	843.3	90.0	2.	1.44613E+11	.0053	86.9	8.66877E+08
17	2.21984E+10	.0830	843.3	254.5	3.	1.45089E+11	.0110	243.7	1.84339E+09
18	2.06740E+10	.1048	843.3	497.1	4.	1.45549E+11	.0131	478.4	2.16609E+09
19	2.11675E+10	.1152	843.3	824.6	5.	1.46184E+11	.0146	792.6	2.43761E+09
20	2.15530E+10	.1273	843.3	1234.6	6.	1.47196E+11	.0163	1185.8	2.74317E+09
21	2.30690E+10	.1677	815.6	1248.2	6.	1.49431E+11	.0224	1194.8	3.86974E+09
22	2.25383E+10	.1415	815.6	833.4	5.	1.48413E+11	.0186	798.6	3.18829E+09
23	2.20636E+10	.1202	815.6	502.6	4.	1.47815E+11	.0156	482.1	2.65279E+09
24	2.32197E+10	.0904	815.6	257.0	3.	1.47348E+11	.0123	245.6	2.09926E+09
25	2.01177E+10	.0682	815.6	90.9	2.	1.47053E+11	.0082	87.6	1.37290E+09
26	2.09692E+10	.0896	787.8	91.7	2.	1.49378E+11	.0111	88.3	1.87849E+09
27	2.41774E+10	.1056	787.8	259.4	3.	1.49648E+11	.0146	247.5	2.55421E+09
28	2.31755E+10	.1531	787.8	507.7	4.	1.50161E+11	.0204	485.9	3.54759E+09
29	2.45645E+10	.1769	787.8	844.0	5.	1.50756E+11	.0246	804.9	4.34509E+09
30	2.51977E+10	.2301	787.8	1264.4	6.	1.51807E+11	.0325	1204.3	5.79736E+09
31	2.90848E+10	.2023	760.0	1285.9	6.	1.54023E+11	.0316	1213.0	5.88496E+09
32	2.83172E+10	.1806	760.0	858.3	5.	1.53050E+11	.0277	811.0	5.11516E+09
33	3.36540E+10	.1115	760.0	525.7	4.	1.52437E+11	.0195	489.6	3.75278E+09
34	3.06230E+10	.1330	760.0	265.8	3.	1.51917E+11	.0218	249.4	4.07430E+09
35	2.38242E+10	.1172	760.0	93.1	2.	1.51652E+11	.0158	89.0	2.79200E+09
36	2.57904E+10	.1587	732.2	94.2	2.	1.53910E+11	.0226	89.7	4.09270E+09
37	3.08096E+10	.1594	732.2	525.0	4.	1.54650E+11	.0259	493.1	4.91121E+09
38	3.34364E+10	.1599	732.2	875.2	5.	1.55247E+11	.0275	816.8	5.34513E+09
39	2.78885E+10	.1683	732.2	265.4	3.	1.54044E+11	.0254	251.2	4.69398E+09
40	3.28234E+10	.1296	732.2	1306.4	6.	1.56258E+11	.0219	1221.8	4.25471E+09
41	3.69152E+10	.0887	704.4	1327.8	6.	1.58525E+11	.0162	1230.6	3.27572E+09
42	3.57910E+10	.0916	704.4	885.7	5.	1.57513E+11	.0164	822.7	3.27848E+09
43	3.44885E+10	.0917	704.4	533.2	4.	1.56910E+11	.0160	496.7	3.16123E+09
44	3.33618E+10	.1322	704.4	270.9	3.	1.56285E+11	.0226	253.0	4.41202E+09
45	3.11466E+10	.1698	704.4	96.1	2.	1.56150E+11	.0276	90.3	5.28990E+09
46	3.53573E+10	.1276	676.7	97.8	2.	1.58405E+11	.0225	91.0	4.50992E+09
47	3.62408E+10	.0793	676.7	274.4	3.	1.58417E+11	.0142	254.7	2.87219E+09
48	3.72221E+10	.0712	676.7	539.9	4.	1.59122E+11	.0130	500.2	2.64850E+09
49	3.81155E+10	.0493	676.7	895.9	5.	1.59727E+11	.0091	828.5	1.87989E+09

50	3.80147E+10	.0415	676.7	1339.4	6.	1.60891E+11	.0076	1239.8	1.57625E+09
51	3.89075E+10	.0203	648.9	1349.7	6.	1.63074E+11	.0038	1248.2	7.91610E+08
52	3.90266E+10	.0251	648.9	903.1	5.	1.62029E+11	.0047	834.4	5.79086E+08
53	3.89883E+10	.0375	648.9	545.4	4.	1.61408E+11	.0070	503.8	1.46213E+09
54	3.77736E+10	.0417	648.9	277.0	3.	1.60727E+11	.0077	256.5	1.57636E+09
55	3.79446E+10	.0714	648.9	99.0	2.	1.60677E+11	.0131	91.6	2.70847E+09
56	3.96595E+10	.0316	621.1	100.0	2.	1.63036E+11	.0059	92.3	1.25192E+09
57	3.91536E+10	.0179	621.1	279.4	3.	1.62776E+11	.0033	258.2	6.99593E+08
58	3.95767E+10	.0213	621.1	549.6	4.	1.63871E+11	.0040	507.6	8.42770E+08
59	3.94478E+10	.0125	621.1	909.3	5.	1.64387E+11	.0023	840.5	4.94011E+08
60	3.93626E+10	.0117	621.1	1359.1	6.	1.65431E+11	.0022	1257.1	4.61872E+08
61	3.92323E+10	.0070	593.3	1366.8	6.	1.67861E+11	.0013	1266.4	2.72880E+08
62	3.94312E+10	.0062	593.3	914.8	5.	1.66829E+11	.0011	846.7	2.44224E+08
63	3.98282E+10	.0094	593.3	553.0	4.	1.66197E+11	.0017	511.2	3.72834E+08
64	3.89717E+10	.0101	593.3	281.1	3.	1.65396E+11	.0018	260.2	3.92576E+08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983
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783
683
LOSS FACTOR ETA
YOUNGS E MODULUS N/M**2
FREQUENCY F HZ
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REDUCED FREQUENCY FR HZ
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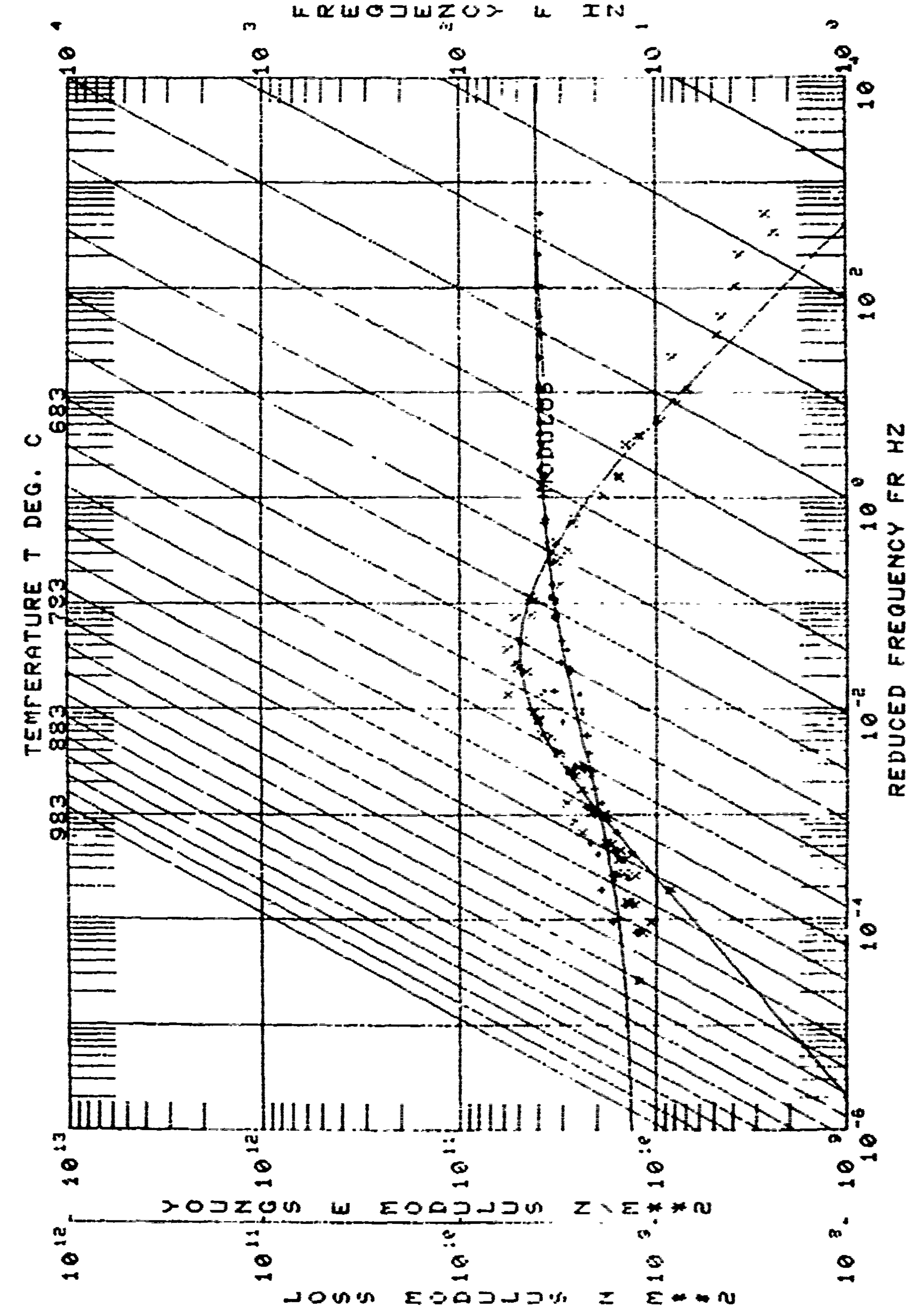

TEMPERATURE T DEG. C
683
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983
MODULUS
REDUCED FREQUENCY FR HZ

Beam No. 01-59-1

Date 3/23/79

Damping Material Corning 7556

Material Thickness 0.0279 cm Material Density 4.68 g/cc

Fixture No. 2 Beam Thickness 0.0970 cm

Beam Density 9.13 g/cc Beam Length 21.689 cm

Temperature Test Range: Between 315 °C and 595 °C

Frequency Test Range: Between 89 Hz and 1,350 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.90		Temperature	520 °C
	1,000 Hz	η_D 0.90		Temperature	570 °C
Range	100 Hz	500 °C	540 °C		
	1,000 Hz	525 °C	595 °C		

Complex Modulus E_D'':

Peak	100 Hz	5.9×10^9 PAS		Temperature	490 °C
	1,000 Hz	5.9×10^9 PAS		Temperature	540 °C
Range	100 Hz	450 °C	520 °C		
	1,000 Hz	500 °C	585 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-59  7556
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0         FROM          MROM         N          ML
              A1            A2          A3         A4
   525.0  2.2122E+01  4.0000E+09     .500  4.3000E+08
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0    ETAFROL     SL        SH         FROL        C
           B1       B2        B3          B4         B5
   525.0    .800     .850    -.570  4.0000E+01    1.250
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: F-107 project.

TABLE 44-B

Beam No. 01-59-1

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	2	89.48	94.94	89.37	89.58	0.21	.00235		
1100	3	250.81	266.65	250.33	251.30	0.97	.00387		
1100	4	490.51	522.20	489.90	491.32	1.42	.00289		
1100	5	812.37	865.00	810.63	814.50	3.87	.00476		
1100	6	1215.75	1292.00	1212.69	1220.15	7.46	.00614		
1050	2	89.97	95.52	89.77	90.17	0.40	.00445		
1050	3	252.57	268.60	251.27	253.92	2.65	.01049		
1050	4	494.69	525.20	491.40	498.53	7.13	.01441		
1050	5	822.12	870.00	809.96	829.95	19.99	.02432		
1050	6	1237.64	1299.00	1222.70	1252.58	29.88	.02414		
1000	2	91.40	96.06	90.29	92.70	2.41	.02637		
1000	3	258.57	270.15	254.15	263.00	8.85	.03423		
1000	4	510.31	528.10	497.97	518.59	20.62	.04041		
1000	5	853.52	854.00	831.07	872.30	41.19	.04826		
1000	6	1275.87	1307.00	1243.21	1298.40	55.19	.04326		
975	2	92.40	96.42	91.09	94.74	3.63	.03929		
975	3	260.48	270.80	254.36	265.19	10.83	.04158		
975	4	512.80	529.60	503.18	521.56	36.12	.70440		
975	5	876.39	877.00	855.31	898.95	43.67	.04983		
975	6	1286.87	1310.00	1251.33	1300.09	95.66	.07432		
950	2	95.62	96.60	93.65	98.18	4.53	.04738		
950	3	267.18	271.70	264.80	269.60	9.43	.03531		X
950	4	534.08	531.00	522.86	544.68	21.84	.04086		

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
950	5	899.15	879.00	885.44	914.44	29.00	.03225		
950	6	1344.10	1313.00	1330.02	1358.16	55.30	.04114		
925	2	98.07	96.84	96.37	100.11	3.74	.03814		
925	3	278.20	272.30	276.12	280.28	8.18	.02939		X
925	4	543.22	532.20	538.84	547.60	17.21	.03169		
925	5	913.29	881.50	903.62	923.96	20.34	.02226		
925	6	1370.32	1317.00	1358.85	1387.86	29.01	.02117		
900	2	100.25	97.10	99.10	101.39	2.29	.02284		
900	3	282.86	273.00	280.65	285.08	4.43	.01566		
900	4	556.40	533.70	552.61	559.77	7.61	.01287		
900	5	924.54	884.00	919.11	929.27	10.16	.01099		
900	6	1382.60	1320.00	1375.51	1389.86	14.35	.01038		
850	2	100.92	97.58	100.71	101.14	0.43	.00426		
850	3	284.96	274.30	284.37	285.42	1.05	.00368		
850	4	562.54	536.40	561.70	564.05	2.35	.00418		
850	5	933.60	888.00	931.73	935.39	3.66	.00392		
850	6	1393.50	1327.00	1392.30	1395.70	3.40	.00244		
800	2	101.48	98.08	101.39	101.60	0.21	.00207		
800	3	286.86	275.60	286.64	287.09	0.44	.00153		
800	4	565.21	534.00	565.88	566.54	0.66	.00117		
800	5	943.60	893.00	942.63	944.45	1.82	.00193		
800	6	1403.17	1333.50	1402.07	1404.35	2.28	.00162		
700	2	102.53	99.06	102.48	102.67	0.19	.00185		

TABLE 44-B (Concluded)

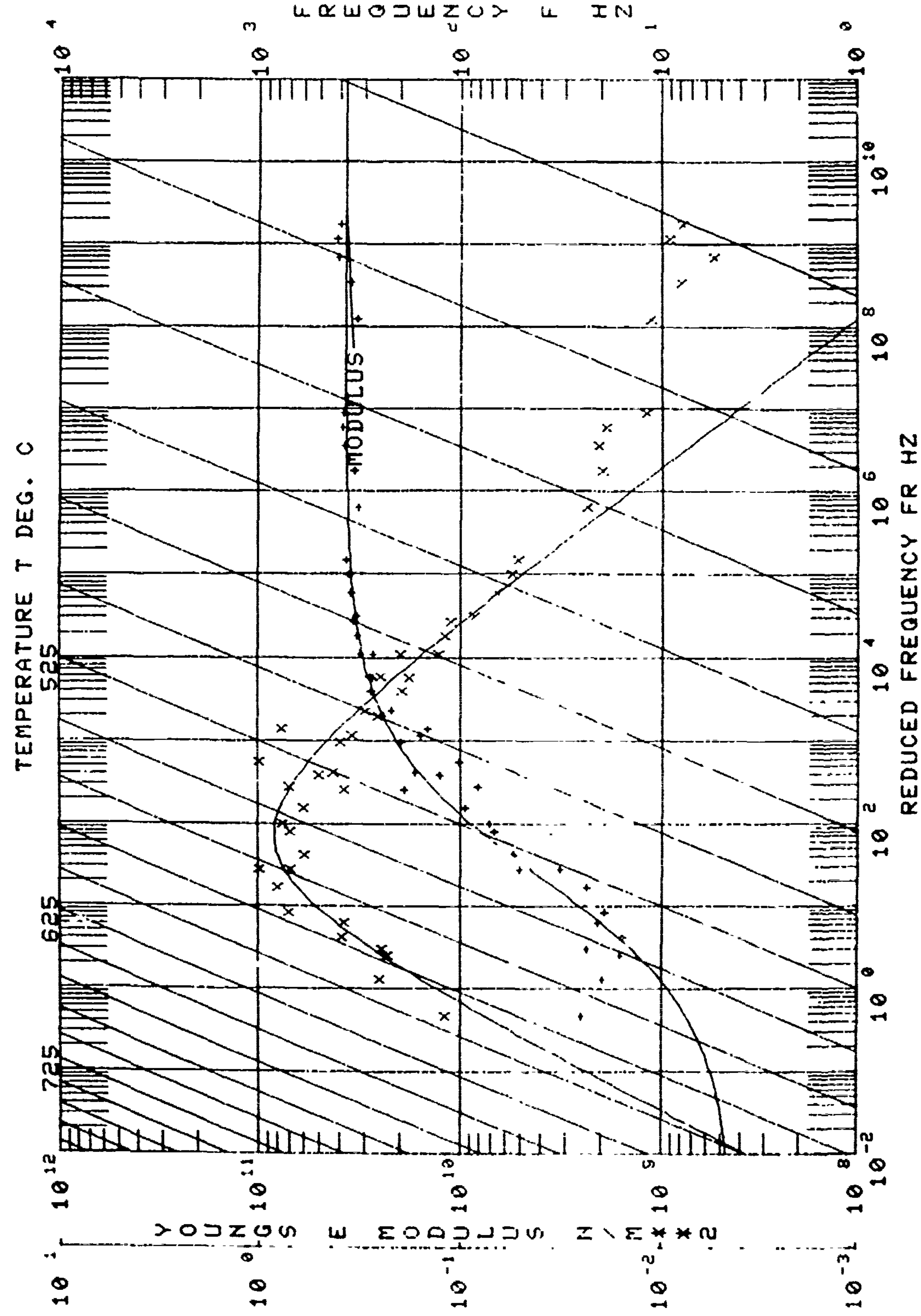
Beam No. 01-59-1

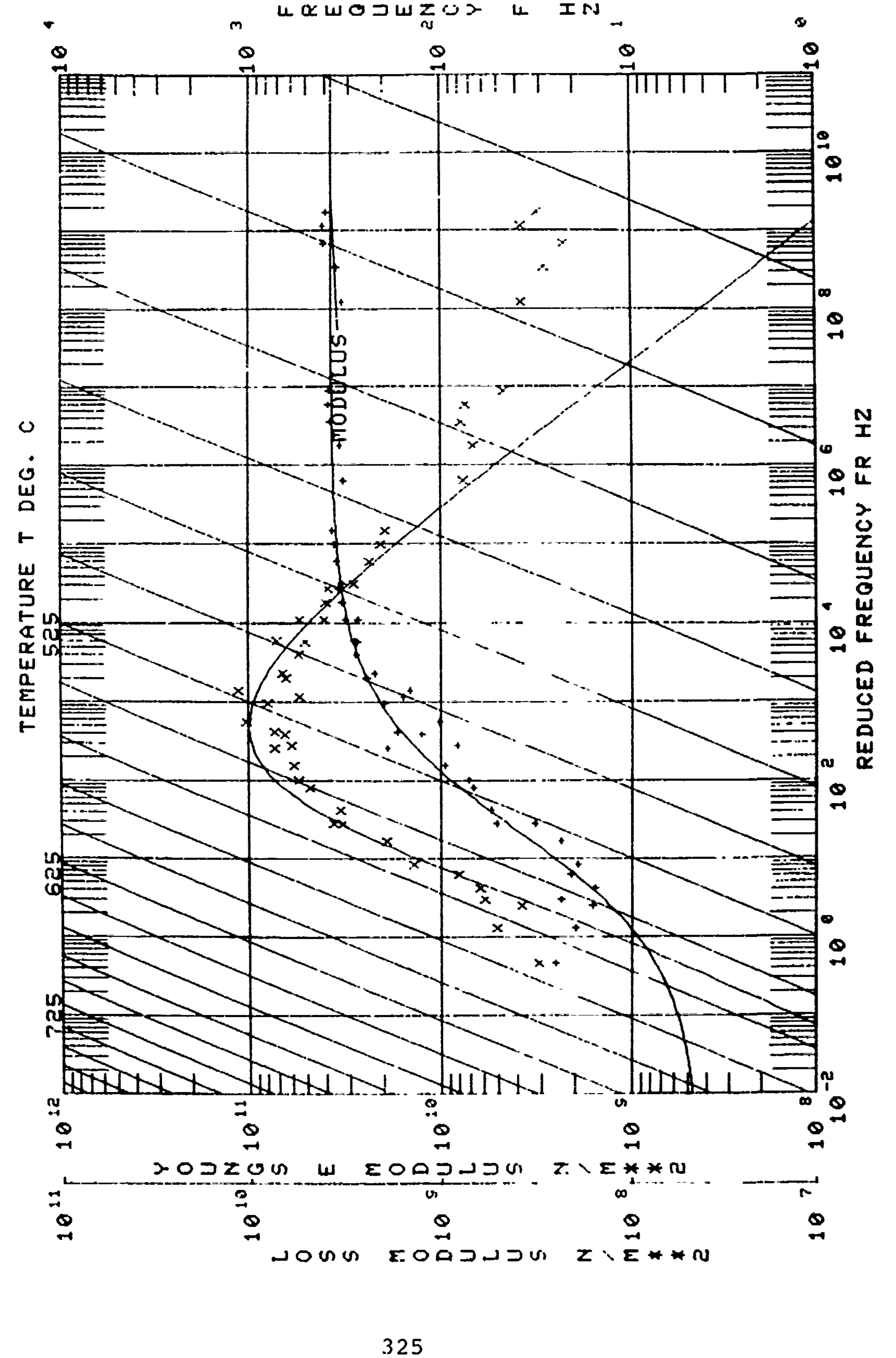
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
700	3	289.08	277.95	288.91	289.26	0.35	00121		
700	4	570.34	539.20	569.98	570.69	0.71	.00124		
700	5	949.93	901.00	949.08	950.78	1.70	.00179		
700	6	1413.72	1320.00	1412.52	1414.72	2.20	.00156		
650	2	104.60	99.52	104.50	104.70	0.20	00191		
650	3	239.59	279.15	293.42	293.72	0.30	.00102		
650	4	577.89	546.60	577.27	578.33	1.06	.00183		
650	5	961.06	905.00	960.61	961.40	0.79	.00082		
650	6	1419.70	1354.00	1416.40	1423.20	6.80	.00[illegible]79		
600	2	105.94	100.00	105.86	106.06	0.20	.00189		
600	3	295.74	280.25	295.62	295.87	0.25	.00085		
600	4	581.86	549.10	581.39	582.32	0.39	.00160		
600	5	968.14	908.00	967.84	968.73	0.89	.00092		
600	6	1431.50	1360.00	1428.86	1434.34	5.48	.00[illegible]83		

EXPERIMENTAL CODE : 61
MATERIAL :01-59 7556
DATA SOURCES
MANUFACTURER :CORNING GLASS No. 7556
AFML :UDRI BEAM COATED ONE SIDE MAR. 28,1979
OTHER :NONE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	4.41481E+10	.0090	315.6	105.9	2.	2.10879E+11	.0019	100.0	3.95298E+08
2	4.25999E+10	.0041	315.6	295.7	3.	2.11251E+11	.0008	280.2	1.75984E+08
3	4.43160E+10	.0076	315.6	581.9	4.	2.11191E+11	.0016	549.1	3.35390E+08
4	4.69647E+10	.0042	315.6	968.1	5.	2.11329E+11	.0009	908.0	1.96671E+08
5	4.19340E+10	.0189	315.6	1431.5	6.	2.13248E+11	.0038	1360.0	7.94227E+08
6	3.99890E+10	.0243	343.3	1419.7	6.	2.11370E+11	.0048	1354.0	9.73101E+08
7	4.49515E+10	.0038	343.3	961.1	5.	2.09935E+11	.0008	905.0	1.71993E+08
8	4.29664E+10	.0088	343.3	577.9	4.	2.09272E+11	.0018	546.6	3.77470E+08
9	4.08889E+10	.0051	343.3	293.6	3.	2.09596E+11	.0010	279.2	2.07389E+08
10	4.04844E+10	.0095	343.3	104.6	2.	2.08859E+11	.0019	99.5	3.86223E+08
11	3.40979E+10	.0104	371.1	102.5	2.	2.06933E+11	.0018	99.1	3.53856E+08
12	3.61103E+10	.0065	371.1	289.1	3.	2.07798E+11	.0012	278.0	2.35808E+08
13	4.20051E+10	.0059	371.1	570.3	4.	2.03644E+11	.0012	539.2	2.49[illegible]61E+08
14	4.15859E+10	.0088	371.1	949.9	5.	2.08083E+11	.0018	921.0	3.64020E+08
15	4.64695E+10	.0069	371.1	1413.7	6.	2.00888E+11	.0016	1320.0	3.21395E+08
16	3.32930E+10	.0116	426.7	101.5	2.	2.02859E+11	.0021	98.1	3.87727E+08
17	3.58034E+10	.0082	426.7	286.9	3.	2.04299E+11	.0015	275.6	2.93843E+08
18	4.14585E+10	.0056	426.7	565.2	4.	1.99735E+11	.0012	534.0	2.31139E+08
19	4.17473E+10	.0093	426.7	943.6	5.	2.04404E+11	.0019	893.0	3.88190E+08
20	4.01913E+10	.0080	426.7	1403.2	6.	2.05018E+11	.0016	1333.5	3.22669E+08
21	3.92906E+10	.0195	454.4	933.6	5.	2.02122E+11	.0039	888.0	7.67765E+08
22	3.82051E+10	.0212	454.4	562.5	4.	2.01535E+11	.0042	536.4	8.10150E+08
23	3.42594E+10	.0202	454.4	284.6	3.	2.02376E+11	.0037	274.3	6.93426E+08
24	3.28012E+10	.0240	454.4	100.9	2.	2.00796E+11	.0043	97.6	7.88838E+08
25	3.18450E+10	.1308	482.2	100.2	2.	1.98825E+11	.0228	97.1	4.16616E[illegible]
26	3.34211E+10	.0871	482.2	282.9	3.	2.00463E+11	.0157	273.0	2.91083E+0[illegible]
27	3.55696E+10	.0677	482.2	556.4	4.	1.99511E+11	.0128	533.7	2.40858E+09
28	3.69197E+10	.0569	482.2	924.5	5.	2.00305E+11	.0110	884.0	2.09953E+09
29	3.76019E+10	.0531	482.2	1382.6	6.	2.00888E+11	.0104	1320.0	1.99780E+09
30	3.49106E+10	.1139	496.1	1370.3	6.	1.99976E+11	.0212	1317.0	3.97544E+09
31	3.33892E+10	.1233	496.1	913.8	5.	1.99174E+11	.0223	881.5	4.11713E+09
32	2.76823E+10	.2014	496.1	543.2	4.	1.98391E+11	.0317	532.2	5.57468E+09
33	2.81635E+10	.1851	496.1	278.2	3.	1.99436E+11	.0294	272.3	5.21193E+09
34	2.48686E+10	.2628	496.1	98.1	2.	1.97762E+11	.0381	96.8	6.53442E+09
35	1.59872E+10	.3510	510.0	267.8	3.	1.98558E+11	.0353	271.7	5.61155E+09
36	1.72192E+10	.4388	510.0	95.6	2.	1.96783E+11	.0474	96.6	7.55657E+09
37	2.25173E+10	.3043	510.0	534.1	4.	1.97497E+11	.0409	531.0	6.85191E+09
38	2.83998E+10	.2007	510.0	899.2	5.	1.98045E+11	.0323	879.0	5.69995E+09
39	2.87681E+10	.2542	510.0	1344.1	6.	1.98763E+11	.0411	1313.0	7.31375E+09
40	1.48947E+10	.7827	523.9	1286.9	6.	1.97856E+11	.0743	1310.0	1.16584E+10
41	2.03306E+10	.4026	523.9	876.4	5.	1.97145E+11	.0498	877.6	8.18489E+09
42	1.03887E+10	1.0134	523.9	512.8	4.	1.96457E+11	.0704	529.6	1.05278E+10
43	8.42198E+09	.7270	523.9	260.5	3.	1.97303E+11	.0416	270.8	6.12238E+09
44	5.23940E+09	.7091	537.8	91.4	2.	1.94589E+11	.0264	96.1	3.71519E+09
45	7.32498E+09	.7768	523.9	92.4	2.	1.96050E+11	.0393	96.4	5.69041E+09
46	6.98033E+09	.7087	537.8	258.6	3.	1.96299E+11	.0342	270.2	4.94674E+09
47	9.72705E+09	.6138	537.8	510.3	4.	1.95346E+11	.0404	528.1	5.97076E+09
48	1.93171E+10	.3893	537.8	853.5	5.	1.86940E+11	.0483	854.0	7.51941E+09
49	1.28802E+10	.5151	537.8	1275.9	6.	1.96951E+11	.0433	1307.0	6.63414E+09

50	2.39852E+09	.2512	565.6	90.0	2.	1.92407E+11	.0044	95.5	6.02560E+08
51	1.96147E+09	.7269	565.6	252.6	3.	1.94053E+11	.0105	268.6	1.42586E+09
52	2.41183E+09	.8124	565.6	494.7	4.	1.93206E+11	.0144	525.2	1.95939E+09
53	3.30989E+09	1.0124	565.6	822.1	5.	1.94011E+11	.0243	870.0	3.35096E+09
54	5.61606E+09	.6077	565.6	1237.6	6.	1.94547E+11	.0241	1299.0	3.41313E+09
55	2.13552E+09	.3884	593.3	1215.7	6.	1.92456E+11	.0061	1292.0	8.29349E+08
56	1.60605E+09	.3968	593.3	812.4	5.	1.91787E+11	.0045	865.0	6.37246E+08
57	3.90049E+10	.0123	454.4	1393.5	6.	2.03024E+11	.0024	1327.0	4.78321E+08
58	1.64255E+09	.2347	593.3	490.5	4.	1.91005E+11	.0029	522.2	3.85496E+08
59	2.01267E+09	.2578	593.3	250.8	3.	1.91245E+11	.0039	266.7	5.18854E+08
60	2.56721E+09	.1227	593.3	89.5	2.	1.90078E+11	.0024	94.9	3.15003E+08


TEMPERATURE T DEG. C
525
625
725
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
525
625
725
FREQUENCY F HZ
MODULUS
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-59-2

Date 6/29/79

Damping Material Pemco 79 R 2634

Material Thickness 0.0213 cm Material Density 2.50 g/cc

Fixture No. 2 Beam Thickness 0.0970 cm

Beam Density 9.13 g/cc Beam Length 21.729 cm

Temperature Test Range: Between 510 °C and 760 °C

Frequency Test Range: Between 88 Hz and 1,420 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.15		Temperature	620 °C
	1,000 Hz	η_D 0.15		Temperature	680 °C
Range	100 Hz	660 °C	590 °C		
	1,000 Hz	635 °C	740 °C		

Complex Modulus E_D'':

Peak	100 Hz	5×10^8 PAS		Temperature	605 °C
	1,000 Hz	5×10^8 PAS		Temperature	650 °C
Range	100 Hz	565 °C	640 °C		
	1,000 Hz	610 °C	700 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-59-2
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM           MROM          N          ML
               A1             A2           A3         A4
  500.0   1.1000E-01   4.0445E+09      .700   2.3500E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL          SH          FROL        C
           B1        B2          B3           B4         B5
  500.0     .150     .600      -.450   2.5000E-02      .700
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS:

TABLE 45-B

Beam No. 01-59-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1400	2	88.44	90.90	88.29	88.52	0.45	.00511	.00301	
1400	3	248.67	255.75	247.84	249.72	1.88	.00756	.00581	
1400	4	488.87	500.50	486.99	490.37	3.38	.00691	.00619	
1400	5	810.13	829.00	805.88	813.94	8.06	.00995	.00913	
1400	6	1211.70	1240.00	1203.67	1221.20	17.53	.01447	.01378	
1350	2	89.26	91.60	88.96	89.54	0.58	.00650	.00487	
1350	3	250.76	257.75	249.42	225.39	2.97	.01184	.01043	
1350	4	494.17	504.50	490.09	497.18	7.09	.01435	.01376	
1350	5	817.10	836.00	809.80	823.70	13.90	.01701	.01631	
1350	6	1228.20	1248.00	1214.60	1246.95	32.35	.02634	.25740	
1300	2	90.20	92.25	89.53	90.69	1.16	.01286	.01145	
1300	3	254.86	259.50	252.32	257.14	4.82	.01891	.01771	
1300	4	501.12	507.50	494.57	508.21	13.64	.02720	.02671	
1300	5	833.77	842.00	820.35	847.66	27.31	.03275	.03216	
1300	6	1246.82	1257.00	1227.29	1269.96	42.67	.03422	.03368	
1250	2	91.31	92.90	90.20	92.27	2.07	.02267	.02137	
1250	3	255.92	261.75	252.74	258.99	6.25	.02442	.02340	
1250	4	512.28	513.00	502.40	522.25	19.85	.03875	.03822	
1250	5	857.37	848.00	847.90	863.72	31.09	.03626	.03574	X
1250	6	1287.40	1267.00	1262.90	1312.47	49.57	.03850	.03800	
1200	2	93.07	93.60	91.34	94.89	3.55	.03814	.03692	
1200	3	265.79	263.50	260.71	272.03	11.32	.04259	.04169	
1200	4	526.88	515.50	516.75	540.58	23.83	.04523	.04483	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1200	5	880.00	854.00	863.11	896.65	33.54	.03811	.03753	
1200	6	1301.07	1275.50	1282.78	1231.25	48.47	.03725	.03579	
1150	2	96.56	94.43	94.34	98.28	3.94	.04080	.03963	
1150	3	272.89	264.28	267.59	278.34	11.25	.04123	.04034	
1150	4	545.01	519.25	536.13	550.97	14.84	.02723	.02684	
1150	5	903.05	859.95	891.08	915.86	24.80	.02746	.02702	
1150	6	1364.26	1285.28	1352.80	1375.72	45.04	.03302	.03259	X
1100	2	99.39	89.48	97.80	101.03	3.23	.03250	.03136	
1100	4	551.40	490.51	546.17	556.34	10.17	.01844	.01806	
1100	5	920.21	812.37	912.87	928.73	15.86	.01724	.01682	
1100	6	1381.72	1215.75	1377.25	1388.96	23.01	.01665	.01624	X
1050	2	101.24	89.97	100.30	102.35	2.05	.02025	.01908	
1050	3	285.78	252.57	283.85	288.03	4.18	.01463	.01392	
1050	4	560.98	494.69	558.85	562.6	7.53	.01342	.01304	X
1050	5	930.70	922.12	926.73	935.53	8.80	.09946	.09060	
1050	6	1395.80	1237.64	1391.10	1402.81	11.71	.00839	.00800	
1000	2	102.83	91.40	102.20	103.35	1.15	.01125	.01125	
1000	3	289.33	258.57	288.13	290.40	2.27	.00785	.00785	
1000	4	557.38	510.31	565.69	569.36	3.67	.00647	.00647	
1000	5	939.50	853.52	936.95	941.90	4.95	.00527	.00527	
1000	6	1406.00	1275.87	1403.10	1409.70	6.60	.00469	.00469	
950	2	103.64	95.62	103.36	103.98	0.62	.00598	.00598	
950	3	291.54	267.18	291.00	292.24	1.24	.00425	.00425	

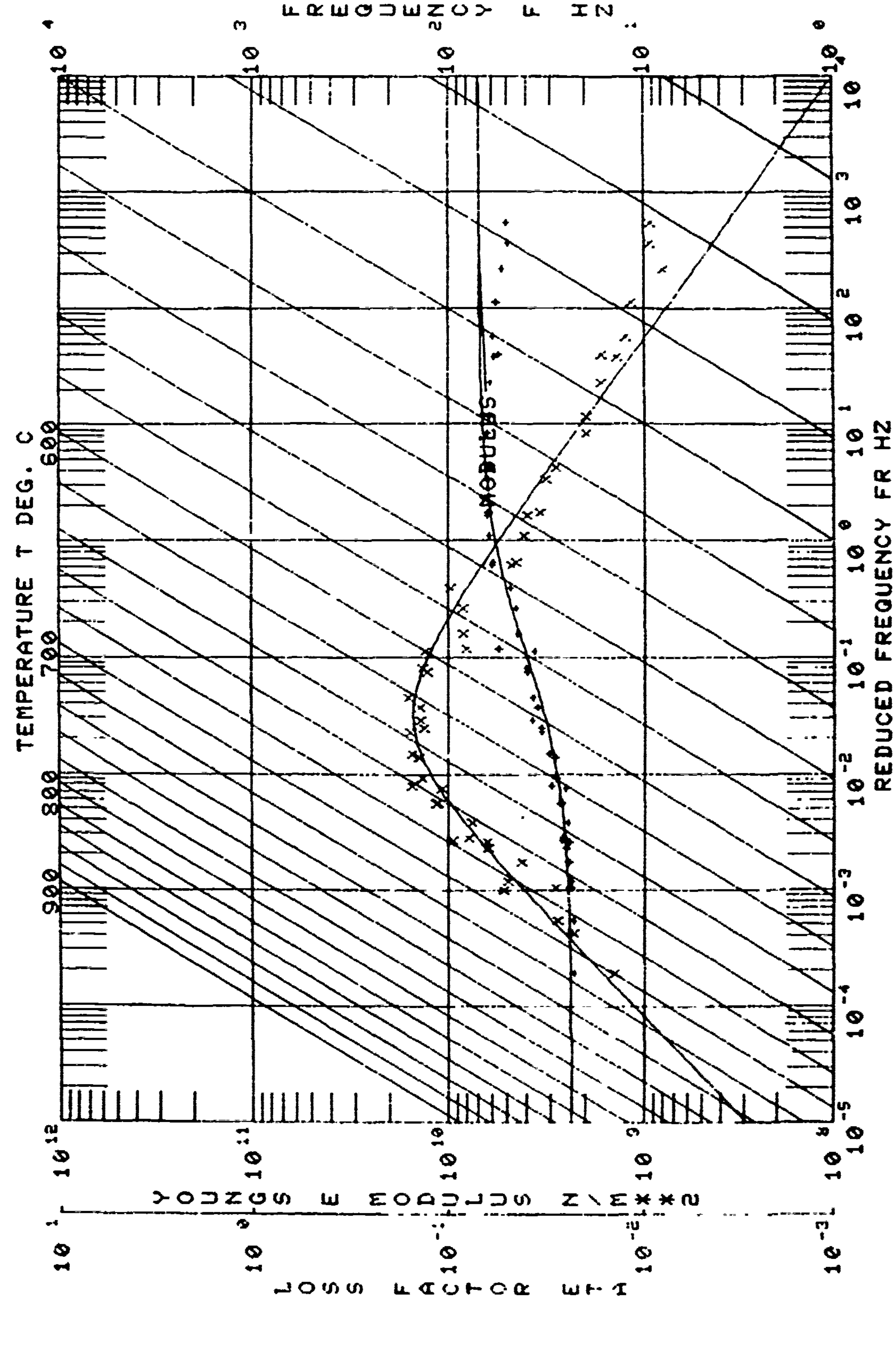
TABLE 45-B (Concluded)

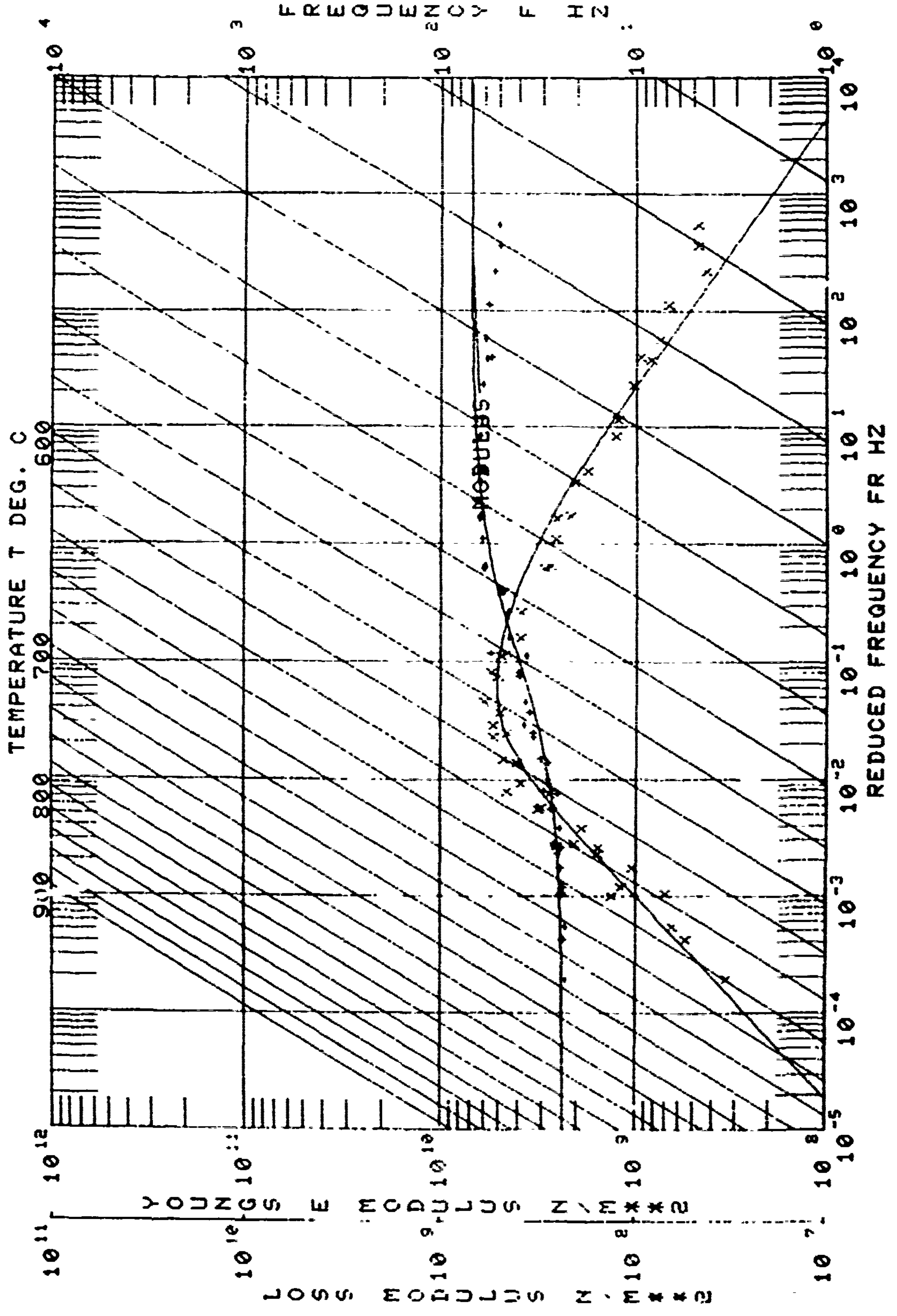
Beam No. 01-59-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
950	4	571.20	534.08	570.64	572.20	1.56	.00273	.00273	
950	5	945.67	899.15	944.49	947.35	2.86	.00302	.00302	
950	6	1415.50	1344.10	1413.50	1417.70	4.20	.00297	.00297	

EXPERIMENTAL CODE : 93
MATERIAL :01-59-2
DATA SOURCES
MANUFACTURER :NONO
AFML :UDRI BARE BEAM COATED ONE SIDE
OTHER :NONO

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	5.68602E+09	.0171	510.0	103.6	2.	1.92801E+11	.0060	95.6	9.70289E+07
2	5.81788E+09	.0120	510.0	291.5	3.	1.93149E+11	.0043	268.0	6.96927E+07
3	5.45013E+09	.0082	510.0	571.2	4.	1.99785E+11	.0027	534.1	4.44814E+07
4	5.09770E+09	.0096	510.0	945.7	5.	2.07220E+11	.0030	899.2	4.90743E+07
5	5.16686E+09	.0094	510.0	1415.5	6.	2.08281E+11	.0030	1344.1	4.86583E+07
6	6.06879E+09	.0127	537.8	1406.0	6.	1.87672E+11	.0047	1275.9	7.70341E+07
7	6.00075E+09	.0143	537.8	939.5	5.	1.86721E+11	.0053	953.5	8.53894E+07
8	6.18510E+09	.0171	537.8	567.4	4.	1.82398E+11	.0065	510.3	1.05488E+08
9	6.30484E+09	.0203	537.8	289.3	3.	1.79822E+11	.0079	258.6	1.281[illegible]E+08
10	6.35102E+09	.0287	537.8	102.8	2.	1.76159E+11	.0113	91.4	1.82206E+08
11	6.15972E+09	.0486	565.6	101.2	2.	1.70690E+11	.0191	90.0	2.99562E+08
12	6.36688E+09	.0350	565.6	285.8	3.	1.71574E+11	.0139	252.6	2.22595E+08
13	6.43169E+09	.0326	565.6	561.0	4.	1.71403E+11	.0130	494.7	2.09425E+08
14	6.44381E+09	.2273	565.6	930.7	5.	1.73261E+11	.0906	822.2	1.46458E+09
15	6.44593E+09	.0203	565.6	1395.8	6.	1.76593E+11	.0080	1237.6	1.30645E+08
16	6.46502E+09	.0403	593.3	1361.7	6.	1.70402E+11	.0162	1215.7	2.60673E+08
17	6.31208E+09	.0421	593.3	920.2	5.	1.69151E+11	.0168	812.4	2.65877E+08
18	6.05045E+09	.0462	593.3	551.4	4.	1.68518E+11	.0181	490.5	2.79274E+08
19	5.69583E+09	.0829	593.3	99.4	2.	1.68836E+11	.0314	89.5	4.72185E+08
20	3.83117E+09	.1430	621.1	96.6	2.	1.88032E+11	.0396	94.4	5.47729E+08
21	4.09106E+09	.1392	621.1	272.9	3.	1.87852E+11	.0403	264.3	5.69339E+08
22	4.58581E+09	.0863	621.1	545.0	4.	1.88845E+11	.0268	519.2	3.95593E+08
23	4.61736E+09	.0867	621.1	903.1	5.	1.89545E+11	.0270	859.9	4.00182E+08
24	4.96270E+09	.1002	621.1	1364.3	6.	1.90450E+11	.0326	1285.3	4.97301E+08
25	3.74552E+09	.1345	648.9	1301.1	6.	1.87563E+11	.0368	1275.5	5.03830E+08
26	4.01305E+09	.1307	648.9	880.0	5.	1.86931E+11	.0375	854.0	5.24559E+08
27	3.77087E+09	.1624	648.9	526.9	4.	1.86127E+11	.0448	515.5	6.12205E+08
28	3.42762E+09	.1616	648.9	265.8	3.	1.86745E+11	.0417	263.5	5.54071E+08
29	3.02027E+09	.1555	648.9	93.1	2.	1.84741E+11	.0369	93.6	4.69660E+08
30	3.59136E+09	.1417	676.7	1287.4	6.	1.85071E+11	.0380	1267.0	5.09038E+08
31	3.44459E+09	.1368	676.7	857.4	5.	1.84314E+11	.0357	848.0	4.71352E+08
32	3.12238E+09	.1569	676.7	512.3	4.	1.84326E+11	.0382	513.0	4.89889E+08
33	2.59314E+09	.1102	676.7	255.9	3.	1.84273E+11	.0234	261.7	2.85663E+08
34	2.68858E+09	.0970	676.7	91.3	2.	1.81988E+11	.0214	92.9	2.60768E+08
35	2.52652E+09	.0539	704.4	90.2	2.	1.79451E+11	.0115	92.2	1.36138E+08
36	2.65685E+09	.0808	704.4	254.9	3.	1.81118E+11	.0177	259.5	2.14691E+08
37	2.77781E+09	.1176	704.4	501.1	4.	1.80395E+11	.0267	507.5	3.26510E+08
38	2.86750E+09	.1390	704.4	833.8	5.	1.81715E+11	.0322	842.0	3.98591E+08
39	2.91675E+09	.1440	704.4	1246.8	6.	1.82161E+11	.0337	1257.0	4.20087E+08
40	2.68336E+09	.1158	732.2	1228.2	6.	1.79562E+11	.0257	1248.0	3.10809E+08
41	2.51866E+09	.0770	732.2	817.1	5.	1.79134E+11	.0163	836.0	1.93405E+08
42	2.55289E+09	.0639	732.2	494.2	4.	1.78268E+11	.0138	504.5	1.63190E+08
43	2.39753E+09	.0509	732.2	250.8	3.	1.78684E+11	.0104	257.7	1.22071E+08
44	2.41165E+09	.0235	732.2	89.3	2.	1.76931E+11	.0049	91.6	5.66480E+07
45	2.33881E+09	.0147	760.0	88.4	2.	1.74237E+11	.0030	90.9	3.43565E+07
46	2.34713E+09	.0285	760.0	248.7	3.	1.75921E+11	.0058	255.7	6.68597E+07
47	2.44620E+09	.0293	760.0	488.9	4.	1.75452E+11	.0062	500.5	7.17879E+07
48	2.48711E+09	.0431	760.0	810.1	5.	1.7614[illegible]E+11	.0091	829.0	1.06421E+08
49	2.48143E+09	.0651	760.0	1211.7	6.	1.77267E+11	.0138	1240.0	1.61622E+08


TEMPERATURE T DEG. C
600
700
800
900
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS


TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

341

Beam No. 01-60-1

Date 3/20/79

Damping Material Owens Illinois SG-67-A

Material Thickness	0.0282	cm	Material Density	5.38	g/cc
Fixture No.	2		Beam Thickness	0.0970	cm
Beam Density	9.13	g/cc	Beam Length	21.73	cm

Temperature Test Range: Between 510 °C and 400 °C

Frequency Test Range: Between 90 Hz and 1,400 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.51		Temperature	460 °C
	1,000 Hz	η_D 0.51		Temperature	485 °C
Range	100 Hz	445 °C	470 °C		
	1,000 Hz	470 °C	500 °C		

Complex Modulus E_D'':

Peak	100 Hz	6.9×10^9 PAS		Temperature	425 °C
	1,000 Hz	6.9×10^9 PAS		Temperature	470 °C
Range	100 Hz	405 °C	445 °C		
	1,000 Hz	450 °C	495 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :BEAM NO. 01-60
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM          N          ML
               A1            A2           A3          A4
   450.0   6.6000E+01   1.2600E+10     .770   3.3000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0      ETAFROL     SL        SH         FROL        C
            B1        B2        B3          B4         B5
   450.0     .520      .630     -.610   5.0000E+01     .400
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: F-107-6. Vitreous frit. Thermal soaked for 100 hours at 540°C. Coating deteriorated badly. The coating was gone around the edges for about 0.32 cm and flaked off in center of beam.

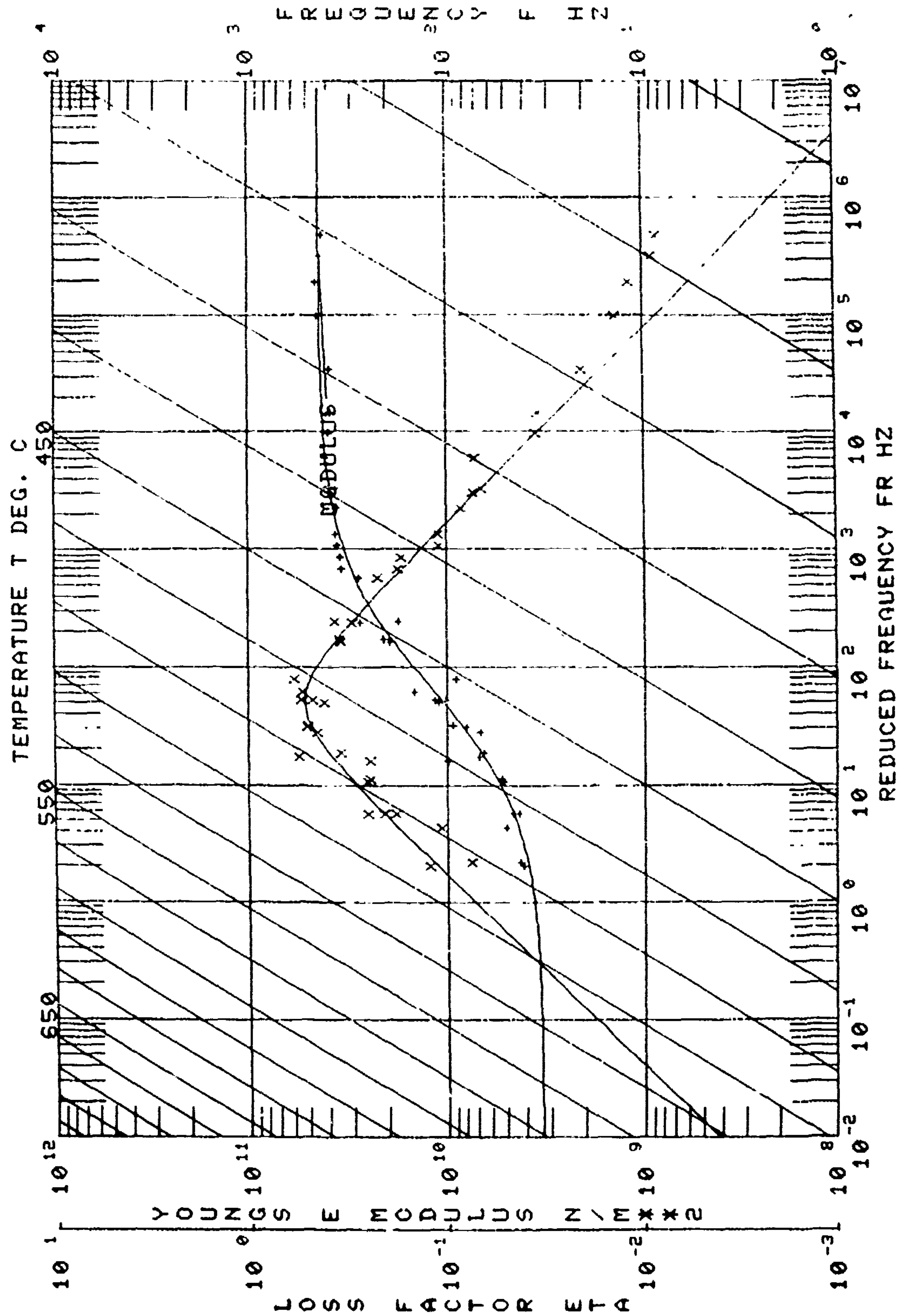
TABLE 46-B

Beam No. 01-60-1

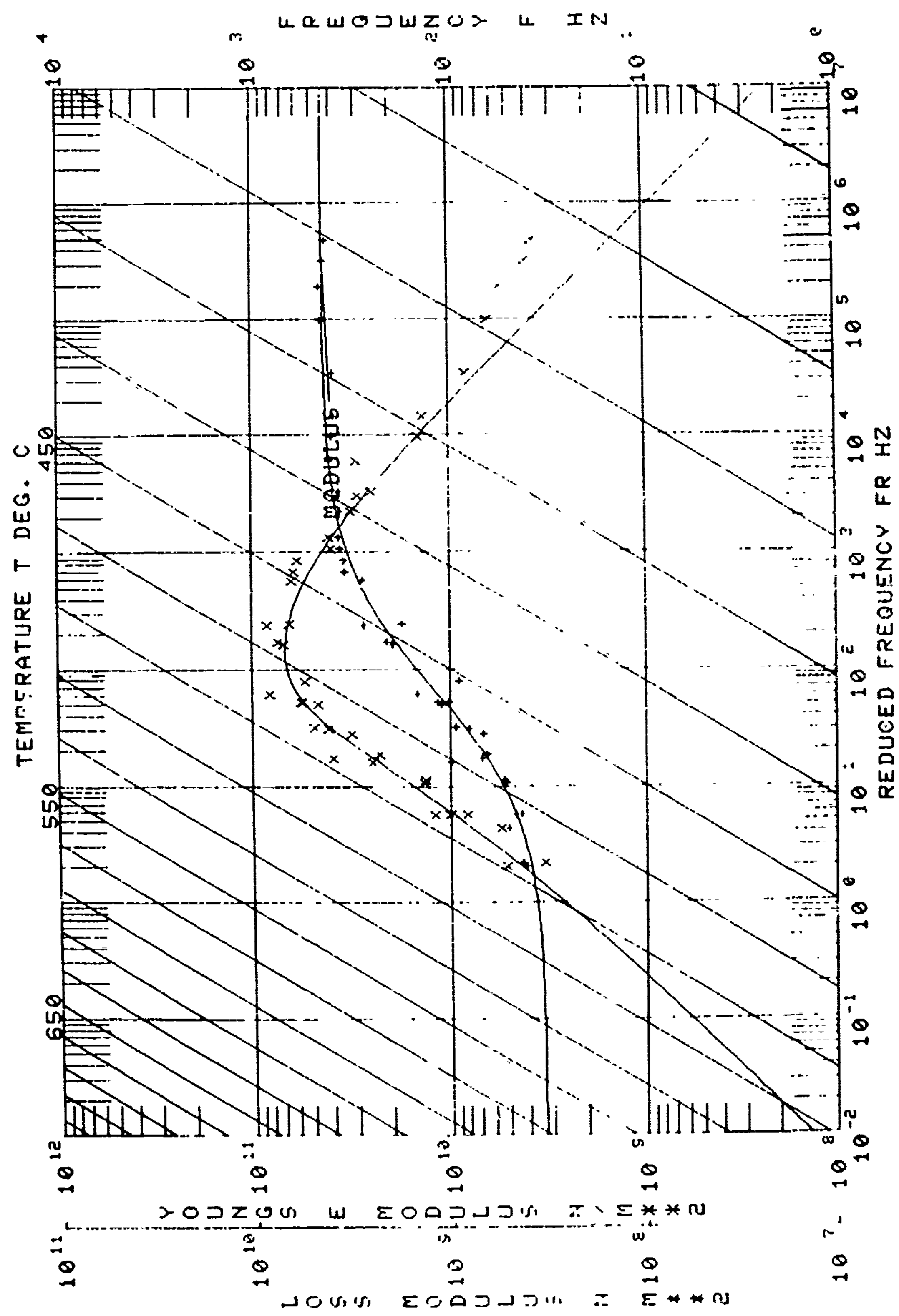
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	n_s	n_c	1dB
950	2	89.42	95.40	89.36	89.52	0.16	.00179		
950	3	251.49	267.75	251.18	251.80	0.62	.00247		
950	4	494.04	524.50	493.02	495.05	2.03	.00411		
950	5	818.30	869.00	815.87	821.59	5.72	.00699		
950	6	1225.00	1300.00	1219.33	1231.44	12.11	.00989		
925	2	89.84	95.70	89.67	90.01	0.34	.00378		
925	3	252.25	268.50	251.49	253.02	1.53	.00607		
925	4	495.99	526.00	493.75	498.63	4.88	.00984		
925	5	824.63	871.00	817.13	830.80	13.67	.01658		
925	6	1235.00	1303.09	1223.27	1251.30	28.03	.02270		
900	2	90.20	95.90	89.86	90.53	0.67	.00743		
900	4	501.58	527.00	494.76	509.62	14.86	.02963		
900	5	837.70	873.50	821.10	854.30	33.20	.03963		
900	6	1256.50	1307.00	1242.25	1271.79	58.05	.04620		X
900	2	90.20	95.90	89.83	90.63	0.80	.00887		
900	3	254.45	265.20	253.29	255.60	4.53	.01784		X
900	4	504.26	527.00	494.78	512.15	17.37	.03445		
900	5	841.74	873.50	825.44	857.80	32.36	.03844		
900	6	1248.20	1307.00	1224.[illegible]	1271.96	47.66	.03818		
875	2	91.16	96.15	89.85	92.46	2.61	.02863		
875	3	259.46	269.75	257.32	261.60	8.41	.03242		X
875	4	517.43	528.50	502.60	525.30	22.70	.004387		
875	5	866.56	876.00	847.55	885.58	38.03	.04389		
875	6	1286.65	1310.00	1259.60	1312.70	54.10	.04205		
850	2	93.89	96.40	90.80	95.88	5.08	.05411		
850	3	268.62	270.50	266.28	272.66	12.54	.04668		X
850	5	890.13	878.00	875.71	908.73	33.02	.03710		
850	6	1355.25	1312.50	1330.00	1374.50	44.50	.03284		
825	2	97.83	96.60	95.53	100.40	4.87	.04978		
825	3	279.54	271.00	276.61	281.47	9.55	.03417		X
825	4	551.34	531.00	545.03	557.38	12.35	[illegible]		
825	5	912.64	880.00	904.79	920.49	15.70	.01720		
825	6	1365.90	1316.00	1356.50	1374.90	18.40	.01347		
800	2	100.40	96.85	99.24	101.44	2.20	.02191		
800	3	284.09	271.75	281.60	286.02	4.42	.01556		
800	4	559.28	532.50	556.04	562.03	5.99	.01071		
800	5	923.23	982.00	919.13	926.12	6.99	.00757		
800	6	1375.83	1319.00	1370.93	1380.81	9.88	.00718		
750	2	101.72	97.30	101.50	101.94	0.44	.00433		
750	3	289.35	273.00	288.89	289.82	0.93	.00321		
750	4	568.02	535.00	567.07	568.64	1.57	.00276		
750	5	935.5[illegible]	886.00	934.90	936.80	1.90	.00203		
750	6	1394.22	1325.00	1392.78	1395.42	2.64	.00189		

EXPERIMENTAL CODE : 63
MATERIAL :BEAM NO. 01-60
DATA SOURCES
MANUFACTURER :OWENS ILLINOIS SG-67-A
AFML :UDRI BEAM COATED ONE SIDE
OTHER :GREEN

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	4.77363E+09	.2148	482.2	90.2	2.	1.93941E+11	.0074	95.9	1.02545E+09
2	8.11913E+09	.5223	482.2	501.6	4.	1.94533E+11	.0296	527.0	4.24099E+09
3	5.31071E+09	.2596	510.0	1225.0	6.	1.94847E+11	.0099	1300.0	1.37850E+09
4	5.13920E+09	.1101	510.0	494.0	4.	1.92692E+11	.0041	524.5	5.65877E+08
5	4.22734E+09	.1251	496.1	89.8	2.	1.93133E+11	.0039	95.7	5.29036E+08
6	4.45507E+09	.1874	496.1	252.2	3.	1.93908E+11	.0061	268.5	8.34906E+08
7	5.47000E+09	.2499	496.1	496.0	4.	1.93795E+11	.0098	526.0	1.36673E+09
8	6.62022E+09	.3530	496.1	824.6	5.	1.94457E+11	.0166	871.0	2.33716E+09
9	6.97837E+09	.4630	496.1	1235.0	6.	1.95747E+11	.0227	1303.0	3.23114E+09
10	9.21461E+09	.6063	482.2	1248.2	6.	1.96951E+11	.0382	1307.0	5.58649E+09
11	1.17959E+10	.4858	482.2	841.7	5.	1.95575E+11	.0384	873.5	5.72998E+09
12	9.65773E+09	.5183	482.2	504.3	4.	1.94533E+11	.0345	527.0	5.00604E+09
13	1.01665E+10	.2499	482.2	254.5	3.	1.89171E+11	.0178	265.2	2.54060E+09
14	4.77363E+09	.2564	482.2	90.2	2.	1.93941E+11	.0089	95.9	1.22420E+09
15	1.78390E+10	.3755	468.3	1286.6	6.	1.97856E+11	.0420	1310.0	6.69828E+09
16	2.00236E+10	.3544	468.3	866.6	5.	1.96696E+11	.0439	876.0	7.09626E+09
17	1.12514E+10	.4276	468.3	259.5	3.	1.95718E+11	.0324	269.7	4.81058E+09
18	7.03810E+09	.5772	468.3	91.2	2.	1.94953E+11	.0286	96.1	4.06226E+09
19	1.50539E+10	.5535	454.4	93.9	2.	1.95969E+11	.0541	96.4	8.33289E+09
20	2.12921E+10	.3587	454.4	268.6	3.	1.96808E+11	.0467	270.5	7.63721E+09
21	2.83885E+10	.2282	454.4	890.1	5.	1.97595E+11	.0371	878.0	6.47704E+09
22	3.51434E+10	.1732	454.4	1355.2	6.	1.98612E+11	.0328	1312.5	6.08733E+09
23	3.72710E+10	.0684	440.6	1365.9	6.	1.99672E+11	.0135	1316.0	2.54962E+09
24	3.67527E+10	.0878	440.6	912.6	5.	1.98496E+11	.0172	880.0	3.22870E+09
25	3.70069E+10	.1135	440.6	551.3	4.	1.97497E+11	.0224	531.0	4.19853E+09
26	3.45766E+10	.1816	440.6	279.5	3.	1.97536E+11	.0342	271.0	6.28018E+09
27	2.78999E+10	.3092	440.6	97.8	2.	1.96783E+11	.0498	96.6	8.62756E+09
28	3.64655E+10	.1122	426.7	100.4	2.	1.97802E+11	.0219	96.9	4.09320E+09
29	3.98167E+10	.0752	426.7	284.1	3.	1.98631E+11	.0156	271.7	2.99456E+09
30	4.16201E+10	.0730	426.7	559.3	4.	1.98615E+11	.0156	532.5	3.03720E+09
31	4.04642E+10	.0363	426.7	923.2	5.	1.99400E+11	.0076	882.0	1.46819E+09
32	3.93462E+10	.0352	426.7	1375.8	6.	2.00584E+11	.0072	1319.0	1.38598E+09
33	4.31539E+10	.0088	398.9	1394.2	6.	2.02413E+11	.0019	1325.0	3.78102E+08
34	4.42976E+10	.0092	398.9	935.6	5.	2.01212E+11	.0020	886.0	4.08057E+08
35	4.63464E+10	.0121	398.9	5[illegible]8.0	4.	2.00484E+11	.0028	535.0	5.62172E+08
36	4.56409E+10	.0142	398.9	289.3	3.	2.00463E+11	.0032	273.0	6.50294E+08
37	4.00266E+10	.0209	398.9	101.7	2.	1.99645E+11	.0043	97.[illegible]	8.37618E+08
38	1.03700E+10	.5619	482.2	837.7	5.	1.95575E+11	.0396	873.5	5.82683E+09
39	4.36896E+09	.0773	510.0	251.5	3.	1.92827E+11	.0025	267.7	3.37632E+08



TEMPERATURE T DEG. C
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS



TEMPERATURE T DEG. C
450
550
650
MODULUS
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-62-1

Date 3/27/79

Damping Material Corning 7570 + 4% Na_2O + 4% $KHCO_3$

Material Thickness 0.0163 cm Material Density 5.19 g/cc

Fixture No. 2 Beam Thickness 0.0975 cm

Beam Density 9.13 g/cc Beam Length 21.749 cm

Temperature Test Range: Between 455 °C and 315 °C

Frequency Test Range: Between 90 Hz and 1,365 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.24		Temperature	370 °C
	1,000 Hz	η_D 0.24		Temperature	400 °C
Range	100 Hz	355 °C	400 °C		
	1,000 Hz	380 °C	435 °C		

Complex Modulus E_D'':

Peak	100 Hz	6.2×10^9 PAS		Temperature	355 °C
	1,000 Hz	6.2×10^9 PAS		Temperature	380 °C
Range	100 Hz	325 °C	375 °C		
	1,000 Hz	370 °C	425 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-62-2+ (CORNING 7550 + 4% Na2 0 + 4% KHCO3
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM          N          ML
               A1            A2           A3         A4
   350.0  2.0000E+01  1.9000E+10     .600  8.0000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL          SH          FROL          C
            B1        B2          B3          B4           B5
   350.0     .250     .500     -.700   2.0000E+01     1.000
LOG(FR)=LOG(F)-12(T-T6)/(525/1.8+T-T0)
```

REMARKS: F-107 project.

TABLE 47-B

Beam No. 01-62-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	2	90.07	93.12	89.95	90.17	0.22	.00244		
1100	3	253.24	261.30	252.75	253.38	0.63	.00249		
1100	4	495.73	512.00	495.35	495.97	0.62	.00125		
1100	5	820.16	848.10	819.87	820.82	0.95	.00116		
1100	6	1225.05	1268.80	1224.20	1225.86	1.56	.00127		
1050	2	90.77	93.70	90.67	90.88	0.21	.00231		
1050	3	254.92	262.90	254.60	255.16	0.56	.00220		
1050	4	498.94	515.10	498.63	499.25	0.62	.00124		
1050	5	825.40	853.20	824.99	825.99	1.00	.00121		
1050	6	1233.20	1276.50	1232.21	1233.68	1.47	.00119		
1000	2	91.35	94.26	91.27	91.44	0.17	.00186		
1000	3	256.21	264.50	256.26	256.78	0.52	.00203		
1000	4	502.30	518.10	501.98	502.60	0.62	.00123		
1000	5	830.98	858.10	830.41	831.34	0.97	.00117		
1000	6	1240.84	1284.00	1241.08	1241.68	1.60	.00129		
950	2	92.02	94.84	91.94	92.11	0.17	.00185		
950	3	258.20	266.10	257.93	258.50	0.57	.00221		
950	4	505.53	521.10	505.21	505.96	0.75	.00148		
950	5	836.08	863.00	835.50	836.66	1.16	.00139		
950	6	1249.35	1291.00	1248.45	1250.27	1.82	.00146		
900	2	92.48	95.36	92.38	92.57	0.19	.00205		
900	3	259.74	267.70	259.42	260.00	0.58	.00223		
900	4	508.20	524.05	507.80	508.59	0.79	.00155		
900	5	840.83	868.00	840.18	841.55	1.37	.00163		
900	6	1255.93	1298.10	1254.81	1257.05	2.24	.00178		
850	2	93.07	95.90	92.95	93.18	0.23	.00247		
850	3	261.24	269.00	260.88	261.60	0.72	.00276		
850	4	511.25	526.95	510.68	511.85	1.17	.00229		
850	5	846.06	872.80	844.96	847.17	2.21	.00261		
850	6	1263.77	1305.10	1261.73	1265.53	3.80	.00301		
850	2	93.06	95.90	92.93	93.18	0.25	.00263		
850	3	261.26	269.00	260.89	261.64	0.75	.00287		
850	4	511.96	526.95	511.36	512.55	1.19	.00232		
850	5	846.96	872.80	845.91	848.05	2.14	.00253		
850	6	1265.46	1305.10	1263.50	1267.41	3.91	.00309		
825	2	93.41	96.17	93.27	93.55	0.28	.00300		
825	3	262.06	269.95	261.62	262.50	0.88	.00336		
825	4	513.15	528.40	512.27	514.03	1.76	.00343		
825	5	849.08	874.90	847.40	850.75	3.35	.00395		
825	6	1268.50	1308.60	1265.33	1271.70	6.37	.00502		
825	2	93.37	96.17	93.21	93.50	0.29	.00311		
825	3	262.16	269.75	261.74	262.63	0.89	.00340		
825	4	513.40	528.40	512.62	514.17	1.55	.00302		
825	5	849.95	874.90	848.43	851.47	3.04	.00358		
825	6	1269.21	1308.60	1266.28	[illegible]	5.96	.00462		
[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

TABLE 47-B (Concluded)

Beam No. 01-62-1

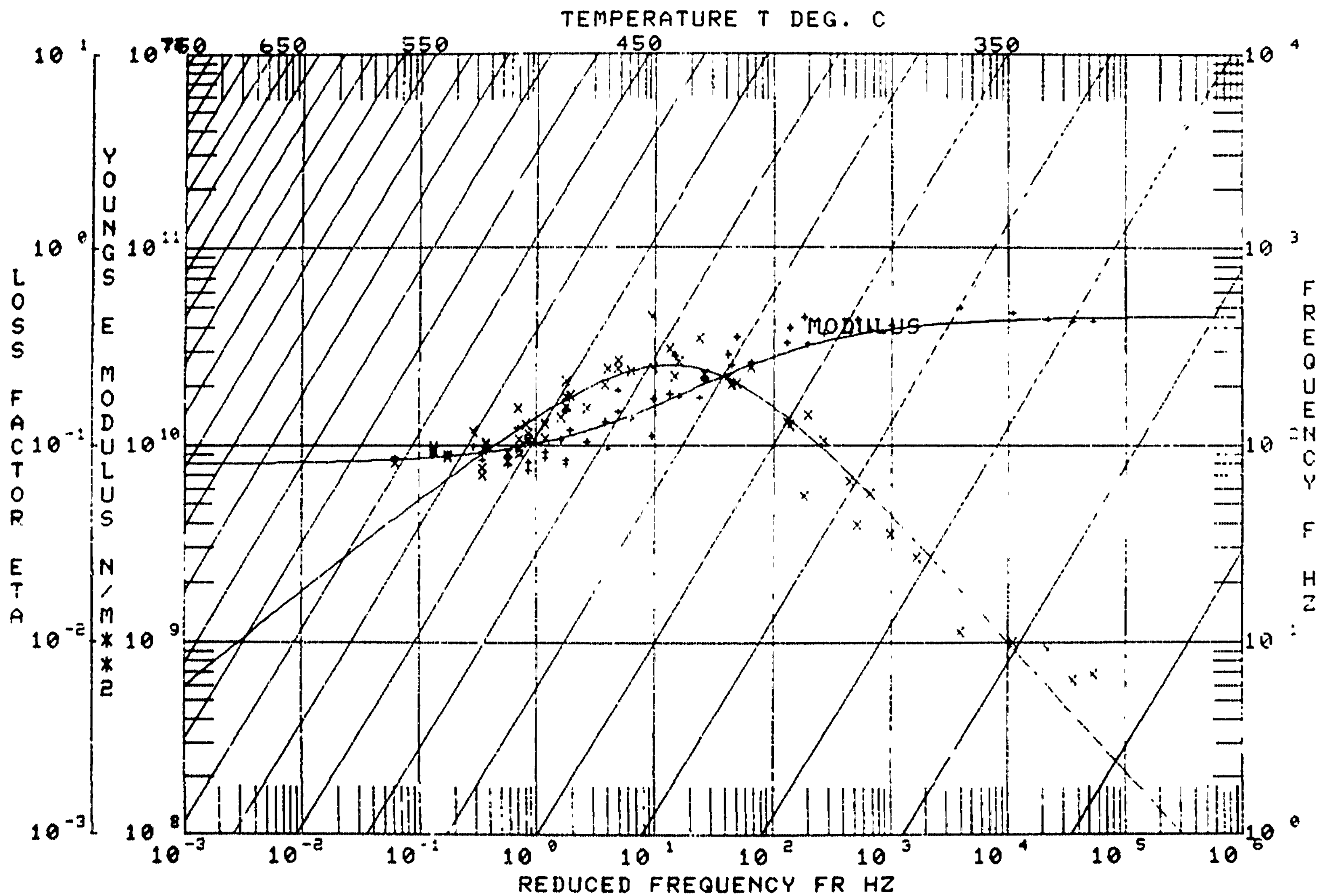
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
800	3	263.10	270.40	262.50	263.71	1.21	.00460		
800	4	515.75	529.60	514.42	517.08	2.66	.00516		
800	5	853.60	877.00	851.20	856.00	4.80	.00562		
800	6	1275.10	1312.00	1270.10	1280.57	10.47	.00821		
775	2	94.34	96.63	94.03	94.65	0.62	.00657		
775	3	264.52	271.10	263.54	265.50	1.96	.00741		
775	4	519.10	531.00	516.75	521.45	4.70	.00905		
775	5	860.30	879.20	855.52	865.07	9.55	.01110		
775	6	1281.25	1315.10	1270.19	1292.29	22.10	.01725		
750	2	94.93	96.76	94.42	95.45	1.03	.01085		
750	3	266.50	271.75	264.77	268.03	3.26	.01224		
750	4	523.80	532.30	519.88	527.34	7.46	.01424		
750	5	86[illegible].14	881.60	861.37	874.90	13.53	.01559		
750	6	1297.72	1318.20	1291.06	1304.39	26.20	.02019		X
725	2	95.79	97.08	94.91	96.52	1.61	.01681		
725	3	268.40	272.30	265.91	270.88	4.97	.01852		
725	4	528.48	533.55	524.14	532.58	8.44	.01597		
725	5	880.84	883.60	873.09	887.66	14.57	.01654		
725	6	1318.22	1321.20	1304.71	1331.73	27.02	.02050		
700	2	97.45	97.30	96.75	98.68	1.93	.01981		
700	3	273.50	272.95	271.83	274.58	5.40	.01976		X
700	5	893.05	885.70	886.19	898.11	11.92	.01335		
700	6	1334.12	1324.30	1329.62	1339.30	19.02	.01426		X

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
675	2	98.64	97.50	97.17	99.33	2.16	.02190		
675	3	278.33	273.55	275.87	279.93	4.06	.01459		
675	4	543.41	536.00	541.80	545.02	6.33	.01164		X
675	5	900.72	887.90	896.95	903.56	6.61	.00734		
675	6	1347.54	1327.20	1343.12	1351.86	8.64	.00641		
650	2	100.12	97.70	99.78	100.49	0.71	.00709		
650	3	280.50	274.10	279.85	281.24	1.39	.00496		
650	4	547.56	537.20	546.41	548.72	2.31	.00422		
650	5	906.10	889.90	904.54	907.40	2.86	.00316		
600	2	101.16	98.06	101.08	101.24	0.16	.00158		
600	3	282.91	275.20	282.72	283.10	0.38	.00134		
600	4	551.67	539.40	551.35	551.99	0.64	.00116		
600	5	912.90	893.60	912.50	913.22	0.72	.00079		
600	6	1363.50	1335.40	1363.03	1364.17	1.14	.00084		

EXPERIMENTAL CODE : 60
MATERIAL :01-62-2+ (CORNING 7559 + 4% Na2 0 + 4% KHCO3
DATA SOURCES
MANUFACTURER :NONE
AFML :UDRI BEAM COATED ONE SIDE MAR.27,1979
OTHER :NONE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	5.05473E+10	.0116	315.6	101.2	2.	2.01402E+11	.0016	98.1	5.86978E+08
2	4.81849E+10	.0103	315.6	282.9	3.	2.02326E+11	.0013	275.2	4.94597E+08
3	4.43594E+10	.0095	315.6	551.6	4.	2.02414E+11	.0012	539.4	4.21310E+08
4	4.38137E+10	.0066	315.6	912.9	5.	2.03292E+11	.0008	893.6	2.87254E+08
5	4.36171E+10	.0070	315.6	1363.5	6.	2.04210E+11	.0008	1335.4	3.06293E+08
6	4.10688E+10	.0275	343.3	906.1	5.	2.01612E+11	.0032	889.9	1.12771E+09
7	4.17030E+10	.0361	343.3	547.6	4.	2.00766E+11	.0042	537.2	1.50501E+09
8	4.44980E+10	.0402	343.3	280.5	3.	2.00712E+11	.0050	274.1	1.79031E+09
9	4.53121E+10	.0565	343.3	100.1	2.	1.99926E+11	.0071	97.7	2.56014E+09
10	3.60829E+10	.2097	357.2	98.6	2.	1.99108E+11	.0219	97.5	7.56527E+09
11	4.02119E+10	.1299	357.2	278.3	3.	1.99907E+11	.0148	273.5	5.22167E+09
12	3.76879E+10	.1078	357.2	543.4	4.	1.99870E+11	.0116	536.0	4.06301E+09
13	3.82642E+10	.0674	357.2	900.7	5.	2.00707E+11	.0073	887.9	2.57759E+09
14	3.90786E+10	.0580	357.2	1347.5	6.	2.01709E+11	.0064	1327.2	2.26848E+09
15	3.34627E+10	.1465	371.1	1334.1	6.	2.00829E+11	.0143	1324.3	4.90365E+09
16	3.38786E+10	.1351	371.1	893.1	5.	1.99714E+11	.0134	885.7	4.57770E+09
17	2.95348E+10	.2242	371.1	273.5	3.	1.99031E+11	.0198	273.0	6.62318E+09
18	2.91034E+10	.2270	371.1	97.4	2.	1.98292E+11	.0198	97.3	6.60544E+09
19	1.92892E+10	.2763	385.0	95.8	2.	1.97396E+11	.0168	97.1	5.33024E+09
20	1.86985E+10	.3142	385.0	268.4	3.	1.98084E+11	.0185	272.3	5.87438E+09
21	2.18006E+10	.2358	385.0	528.5	4.	1.98047E+11	.0160	533.6	5.14023E+09
22	2.60717E+10	.2090	385.0	880.8	5.	1.98768E+11	.0165	883.6	5.44931E+09
23	2.68056E+10	.2541	385.0	1318.2	6.	1.99890E+11	.0205	1321.2	6.81061E+09
24	1.79843E+10	.3563	398.9	1297.7	6.	1.98986E+11	.0202	1318.2	6.40869E+09
25	1.80668E+10	.2726	398.9	868.1	5.	1.97869E+11	.0156	881.6	4.92513E+09
26	1.75568E+10	.2547	398.9	523.8	4.	1.97121E+11	.0142	532.3	4.47207E+09
27	1.51941E+10	.2503	398.9	266.4	3.	1.97285E+11	.0122	271.7	3.80303E+09
28	1.56025E+10	.2153	398.9	94.9	2.	1.96097E+11	.0108	96.8	3.35907E+09
29	1.25542E+10	.1592	412.8	94.3	2.	1.95571E+11	.0066	96.6	1.99868E+09
30	1.22549E+10	.1844	412.8	264.5	3.	1.96342E+11	.0074	271.1	2.25921E+09
31	1.33951E+10	.2070	412.8	519.1	4.	1.96159E+11	.0091	531.0	2.77239E+09
32	1.40161E+10	.2441	412.8	860.3	5.	1.96793E+11	.0111	879.2	3.42107E+09
33	1.14282E+10	.4621	412.8	1281.2	6.	1.98048E+11	.0173	1315.1	5.28072E+09
34	9.88214E+09	.2513	426.7	1275.1	6.	1.97116E+11	.0082	1312.0	2.48304E+09
35	1.07091E+10	.1584	426.7	853.6	5.	1.95809E+11	.0056	877.0	1.69600E+09
36	1.10033E+10	.1413	426.7	515.7	4.	1.95126E+11	.0052	529.6	1.55432E+09
37	1.04867E+10	.1319	426.7	263.1	3.	1.95330E+11	.0046	270.4	1.38343E+09
38	1.00888E+10	.1201	426.7	93.7	2.	1.94641E+11	.0040	96.4	1.21152E+09
39	9.11300E+09	.1011	440.6	93.4	2.	1.93713E+11	.0031	96.2	9.21557E+08
40	9.36738E+09	.0950	440.6	93.4	2.	1.93713E+11	.0030	96.2	8.90109E+08
41	9.74558E+09	.1041	440.6	262.2	3.	1.94392E+11	.0034	269.7	1.01409E+09
42	9.52034E+09	.1051	440.6	262.1	3.	1.94392E+11	.0034	269.7	1.00102E+09
43	9.58806E+09	.0938	440.6	513.4	4.	1.94243E+11	.0030	528.4	8.99378E+08
44	9.28796E+09	.1098	440.6	513.2	4.	1.94243E+11	.0034	528.4	1.01993E+09
45	8.91165E+09	.1320	440.6	849.1	5.	1.94873E+11	.0039	874.9	1.17595E+09
46	9.52884E+09	.1122	440.6	849.9	5.	1.94873E+11	.0036	874.9	1.06912E+09
47	8.61916E+09	.1603	440.6	1269.2	6.	1.96095E+11	.0046	1308.6	1.38163E+09
48	8.27076E+09	.1812	440.6	1268.5	6.	1.96095E+11	.0050	1308.6	1.49863E+09
49	8.40738E+09	.1092	454.4	1265.5	6.	1.95048E+11	.0031	1305.1	9.18374E+08

50	7.60883E+09	.1171	454.4	1263.8	6.	1.95048E+11	.0030	1305.1	8.90992E+08
51	8.82397E+09	.0849	454.4	847.0	5.	1.93938E+11	.0025	872.8	7.49424E+08
52	8.19476E+09	.0940	454.4	846.1	5.	1.93938E+11	.0026	872.8	7.70656E+08
53	8.67000E+09	.0779	454.4	511.2	4.	1.93178E+11	.0023	526.9	6.75263E+08
54	9.49074E+09	.0724	454.4	512.0	4.	1.93178E+11	.0023	526.9	6.86970E+08
55	9.30321E+09	.0913	454.4	261.3	3.	1.93312E+11	.0029	269.0	8.49522E+08
56	9.25841E+09	.0882	454.4	261.2	3.	1.93312E+11	.0028	269.0	8.16834E+08
57	8.82382E+09	.0824	454.4	93.1	2.	1.92627E+11	.0025	95.9	7.26924E+08
58	7.03553E+09	.0739	482.2	1255.9	6.	1.92961E+11	.0018	1298.1	5.19950E+08
59	7.70482E+09	.0617	482.2	840.8	5.	1.91811E+11	.0016	868.0	4.75034E+08
60	8.30918E+09	.0543	482.2	508.2	4.	1.91058E+11	.0015	524.1	4.51421E+08
61	8.85196E+09	.0737	482.2	259.7	3.	1.91305E+11	.0022	267.6	6.52087E+08
62	8.29806E+09	.0717	482.2	92.5	2.	1.90464E+11	.0020	95.4	5.95229E+08
63	8.48431E+09	.0627	510.0	92.0	2.	1.88392E+11	.0018	94.8	5.32084E+08
64	8.43479E+09	.0506	510.0	505.5	4.	1.83913E+11	.0015	521.1	4.26681E+08


TEMPERATURE T DEG. C
750
650
550
450
350
MODULUS
LOSS FACTOR ETA
YOUNGS E MODULUS N/M**2
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
10^{1}
10^{0}
10^{-1}
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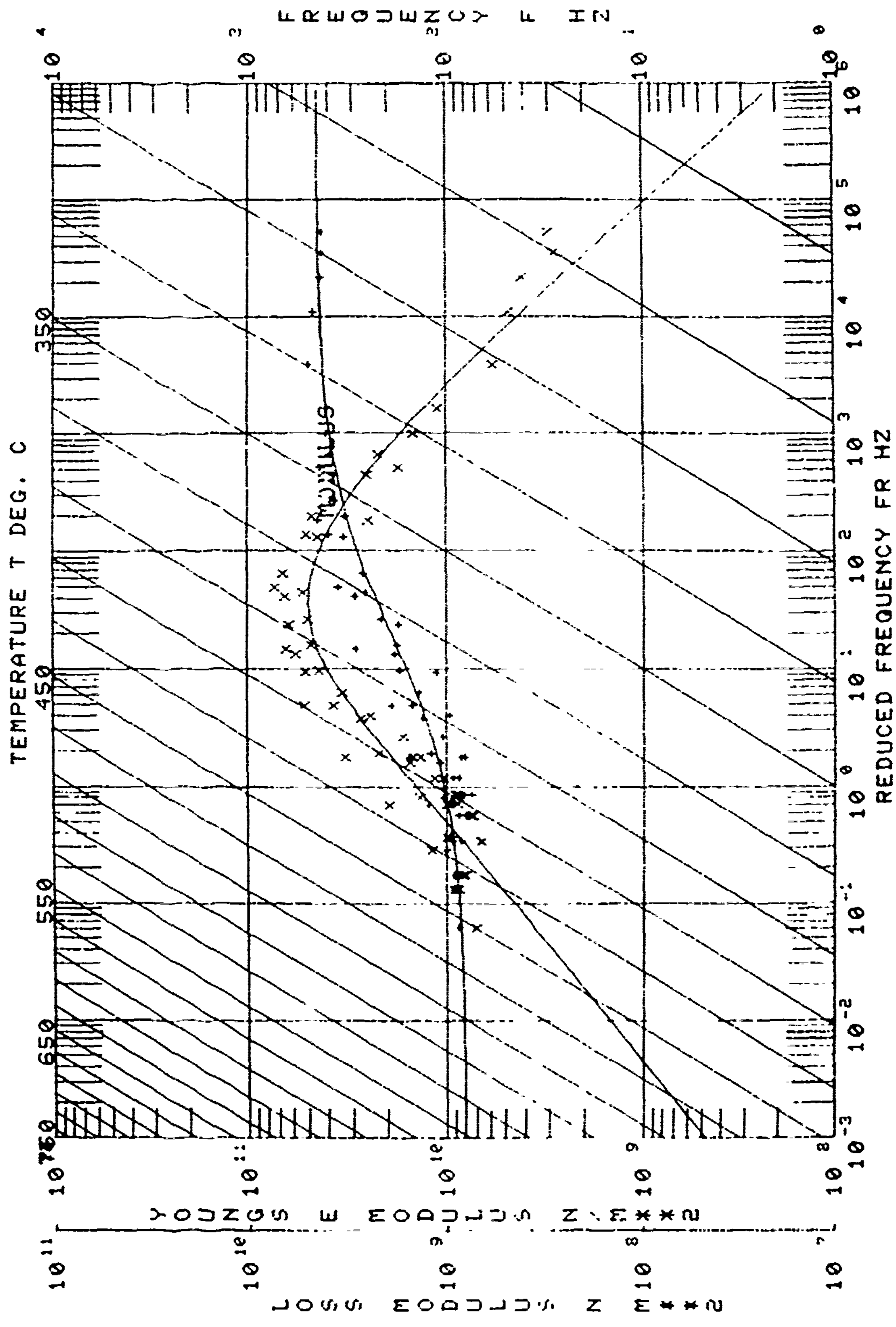

TEMPERATURE T DEG. C
350
450
550
650
750
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-70-1

Date 7/11/79

Damping Material O. Hommel 1262

Material Thickness 0.041 cm Material Density 2.86 g/cc

Fixture No. 2 Beam Thickness 0.1255 cm

Beam Density 9.13 g/cc Beam Length 21.659 cm

Temperature Test Range: Between 840 °C and 590 °C

Frequency Test Range: Between 135 Hz and 3,500 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.28	Temperature	640 °C	
	1,000 Hz	η_D 0.28	Temperature	680 °C	
Range	100 Hz	615 °C	665 °C		
	1,000 Hz	665 °C	720 °C		

Complex Modulus E_D":

Peak	100 Hz	4.1×10^9 PAS	Temperature	630 °C
	1,000 Hz	4.1×10^9 PAS	Temperature	700 °C
Range	100 Hz	600 °C	660 °C	
	1,000 Hz	630 °C	700 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-70-1 O'HOmmel 1262
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM           MROM         N          ML
               A1             A2          A3         A4
   600.0  7.0000E+00  1.5200E+10     .570   8.0000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL         SH         FROL        C
            B1       B2         B3          B4         B5
   600.0    .290     .420     -.480   3.5000E+00    1.000
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J-85. Coating smooth and glossy with no visible signs of deterioration.

TABLE 48-B

Beam No. 01-70-1

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1600	2	136.19	138.69	135.24	136.88	1.64	.01204		
1600	3	382.50	388.83	381.69	383.26	1.57	.00410		
1600	4	750.96	762.44	749.70	752.30	2.60	.00346		
1600	5	1239.22	1261.33	1236.08	1243.52	7.44	.00600		
1600	6	1864.42	1869.63	1858.00	1868.70	10.70	.00574		
1600	7	2604.43		2600.74	2606.77	6.03	.00232		
1600	8	3470.64		3465.56	3475.10	9.54	.00275		
1550	2	136.96	139.99	136.07	137.47	1.40	.01023		
1550	3	384.26	392.37	383.67	384.87	1.20	.00312		
1550	4	754.44	769.30	753.11	744.97	2.86	.00379		
1550	5	1245.69	1271.88	1242.38	1248.83	6.45	.00518		
1550	6	1871.50	1909.11	1867.18	1875.60	8.42	.00450		
1550	7	2615.50		2611.93	2620.65	8.72	.00333		
1550	8	3488.30		3480.94	3494.67	13.73	.00394		
1500	2	137.94	141.1	137.36	138.49	1.13	.00819		
1500	3	387.11	395.27	386.50	387.64	1.14	.00294		
1500	4	760.04	775.35	758.71	761.69	2.98	.00392		
1500	5	1255.35	1281.70	1252.58	1258.58	6.00	.00478		
1500	6	1885.49	1924.27	1880.58	1889.95	9.37	.00497		
1500	7	2636.40		2630.70	2641.00	10.30	.00391		
1500	8	3515.03		3506.70	3522.46	15.76	.00448		
1450	2	139.18	142.24	138.54	139.64	1.10	.00790		

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1450	3	390.30	398.28	389.66	390.78	1.12	.00287		
1450	4	766.12	781.40	764.42	767.69	3.27	.00427		
1450	5	1265.81	1291.74	1262.54	1268.14	5.60	.00443		
1450	6	1900.48	1937.25	1894.79	1907.50	12.71	.00669		
1450	7	2656.80		2648.87	2662.60	13.73	.00517		
1450	8	3540.86		3530.27	3551.54	21.27	.00601		
1450	2	139.42	142.24	139.07	139.85	0.78	.00599		
1450	3	390.61	398.28	390.23	390.87	0.86	.00221		X
1450	4	766.67	781.40	765.39	768.26	2.87	.00374		
1450	5	1265.85	1291.74	1261.68	1269.78	8.10	.00640		
1450	6	1903.18	1937.25	1897.46	1908.10	10.64	.00559		
1450	7	2661.70		2653.25	2667.12	13.87	.00521		
1450	8	3546.67		3536.33	3557.30	20.97	.00591		
1400	2	140.52	143.30	140.12	140.92	0.80	.00569		
1400	3	393.53	401.49	393.12	393.89	1.51	.00385		X
1400	4	772.63	787.44	770.90	724.68	3.78	.00489		
1400	5	1276.08	1301.50	1270.85	1280.28	9.45	.00793		
1400	6	1918.46	1953.30	1909170	1924.47	14.77	.00770		
1400	7	2681.50		2670.12	2693.25	23.13	.00863		
1400	8	3576.77		3561.90	3592.00	31.16	.00842		
1350	2	141.59	144.40	141.08	142.09	1.01	.00713		
1350	3	396.69	404.50	395.54	397.70	2.16	.00545		

TABLE 48-B (Continued)

Beam No. 91-70-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	ldη
1350	4	778.84	793.50	776.26	781.82	5.56	.00714		
1350	5	1286.56	1312.00	1277.51	1295.94	18.43	.01433		
1350	6	1934.80	1968.00	1920.36	1947.30	26.34	.01392		
1350	7	2708.23		2687.00	2725.20	38.20	.01411		
1350	8	3612.96		3598.60	3629.43		.01677		x
1300	2	142.92	145.38	142.31	143.54	1.23	.00861		
1300	3	400.82	407.30	399.57	401.58	2.01	.00501		
1300	4	788.23	798.60	782.13	792.93	10.80	.01370		
1300	5	1298.30	1320.43	2182.59	1307.93	25.34	.01952		
1300	6	1963.00	1980.36	1946.06	1980.66	34.62	.01764		
1300	7	2742.20		2714.20	2769.78	55.08	.02009		
1300	8	3661.56		3634.40	3713.10	73.70	.02146		
1250	2	144.67	146.50	143.46	145.62	2.16	.01493		
1250	3	406.53	410.00	402.30	410.14	7.84	.01929		
1250	4	803.65	804.00	791.80	812 08	20.28	.0252[illegible]		
1250	5	1314.85	1330.0	1286.33	1329.28	42.95	.03267		
1250	6	1995.29	1995.00	1952.92	2018.18	65.26	.03[illegible]		
1250	7	2806.92		2784.12	2827.23	84.72	.03018		x
1250	8	3750.60		3707.94	3808.63	101.69	.0271[illegible]		
1200	2	146.78	147.37	145.12	148.60	3.48	.02371		
1200	3	414.40	412.72	411.65	417.19	10.88	.02627		x
1200	4	817.94	809.40	807.80	826.71	18.27	.02234		

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	ld3
1200	5	1370.58	1338.53	1365.32	1378.72	26.33	.01921		
1200	6	2040.16	2000.62	2075.62	2047.80	43.59	.02137		
1200	7	2902.82		2849.15	2943.34	94.19	.03245		
1200	8	3815.50		3758.60	3852.40	93.80	.02458		
1150	2	150.68	148.50	148.91	152.57	3.67	.02436		
1150	3	424.52	415.50	421.15	428.64	7.49	.01764		
1150	4	835.03	815.50	729.35	841.37	12.02	.01433		
1150	5	1396.89	1348.00	1389.76	1406.51	16.75	.01199		
1150	6	2077.02	2020.00	2064.74	2086.14	21.40	.01030		
1150	7	2907.20		2894.10	2921.90	27.80	.00956		
1150	8	3874.96		3859.13	3891.33	32.20	.00831		
1100	2	151.70	149.38	152.73	154.66	1.93	.01266		
1100	3	431.38	418.49	429.16	432.98	3.83	.00886		
1100	4	846.78	820.50	843.40	849.05	5.65	.00667		
1100	5	1411.28	1347.01	1407.80	1416.41	9.33	.00661		
1100	6	2098.14	2019 12	2092.26	2003.64	10.88	.00519		
1050	2	155.13	150.40	154.68	155.72	1.04	.00670		
1050	3	434.71	420.50	433.99	435.97	1.98	.00432		
1050	4	854.44	825.00	853.13	855.89	2.76	.00323		
1050	5	1422.12	1365.0	1419.83	1425.04	[illegible]	[illegible]		
[illegible]	6	2121.54	2046.00	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

TABLE 48-B (Concluded)

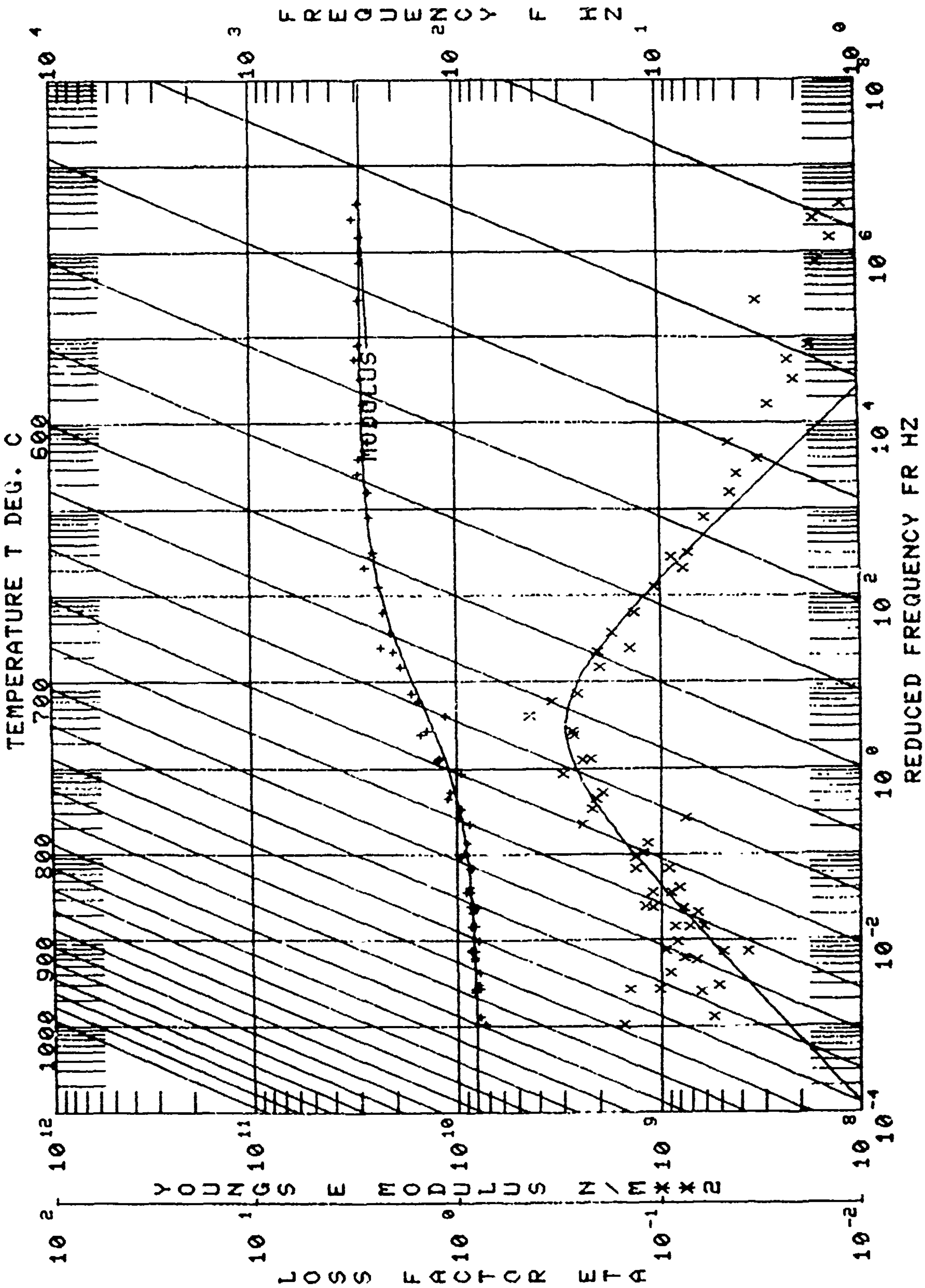
Beam No. 01-70-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1000	3	439.07	423.56	438.56	439.65	1.09	.00248		
1000	4	860.95	830.64	860.15	861.93	1.78	.00207		
1000	5	1430.91	1372.41	1429.23	1433.13	3.90	.00272		
1000	6	2133.68	2058.54	2131.68	2135.62	3.94	.00185		

EXPERIMENTAL CODE : 95
MATERIAL :01-70-1 O'HOmmel 1262
DATA SOURCES
MANUFACTURER :NONE
AFML :UDRI BEAMCOATED ONE SIDE
OTHER :TESTED7\11\79

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	7.53849E+09	.1559	815.6	137.9	2.	2.43883E+11	.0082	141.1	1.17514E+09
2	8.06106E+09	.0526	815.6	387.1	3.	2.44113E+11	.0029	395.3	4.24340E+08
3	8.34243E+09	.0681	815.6	760.0	4.	2.44603E+11	.0039	775.3	5.68363E+08
4	8.10018E+09	.0854	815.6	1255.4	5.	2.44599E+11	.0048	1281.7	6.91440E+08
5	8.33401E+09	.0876	815.6	1885.5	6.	2.47989E+11	.0050	1924.3	7.29725E+08
6	7.92246E+09	.1458	787.8	139.2	2.	2.47839E+11	.0079	142.2	1.15478E+09
7	8.36420E+09	.0504	787.8	390.3	3.	2.47845E+11	.0029	398.3	4.21284E+08
8	8.52934E+09	.0738	787.8	766.1	4.	2.48435E+11	.0043	781.4	6.29141E+08
9	8.20650E+09	.0793	787.8	1265.1	5.	2.48446E+11	.0044	1291.7	6.50761E+0[illegible]
10	8.80460E+09	.1134	787.8	1900.5	6.	2.51346E+11	.0067	1937.2	9.98877E+08
11	8.42944E+09	.1044	787.8	139.4	2.	2.47839E+11	.0060	142.2	8.79789E+08
12	8.59784E+09	.0378	787.8	390.6	3.	2.47845E+11	.0022	398.3	3.25119E+08
13	8.74245E+09	.0632	787.8	766.7	4.	2.48435E+11	.0037	781.4	5.52156E+08
14	8.38449E+09	.1123	787.8	1265.9	5.	2.48446E+11	.0064	1291.7	9.41728E+08
15	9.22872E+09	.0908	787.8	1903.2	6.	2.51346E+11	.0056	1937.2	8.37924E+08
16	8.68359E+09	.0978	760.0	140.5	2.	2.51547E+11	.0057	143.3	8.49238E+08
17	8.56367E+09	.0671	760.0	393.5	3.	2.51856E+11	.0038	401.5	5.74625E+08
18	8.89002E+09	.0825	760.0	772.6	4.	2.52291E+11	.0049	787.4	7.33220E+08
19	8.66621E+09	.1369	760.0	1276.1	5.	2.52215E+11	.0079	1301.5	1.18626E+09
20	9.30519E+09	.1260	760.0	1918.5	6.	2.55528E+11	.0077	1953.3	1.17259E+09
21	8.80057E+09	.1228	732.2	141.6	2.	2.55424E+11	.0071	144.4	1.08039E+09
22	8.85402E+09	.0934	732.2	396.7	3.	2.55646E+11	.0055	404.5	8.26892E+08
23	9.13122E+09	.1192	732.2	778.8	4.	2.56189E+11	.0071	793.5	1.08816E+09
24	8.85010E+09	.2462	732.2	1286.6	5.	2.56301E+11	.0143	1312.0	2.17923E+09
25	9.75142E+09	.2213	732.2	1934.8	6.	2.59389E+11	.0139	1968.0	2.15772E+09
26	9.71607E+09	.1371	704.4	142.9	2.	2.58903E+11	.0086	145.4	1.33192E+09
27	1.00448E+10	.0775	704.4	400.8	3.	2.59198E+11	.0050	407.3	7.78112E+08
28	1.09833E+10	.1956	704.4	788.2	4.	2.59493E+11	.0127	798.6	2.14784E+09
29	9.79135E+09	.3094	704.4	1298.3	5.	2.59605E+11	.0195	1320.4	3.02915E+09
30	1.24914E+10	.2268	704.4	1963.1	6.	2.62657E+11	.0176	1980.4	2.83304E+09
31	1.12864E+10	.2107	676.7	144.7	2.	2.62907E+11	.0149	146.5	2.377[illegible]E+09
32	1.25775E+10	.2465	676.7	406.5	3.	2.62646E+11	.0193	410.0	3.10023E+09
33	1.52208E+10	.2729	676.7	803.7	4.	2.63014E+11	.0252	804.0	4.15326E+09
34	1.16643E+10	.4477	676.7	1314.9	5.	2.63381E+11	.0327	1330.0	5.22214E+09
35	1.56192E+10	.3500	676.7	1995.3	6.	2.66555E+11	.0327	1995.0	5.46596E+09
36	1.42122E+10	.2750	648.9	146.8	2.	2.66039E+11	.0237	147.4	3.90861E+09
37	1.91298E+10	.2009	648.9	817.9	4.	2.66559E+11	.0223	809.4	3.84361E+09
38	2.37647E+10	.1445	648.9	1370.6	5.	2.66771E+11	.0192	1338.5	3.43375E+09
39	2.14884E+10	.1761	648.9	2040.2	6.	2.69669E+11	.0214	2006.6	3.78427E+09
40	2.08159E+10	.2064	621.1	150.7	2.	2.70134E+11	.0244	148.5	4.29664E+09
41	2.32256E+10	.1364	621.1	424.5	3.	2.69740E+11	.0176	415.5	3.16800E+09
42	2.41051E+10	.1078	621.1	835.0	4.	2.70592E+11	.0143	815.5	2.59815E+09
43	2.85145E+10	.0789	621.1	1396.9	5.	2.70559E+11	.0120	1346.0	2.24944E+09
44	2.58797E+10	.0737	621.1	2077.0	6.	2.73277E+11	.0103	2020.0	1.90861E+09
45	2.61386E+10	.0899	593.3	153.7	2.	2.73346E+11	.0127	149.4	2.35109E+09
46	2.68474E+10	.0617	593.3	431.4	3.	2.73636E+11	.0089	418.5	1.65578E+09
47	2.73220E+10	.0458	593.3	846.8	4.	2.73920E+11	.0067	820.5	1.25208E+09
48	3.02694E+10	.0420	593.3	1411.3	5.	2.74188E+11	.0066	1357.0	1.26981E+09
49	2.99868E+10	.0330	593.3	2098.1	6.	2.72769E+11	.0052	2018.1	9.90918E+08

50	2.74241E+10	.0463	565.6	155.1	2.	2.77091E+11	.0067	150.4	1.27021E+09
51	2.82023E+10	.0291	565.6	434.7	3.	2.76271E+11	.0043	420.5	8.21905E+08
52	2.89696E+10	.0214	565.6	854.4	4.	2.76933E+11	.0032	825.0	6.19249E+08
53	3.13199E+10	.0228	565.6	1422.1	5.	2.77426E+11	.0037	1365 3	7.15068E+08
54	2.97929E+10	.0178	565.6	2121.5	6.	2.80358E+11	.0027	2046.0	5.31690E+08
55	2.99910E+10	.0332	537.8	156.9	2.	2.80232E+11	.0051	151.2	9.94375E+08
56	2.96739E+10	.0163	537.8	439.1	3.	2.80306E+11	.0025	423.6	4.82506E+08
57	2.96687E+10	.0136	537.3	860.9	4.	2.80732E+11	.0021	830.6	4.03199E+08
58	3.19649E+10	.0168	537.8	1430.9	5.	2.80446E+11	.0027	1372.4	5.38397E+08
59	2.99987E+10	.0121	537.8	2133.7	6.	2.83805E+11	.0018	2058.5	3.64305E+08
60	7.93414E+09	.0559	843.3	384.3	3.	2.40544E+11	.0031	392.4	4.43697E+08
61	8.33760E+09	.0650	843.3	754.4	4.	2.40801E+11	.0038	769.3	5.41627E+08
62	7.96745E+09	.0926	843.3	1245.7	5.	2.40865E+11	.0052	1271.9	7.37798E+08
63	8.33898E+09	.0781	843.3	1871.5	6.	2.44097E+11	.0045	1909.1	6.51193E+08
64	1.69097E+10	.2621	648.9	414.4	3.	2.66142E+11	.0263	412.7	4.43155E+09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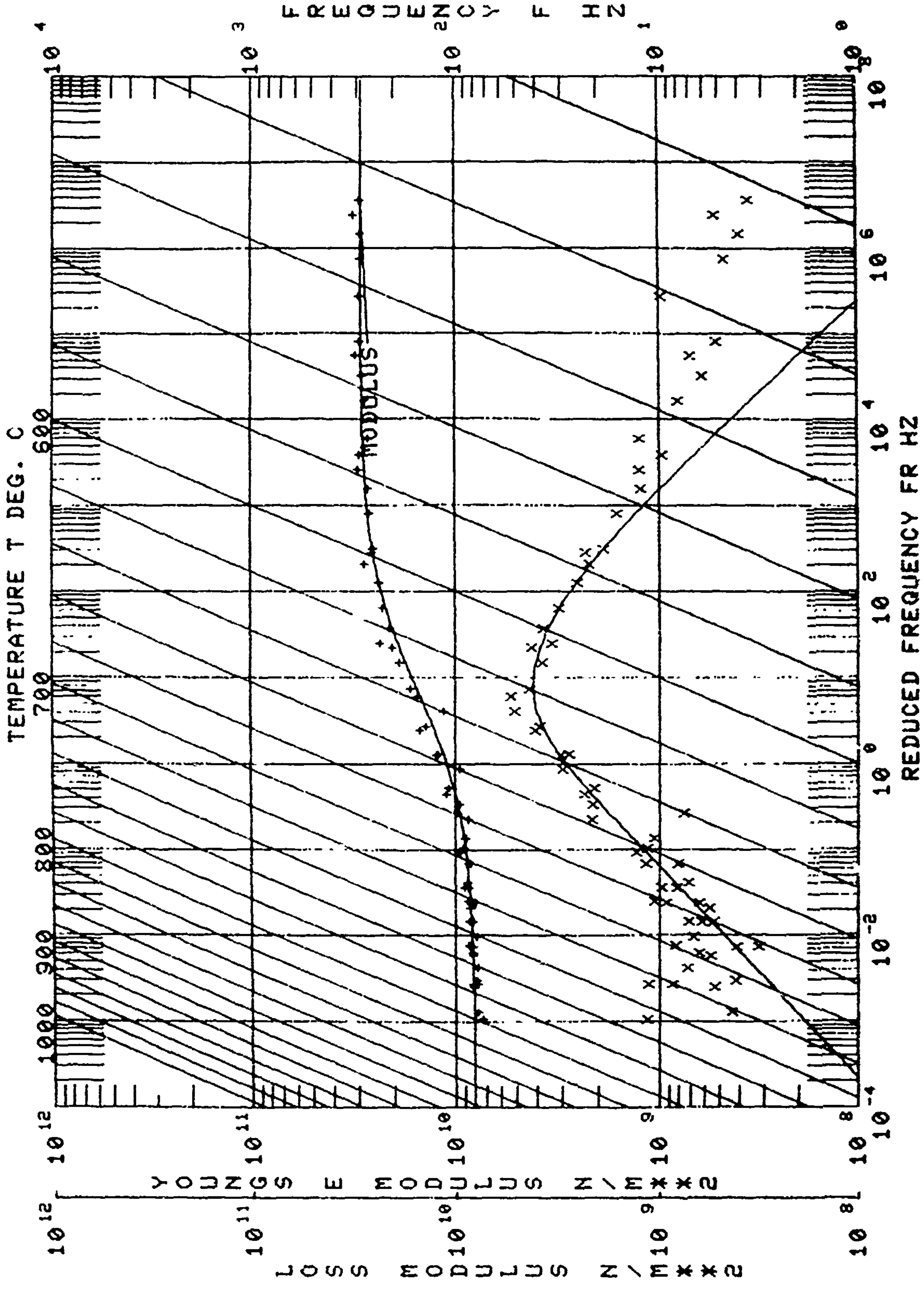
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS



TEMPERATURE T DEG. C
600
700
800
900
1000
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

APPENDIX C

BARE BEAM EXPERIMENTAL DATA

The bare beam (uncoated specimen) modal resonances and modal damping were determined by the methods described in Section 3.1 of this report, and is presented in this Appendix.

The modal damping and resonant frequencies versus temperature or each beam were determined before the beam was coated by measuring the half-power bandwidth of the resonance. The calculated properties for the coating depend on accurate measurements of the resonant frequencies and damping of the uncoated and coated beams. Usually the damping of the uncoated metal beams is insignificant, but experiments have shown that for the type of metal alloy (Haynes 188) used in this study, the damping of the metal beams starts to become significant at temperatures above 650°C (1,200°F). The average damping versus temperature for modes 2, 3, 4, 5, and 6 for several Haynes 188 specimens is illustrated in Figure 1-C. As shown, the damping starts to peak at 950°C (1,750°F). This is especially noticeable for the second mode. Other authors have attributed this behavior to fixture damping [4]. These results indicate the metal behaves as a viscoelastic material and the modal damping is related to the creep behavior of the material.

To account for the damping of the metal at temperatures above 650°C (1,200°F), the loss factor of the bare metal was subtracted from the measured loss factor of the coated beam for each mode. Sridharan [5] has shown, for thin coatings, the damping due to the coating is $\eta_C = \eta_S - \eta_B$, where η_S is the measured specimen damping and η_B is the damping measured for the uncoated beam.

The modal resonant frequencies for modes 2 through 6 were plotted versus temperature for temperatures between 1,800°F and 600°F (980°C and 325°C). This data was hand-fitted and the modal frequencies were interpolated from this curve at the desired temperatures. Figure 2-C is an illustration of mode 2 resonant frequencies of a typical bare beam specimen.

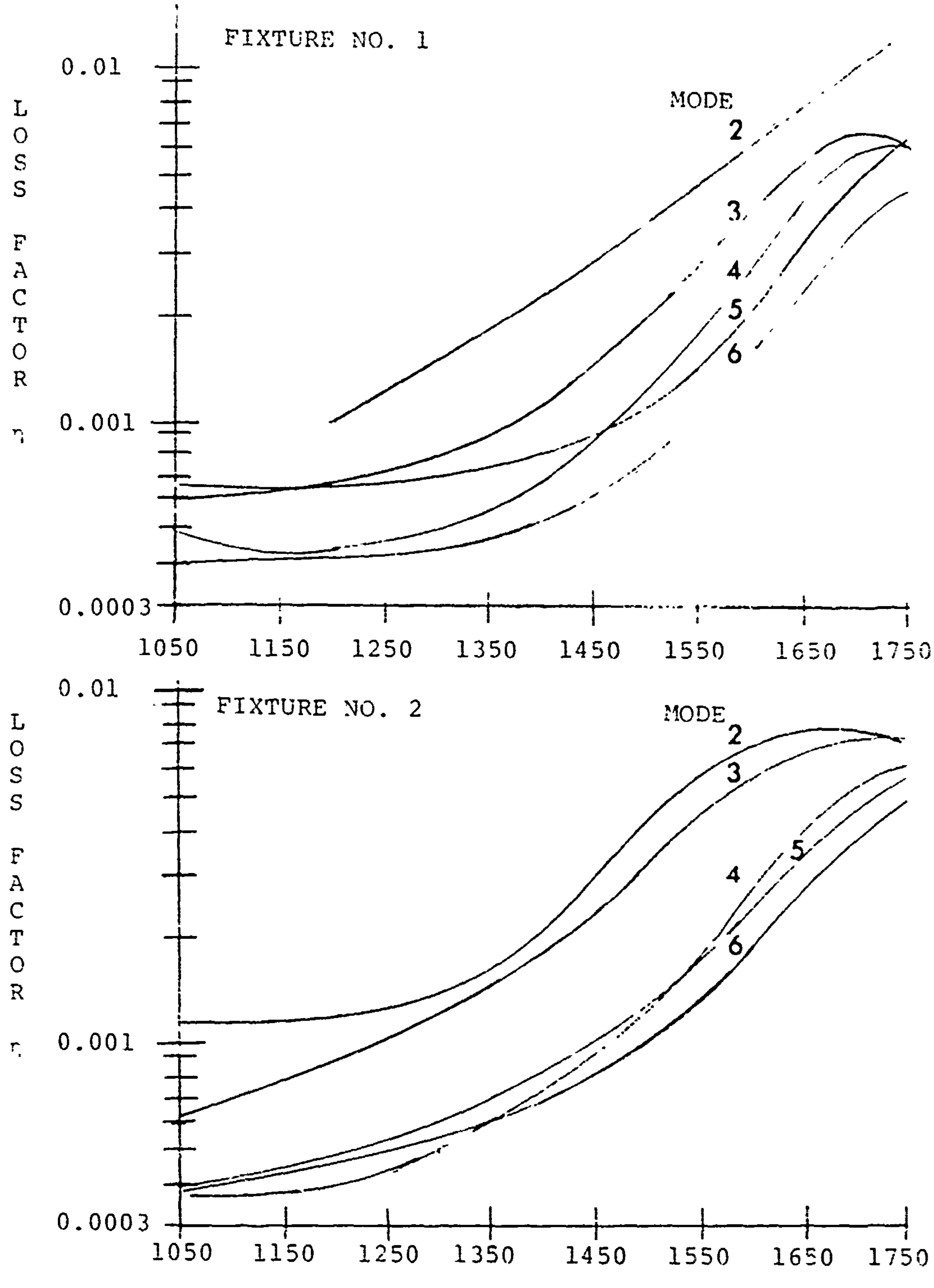


Figure 1-C. Average Damping Versus Temperature for Haynes 188 Specimens, With Damping Peak at 950°C.

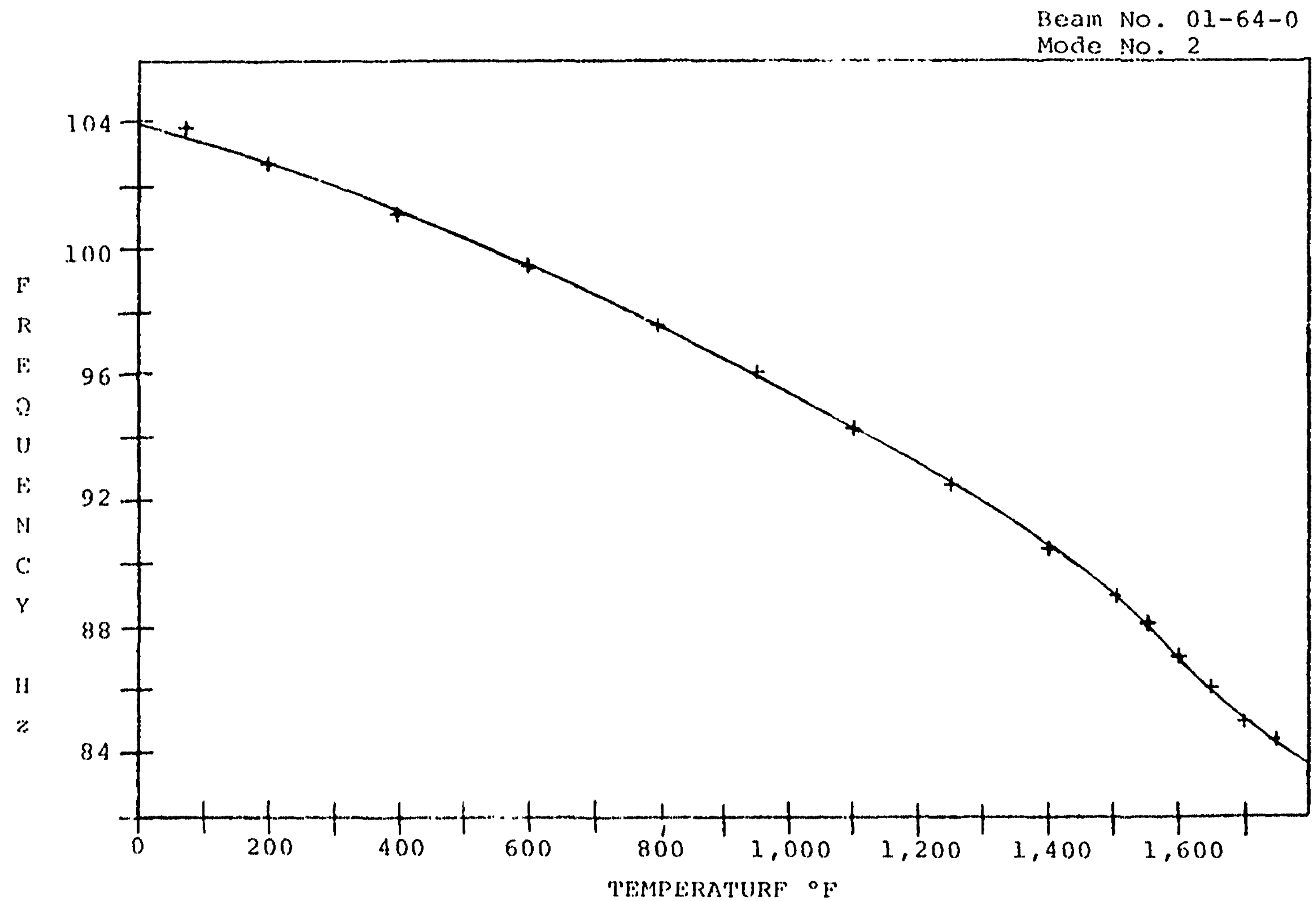


Figure 2-C. Mode 2 Resonant Frequencies of a Typical Bare Beam Specimen.

Tables 1-C through 31-C present the results of these bare beam tests. Each beam is assigned a five-digit number in the following format:

Ø1-XX-Ø

where:

Ø1 is the material code for Haynes Alloy Number 188;

XX is the chronological number assigned to each specimen;

Ø is the test code for a bare beam test.

TABLE 1-C

Bare Beam No. 01-04-1

Temp. °F	Mode	f_n Hz	f_L Hz	f_R Hz	Δf Hz	
1600	1	14.18	14.26	14.10	.162	.0114
1600	2	87.83	88.18	87.55	.625	.00712
1600	3	246.00	246.52	245.43	1.08	.00440
1600	4	491.50	482.19	480.79	1.40	.00291
1600	5	801.00	799.70	802.57	2.82	.00353
1600	6	1197.20	1198.18	1196.03	2.15	.0018
1500	1	14.27	14.36	14.19	.175	.0123
1500	2	89.26	89.49	89.10	.383	.00429
1500	3	250.00	250.09	249.60	.493	.0020
1500	4	489.00	489.34	488.69	.646	.00132
1500	5	811.50	812.22	811.10	1.12	.00138
1500	6	1214.20	1214.92	1213.89	1.03	.00085
1400	1	14.94	15.06	14.94	.117	.00783
1400	2	90.87	90.99	90.78	.215	.00236
1400	3	253.90	254.05	253.77	.284	.00112
1400	4	497.80	498.01	497.61	.40	.0008
1400	5	823.70	824.13	823.32	.814	.0010
1400	6	1235.50	1234.40	1236.90	2.44	.0020
1250	1	15.09	15.14	15.05	.09	.00589
1250	2	92.88	92.95	92.80	.16	.00172
1250	3	259.40	259.34	259.35	.195	.00075
1250	4	508.40	508.62	508.36	.26	.00051
1250	5	841.30	841.61	841.18	.425	.0005
1250	6	1262.00	1262.63	1261.51	1.11	.0009
1100	1	15.37	15.41	15.33	.078	.00507
1100	2	94.84	94.92	94.80	.117	.00123
1100	3	265.00	265.14	264.99	.15	.00056
1100	4	519.50	519.63	519.43	.202	.00039
1100	5	859.70	849.85	859.55	.30	.000344
1100	6	1279.60	1281.10	1278.30	2.78	.002
950	1	15.85	15.91	15.84	.073	.00461
950	2	96.48	96.54	96.44	.107	.00111
950	3	269.50	269.61	269.46	.145	.00054

Page 1 of 2

TABLE 1-C (Concluded)

Bare Beam No. 01-04-1

Temp. °F	Mode	f_n Hz	f_L Hz	f_R Hz	Δf Hz	η
950	4	528.20	528.32	528.15	.167	.00032
950	5	874.00	874.13	873.87	.26	.0003
950	6	1304.10	1303.10	1305.10	2.00	.0015
800	1	15.95	16.01	15.94	.064	.0040
800	2	97.95	97.91	98.00	.086	.00088
800	3	273.60	273.73	273.61	.12	.00044
800	4	536.30	536.42	536.22	.20	.00038
800	5	887.40	887.28	887 55	.27	.00[illegible]3
800	6	1325.30	1325.68	1325.05	.63	.00048
600	1	16.19				
600	2	99.76				
600	3	278.80	278.86	278.77	.093	.00033
600	4	546.40	546.51	546.36	.15	.00027
600	5	904.20	904.32	904.05	.27	.0003
600	6	1351.40	1352.68	1350.60	1.46	.00108
76	1	16.73				
76	2	104.03				
76	3	290.80				
76	4	569.80				
76	5	942.70				
76	6	1408.80				

Page 2 of 2

TABLE 2-C

Bare Beam No. 01-19-2

Temp. °F	Mode	f_n Hz	f_L Hz	f_R Hz	Δf Hz	η
1750	1	15.48	15.60	15.44	.16	.0103
1750	2	81.63	82.44	81.24	1.20	.0147
1750	3	234.03	234.84	233.40	1.40	.00614
1750	4	460.70	462.45	459.54	2.90	.0063
1750	5	766.90	770.24	763.91	6.30	.00825
1750	6	1149.20	1152.47	1146.66	5.81	.00506
1650	1	15.55				
1650	3	238.24	238.96	237.65	1.31	.00548
1650	4	468.50	469.53	467.62	1.91	.00408
1650	5	778.60	780.52	776.85	3.70	.0047
1650	6	1165.60	1167.41	1164.48	2.92	.00251
1550	2	86.62	86.51	86.34	.51	.00589
1550	3	242.26	252.63	241.95	.68	.00281
1550	4	475.78	476.28	475.40	.88	.00186
1550	5	789.80	790.89	788.83	2.06	.00261
1550	6	1181.60	1181.06	1182.59	1.54	.0013
1450	2	89.20	89.38	89.13	.25	.00286
1450	3	246.54	246.72	246.38	.34	.00138
1450	4	483.37	483.68	483.19	.49	.00102
1450	5	802.12	802.63	801.47	1.16	.00144
1450	6	1200.50	1200.91	1200.05	.86	.00072
1250	2	95.61	96.40	94.97	1.44	.01506
1250	3	253.20	253.28	253.09	.19	.00073
1250	4	497.17	497.29	497.02	.27	.00055
1250	5	824.80	825.15	824.40	.75	.000907
1250	6	1234.60	1234.95	1234.35	.59	.00048
1050	2	93.64	93.70	93.57	.13	.0014
1050	3	260.50	260.55	260.41	.14	.00055
1050	4	510.90	511.09	510.86	.23	.00046
1050	5	847.50	847.89	847.31	.57	.00068
1050	6	1268.40	1268.68	1268.25	.43	.00034
900	2	95.06				
900	3	264.73				

Page 1 of 2

TABLE 2-C (Concluded)

Bare Beam No. 01-19-7

Temp.	Mode	f_n	f_L	f_R	Δf	η
°F		Hz	Hz	Hz	Hz	
900	4	519.32				
900	5	861.30				
900	6	1289.00	1289.24	1288.76	.48	

Page 2 of 2

TABLE 3-C

Bore Hole No. 01-32-2

[illegible]	[illegible]	f_C	f_L	f_L	[illegible]	[illegible]
[illegible]		Hz	Hz	Hz	Hz	
1500	2	96.94	95.12	94.77	.35	.0037
1500	3	265.70				
1500	4	521.90	522.19	521.62	.57	.0011
1500	5	865.30	864.75	865.80	1.05	.0012
1500	6	1295.00				
1500	7	1811.90	1812.55	1811.43	1.12	.000616
1400	2	96.55				
1400	3	270.20				
1400	4	529.80				
1400	6	1314.60				
1400	7	1838.70	1839.18	1838.34	.85	.00046
1300	2	98.10				
1300	3	274.18				
1300	4	537.52				
1200	2	99.51				
1200	3	278.40				
1200	4	545.80				
1200	5	904.70				
1200	6	1353.70				
1200	7	1891.10				
1100	2	100.84				
1100	3	282.25				
1100	4	553.30				
1100	5	917.20				
1100	6	1372.40				
1100	7	1918.70	1916.17	1918.91	.74	.00038
1000	2	102.04				
1000	3	285.60				
1000	4	559.90				
1000	5	928.00				
1000	6	1388.70				
1000	7	1941.20				
900	2	103.19				

TABLE 3-C (Concluded)

Bare Beam No. 01-32-2

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
900	3	288.78				
900	4	566.20				
900	5	938.30				
900	6	1403.90				
900	7	1962.01	1961.86	1962.52	.25	.00033
73	2	109.38				
73	3	306.39	306.34	306.25	.082	.000266
73	4	599.80	599.99	599.59	.396	.00066
73	5	944.30	993.84	994.43	.59	.00063
73	7	2082.50	2081.95	2082.90	.95	.00046

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TABLE 4-C

Dare Beam No. 01-37-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1205	2	98.52	98.33	98.71		.0038
1205	3	275.61	275.59	275.70		.0003
1205	4	541.02	540.69	541.30		.0011
1205	5	897.63	897.37	898.06		.0007
1205	6	1342.37	1341.52	1343.54		.0015
1100	2	99.802				
1100	3	279.552				
1100	4	547.77				
1100	5	909.57				
1100	6	1358.90				
1015	2	101.172				
1015	3	283.13				
1015	4	555.07				
1015	5	920.66				
1015	6	1375.168				
918	2	102.23				
918	3	285.99				
918	4	561.14				
918	5	930.34				
918	6	1394.40				
805	2	103.52				
805	3	289.23				
805	4	567.43				
805	5	940.63				
805	6	1407.73				
705	2	104.50				
705	3	292.15				
705	4	572.95				
705	5	949.72				
705	6	1421.80				
610	2	105.36				
610	3	294.71				
610	4	578.38				

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TABLE 4-C (Concluded)

Dare Beam No. 01-37-1

Temp.	Mode	f_C	f_L	f_R	Δf	n
°F		Hz	Hz	Hz	Hz	
610	5	958.34				
610	6	1432.77				

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TABLE 5-C

Bare Lear No. 01-38-1

Temp.	Mode	f_C	f_L	f_R	[illegible]	[illegible]
°F		Hz	Hz	Hz	Hz	
1704	2	92.00				
1704	3	258.00				
1704	4	508.00				
1704	5	844.00				
1590	2	94.00				
1590	3	263.00				
1590	4	518.00				
1590	5	860.00				
1500	2	96.00				
1500	3	268.00				
1500	4	526.00				
1500	5	872.00				
1400	2	97.00				
1400	3	273.00				
1400	4	534.00				
1400	5	886.00				
1300	2	100.00				
1300	3	276.00				
1300	4	542.00				
1300	5	899.00				
1200	2	101.00				
1200	3	281.00				
1200	4	550.00				
1200	5	911.00				
1100	2	102.00				
1100	3	284.00				
1100	4	557.00				
1100	5	924.00				
1000	2	103.00				
1000	3	287.00				
1000	4	564.00				
1000	5	935.00				
895	2	104.00				

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TABLE 5-C (Concluded)

Bare Beam No. 01-38-1

Temp.	Mode	f_C	f_L	f_R	Δf	η
°F		Hz	Hz	Hz	Hz	
895	3	290.00				
895	4	570.00				
895	5	945.00				
800	2	105.00				
800	3	293.00				
800	4	576.00				
800	5	954.00				

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TABLE 6-C

Baze Beam No. 01-39-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1250	2	99.062				
1250	3	277.00				
1250	4	544.00				
1250	5	902.00				
1175	2	100.00				
1175	3	280.00				
1175	4	549.40				
1175	5	910.90				
1105	2	101.00				
1105	3	283.00				
1105	4	555.00				
1105	5	920.00				
1010	2	102.00				
1010	3	286.00				
1010	4	561.00				
1010	5	930.00				
920	2	104.00				
920	3	289.00				
920	4	567.00				
920	5	940.00				
820	2	105.00				
820	3	293.00				
820	4	574.00				
820	5	950.00				
710	2	106.00				
710	3	296.00				
710	4	580.00				
710	5	961.00				
605	2	107.00				
605	3	298.00				
605	4	586.00				
605	5	971.00				

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TABLE 7-C

Bare Beam No. 01-40-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1300	2	98				
1300	3	274				
1300	4	536				
1300	5	890				
1203	2	99				
1203	3	278				
1203	4	545				
1203	5	903				
1108	2	100				
1108	3	281				
1108	4	552				
1108	5	916				
1005	2	102				
1005	3	285				
1005	4	559				
1005	5	926				
900	2	103				
900	3	288				
900	4	566				
900	5	938				
805	2	104				
805	3	292				
805	4	566				
805	5	948				
700	2	105				
700	3	294				
700	4	578				
700	5	957				

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TABLE 8-C

Bare Beam No. 01-41-1

Temp.	Mode	f_C	f_L	f_R	Δf	η
°F		Hz	Hz	Hz	Hz	
1700	2	90.81				
1700	3	254.94				
1700	4	501.21				
1700	5	832.36				
1700	6	1245.80				
1600	2	92.77				
1600	3	260.18				
1600	4	511.07				
1600	5	847.32				
1600	6	1268.30				
1400	2	96.00				
1400	3	268.71				
1400	4	527.16				
1400	5	874.10				
1400	6	1307.87				
1200	2	98.89				
1200	3	276.64				
1200	4	542.65				
1200	5	899.80				
1200	6	1346.60				
1000	2	100.90				
1000	3	282.30				
1000	4	554.81				
1000	5	919.70				
1000	6	1376.60				
800	2	102.97				
800	3	288.53				
800	4	566.54				
800	5	939.27				
800	6	1405.45				
700	2	103.90				
700	3	291.40				
700	4	571.89				

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TABLE 8-C (Concluded)

Bare Beam No. 01-41-1

Temp.	Mode	f_C	f_L	f_R	Δf	η
°F		Hz	Hz	Hz	Hz	
700	5	948.04				
700	6	1418.28				

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TABLE 9-C

Bare Beam No. 01-42-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1550	2	95.0				
1550	3	265.0				
1550	4	520.0				
1550	5	864.0				
1400	2	97.0				
1400	3	271.0				
1400	4	533.0				
1400	5	883.0				
1250	2	99.2				
1250	3	277.6				
1250	4	544.9				
1250	5	903.5				
1250	6	1352.3				
1200	2	100.1				
1200	3	279.6				
1200	4	549.0				
1200	5	910.2				
1200	6	1361.9				
1100	2	101.3				
1100	3	283.0				
1100	4	556.0				
1100	5	921.6				
1100	2	101.3				
1100	3	283.1				
1100	4	555.7				
1100	5	921.4				
1100	6	1378.5				
1000	2	102.5				
1000	3	286.5				
1000	4	562.2				
1000	5	932.0				
1000	6	1394.7				
900	2	103.42				

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TABLE 9-C (Concluded)

Bare Beam No. 01-42-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
900	3	289.4				
900	4	568.5				
900	5	942.9				
900	6	1410.2				
700	2	105.46				
700	3	295.0				
700	4	579.3				
700	5	960.5				
700	6	1437.1				

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TABLE 10-C

Base Beam No. 01-43-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1500	2	94.91				
1500	3	266.2				
1500	4	520.6				
1500	5	863.5				
1500	6	1292.4				
1400	2	96.33				
1400	3	269.43				
1400	4	528.3				
1400	5	876.1				
1400	6	1311.0				
1300	2	97.73				
1300	3	273.4				
1300	4	536.0				
1300	5	888.8				
1300	6	1329.9				
1200	2	99.19				
1200	3	277.6				
1200	4	544.1				
1200	5	902.4				
1200	6	1351.3				
1100	2	100.57				
1100	3	281.5				
1100	4	551.7				
1100	5	914.9				
1100	6	1369.7				
1000	2	101.86				
1000	3	285.1				
1000	4	558.6				
1000	5	926.5				
1000	6	1386.8				
900	2	103.26				
900	3	288.25				
900	4	564.7				

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TABLE 10-C (Concluded)

Bare Beam No. 01-43-1

Temp.	Mode	f_C	f_L	f_R	Δf	η
°F		Hz	Hz	Hz	Hz	
900	5	936.97				
900	6	1401.7				
800	2	104.04				
800	3	291.18				
800	4	570.33				
800	5	946.35				
800	6	1415.7				
700	2	105.02				
700	3	294.05				
700	4	575.6				
700	5	965.5				
700	6	1429.1				

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TABLE 11-C

Bare Beam No. 01-43-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	[illegible]
1700	2	89.25				
1700	3	255.84				
1700	4	502.06				
1700	5	833.96				
1700	6	1249.23				
1600	2	90.95				
1600	3	260.98				
1600	4	512.08				
1600	5	848.51				
1600	6	1273.70				
1400	2	96.18				
1400	3	269.67				
1400	4	528.56				
1400	5	875.44				
1400	6	1313.28				
1200	2	99.18				
1200	3	277.65				
1200	4	543.96				
1200	5	901.33				
1200	6	1352.18				
1000	2	101.74				
1000	3	285.00				
1000	4	556.41				
1000	5	925.02				
1000	6	1386.99				
800	2	103.95				
800	3	290.90				
800	4	569.56				
800	5	943.86				
800	6	1415.25				
600	2	105.85				
600	3	296.37				
600	4	579.66				

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TABLE 11-C (Concluded)

Bare Beam No. 01-43-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
600	5	961.27				
600	6	1441.01				

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TABLE 12-C

Bare Beam No. 01-44-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1400	2	96.83				
1400	3	271.2				
1400	4	532.08				
1400	5	882.0				
1400	6	1319.9				
1200	2	99.66				
1200	3	279.12				
1200	4	547.63				
1200	5	907.75				
1200	6	1358.2				
1000	2	102.24				
1000	3	286.37				
1000	4	561.8				
1000	5	930.9				
1000	6	1392.8				
800	2	104.42				
800	3	292.38				
800	4	573.3				
800	5	950.1				
800	6	1421.6				
600	2	106.39				
600	3	297.93				
600	4	584.4				
600	5	968.4				
600	6	1449.0				

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TABLE 13-C

Bare Beam No. 01-46-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1700	2	91.83	91.54	92.12	.580	.00632
1700	3	258.34	257.48	259.19	1.710	.00662
1700	4	508.46	507.06	509.76	2.700	.00531
1700	5	843.05	840.65	845.41	4.760	.00565
1700	6	1263.05	1265.59	1260.75	4.84	.00383
1650	2	93.07	92.74	93.44	.700	.00752
1650	3	261.25	260.50	262.02	1.52	.00582
1650	4	514.15	513.08	515.17	2.90	.00406
1650	5	851.79	850.19	853.21	3.03	.00356
1650	6	1275.50	1273.90	1277.13	3.23	.00253
1600	2	93.92	93.60	94.30	.70	.00745
1600	3	263.78	263.20	264.40	1.20	.00455
1600	4	518.31	517.66	519.10	1.44	.00278
1600	5	858.86	857.77	859.83	2.06	.00240
1600	6	1285.65	1284.52	1286.90	2.38	.00185
1500	2	95.61	95.41	95.81	.40	.00418
1500	3	268.05	267.80	268.39	.59	.00220
1500	4	526.65	526.36	527.01	.65	.00123
1500	5	872.57	872.05	873.08	1.03	.00118
1500	6	1306.42	1305.73	1307.00	1.27	.00097
1300	2	98.39	98.32	98.47	.15	.00152
1300	3	275.99	275.87	276.15	.28	.00101
1300	4	542.06	541.95	542.18	.23	.00042
1300	5	897.89	897.65	898.18	.53	.00059
1300	6	1344.04	1343.76	1344.36	.60	.00045
1100	2	101.49	101.43	101.54	.11	.00108
1100	3	284.69	284.59	284.80	.21	.00074
1100	4	559.38	559.30	559.48	.18	.00032
1100	5	926.60	926.35	926.86	.51	.00055
1100	6	1386.80	1386.60	1387.10	.50	.00036
900	2	103.67	290.63	103.71	.08	.00077
900	3	290.34	290.24	290.42	.18	.00062
900	4	570.41	570.35	570.49	.14	.00025

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TABLE 13-C (Concluded)

Bare Beam No. 01-46-1

Temp.	Mode	f_C	f_L	f_R	Δf	η
°F		Hz	Hz	Hz	Hz	
900	5	944.63	944.43	944.82	.39	.00041
900	6	1413.37	1413.10	1413.71	.61	.00043
700	2	105.64				
700	3	297.78				
700	4	581.39				
700	5	962.77				
700	6	1440.05				
1300	2	98.72	98.65	98.80	.15	.00152
1300	3	276.90	276.82	277.00	.18	.00065
1300	4	543.77	543.68	543.93	.25	.00046
1300	5	900.87	900.53	901.12	.59	.00065
1300	6	1348.46	1348.12	1348.78	.66	.00049
1000	2	102.52				
1000	3	287.25				
1000	4	564.32				
1000	5	934.51				
1000	6	1398.30				

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TABLE 14-C

Bare Beam No. 01-47-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1600	2	94.76	94.45	95.10	.65	.00685
1600	3	266.16				
1600	4	522.92	522.22	523.58	1.36	.00260
1600	5	866.43	865.45	867.39	1.94	.00224
1600	6	1296.67	1295.63	1297.72	2.09	.00161
1400	2	97.35				
1400	3	274.20				
1400	4	538.59				
1400	5	892.12				
1400	6	1334.84				
1200	2	100.79				
1200	3	282.27				
1200	4	554.47				
1200	5	918.41				
1200	6	1373.89				
1000	2	103.22				
1000	3	289.29				
1000	4	568.42				
1000	5	941.36				
1000	6	1408.16				
800	2	105.49				
800	3	296.28				
800	4	580.22				
800	5	960.90				
800	5	1437.16				
600	2	107.57				
600	3	302.13				
600	4	591.65				
600	5	979.43				
600	6	1464.20				

TABLE 15-C

Bare Beam No. 01-49-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1750	2	89.56	89.21	89.84	.63	.007
1750	3	251.66	250.87	252.44	1.57	.0062
1750	4	495.56	494.09	497.09	3.00	.0061
1750	5	821.96	820.68	823.18	4.88	.0059
1750	6	1231.92	1229.00	1235.09	6.09	.0049
1700	2	90.41	90.12	90.74	.62	.0069
1700	3	254.26	253.42	255.02	1.60	.0063
1700	4	500.39	498.94	501.68	2.74	.0055
1700	5	829.78	828.76	830.70	3.90	.0047
1700	6	1242.06	1240.05	1244.77	4.72	.0038
1650	2	91.27	90.92	91.62	.70	.0078
1650	3	256.62	255.87	257.38	1.51	.0059
1650	4	504.98	503.85	505.98	2.13	.0042
1650	5	837.12	836.46	837.89	2.79	.0039
1650	6	1253.65	1251.94	1255.29	3.35	.0027
1600	2	92.24	91.89	92.55	.66	.0072
1600	3	259.19	258.56	259.70	1.14	.0044
1600	4	509.52	508.86	510.26	1.40	.0027
1600	5	844.39	843.30	845.42	2.12	.0025
1600	6	1264.02	1262.90	1265.10	2.20	.0017
1550	2	93.10	92.84	93.38	.54	.0058
1550	3	261.30	260.92	261.69	.77	.0029
1550	4	513.64	513.23	514.14	.91	.0018
1550	5	851.10	850.42	851.84	1.42	.0017
1550	6	1274.09	1273.12	1274.84	1.72	.0013
1500	2	93.92	93.74	94.10	.36	.0038
1500	3	263.41	263.17	263.69	.52	.0020
1500	4	517.78	517.37	518.08	.71	.0014
1500	5	857.74	857.20	858.32	1.12	.0013
1500	6	1283.80	1283.31	1284.63	1.32	.0010
1450	2	94.60	94.48	94.74	.30	.0032
1450	3	265.32	265.12	265.52	.40	.0015
1450	4	521.49	521.27	521.70	.43	.0008

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TABLE 15-C (Continued)

Bare Beam No. 01-49-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1450	5	864.01	863.58	864.44	.86	.0010
1450	6	1293.25	1292.78	1293.83	1.05	.0008
1400	2	95.42	95.32	95.52	.20	.0021
1400	3	267.58	267.40	267.74	.34	.00127
1400	4	525.90	525.72	526.10	.38	.00072
1400	5	871.22	870.93	871.64	.71	.0008
1400	6	1304.00	1303.54	1304.44	.90	.0007
1350	2	96.11	96.04	06.20	.16	.00166
1350	3	269.50	269.36	269.63	.27	.0010
1350	4	529.69	529.53	529.86	.33	.00662
1350	5	877.46	877.25	877.79	.54	.00062
1350	6	1313.35	1312.91	1313.71	.80	.00061
1300	2	96.82	96.74	96.88	.14	.00145
1300	3	271.30	271.18	271.48	.30	.0011
1300	4	533.24	533.16	533.40	.24	.00045
1300	5	883.43	883.17	883.61	.44	.0005
1300	6	1322.22	1321.79	1322.37	.48	.00036
1250	2	97.52	97.45	97.58	.13	.0133
1250	3	273.28	273.12	273.46	.34	.0124
1250	4	537.16	537.07	537.28	.21	.00033
1250	5	889.82	889.55	890.04	.49	.00055
1250	6	1331.72	1331.44	1331.95	.51	.00038
1100	2	99.58	99.52	99.64	.12	.00121
1100	3	279.00	278.88	279.14	.26	.00093
1100	4	548.42	548.33	548.51	.18	.00033
1100	5	908.30	908.09	908.51	.42	.00046
1100	6	1359.01	1358.80	1359.24	.44	.00032
900	2	101.71				
900	3	284.48				
900	4	560.18				
900	5	927.67				
900	6	1338.06				
800	2	102.67				

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TABLE 15-C (Concluded)

Barc Beam No. 01-49-1

Temp.	Mode	f_C	f_L	f_R	Δf	η
°F		Hz	Hz	Hz	Hz	
800	3	286.36				
800	4	565.52				
800	5	936.62				
800	6	1401.23				

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TABLE 16-C

Bare Beam No. 01-50-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1750	2	90.86				
1750	3	254.70				
1750	4	501.78				
1750	5	832.61				
1750	6	1247.73				
1600	2	93.41				
1600	3	261.98				
1600	4	515.33				
1600	5	854.00				
1600	6	1278.44				
1450	2	95.85				
1450	3	268.35				
1450	4	527.63				
1450	5	874.18				
1450	6	1308.60				
1300	2	97.90				
1300	3	274.03				
1300	4	538.89				
1300	5	892.73				
1300	6	1336.11				
1150	2	100.07				
1150	3	279.93				
1150	4	550.54				
1150	5	912.00				
1150	6	1364.76				
1000	2	102.00				
1000	3	285.06				
1000	4	561.04				
1000	5	929.15				
1000	6	1390.28				
800	2	104.08				
800	3	289.75				
800	4	572.26				

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TABLE 16-C (Concluded)

Bare Beam No. 01-50-2

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
800	5	947.74				
800	6	1418.03				
600	2	106.04				
600	3	298.01				
600	4	583.32				
600	5	965.77				
600	6	1444.80				

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TABLE 17-C

Bare Drum No. 01-51-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1750	2	91.47				
1750	3	256.68				
1750	4	504.64				
1750	5	836.82				
1750	6	1253.83				
1600	2	94.02				
1600	3	263.59				
1600	4	518.00				
1600	5	858.57				
1600	6	1284.98				
1450	2	96.41				
1450	3	269.99				
1450	4	530.31				
1450	5	878.60				
1450	6	1314.86				
1300	2	98.53				
1300	3	275.76				
1300	4	541.77				
1300	5	897.44				
1300	6	1343.26				
1150	2	100.70				
1150	3	281.68				
1150	4	553.62				
1150	5	917.08				
1150	6	1372.32				
1000	2	102.68				
1000	3	286.80				
1000	4	564.50				
1000	5	935.01				
1000	6	1399.08				
800	2	104.69				
800	3	295.83				
800	4	575.65				

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TABLE 17-C (Concluded)

Bare Beam No. 01-51-1

Temp.	Mode	f_C	f_L	f_R	Δf	η
°F		Hz	Hz	Hz	Hz	
800	5	953.29				
800	6	1426.52				
600	2	106.66				
600	3	299.80				
600	4	596.38				
600	5	971.05				
600	6	1452.70				

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TABLE 18-C

Bare Beam No. 01-52-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1650	2	93.20	93.50	92.82	.68	.0073
1650	3	261.17	262.01	260.50	1.50	.0057
1650	4	512.66	511.64	513.74	2.10	.0041
1650	5	850.20	848.68	851.43	2.75	.00323
1650	6	1272.40	1270.92	127[illegible]92	2.90	.0023
1550	2	94.95				
1550	3	265.80				
1550	4	521.30				
1550	5	864.10				
1550	6	1293.10				
1400	2	97.19	97.30	97.10	.19	.00198
1400	3	272.00	272.11	271.83	.28	.0010
1400	4	533.40	533.13	533.62	.49	.0009
1400	5	884.00				
1400	6	1322.70				
1200	2	100.10				
1200	3	279.98				
1200	4	549.00				
1200	5	909.90				
1200	6	1361.30				
1[illegible]00	2	102.65				
1000	3	287.22				
1000	4	563.00				
1000	5	933.10				
1000	6	1396.10				
800	2	104.77				
800	3	293.19				
800	4	574.60				
800	5	952.55				
800	6	1424.90				

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TABLE 19-C

Bare Beam No. 01-53-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1750	2	91.25				.0063
1750	3	255.70				
1750	4	502.64				.006
1750	5	834.13				
1750	6	1249.40				
1650	2	92.97				.0074
1650	3	260.62				.0058
1650	4	512.25				.0042
1650	5	849.40				
1650	6	1271.70				
1500	2	95.83				
1500	3	267.30				
1500	4	524.70				
1500	5	869.70				
1500	6	1301.54				
1200	2	99.97				
1200	3	279.63				
1200	4	548.80				
1200	5	909.40				
1200	6	1360.80				
1000	2	102.56				
1000	3	287.15				
1000	4	563.52				
1000	5	933.70				
1000	6	1397.20				
800	3	311.50				
800	4	611.10				
800	5	1012.20				
800	6	1514.40				
75	2	104.60				
75	3	292.93				
75	4	574.84				
75	5	952.50				

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TABLE 19-C (Concluded)

Bare Beam No. 01-53-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
75	6	1425.20				

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TABLE 20-C

Bare Beam No. 01-53-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1750	2	91.24				
1750	3	255.65				
1750	4	502.60				
1750	5	834.20				
1750	6	1249.20				
1650	2	92.95				
1650	3	260.60				
1650	4	512.80				
1650	5	849.60				
1650	6	1271.00				
1500	2	95.80				
1500	3	267.30				
1500	4	526.80				
1500	5	870.00				
1500	6	1301.60				
1200	2	99.95				
1200	3	279.10				
1200	4	553.50				
1200	5	909.20				
1200	6	1360.00				
1000	2	102.55				
1000	3	284.00				
1000	4	563.40				
1000	5	933.10				
1000	6	1397.40				
800	2	104.56				
800	4	574.80				
800	5	952.50				

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TABLE 21-C

Bare Beam No. 01-54-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1750	2	91.62				
1750	3	257.10				
1750	4	505.50				
1750	5	838.60				
1750	6	1255.80				
1600	2	94.28				
1600	3	264.25				
1600	4	519.18				
1600	5	860.80				
1600	6	1288.10				
1400	2	97.55				
1400	3	272.985				
1400	4	535.957				
1400	5	888.131				
1400	6	1328.727				
1200	2	100.31				
1200	3	280.79				
1200	4	551.17				
1200	5	913.54				
1200	6	1366.60				
1000	2	102.90				
1000	3	288.24				
1000	4	565.55				
1000	5	937.51				
1000	6	1402.30				
800	2	104.98				
800	3	294.06				
800	4	577.01				
800	5	956.31				
800	6	1430.60				

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TABLE 22-C

Bare Beam No. 01-55-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1750	2	91.20				
1750	3	256.30				
1750	4	502.90				
1750	5	835.10				
1750	6	1251.40				
1530	2	95.00				
1530	3	266.30				
1530	4	522.40				
1530	5	866.70				
1530	6	1297.60				
1350	2	97.80				
1350	3	273.50				
1350	4	536.60				
1350	5	870.10				
1200	2	99.80				
1200	3	279.60				
1200	4	548.20				
1200	5	909.40				
1060	2	101.70				
1060	3	284.80				
1060	4	558.60				
1060	5	926.60				
800	2	104.67				
800	3	293.13				
800	4	577.50				
800	5	953.50				
800	6	1426.30				

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TABLE 23-C

Bare Dec. No. 01-56-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1750	2	90.36	90.63	90.09	.54	.0059
1750	3	253.31	254.03	252.55	1.48	.0059
1750	4	498.00	499.43	496.5	2.93	.0059
1750	5	826.40	821.77	824.00	2.23	.0027
1750	6	1238.80	1241.79	2135.64	6.14	.0050
1650	2	92.13				
1650	3	258.34	259.14	257.64	1.49	.0058
1650	4	507.90	508.96	506.87	2.09	.0041
1650	5	842.50	844.07	841.50	2.57	.0031
1650	6	1261.80	1263.20	1260.20	3.00	.0024
1450	2	95.47				
1450	3	267.15				
1450	4	524.70				
1450	5	870.04				
1450	6	1302.40				
1250	2	98.36				
1250	3	275.17				
1250	4	540.17				
1250	5	895.70				
1250	6	1340.50				
1050	2	101.15				
1050	3	282.98				
1050	4	555.48				
1050	5	920.80				
1050	6	1378.20				
900	2	102.75				
900	3	287.46				
900	4	564.21				
900	5	935.30				
900	6	1399.[illegible]0				
700	2	104.80				
700	3	293.30				
700	4	575.70				

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TABLE 23-C (Concluded)

Bare Beam No. 01-56-1

Temp.	Mode	f_C	f_L	f_R	Δf	η
°F		Hz	Hz	Hz	Hz	
700	5	957.27				
700	6	1428.10				

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TABLE 24-C

Bare Beam No. 01-57-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1750	2	83.92	83.67	84.20	.53	.00632
1750	3	235.15	234.38	235.97	1.59	.00676
1750	4	461.86	460.61	463.31	2.70	.00585
1750	5	766.20	763.99	768.42	4.43	.00578
1750	6	1147.05	1144.16	1149.80	5.64	.00492
1700	2	84.58	84.28	84.88	.60	.00709
1700	3	237.46	236.65	238.27	1.62	.00682
1700	4	466.45	465.21	467.69	2.48	.00532
1700	5	773.26	771.88	775.09	3.21	.00415
1700	6	1157.33	1155.41	1159.49	4.08	.00353
1650	2	85.24	84.92	85.59	.67	.00786
1650	3	239.52	238.81	240.34	1.53	.00639
1650	4	470.48	469.57	471.50	1.93	.00410
1650	5	779.80	778.51	781.16	2.65	.00340
1650	6	1167.05	1165.56	1168.40	2.84	.00243
1600	2	86.01	85.79	86.41	.62	.00721
1600	3	241.76	241.17	242.32	1.15	.00476
1600	4	474.54	473.92	475.20	1.28	.00270
1600	5	786.21	785.24	787.02	1.78	.00226
1600	6	1176.30	1175.35	1177.43	2.08	.00177
1550	2	86.91	86.64	87.14	.50	.00573
1550	3	243.75	243.35	244.15	.80	.00328
1550	4	478.41	477.98	478.83	.85	.00178
1550	5	792.57	791.89	793.17	1.28	.00161
1550	6	1185.84	1184.93	1186.51	1.58	.00133
1500	2	87.64	87.45	87.80	.35	.00399
1500	3	245.64	245.34	245.96	.62	.00252
1500	4	482.12	481.84	482.46	.62	.00129
1500	5	798.59	798.12	799.14	1.02	.00128
1500	6	1194.81	1194.22	1195.40	1.18	.00099
1450	2	88.33	88.21	88.46	.25	.00283
1450	3	247.55	247.33	247.81	.48	.00194
1450	4	485.93	485.72	486.18	.46	.00095

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TABLE 24-C (Continued)

Bare Beam No. 01-57-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	[illegible]
1450	5	804.97	804.54	805.39	.85	.00106
1450	6	1204.27	1203.89	1204.76	.87	.00072
1400	2	89.00	88.90	89.10	.20	.00225
1400	3	249.42	249.19	249.65	.46	.00184
1400	4	489.60	489.40	489.75	.35	.00071
1400	5	810.91	810.54	811.24	.70	.00086
1400	6	1213.03	1212.67	1212.49	.82	.0068
1350	2	89.66	89.57	89.74	.17	.00190
1350	3	251.16	250.99	251.33	.34	.00136
1350	4	493.14	492.98	493.27	.29	.00059
1350	5	816.77	816.47	817.08	.61	.00075
1350	6	1221.80	1221.38	1222.23	.85	.00070
1300	2	90.31	90.25	90.40	.15	.00166
1300	3	252.98	252.78	253.18	.40	.00158
1300	4	496.73	496.60	496.86	.26	.00052
1300	5	822.71	822.44	822.96	.52	.00063
1300	6	1230.63	1230.25	1230.98	.73	.00059
1250	2	90.96	90.89	91.03	.14	.00154
1250	3	254.70	254.48	254.91	.43	.00046
1250	4	500.22	500.10	500.33	.23	.00046
1250	5	828.47	828.22	828.71	.49	.00059
1250	6	1239.28	1238.90	1239.66	.76	.00061
1200	2	91.61	91.56	91.69	.13	.00142
1200	3	256.55	256.23	256.67	.44	.00172
1200	4	503.80	503.70	503.90	.20	.00040
1200	5	834.42	834.17	834.66	.49	.00059
1200	6	1248.16	1247.74	1248.33	.79	.00063
1150	2	92.28	92.22	92.34	.12	.00130
1150	3	258.18	258.02	258.35	.64	.00251
1150	4	507.36	507.24	507.49	.25	.00099
1150	5	840.47	840.20	840.70	.50	.00059
1150	6	1257.15	1256.76	1257.56	.80	.00064
1100	2	92.96	92.91	93.01	.10	.00108

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TABLE 24-C (Concluded)

Bare Beam No. 01-57-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1100	3	260.25	260.00	260.47	.47	.00181
1100	4	511.22	511.13	511.37	.24	.00047
1100	5	846.69	846.48	846.95	.47	.00056
1100	6	1266.35	1266.20	1266.90	.70	.00055
1050	2	93.53	93.49	93.59	.10	.00107
1050	3	261.79	261.51	262.05	.54	.00206
1050	4	514.39	514.30	514.48	.18	.00035
1050	5	852.10	851.84	852.28	.44	.00052
1050	6	1274.53	1274.25	1274.81	.56	.00044
900	2	94.98				
900	3	265.45				
900	4	522.27				
900	5	865.00				
900	6	1293.81				
800	2	95.93				
800	3	269.85				
800	4	527.51				
800	5	873.64				
800	6	1306.68				

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TABLE 25-C

Bare Beam No. 01-58-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1750	2	85.63	85.39	85.96	.57	.00666
1750	3	240.43	239.70	241.19	1.49	.00620
1750	4	473.34	471.83	474.59	2.76	.00583
1750	5	784.86	782.66	786.99	4.33	.00552
1750	6	1175.55	1172.62	1178.34	5.72	.00487
1700	2	86.47	86.20	86.81	.61	.00705
1700	3	242.72	241.93	243.52	1.59	.00655
1700	4	477.72	476.47	478.98	2.51	.00525
1700	5	792.09	790.24	793.94	3.70	.00467
1700	6	1185.95	1183.73	1188.03	4.30	.00363
1650	2	87.22	86.89	87.57	.68	.00780
1650	3	245.01	244.24	245.73	1.49	.00608
1650	4	482.02	481.13	483.05	1.92	.00398
1650	5	799.08	797.86	800.39	2.53	.00317
1650	6	1196.01	1194.38	1197.38	3.00	.00251
1600	2	88.21	87.87	88.54	.70	.00794
1600	3	247.18	246.83	247.58	1.45	.00587
1600	4	486.30	485.63	486.91	1.28	.00263
1600	5	815.70	804.86	806.53	1.67	.00207
1600	6	1205.68	1204.66	1206.69	2.03	.00168
1550	2	88.89	88.59	89.14	.55	.00619
1550	3	249.15	248.72	249.84	1.12	.00450
1550	4	490.02	489.66	490.51	.85	.00173
1550	5	812.03	811.47	812.64	1.17	.00144
1550	6	1215.13	1214.42	1215.89	1.47	.00121
1500	2	89.69	89.49	89.86	.37	.00413
1500	3	251.86	251.39	252.34	.95	.00377
1500	4	493.85	493.57	494.14	.57	.00115
1500	5	818.23	817.85	818.78	.93	.00114
1500	6	1224.27	1223.76	1224.84	1.08	.00088
1450	2	90.39	90.26	90.53	.27	.00299
1450	3	253.86	253.49	254.24	.75	.00295
1450	4	497.63	497.44	497.89	.45	.00090

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TABLE 25-C (Continued)

Bare Beam No. 01-58-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1450	5	824.50	824.16	824.84	.68	.00082
1450	6	1233.53	1233.10	1233.94	.84	.00068
1400	2	91.12	91.02	91.22	.20	.00219
1400	3	255.76	255.51	256.01	.50	.00195
1400	4	501.39	501.22	501.60	.38	.00076
1400	5	830.62	830.36	830.92	.56	.00067
1400	6	1242.59	1242.27	1243.00	.73	.00059
1350	2	91.92	91.83	92.00	.17	.00185
1350	3	257.84	257.65	258.06	.41	.00159
1350	4	505.52	505.37	505.67	.30	.00059
1350	5	837.45	837.18	837.70	.52	.00062
1250	2	93.11	93.02	93.18	.16	.00172
1250	3	261.20	261.10	261.36	.26	.00100
1250	4	512.34	512.19	512.48	.35	.00041
1250	5	848.63	848.42	848.77	.29	.00057
1250	6	1269.51	1269.23	1269.86	.63	.00050
1150	2	94.55	94.48	94.62	.14	.00146
1150	3	266.16	266.05	256.25	.20	.00078
1150	4	519.95	519.84	520.08	.24	.00046
1150	5	861.20	861.08	861.37	.29	.00034
1150	6	1288.13	1287.91	1288.46	.55	.00043
1050	2	95.79	95.73	95.85	.12	.00125
1050	3	268.50	268.42	268.59	.17	.00063
1050	4	526.52	526.40	526.62	.22	.00042
1050	5	871.93	871.80	872.11	.31	.00036
1050	6	1304.21	1303.91	1304.34	.43	.00033
900	2	97.43				
900	3	272.80				
900	4	534.90				
900	5	885.80				
900	6	1324.80				
750	2	98.77				
750	3	276.80				

TABLE 25-C (Concluded)

Bare Beam No. 01-58-1

Temp.	Mode	f_C	f_L	f_R	Δf	
°F		Hz	Hz	Hz	Hz	
750	4	542.80				
750	5	898.90				
750	6	1344.26				
650	2	99.71				
650	3	279.30				
650	4	547.80				
650	5	907.00				
650	6	1356.20				

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TABLE 26-C

Bare Beam No. 01-59-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1750	2	85.78				
1750	3	240.22				
1750	4	472.65				
1750	5	783.76				
1750	6	1172.50				
1600	2	97.95				
1600	3	246.57				
1600	4	485.26				
1600	5	803.91				
1600	6	1201.95				
1450	2	90.09				
1450	3	253.58				
1450	4	495.99				
1450	5	821.52				
1450	6	1228.03				
1300	2	92.24				
1300	3	259.30				
1300	4	507.59				
1300	5	840.54				
1300	6	1256.55				
1150	2	94.43				
1150	3	265.28				
1150	4	519.25				
1150	5	859.95				
1150	6	1285.28				
1000	2	96.04				
1000	3	269.80				
1000	4	528.15				
1000	5	874.53				
1000	6	1306.90				
850	2	97.52				
850	3	273.91				
850	4	536.22				

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TABLE 26-C (Concluded)

Bare Beam No. 01-59-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	[illegible]
850	5	887.79				
850	6	1326.68				
700	2	98.97				
700	3	277.90				
700	4	544.14				
700	5	900.87				
700	6	1346.29				
600	2	99.92				
600	3	280.48				
600	4	549.10				
600	5	909.09				
600	6	1358.35				

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TABLE 27-C

Bare Beam No. 01-59-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1100	2	89.48	89.37	89.58	.21	.00235
1100	3	250.81	250.53	251.30	.97	.00387
1100	4	490.51	489.90	491.32	1.42	.00289
1100	5	812.37	810.63	814.50	3.87	.00476
1100	6	1215.75	1212.69	1220.15	7.46	.00614
1050	2	89.97	89.77	90.17	.40	.00445
1050	3	252.57	251.72	253.92	2.65	.01049
1050	4	494.69	491.40	498.53	7.13	.01441
1050	5	822.12	809.96	829.95	19.99	.02432
1050	6	1237.64	1222.70	1252.58	29.88	.02414
1000	2	91.40	90.29	92.70	2.41	.02637
1000	3	258.57	254.15	263.00	8.85	.03423
1000	4	510.31	497.97	518.59	20.62	.04041
1000	5	853.52	831.07	872.30	41.19	.04826
1000	6	1275.87	1243.21	1298.40	55.19	.04326
975	2	92.40	91.09	94.74	3.63	.03929
975	3	260.48	254.36	265.19	10.83	.04158
975	4	512.80	503.18	521.56	36.12	.7044
975	5	876.39	855.31	898.95	43.67	.04983
975	6	1286.87	1251.33	1300.09	95.66	.07432
950	2	95.62	93.65	98.18	4.53	.04738
950	3	267.18	264.80	269.60	9.43	.03531
950	4	534.08	522.86	544.68	21.84	.04086
950	5	899.15	885.44	914.44	29.00	.03225
950	6	1344.10	1330.02	1358.16	55.30	.04114

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TABLE 28-C

Bare Beam No. 01-60-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1750	2	84.44				
1750	3	237.56				
1750	4	467.16				
1750	5	774.67				
1750	6	1159.87				
1600	2	86.90				
1600	3	243.98				
1600	4	479.50				
1600	5	794.27				
1600	6	1188.80				
1450	2	89.15				
1450	3	249.98				
1450	4	490.64				
1450	5	812.66				
1450	6	1215.90				
1300	2	91.14				
1300	3	255.96				
1300	4	501.50				
1300	5	830.40				
1300	6	1242.42				
1150	2	93.21				
1150	3	261.68				
1150	4	512.67				
1150	5	848.95				
1150	6	1269.75				
1000	2	94.90				
1000	3	266.21				
1000	4	521.75				
1000	5	863.92				
1000	6	1292.30				
850	2	96.39				
850	3	270.41				
850	4	529.90				

Page 1 of 2

TABLE 28-C (Concluded)

Bare Beam No. 01-60-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
850	5	877.25				
850	6	1312.00				
700	2	97.69				
700	3	274.14				
700	4	537.34				
700	5	889.70				
700	6	1330.50				
600	2	98.59				
600	3	276.61				
600	4	542.16				
600	5	897.50				
600	6	1342.00				

Page 2 of 2

TABLE 29-C

Bare Beam No. 01-61-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1750	2	84.35				
1750	3	236.05				
1750	4	464.08				
1750	5	769.95				
1705	6	1153.30				
1600	2	86.58				
1600	3	242.81				
1600	4	476.98				
1600	5	790.37				
1600	6	1182.67				
1450	2	88.74				
1450	3	248.55				
1450	4	488.10				
1450	5	808.60				
1450	6	1209.80				
1300	2	91.01				
1300	3	254.83				
1300	4	500.42				
1300	5	828.95				
1300	6	1240.02				
1150	2	92.90				
1150	3	260.02				
1150	4	510.70				
1150	5	846.94				
1150	6	1265.40				
1000	2	94.54				
1000	3	264.50				
1000	4	519.69				
1000	5	860.70				
1000	6	1287.50				
850	2	95.97				
850	3	268.24				
850	4	527.55				

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TABLE 29-C (Concluded)

Bare Beam No. 01-61-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
850	5	873.60				
850	6	[illegible].70				
600	2	[illegible].31				
600	3	276.00				
600	4	540.83				
600	5	895.55				
600	6	1338.90				

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TABLE 30-C

Bare Beam No. 01-62-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
1750	2	84.15				
1750	3	236.50				
1750	4	464.18				
1750	5	770.05				
1750	6	1152.70				
1600	2	86.49				
1600	3	243.18				
1600	4	476.90				
1600	5	790.00				
1600	6	1182.09				
1400	2	89.38				
1400	3	250.70				
1400	4	491.48				
1400	5	814.04				
1400	6	1217.70				
1200	2	91.88				
1200	3	257.82				
1200	4	505.65				
1200	5	837.70				
1200	6	1252.80				
1000	2	94.24				
1000	3	264.64				
1000	4	518.35				
1000	5	858.67				
1000	6	1284.20				
800	2	96.32				
800	3	270.30				
800	4	529.55				
800	5	877.02				
800	6	1311.40				
600	2	98.09				
600	3	275.25				
600	4	539.25				

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TABLE 30-C (Concluded)

Bare Beam No. 01-62-1

Temp. °F	Mode	f_C Hz	f_L Hz	f_R Hz	Δf Hz	η
600	5	893.96				
600	6	1335.30				

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TABLE 31-C

Bare Beam No. 01-63-1

Temp.	Mode	f_C	f_L	f_R	Δf	η
°F		Hz	Hz	Hz	Hz	
1600	2	88.18	87.90	88.54		
1600	3	248.11	247.40	249.15		
1600	4	485.72	484.93	486.27		
1600	5	804.73	803.75	805.38		
1600	6	1203.96	1202.21	1204.88		
1400	2	91.18	91.10	91.26		
1400	3	256.28	256.05	256.86		
1400	4	500.76	500.65	500.91		
1400	5	829.93	829.31	830.25		
1400	6	1240.92	1239.75	1241.39		
1200	2	93.74	93.67	93.81		
1200	3	263.09	262.95	263.33		
1200	4	515.04	514.89	515.04		
1200	5	852.55	852.50	852.92		
1200	6	1275.03	1374.68	1275.55		
1000	2	96.50				
1000	3	270.59				
1000	4	529.91				
1000	5	877.44				
1000	6	1309.69				
800	2	97.84				
800	3	276.17				
800	4	540.48				
800	5	894.63				
800	6	1337.33				
600	2	100.28				
600	3	281.10				
600	4	550.60				
600	5	911.96				
600	6	1361.85				

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APPENDIX D

THERMAL AGING

The porcelain enamels listed in this Appendix were thermally aged as described in Section IV of this report. Table 1-D is an index of these materials, listing the times and temperatures to which the specimens were exposed. The tables referenced in Table 1-D are derived by using the nomograph curve fit equations. A frequency of 100 Hz is used over a temperature range which describes peak damping. The figures associated with these tables are plots of loss factor versus temperature, and illustrate the change in damping.

The effects of thermal aging vary widely for different glasses, as illustrated in Figure 1-D.

TABLE 1-D

INDEX OF MATERIALS THERMALLY AGED

Material	Beam Number	Temperature °C	Time Hours
O. Hommel 7007	01-37-1	*	*
	01-39-1	600	120
Corning 0010 + 7.5% Al_2O_3 + 1% Co_2O_3	01-48-1	*	*
	01-48-2	760	166.5
	01-49-1	*	*
	01-49-2	760	100
Corning 7570 + 2% Na_2O + 2% $KHCO_3$	01-48-4	*	*
	01-48-5	480	121
SiO_2 + 12.75% Na_2O + 10.75% CaO + 2% Co_2O_3	01-46-1	*	*
	01-46-2	760	100
	01-46-3	760	314
SiO_2 + 12.75% Na_2O + 10.75% CaO + 3% Al_2O_3 + 2% Co_2O_3	01-44-2	*	*
	01-44-3	750	98
SiO_2 + 12.75% Na_2O + 10.75% CaO + 6% Al_2O + 2% Co_2O_3	01-55-2	*	*
	01-55-3	815	100
	01-55-4	815	300
SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3	01-57-1	*	*
	01-57-2	815	112
	01-57-3	815	308
Borosilicate + 5% Na_2O + 2% Co_2O_3	01-43-1	*	*
	01-44-1	515	120

* As fired

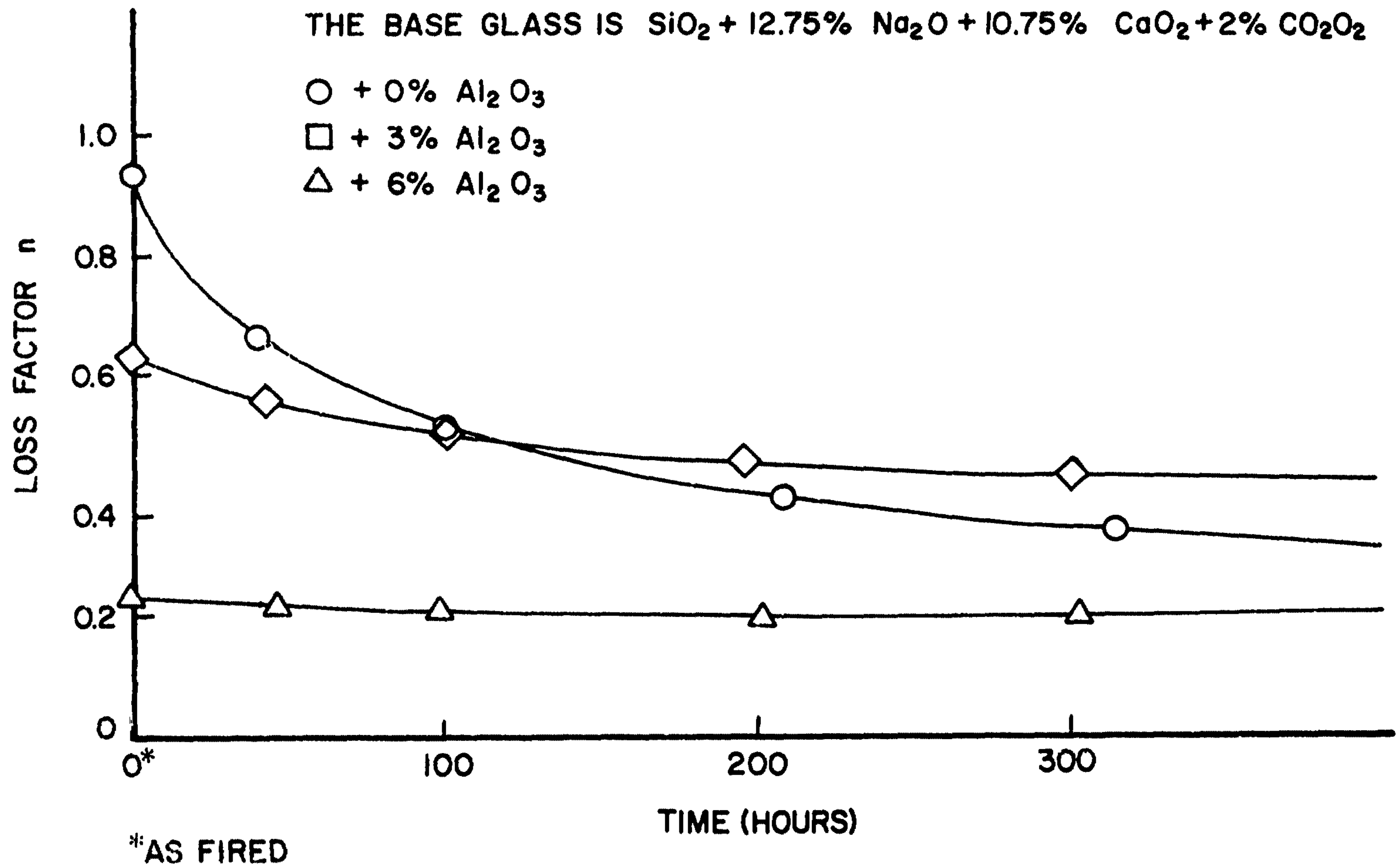


Figure 1-D. Effects of Thermal Aging for Different Glass Compositions.

TABLE 1-D

MATERIAL: O. HOMMEL 7007

AS FIRED

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
7.86594E+10	.0048	410.0	100.0	3.75008E+08
7.84766E+10	.0086	420.0	100.0	6.78286E+08
7.80544E+10	.0149	430.0	100.0	1.16384E+09
7.71528E+10	.0246	440.0	100.0	1.89942E+09
7.53811E+10	.0391	450.0	100.0	2.94679E+09
7.21986E+10	[illegible]	460.0	100.0	4.32727E+09
6.70563E+10	.0890	470.0	100.0	5.96900E+09
5.97521E+10	.1284	480.0	100.0	7.66993E+09
5.08360E+10	.1799	490.0	100.0	9.14631E+09
4.16046E+10	.2447	500.0	100.0	1.01808E+10
3.34391E+10	.3196	510.0	100.0	1.06859E+10
2.70872E+10	.3803	520.0	100.0	1.03018E+10
2.25614E+10	.3481	530.0	100.0	7.85399E+09
1.94898E+10	.2570	540.0	100.0	4.94608E+09
1.74456E+10	.1766	550.0	100.0	3.08149E+09
1.60875E+10	.1232	560.0	100.0	1.98224E+09
1.51777E+10	.0870	570.0	100.0	1.32080E+09
1.45605E+10	.0624	580.0	100.0	9.08156E+08
1.41357E+10	.0454	590.0	100.0	6.41412E+08
1.38387E+10	.0335	600.0	100.0	4.63489E+08
1.36282E+10	.0251	610.0	100.0	3.41576E+08
1.34786E+10	.0190	620.0	100.0	2.56088E+08
1.33661E+10	.0146	630.0	100.0	1.94933E+08
1.32846E+10	.0113	640.0	100.0	1.50417E+08
1.32236E+10	.0089	650.0	100.0	1.17505E+08
1.31774E+10	.0070	660.0	100.0	9.28345E+07
1.31421E+10	.0056	670.0	100.0	7.41072E+07
1.31149E+10	.0046	680.0	100.0	5.97278E+07
1.30938E+10	.0037	690.0	100.0	4.85697E+07
1.30770E+10	.0030	700.0	100.0	3.98254E+07
1.30638E+10	.0025	710.0	100.0	3.29106E+07
1.30533E+10	.0021	720.0	100.0	2.73960E+07
1.30447E+10	.0018	730.0	100.0	2.29626E+07
1.30377E+10	.0015	740.0	100.0	1.93716E+07
1.30321E+10	.0013	750.0	100.0	1.64423E+07
1.30274E+10	.0011	760.0	100.0	1.40369E+07
1.30235E+10	.0009	770.0	100.0	1.20492E+07
1.30204E+10	.0008	780.0	100.0	1.03968E+07
1.30177E+10	.0007	790.0	100.0	9.01527E+06
1.30155E+10	.0006	800.0	100.0	7.85399E+06

AFTER 120 HOURS AT 600°C

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
6.61916E+10	.0004	410.0	100.0	2.57300E+07
6.60713E+10	.0009	420.0	100.0	5.66202E+07
6.58053E+10	.0018	430.0	100.0	1.17151E+08
6.52560E+10	.0035	440.0	100.0	2.28797E+08
6.41960E+10	.0066	450.0	100.0	4.22375E+08
6.22904E+10	.0118	460.0	100.0	7.35905E+08
5.91357E+10	.0204	470.0	100.0	1.20444E+09
5.44078E+10	.0338	480.0	100.0	1.83887E+09
4.81250E+10	.0541	490.0	100.0	2.60178E+09
4.08608E+10	.0834	500.0	100.0	3.40579E+09
3.36114E+10	.1235	510.0	100.0	4.15124E+09
2.73069E+10	.1744	520.0	100.0	4.76354E+09
2.24009E+10	.2303	530.0	100.0	5.15833E+09
1.88627E+10	.2729	540.0	100.0	5.14674E+09
1.64189E+10	.2761	550.0	100.0	4.53388E+09
1.47620E+10	.2396	560.0	100.0	3.53727E+09
1.36418E+10	.1898	570.0	100.0	2.58915E+09
1.28798E+10	.1446	580.0	100.0	1.86273E+09
1.23562E+10	.1088	590.0	100.0	1.34497E+09
1.19918E+10	.0819	600.0	100.0	9.81875E+08
1.17349E+10	.0619	610.0	100.0	7.26253E+08
1.15514E+10	.0471	620.0	100.0	5.44309E+08
1.14187E+10	.0362	630.0	100.0	4.13116E+08
1.13216E+10	.0280	640.0	100.0	3.17267E+08
1.12496E+10	.0219	650.0	100.0	2.46355E+08
1.11956E+10	.0173	660.0	100.0	1.93267E+08
1.11548E+10	.0137	670.0	100.0	1.53082E+08
1.11236E+10	.0110	680.0	100.0	1.22349E+08
1.10995E+10	.0089	690.0	100.0	9.86145E+07
1.10808E+10	.0072	700.0	100.0	8.01199E+07
1.10661E+10	.0059	710.0	100.0	6.55840E+07
1.10544E+10	.0049	720.0	100.0	5.40672E+07
1.10451E+10	.0041	730.0	100.0	4.48727E+07
1.10377E+10	.0034	740.0	100.0	3.74799E+07
1.10316E+10	.0029	750.0	100.0	3.14943E+07
1.10266E+10	.0024	760.0	100.0	2.66170E+07
1.10227E+10	.0021	770.0	100.0	2.26182E+07
1.10194E+10	.0018	780.0	100.0	1.93203E+07
1.10166E+10	.0015	790.0	100.0	1.65850E+07
1.10143E+10	.0013	800.0	100.0	1.43042E+07

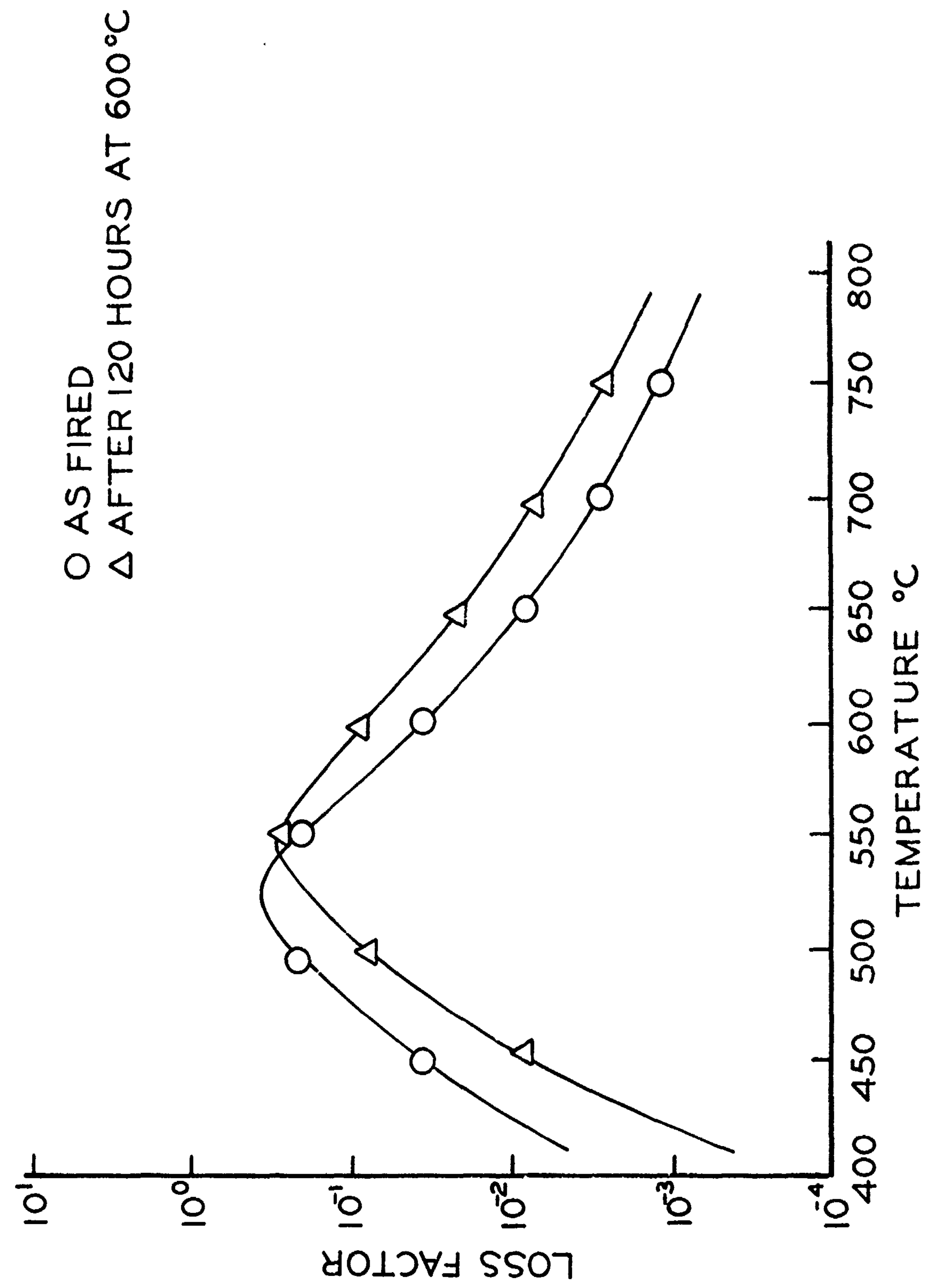

O AS FIRED
Δ AFTER 120 HOURS AT 600°C
LOSS FACTOR
10^1
10^0
10^-1
10^-2
10^-3
10^-4
400
450
500
550
600
650
700
750
800
TEMPERATURE °C

TABLE 2-D

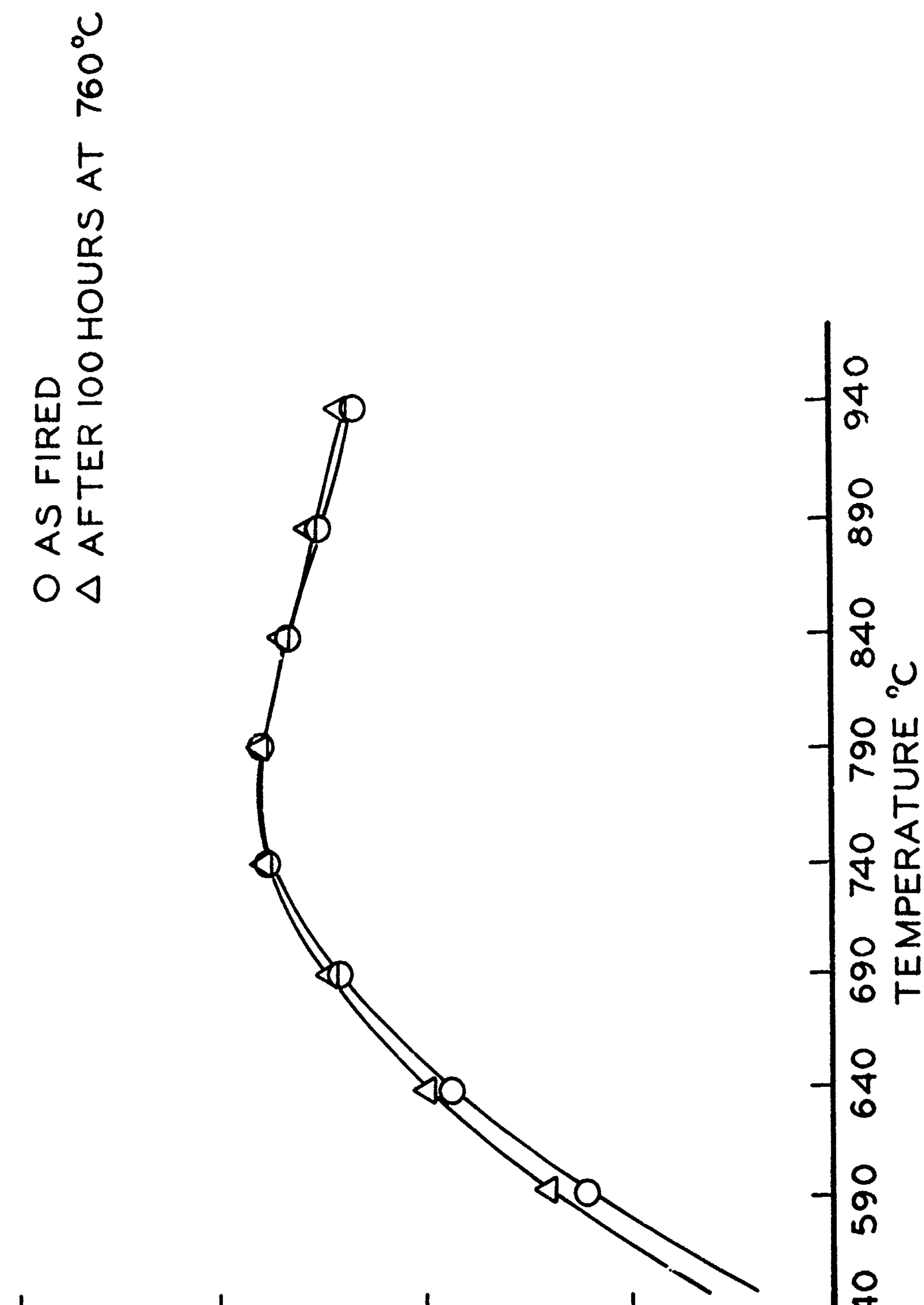
MATERIAL: CORNING 0010 + 7.5% Al_2O_3 + 1% Co_2O_3

AS FIRED

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
3.74478E+10	.0040	550.0	100.0	1.50281E+08
3.74046E+10	.0063	560.0	100.0	2.36026E+08
3.73323E+10	.0096	570.0	100.0	3.59479E+08
3.72158E+10	.0143	580.0	100.0	5.32145E+08
3.70338E+10	.0207	590.0	100.0	7.66957E+08
3.67591E+10	.0293	600.0	100.0	1.07755E+09
3.63568E+10	.0406	610.0	100.0	1.47686E+09
3.57853E+10	.0552	620.0	100.0	1.97501E+09
3.49985E+10	.0736	630.0	100.0	2.57633E+09
3.39492E+10	.0965	640.0	100.0	3.27564E+09
3.25966E+10	.1244	650.0	100.0	4.05448E+09
3.09143E+10	.1578	660.0	100.0	4.87815E+09
2.89008E+10	.1971	670.0	100.0	5.69531E+09
2.65879E+10	.2423	680.0	100.0	6.44163E+09
2.40432E+10	.2931	690.0	100.0	7.04789E+09
2.13663E+10	.3488	700.0	100.0	7.45206E+09
1.86746E+10	.4076	710.0	100.0	7.61119E+09
1.60846E+10	.4669	720.0	100.0	7.51027E+09
1.36939E+10	.5232	730.0	100.0	7.16508E+09
1.15686E+10	.5721	740.0	100.0	6.61889E+09
9.73938E+09	.6094	750.0	100.0	5.93473E+09
8.20616E+09	.6318	760.0	100.0	5.18489E+09
6.94681E+09	.6388	770.0	100.0	4.43771E+09
5.92727E+09	.6319	780.0	100.0	3.74549E+09
5.10936E+09	.6142	790.0	100.0	3.13823E+09
4.45625E+09	.5892	800.0	100.0	2.62554E+09
3.93519E+09	.5598	810.0	100.0	2.20311E+09
3.51880E+09	.5285	820.0	100.0	1.85978E+09
3.18485E+09	.4968	830.0	100.0	1.58232E+09
2.91562E+09	.4658	840.0	100.0	1.35806E+09
2.69732E+09	.4360	850.0	100.0	1.17614E+09
2.51918E+09	.4079	860.0	100.0	1.02764E+09
2.37289E+09	.3816	870.0	100.0	9.05512E+08
2.25194E+09	.3571	880.0	100.0	8.04214E+08
2.15133E+09	.3344	890.0	100.0	7.19471E+08
2.06712E+09	.3135	900.0	100.0	6.47969E+08
1.99621E+09	.2941	910.0	100.0	5.87124E+08
1.93619E+09	.2763	920.0	100.0	5.34939E+08
1.88507E+09	.2598	930.0	100.0	4.89829E+08
1.84136E+09	.2447	940.0	100.0	4.50566E+08
1.80377E+09	.2307	950.0	100.0	4.16160E+08

AFTER 100 HOURS AT 760°C

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
4.79427E+10	.0024	550.0	100.0	1.17326E+08
4.78950E+10	.0040	560.0	100.0	1.89833E+08
4.78150E+10	.0062	570.0	100.0	2.97428E+08
4.76865E+10	.0095	580.0	100.0	4.52390E+08
4.74857E+10	.0141	590.0	100.0	6.69311E+08
4.71821E+10	.0204	600.0	100.0	9.64675E+08
4.67368E+10	.0290	610.0	100.0	1.35587E+09
4.61035E+10	.0403	620.0	100.0	1.85944E+09
4.52290E+10	.0550	630.0	100.0	2.48835E+09
4.40586E+10	.0737	640.0	100.0	3.24828E+09
4.25424E+10	.0972	650.0	100.0	4.13326E+09
4.06443E+10	.1260	660.0	100.0	5.12131E+09
3.83535E+10	.1609	670.0	100.0	6.17162E+09
3.56946E+10	.2024	680.0	100.0	7.22485E+09
3.27319E+10	.2507	690.0	100.0	8.20750E+09
2.95675E+10	.3058	700.0	100.0	9.04077E+09
2.63293E+10	.3666	710.0	100.0	9.65136E+09
2.31520E+10	.4311	720.0	100.0	9.98131E+09
2.01557E+10	.4958	730.0	100.0	9.99371E+09
1.74303E+10	.5552	740.0	100.0	9.67704E+09
1.50287E+10	.6024	750.0	100.0	9.05267E+09
1.29671E+10	.6313	760.0	100.0	8.18567E+09
1.12337E+10	.6395	770.0	100.0	7.18383E+09
9.79822E+09	.6294	780.0	100.0	6.16686E+09
8.62179E+09	.6062	790.0	100.0	5.22615E+09
7.66367E+09	.5752	800.0	100.0	4.40809E+09
6.88529E+09	.5406	810.0	100.0	3.72253E+09
6.25296E+09	.5053	820.0	100.0	3.15936E+09
5.73827E+09	.4706	830.0	100.0	2.70069E+09
5.31794E+09	.4377	840.0	100.0	2.32768E+09
4.97314E+09	.4069	850.0	100.0	2.02337E+09
4.68892E+09	.3783	860.0	100.0	1.77370E+09
4.45340E+09	.3519	870.0	100.0	1.56735E+09
4.25718E+09	.3278	880.0	100.0	1.39542E+09
4.09284E+09	.3057	890.0	100.0	1.25099E+09
3.95445E+09	.2854	900.0	100.0	1.12863E+09
3.83734E+09	.2669	910.0	100.0	1.02415E+09
3.73774E+09	.2499	920.0	100.0	9.34239E+08
3.65258E+09	.2344	930.0	100.0	8.56287E+08
3.57949E+09	.2202	940.0	100.0	7.88257E+08



O AS FIRED
Δ AFTER 100 HOURS AT 760°C
LOSS FACTOR
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
540
590
640
690
740
790
840
890
940
TEMPERATURE °C

TABLE 3-D

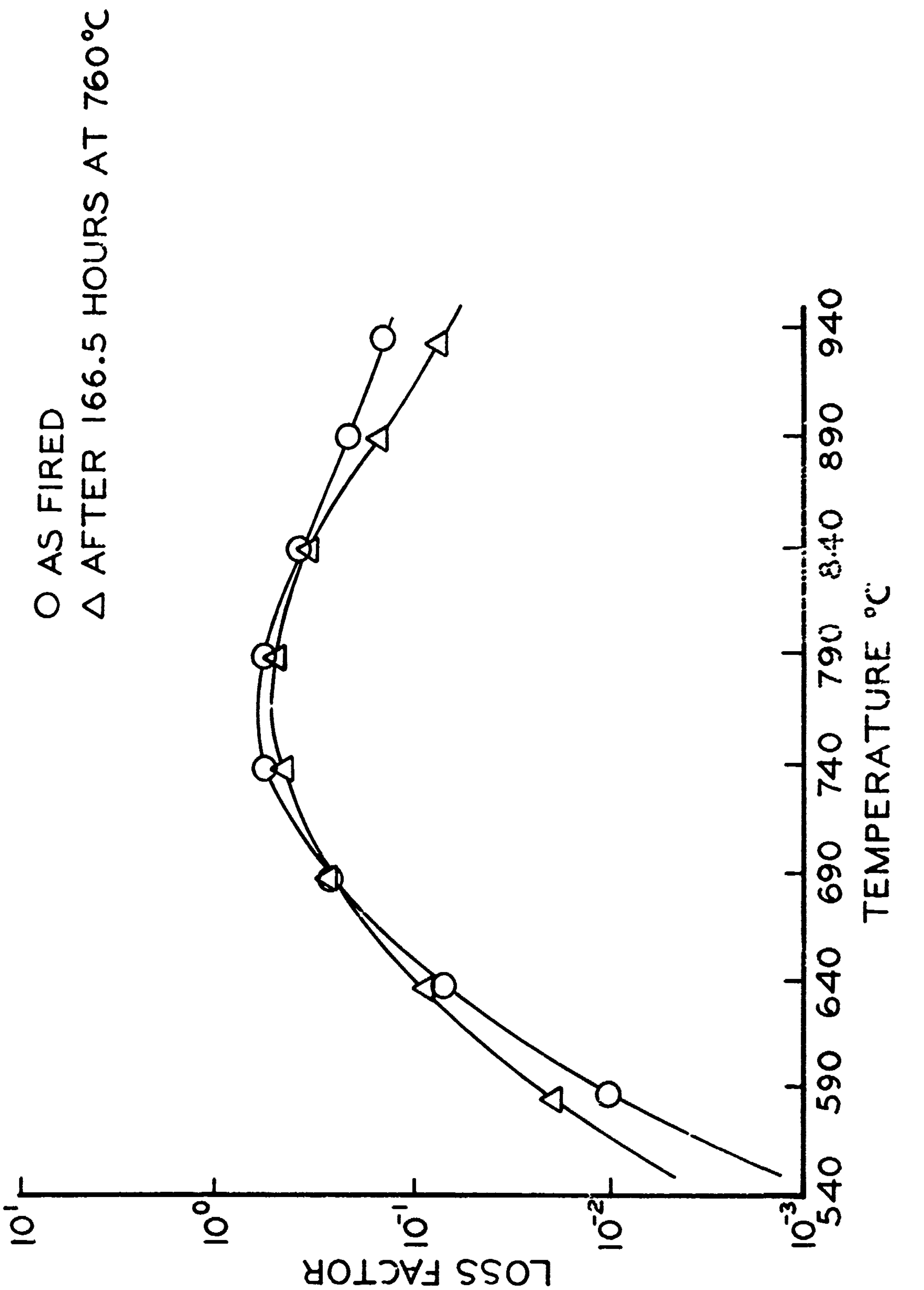
MATERIAL: CORNING 0010 + 7.5% AL_2O_3 + 1% Co_2O_3

AS FIRED

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
4.11038E+10	.0013	550.0	100.0	5.44982E+07
4.10673E+10	.0024	560.0	100.0	9.81436E+07
4.10037E+10	.0041	570.0	100.0	1.68641E+08
4.08982E+10	.0068	580.0	100.0	2.77756E+08
4.07301E+10	.0108	590.0	100.0	4.40111E+08
4.04727E+10	.0166	600.0	100.0	6.72849E+08
4.00926E+10	.0248	610.0	100.0	9.94661E+08
3.95504E+10	.0360	620.0	100.0	1.42392E+09
3.88037E+10	.0509	630.0	100.0	1.97585E+09
3.78099E+10	.0703	640.0	100.0	2.65851E+09
3.65337E+10	.0949	650.0	100.0	3.46836E+09
3.49537E+10	.1255	660.0	100.0	4.38589E+09
3.30703E+10	.1625	670.0	100.0	5.37288E+09
3.09121E+10	.2062	680.0	100.0	6.37297E+09
2.85360E+10	.2564	690.0	100.0	7.31604E+09
2.60237E+10	.3123	700.0	100.0	8.12663E+09
2.34706E+10	.3721	710.0	100.0	8.73431E+09
2.09725E+10	.4331	720.0	100.0	9.08374E+09
1.86122E+10	.4912	730.0	100.0	9.14217E+09
1.64509E+10	.5413	740.0	100.0	8.90502E+09
1.45239E+10	.5783	750.0	100.0	8.39864E+09
1.28435E+10	.5980	760.0	100.0	7.68073E+09
1.14030E+10	.5991	770.0	100.0	6.83200E+09
1.01841E+10	.5832	780.0	100.0	5.93975E+09
9.16158E+09	.5543	790.0	100.0	5.07799E+09
8.30851E+09	.5170	800.0	100.0	4.29535E+09
7.59866E+09	.4757	810.0	100.0	3.61437E+09
7.00817E+09	.4335	820.0	100.0	3.03824E+09
6.51642E+09	.3927	830.0	100.0	2.55904E+09
6.10592E+09	.3544	840.0	100.0	2.16406E+09
5.76205E+09	.3193	850.0	100.0	1.83958E+09
5.47292E+09	.2874	860.0	100.0	1.57296E+09
5.22879E+09	.2588	870.0	100.0	1.35328E+09
5.02171E+09	.2333	880.0	100.0	1.17148E+09
4.84529E+09	.2106	890.0	100.0	1.02025E+09
4.69433E+09	.1904	900.0	100.0	8.93735E+08
4.56454E+09	.1725	910.0	100.0	7.87246E+08
4.45251E+09	.1566	920.0	100.0	6.97091E+08
4.35537E+09	.1424	930.0	100.0	6.20310E+08
4.27085E+09	.1298	940.0	100.0	5.54551E+08
4.19697E+09	.1186	950.0	100.0	4.97919E+08

AFTER 166.5 HOURS AT 760°C

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
4.87805E+10	.0045	550.0	100.0	2.17255E+08
4.87753E+10	.0069	560.0	100.0	3.36933E+08
4.87650E+10	.0104	570.0	100.0	[illegible]
4.87436E+10	.0152	580.0	100.0	[illegible]
4.87024E+10	.0217	590.0	100.0	1.05712E+09
4.86249E+10	.0303	600.0	[illegible]	1.47099E+09
4.84860E+10	.0413	610.0	[illegible]	[illegible]
4.82463E+10	.0551	620.0	100.0	[illegible]
4.78474E+10	.0722	630.0	100.0	[illegible]
4.72085E+10	.0929	640.0	100.0	[illegible]
4.62253E+10	.1175	650.0	100.0	[illegible]
4.47783E+10	.1461	660.0	100.0	[illegible]
4.27519E+10	.1787	670.0	100.0	[illegible]
4.00740E+10	.2151	680.0	100.0	8.61880E+09
3.67612E+10	.2546	690.0	100.0	9.36034E+09
3.29540E+10	.2965	700.0	100.0	9.77167E+09
2.89096E+10	.3395	710.0	100.0	9.81541E+09
2.49409E+10	.3820	720.0	100.0	9.52660E+09
2.13244E+10	.4218	730.0	100.0	8.99548E+09
1.82333E+10	.4568	740.0	100.0	8.32957E+09
1.57212E+10	.4845	750.0	100.0	7.61745E+09
1.37526E+10	.5027	760.0	100.0	6.91336E+09
1.22453E+10	.5096	770.0	100.0	6.24028E+09
1.11059E+10	.5044	780.0	100.0	5.60219E+09
1.02492E+10	.4875	790.0	100.0	4.99633E+09
9.60496E+09	.4602	800.0	100.0	4.42053E+09
9.11890E+09	.4251	810.0	100.0	3.87636E+09
8.75017E+09	.3849	820.0	100.0	3.36828E+09
8.46865E+09	.3426	830.0	100.0	2.90174E+09
8.25220E+09	.3007	840.0	100.0	2.48108E+09
8.08451E+09	.2608	850.0	100.0	2.10840E+09
7.95377E+09	.2242	860.0	100.0	1.78337E+09
7.85101E+09	.1915	870.0	100.0	1.50353E+09
7.76969E+09	.1628	880.0	100.0	1.26509E+09
7.70492E+09	.1380	890.0	100.0	1.06351E+09
7.65302E+09	.1168	900.0	100.0	8.94061E+08
7.61113E+09	.0988	910.0	100.0	7.52178E+08
7.57715E+09	.0836	920.0	100.0	6.33664E+08
7.54943E+09	.0708	930.0	100.0	5.34784E+08
7.52667E+09	.0601	940.0	100.0	4.52308E+08
7.50783E+09	.0511	950.0	100.0	3.83479E+08



O AS FIRED
Δ AFTER 166.5 HOURS AT 760°C
LOSS FACTOR
10^1
10^0
10^{-1}
10^{-2}
10^{-3}
540
590
640
690
740
790
840
890
940
TEMPERATURE °C

TABLE 4-D

MATERIAL: CORNING 7570 + 2% Na_2O + 2% $KHCO_3$

AS FIRED

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
2.59390E+10	.0000	300.0	100.0	1.85748E+05
2.59390E+10	.0000	305.0	100.0	4.42861E+05
2.59390E+10	.0000	310.0	100.0	9.96522E+05
2.59389E+10	.0001	315.0	100.0	2.12791E+06
2.59385E+10	.0002	320.0	100.0	4.33256E+06
2.59377E+10	.0003	325.0	100.0	8.44650E+06
2.59360E+10	.0006	330.0	100.0	1.58252E+07
2.59323E+10	.0011	335.0	100.0	2.85858E+07
2.59248E+10	.0019	340.0	100.0	4.99224E+07
2.59100E+10	.0033	345.0	100.0	8.44946E+07
2.58819E+10	.0054	350.0	100.0	1.38872E+08
2.58309E+10	.0086	355.0	100.0	2.21993E+08
2.57406E+10	.0134	360.0	100.0	3.45514E+08
2.55870E+10	.0205	365.0	100.0	5.23846E+08
2.53337E+10	.0305	370.0	100.0	7.73464E+08
2.49305E+10	.0446	375.0	100.0	1.11085E+09
2.43140E+10	.0637	380.0	100.0	1.54840E+09
2.34131E+10	.0892	385.0	100.0	2.08755E+09
2.21644E+10	.1223	390.0	100.0	2.71011E+09
2.05393E+10	.1641	395.0	100.0	3.37094E+09
1.85738E+10	.2153	400.0	100.0	3.99848E+09
1.63831E+10	.2751	405.0	100.0	4.50776E+09
1.41439E+10	.3410	410.0	100.0	4.82328E+09
1.20413E+10	.4067	415.0	100.0	4.89684E+09
1.02126E+10	.4612	420.0	100.0	4.70990E+09
8.71858E+09	.4897	425.0	100.0	4.26945E+09
7.55351E+09	.4794	430.0	100.0	3.62129E+09
6.67237E+09	.4300	435.0	100.0	2.86939E+09
6.01779E+09	.3567	440.0	100.0	2.14667E+09
5.53541E+09	.2792	445.0	100.0	1.54549E+09
5.18048E+09	.2105	450.0	100.0	1.09071E+09
4.91868E+09	.1554	455.0	100.0	7.64573E+08
4.72457E+09	.1136	460.0	100.0	5.36561E+08
4.57970E+09	.0827	465.0	100.0	3.78602E+08
4.47084E+09	.0602	470.0	100.0	2.69184E+08
4.38843E+09	.0440	475.0	100.0	1.93039E+08
4.32558E+09	.0323	480.0	100.0	1.39672E+08
4.27729E+09	.0238	485.0	100.0	1.01963E+08
4.23989E+09	.0177	490.0	100.0	7.50887E+07
4.21077E+09	.0132	495.0	100.0	5.57693E+07
4.18788E+09	.0100	500.0	100.0	4.17616E+07
4.16983E+09	.0076	505.0	100.0	3.15209E+07
4.15548E+09	.0058	510.0	100.0	2.39734E+07
4.14401E+09	.0044	515.0	100.0	1.83672E+07
4.13479E+09	.0034	520.0	100.0	1.41717E+07
4.12733E+09	.0027	525.0	100.0	1.10091E+07
4.12128E+09	.0021	530.0	100.0	8.60839E+06
4.11631E+09	.0016	535.0	100.0	6.77369E+06
4.11224E+09	.0013	540.0	100.0	5.36249E+06
4.10889E+09	.0010	545.0	100.0	4.27020E+06
4.10612E+09	.0008	550.0	100.0	3.41964E+06

AFTER 148 HOURS AT 480°C

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
3.19069E+10	.0010	300.0	100.0	3.17122E+07
3.16381E+10	.0017	305.0	100.0	5.32676E+07
3.13324E+10	.0027	310.0	100.0	8.58185E+07
3.09910E+10	.0043	315.0	100.0	1.32829E+08
3.06148E+10	.0065	320.0	100.0	1.97769E+08
3.02067E+10	.0094	325.0	100.0	2.83530E+08
2.97698E+10	.0132	330.0	100.0	3.91687E+08
2.93082E+10	.0178	335.0	100.0	5.21692E+08
2.88266E+10	.0233	340.0	100.0	6.70242E+08
2.83297E+10	.0293	345.0	100.0	8.30989E+08
2.78228E+10	.0358	350.0	100.0	9.94907E+08
2.73108E+10	.0422	355.0	100.0	1.15127E+09
2.67988E+10	.0481	360.0	100.0	1.28923E+09
2.62912E+10	.0532	365.0	100.0	1.39954E+09
2.57917E+10	.0572	370.0	100.0	1.47594E+09
2.53039E+10	.0599	375.0	100.0	1.51596E+09
2.48303E+10	.0612	380.0	100.0	1.52072E+09
2.43732E+10	.0613	385.0	100.0	1.49430E+09
2.39345E+10	.0603	390.0	100.0	1.44254E+09
2.35149E+10	.0583	395.0	100.0	1.37194E+09
2.31156E+10	.0558	400.0	100.0	1.28879E+09
2.27365E+10	.0527	405.0	100.0	1.19861E+09
2.23779E+10	.0494	410.0	100.0	1.10589E+09
2.20392E+10	.0460	415.0	100.0	1.01400E+09
2.17202E+10	.0426	420.0	100.0	9.25349E+08
2.14201E+10	.0393	425.0	100.0	8.41494E+08
2.11381E+10	.0361	430.0	100.0	7.63350E+08
2.08735E+10	.0331	435.0	100.0	6.91347E+08
2.06255E+10	.0303	440.0	100.0	6.25565E+08
2.03930E+10	.0277	445.0	100.0	5.65840E+08
2.01752E+10	.0254	450.0	100.0	5.11876E+08
1.99712E+10	.0232	455.0	100.0	4.63277E+08
1.97801E+10	.0212	460 0	100.0	4.19616E+08
1.96011E+10	.0194	465.0	100.0	3.80453E+08
1.94334E+10	.0178	470.0	100.0	3.45[illegible]56E+08
1.92762E+10	.0163	475.0	100.0	3.13913E+08
1.91289E+10	.0149	480.0	100.0	2.85746E+08
1.89907E+10	.0137	485.0	100.0	2.60501E+08
1.88609E+10	.0126	490.0	100.0	2.37859E+08
1.87391E+10	.0116	495.0	100.0	2.17537E+08
1.86246E+10	.0107	500.0	100.0	1.99278E+08
1.85171E+10	.0099	505.0	100.0	1.82854E+08
1.84159E+10	.0091	510.0	100.0	1.68062E+08
1.83206E+10	.0084	515.0	100.0	1.54720E+08
1.82308E+10	.0078	520.0	100.0	1.42669E+08
1.81462E+10	.0073	525.0	100.0	1.31771E+08
1.80664E+10	.0067	530.0	100.0	1.21899E+08
1.79909E+10	.0063	535.0	100.0	1.12944E+08
1.79197E+10	.0058	540.0	100.0	1.04808E+08
1.78523E+10	.0055	545.0	100.0	9.74044E+07
1.77686E+10	.0051	550.0	100.0	9.06569E+07

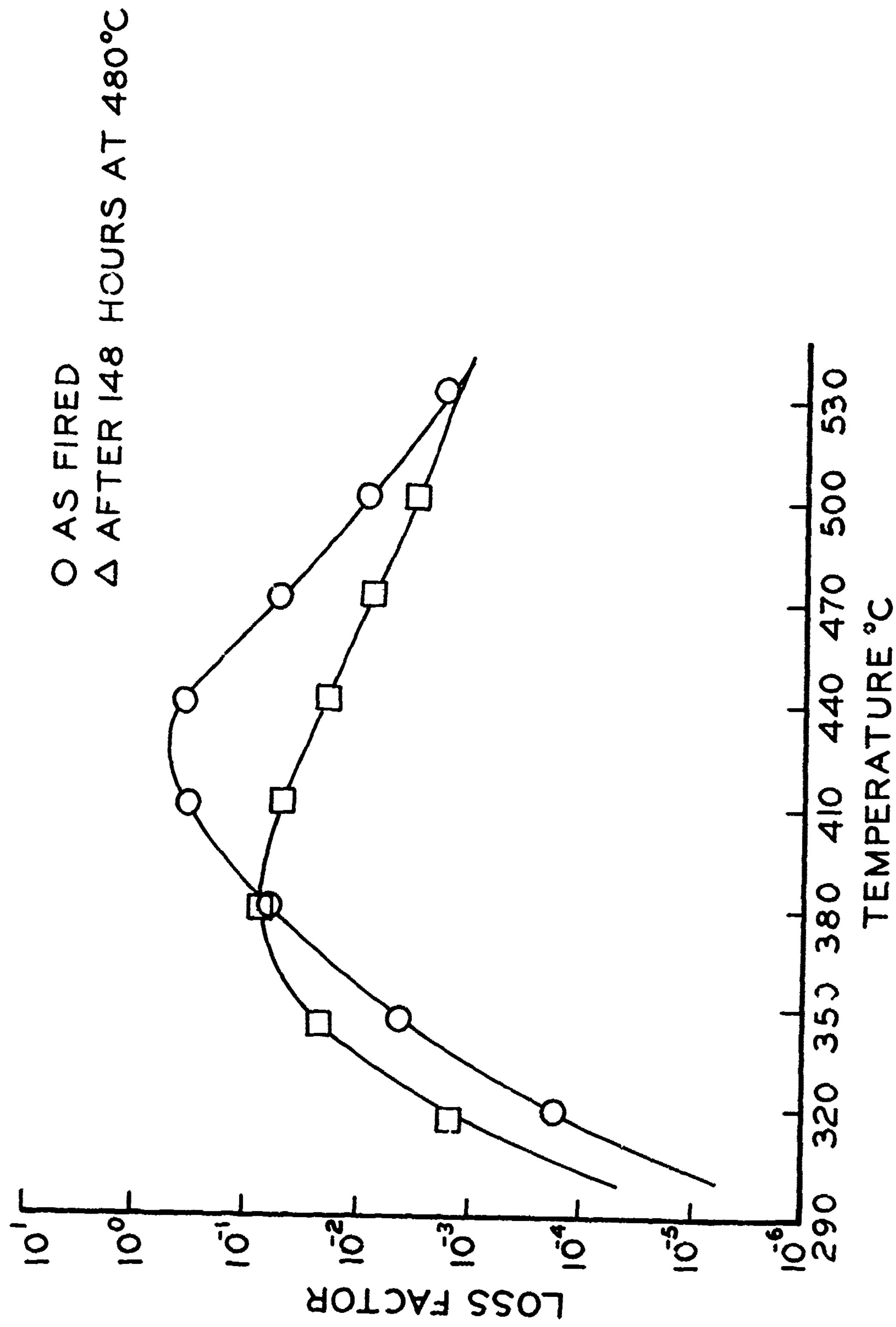

O AS FIRED
Δ AFTER 148 HOURS AT 480°C
LOSS FACTOR
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
290
320
350
380
410
440
470
500
530
TEMPERATURE °C

TABLE 5-D

MATERIAL: SiO_2 + 12.75% Na_2O + 10.75% CaO + 2% Co_2O_3

AS FIRED

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
3.41238E+10	.0007	500.0	100.0	2.42912E+07
3.41099E+10	.0015	510.0	100.0	5.02203E+07
3.40794E+10	.0029	520.0	100.0	9.81274E+07
3.40171E+10	.0054	530.0	100.0	1.82237E+08
3.38961E+10	.0095	540.0	100.0	3.23095E+08
3.36733E+10	.0163	550.0	100.0	5.48592E+08
3.32833E+10	.0269	560.0	100.0	8.93668E+08
3.26346E+10	.0428	570.0	100.0	1.39714E+09
3.16097E+10	.0662	580.0	100.0	2.09328E+09
3.00791E+10	.0996	590.0	100.0	2.99612E+09
2.79357E+10	.1460	600.0	100.0	4.07736E+09
2.51455E+10	.2086	610.0	100.0	5.24572E+09
2.18047E+10	.2910	620.0	100.0	6.34557E+09
1.81572E+10	.3960	630.0	100.0	7.19059E+09
1.45452E+10	.5243	640.0	100.0	7.62672E+09
1.12944E+10	.6711	650.0	100.0	7.57990E+09
8.61076E+09	.8184	660.0	100.0	7.04703E+09
6.54554E+09	.9262	670.0	100.0	6.06248E+09
5.03397E+09	.9495	680.0	100.0	4.77966E+09
3.96055E+09	.8920	690.0	100.0	3.53284E+09
3.20818E+09	.7968	700.0	100.0	2.55628E+09
2.68104E+09	.6958	710.0	100.0	1.86544E+09
2.30881E+09	.6024	720.0	100.0	1.39083E+09
2.04268E+09	.5205	730.0	100.0	1.06330E+09
1.84963E+09	.4504	740.0	100.0	8.33040E+08
1.70748E+09	.3908	750.0	100.0	6.67269E+08
1.60128E+09	.3403	760.0	100.0	5.44952E+08
1.52086E+09	.2976	770.0	100.0	4.52544E+08
1.45916E+09	.2612	780.0	100.0	3.81204E+08
1.41128E+09	.2303	790.0	100.0	3.25052E+08
1.37374E+09	.2039	800.0	100.0	2.80093E+08
1.34399E+09	.1812	810.0	100.0	2.43550E+08
1.32022E+09	.1617	820.0	100.0	2.13454E+08
1.30106E+09	.1448	830.0	100.0	1.88381E+08
1.28550E+09	.1301	840.0	100.0	1.67280E+08
1.27277E+09	.1174	850.0	100.0	1.49363E+08
1.26229E+09	.1062	860.0	100.0	1.34029E+08
1.25359E+09	.0964	870.0	100.0	1.20813E+08
1.24635E+09	.0877	880.0	100.0	1.09350E+08
1.24027E+09	.0801	890.0	100.0	9.93513E+07

AFTER 100 HOURS AT 760°C

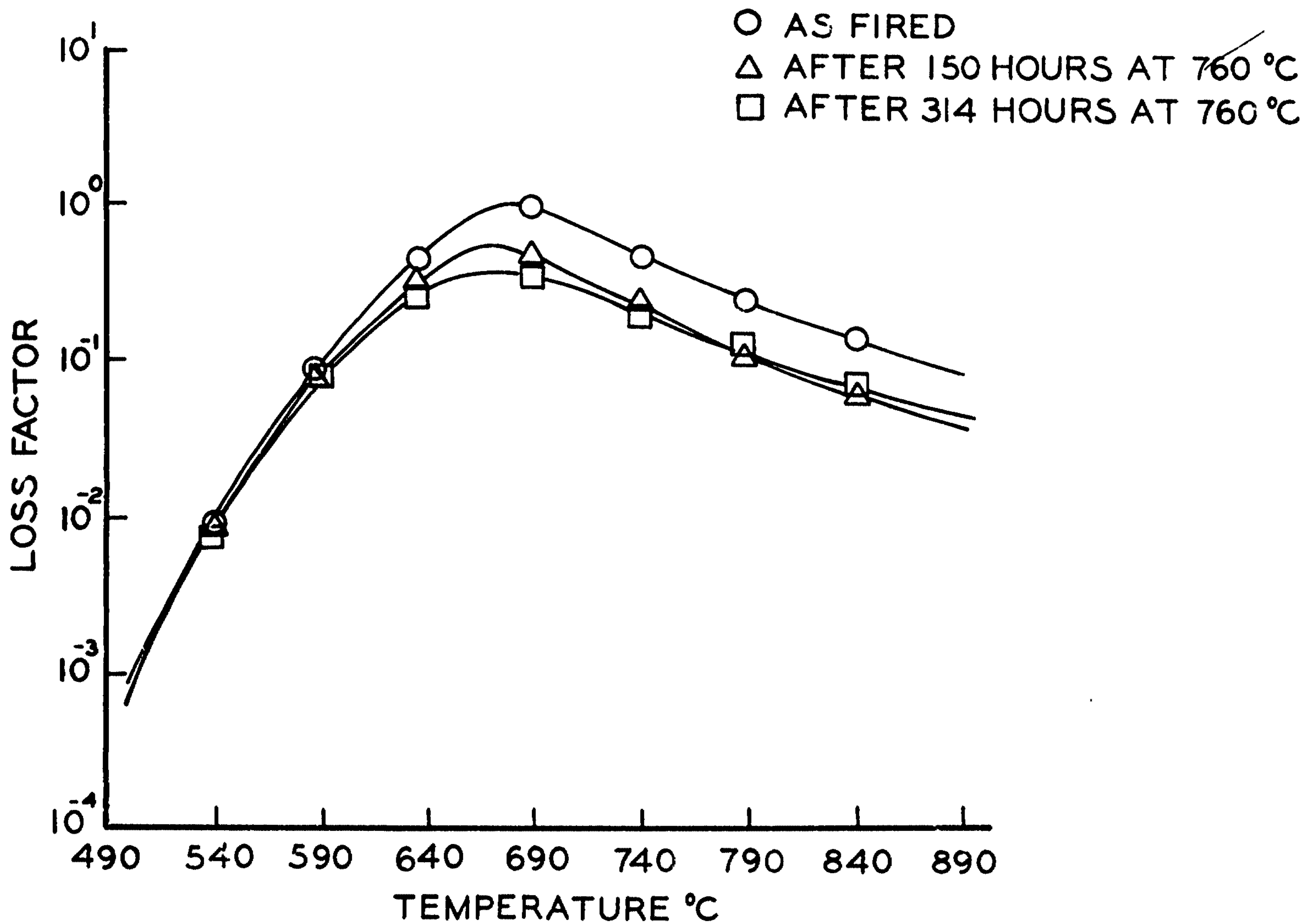
MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
3.70863E+10	.0008	500.0	100.0	3.04257E+07
3.70761E+10	.0016	510.0	100.0	5.96618E+07
3.70534E+10	.0030	520.0	100.0	1.11032E+08
3.70062E+10	.0053	530.0	100.0	1.97156E+08
3.69143E+10	.0091	540.0	100.0	3.35452E+08
3.67441E+10	.0149	550.0	100.0	5.48650E+08
3.64440E+10	.0237	560.0	100.0	8.64390E+08
3.59412E+10	.0365	570.0	100.0	1.31297E+09
3.51396E+10	.0547	580.0	100.0	1.92188E+09
3.39302E+10	.0798	590.0	100.0	2.70619E+09
3.22146E+10	.1135	600.0	100.0	3.65510E+09
2.99435E+10	.1576	610.0	100.0	4.71877E+09
2.71626E+10	.2137	620.0	100.0	5.80418E+09
2.40348E+10	.2824	630.0	100.0	6.78641E+09
2.08126E+10	.3617	640.0	100.0	7.52879E+09
1.77629E+10	.4439	650.0	100.0	7.88567E+09
1.50861E+10	.5093	660.0	100.0	7.68359E+09
1.28759E+10	.5301	670.0	100.0	6.82574E+09
1.11312E+10	.5013	680.0	100.0	5.57989E+09
9.79382E+09	.4469	690.0	100.0	4.37720E+09
8.78565E+09	.3881	700.0	100.0	3.40945E+09
8.03099E+09	.3337	710.0	100.0	2.67077E+09
7.46637E+09	.2863	720.0	100.0	2.13764E+09
7.04239E+09	.2460	730.0	100.0	1.73248E+09
6.72202E+09	.2121	740.0	100.0	1.42542E+09
6.47818E+09	.1835	750.0	100.0	1.18883E+09
6.29104E+09	.1595	760.0	100.0	1.00346E+09
6.14625E+09	.1393	770.0	100.0	8.55941E+08
6.03325E+09	.1221	780.0	100.0	7.36850E+08
5.94438E+09	.1076	790.0	100.0	6.39489E+08
5.87388E+09	.0952	800.0	100.0	5.58985E+08
5.81762E+09	.0845	810.0	100.0	4.91761E+08
5.77233E+09	.0754	820.0	100.0	4.35122E+08
5.73560E+09	.0675	830.0	100.0	3.87024E+08
5.70568E+09	.0606	840.0	100.0	3.45895E+08
5.68111E+09	.0547	850.0	100.0	3.10497E+08
5.66081E+09	.0494	860.0	100.0	2.79856E+08
5.64398E+09	.0449	870.0	100.0	2.53195E+08
5.62991E+09	.0408	880.0	100.0	2.29882E+08
5.61810E+09	.0373	890.0	100.0	2.09406E+08

TABLE 5-D

MATERIAL: SiO_2 + 12.75% Na_2O + 10.75% CaO + 2% Co_2O_3 (CONCLUDED)

AFTER 314 HOURS AT 760°C

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
4.14366E+10	.0009	500.0	100.0	3.93603E+07
4.14300E+10	.0018	510.0	100.0	7.57176E+07
4.14138E+10	.0033	520.0	100.0	1.38289E+08
4.13788E+10	.0058	530.0	100.0	2.41028E+08
4.13058E+10	.0097	540.0	100.0	4.02534E+08
4.11627E+10	.0157	550.0	100.0	6.46098E+08
4.08967E+10	.0244	560.0	100.0	9.98492E+08
4.04280E+10	.0368	570.0	100.0	1.48645E+09
3.96459E+10	.0537	580.0	100.0	2.12937E+09
3.84166E+10	.0762	590.0	100.0	2.92734E+09
3.66114E+10	.1050	600.0	100.0	3.84588E+09
3.41624E+10	.1406	610.0	100.0	4.80487E+09
3.11256E+10	.1826	620.0	100.0	5.68327E+09
2.77146E+10	.2291	630.0	100.0	6.34901E+09
2.42517E+10	.2763	640.0	100.0	6.70182E+09
2.10553E+10	.3184	650.0	100.0	6.70346E+09
1.83344E+10	.3481	660.0	100.0	6.38210E+09
1.61579E+10	.3603	670.0	100.0	5.82143E+09
1.44897E+10	.3545	680.0	100.0	5.13691E+09
1.32439E+10	.3350	690.0	100.0	4.43680E+09
1.23258E+10	.3076	700.0	100.0	3.79141E+09
1.16522E+10	.2772	710.0	100.0	3.23039E+09
1.11573E+10	.2471	720.0	100.0	2.75709E+09
1.07921E+10	.2189	730.0	100.0	2.36277E+09
1.05206E+10	.1935	740.0	100.0	2.03526E+09
1.03173E+10	.1709	750.0	100.0	1.76271E+09
1.01636E+10	.1510	760.0	100.0	1.53491E+09
1.00466E+10	.1337	770.0	100.0	1.34349E+09
9.95659E+09	.1187	780.0	100.0	1.18175E+09
9.88686E+09	.1056	790.0	100.0	1.04432E+09
9.83233E+09	.0943	800.0	100.0	9.26928E+08
9.78947E+09	.0844	810.0	100.0	8.26152E+08
9.75536E+09	.0758	820.0	100.0	7.39211E+08
9.72816E+09	.0682	830.0	100.0	6.63883E+08
9.70622E+09	.0616	840.0	100.0	5.98329E+08
9.68842E+09	.0558	850.0	100.0	5.41056E+08
9.67398E+09	.0507	860.0	100.0	4.90830E+08
9.66207E+09	.0462	870.0	100.0	4.46617E+08
9.65227E+09	.0422	880.0	100.0	4.07568E+08
9.64410E+09	.0387	890.0	100.0	3.72962E+08



AS FIRED
AFTER 150 HOURS AT 760 °C
AFTER 314 HOURS AT 760 °C
LOSS FACTOR
10^1
10^0
10^-1
10^-2
10^-3
10^-4
490
540
590
640
690
740
790
840
890
TEMPERATURE °C

TABLE 6-D

MATERIAL: SiO_2 + 12.75% Na_2O + 10.75% CaO + 3% Al_2O_3 + 2% Co_2O_3

AS FIRED

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
5.55489E+10	.0002	500.0	100.0	8.80692E+06
5.55477E+10	.0004	510.0	100.0	1.97877E+07
5.55451E+10	.0007	520.0	100.0	4.10237E+07
5.55371E+10	.0014	530.0	100.0	7.93692E+07
5.55172E+10	.0026	540.0	100.0	1.44623E+08
5.54735E+10	.0045	550.0	100.0	2.50050E+08
5.53826E+10	.0075	560.0	100.0	4.12734E+08
5.52051E+10	.6118	570.0	100.0	6.53340E+08
5.48799E+10	.0181	580.0	100.0	9.95238E+08
5.43178E+10	.0269	590.0	100.0	1.46204E+09
5.34024E+10	.0388	600.0	100.0	2.07317E+09
5.20009E+10	.0546	610.0	100.0	2.83698E+09
4.99957E+10	.0749	620.0	100.0	3.74279E+09
4.73325E+10	.1005	630.0	100.0	4.75495E+09
4.40730E+10	.1319	640.0	100.0	5.81341E+09
4.04132E+10	.1692	650.0	100.0	6.83829E+09
3.66419E+10	.2104	660.0	100.0	7.71074E+09
3.30547E+10	.2454	670.0	100.0	8.11304E+09
2.98694E+10	.2423	680.0	100.0	7.23790E+09
2.71912E+10	.2011	690.0	100.0	5.46728E+09
2.50271E+10	.1585	700.0	100.0	3.96785E+03
2.33238E+10	.1243	710.0	100.0	2.90013E+09
2.20044E+10	.0981	720.0	100.0	2.15772E+09
2.09902E+10	.0780	730.0	100.0	1.63699E+09
2.02125E+10	.0626	740.0	100.0	1.26531E+09
1.96149E+10	.0507	750.0	100.0	9.94744E+08
1.91540E+10	.0415	760.0	100.0	7.93970E+08
1.87965E+10	.0342	770.0	100.0	6.42299E+08
1.85174E+10	.0284	780.0	100.0	5.25852E+08
1.82980E+10	.0238	790.0	100.0	4.35138E+08
1.81241E+10	.0201	800.0	100.0	3.63541E+08
1.79855E+10	.0170	810.0	100.0	3.06370E+08
1.78741E+10	.0146	820.0	100.0	2.60233E+08
1.77840E+10	.0125	830.0	100.0	2.22647E+08
1.77106E+10	.0108	840.0	100.0	1.91760E+08
1.76504E+10	.0094	850.0	100.0	1.66175E+08
1.76007E+10	.0082	860.0	100.0	1.44829E+08
1.75595E+10	.0072	870.0	100.0	1.26899E+08
1.75251E+10	.0064	880.0	100.0	1.11743E+08
1.74962E+10	.0057	890.0	100.0	9.88577E+07

AFTER 98 HOURS AT 750°C

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
6.21845E+10	.0005	500.0	100.0	3.12583E+07
6.21789E+10	.0010	510.0	100.0	6.03722E+07
6.21657E+10	.0018	520.0	100.0	1.10768E+08
6.21368E+10	.0031	530.0	100.0	1.94094E+08
6.20757E+10	.0053	540.0	100.0	3.26234E+08
6.19567E+10	.0085	550.0	100.0	5.27823E+08
6.17339E+10	.0133	560.0	100.0	8.24125E+08
6.13392E+10	.0203	570.0	100.0	1.24376E+09
6.06733E+10	.0299	580.0	100.0	1.81517E+09
5.96085E+10	.0429	590.0	100.0	2.55984E+09
5.80043E+10	.0600	600.0	100.0	3.48150E+09
5.57458E+10	.0817	610.0	100.0	4.55260E+09
5.27955E+10	.1080	620.0	100.0	5.70190E+09
4.92731E+10	.1382	630.0	100.0	6.80991E+09
4.54162E+10	.1698	640.0	100.0	7.71212E+09
4.15602E+10	.1977	650.0	100.0	8.21568E+09
3.80074E+10	.2148	660.0	100.0	8.16281E+09
3.49508E+10	.2166	670.0	100.0	7.57001E+09
3.24561E+10	.2054	680.0	100.0	6.66650E+09
3.04940E+10	.1872	690.0	100.0	5.70867E+09
2.89876E+10	.1670	700.0	100.0	4.83948E+09
2.78464E+10	.1473	710.0	100.0	4.10229E+09
2.69875E+10	.1294	720.0	100.0	3.49339E+09
2.63419E+10	.1137	730.0	100.0	2.99396E+09
2.58552E+10	[illegible]	740.0	100.0	2.58353E+09
2.54871E+10	.0881	750.0	100.0	2.24430E+09
2.52065E+10	.0778	760.0	100.0	1.96189E+09
2.49916E+10	.0690	770.0	100.0	1.72504E+09
2.48257E+10	.0614	780.0	100.0	1.52496E+09
2.46965E+10	.0549	790.0	100.0	1.35481E+09
2.45953E+10	.0492	800.0	100.0	1.20919E+09
2.45155E+10	.0442	810.0	100.0	1.08388E+09
2.44521E+10	.0399	820.0	100.0	9.75457E+08
2.44013E+10	.0361	830.0	100.0	8.81184E+08
2.43605E+10	.0328	840.0	100.0	7.98842E+08
2.43272E+10	.0299	850.0	100.0	7.26611E+08
2.43002E+10	.0273	860.0	100.0	6.63001E+08
2.42779E+10	.0250	870.0	100.0	6.06765E+08
2.42595E+10	.0230	880.0	100.0	5.56878E+08
2.42443E+10	.0211	890.0	100.0	5.12473E+08

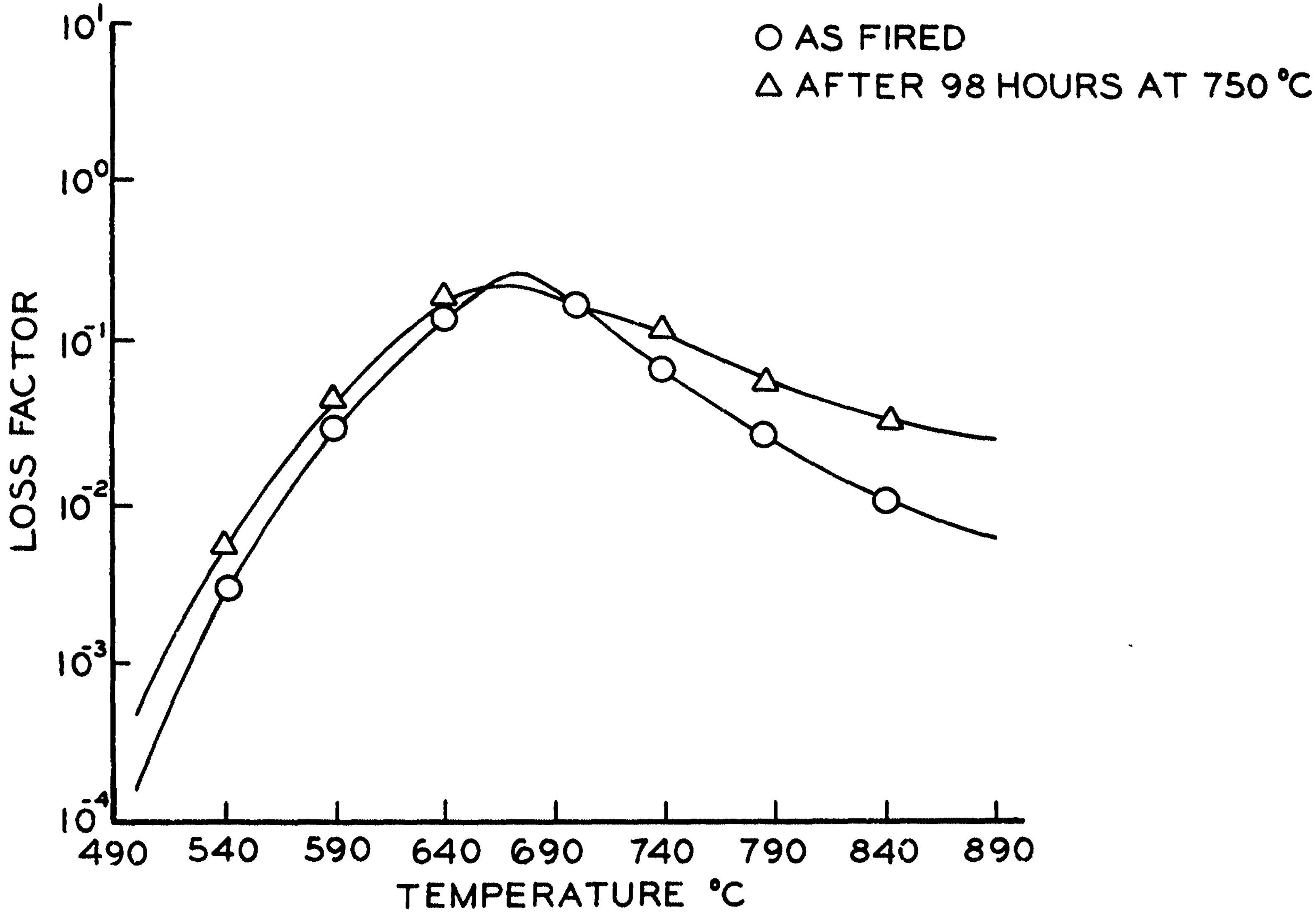

O AS FIRED
Δ AFTER 98 HOURS AT 750 °C
LOSS FACTOR
10^1
10^0
10^-1
10^-2
10^-3
10^-4
490
540
590
640
690
740
790
840
890
TEMPERATURE °C

TABLE 7-D

MATERIAL: SiO_2 + 12.75% Na_2O + 10.75% CaO + 6% Al_2O_3 + 2% Co_2O_3

AS FIRED

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
5.45680E+10	.0011	600.0	100.0	5.77489E+07
5.45680E+10	.0020	610.0	100.0	1.11213E+08
5.45674E+10	.0037	620.0	100.0	2.02588E+08
5.45651E+10	.0064	630.0	100.0	3.51425E+08
5.45582E+10	.0107	640.0	100.0	5.83777E+08
5.45403E+10	.0171	650.0	100.0	9.33014E+08
5.44933E+10	.0264	660.0	100.0	1.44009E+09
5.43816E+10	.0396	670.0	100.0	2.15267E+09
5.41334E+10	.0577	680.0	100.0	3.12154E+09
5.36135E+10	.0819	690.0	100.0	4.39090E+09
5.25966E+10	.1137	700.0	100.0	5.97774E+09
5.07522E+10	.1544	710.0	100.0	7.83436E+09
4.77006E+10	.2055	720.0	100.0	9.80100E+09
4.32044E+10	.2682	730.0	100.0	1.15878E+10
3.74640E+10	.3433	740.0	100.0	1.28602E+10
3.12399E+10	.4299	750.0	100.0	1.34289E+10
2.55157E+10	.5234	760.0	100.0	1.33544E+10
2.09467E+10	.6089	770.0	100.0	1.27552E+10
1.76542E+10	.6508	780.0	100.0	1.14890E+10
1.54221E+10	.6170	790.0	100.0	9.51605E+09
1.39517E+10	.5376	800.0	100.0	7.50012E+09
1.29907E+10	.4530	810.0	100.0	5.88424E+09
1.23604E+10	.3782	820.0	100.0	4.67427E+09
1.19430E+10	.3157	830.0	100.0	3.77059E+09
1.16632E+10	.2645	840.0	100.0	3.08526E+09
1.14729E+10	.2228	850.0	100.0	2.55579E+09
1.13419E+10	.1887	860.0	100.0	2.13972E+09
1.12504E+10	.1607	870.0	100.0	1.80788E+09
1.11856E+10	.1377	880.0	100.3	1.53987E+09
1.11392E+10	.1186	890.0	100.0	1.32107E+09
1.11055E+10	.1027	900.0	100.0	1.14077E+09
1.10808E+10	.0894	910.0	100.0	9.90978E+08
1.10626E+10	.0782	920.0	100.0	8.65610E+08
1.10489E+10	.0688	930.0	100.0	7.59988E+08
1.10385E+10	.0607	940.0	100.0	6.70454E+08
1.10306E+10	.0539	950.0	100.0	5.94138E+08
1.10245E+10	.0480	960.0	100.0	5.28744E+08
1.10198E+10	.0429	970.0	100.0	4.72432E+08
1.10161E+10	.0385	980.0	100.0	4.23722E+08
1.10131E+10	.0346	990.0	100.0	3.81400E+08

AFTER 100 HOURS AT 815°C

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
6.21095E+10	.0204	600.0	100.0	1.26852E+09
6.20006E+10	.0275	610.0	100.0	1.70707E+09
6.18068E+10	.0365	620.0	100.0	2.25802E+09
6.14746E+10	.0478	630.0	100.0	2.93664E+09
6.09247E+10	.0616	640.0	100.0	3.75403E+09
6.00493E+10	.0785	650.0	100.0	4.71250E+09
5.87091E+10	.0988	660.0	100.0	5.79878E+09
5.67514E+10	.1229	670.0	100.0	6.97682E+09
5.40407E+10	.1514	680.0	100.0	8.18241E+09
5.05150E+10	.1846	690.0	100.0	9.32628E+09
4.62475E+10	.2230	700.0	100.0	1.03113E+10
4.14785E+10	.2667	710.0	100.0	1.10631E+10
3.65739E+10	.3160	720.0	100.0	1.15587E+10
3.19230E+10	.3707	730.0	100.0	1.18345E+10
2.78215E+10	.4299	740.0	100.0	1.19602E+10
2.44141E+10	.4912	750.0	100.0	1.19927E+10
2.17072E+10	.5491	760.0	100.0	1.19186E+10
1.96215E+10	.5910	770.0	100.0	1.15969E+10
1.80439E+10	.5986	780.0	100.0	1.08003E+10
1.68620E+10	.5667	790.0	100.0	9.55551E+09
1.59795E+10	.5136	800.0	100.0	8.20642E+09
1.53198E+10	.4563	810.0	100.0	6.99055E+0[illegible]
1.48250E+10	.4025	820.0	100.0	5.96670E+09
1.44519E+10	.3544	830.0	100.0	5.12128E+09
1.41689E+10	.3123	840.0	100.0	4.42433E+09
1.39527E+10	.2757	850.0	100.0	3.84688E+09
1.37865E+10	.2441	860.0	100.0	3.36499E+09
1.36578E+10	.2167	870.0	100.0	2.95975E+09
1.35575E+10	.1930	880.0	100.0	2.61650E+09
1.34788E+10	.1724	890.0	100.0	2.32377E+09
1.34166E+10	.1545	900.0	100.0	2.07256E+09
1.33671E+10	.1388	910.0	100.0	1.85577E+09
1.33276E+10	.1251	920.0	100.0	1.66772E+09
1.32958E+10	.1131	930.0	100.0	1.50384E+09
1.32701E+10	.1025	940.0	100.0	1.36039E+09
1.32492E+10	.0938	950.0	100.0	1.23433E+09
1.32312E+10	.0849	960.0	100.0	1.12313E+09
1.32179E+10	.0775	970.0	100.0	1.02472E+09
1.32063E+10	.0710	980.0	100.0	9.37329E+08
1.31967E+10	.0651	990.0	100.0	8.59484E+08
1.31886E+10	.0599	1000.0	100.0	7.89940E+08

TABLE 7-D

MATERIAL: SiO_2 + 12.75% Na_2O + 10.75% CaO + 6% Al_2O_3 + 2% Co_2O_3 (CONCLUDED)

AFTER 300 HOURS AT 815°C

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
6.44665E+10	.0120	600.0	100.0	7.72026E+08
6.42938E+10	.0177	610.0	100.0	1.13822E+09
6.40129E+10	.0256	620.0	100.0	1.63596E+09
6.35703E+10	.0361	630.0	100.0	2.29377E+09
6.28955E+10	.0499	640.0	100.0	3.13750E+09
6.19017E+10	.0676	650.0	100.0	4.18443E+09
6.04910E+10	.0898	660.0	100.0	5.43489E+09
5.85665E+10	.1172	670.0	100.0	6.86228E+09
5.60550E+10	.1499	680.0	100.0	8.40432E+09
5.29334E+10	.1882	690.0	100.0	9.95943E+09
4.92562E+10	.2313	700.0	100.0	1.13940E+10
4.51662E+10	.2781	710.0	100.0	1.25625E+10
4.08781E+10	.3262	720.0	100.0	1.33353E+10
3.66357E+10	.3719	730.0	100.0	1.36256E+10
3.26600E+10	.4105	740.0	100.0	1.34067E+10
2.91074E+10	.4369	750.0	100.0	1.27169E+10
2.60551E+10	.4474	760.0	100.0	1.16564E+10
2.35117E+10	.4411	770.0	100.0	1.03701E+10
2.14384E+10	.4204	780.0	100.0	9.01198E+09
1.97730E+10	.3898	790.0	100.0	7.70695E+09
1.84470E+10	.3540	800.0	100.0	6.53088E+09
1.73957E+10	.3170	810.0	100.0	5.51386E+09
1.65631E+10	.2811	820.0	100.0	4.65576E+09
1.59025E+10	.2478	830.0	100.0	3.94108E+09
1.53772E+10	.2178	840.0	100.0	3.34916E+09
1.49577E+10	.1912	850.0	100.0	2.85927E+09
1.46218E+10	.1678	860.0	100.0	2.45296E+09
1.43490E+10	.1474	870.0	100.0	2.11474E+09
1.41300E+10	.1296	880.0	100.0	1.83193E+09
1.39516E+10	.1143	890.0	100.0	1.59430E+09
1.38043E+10	.1010	900.0	100.0	1.39363E+09
1.36836E+10	.0894	910.0	100.0	1.22336E+09
1.35838E+10	.0794	920.0	100.0	1.07818E+09
1.35008E+10	.0707	930.0	100.0	9.53847E+08
1.34318E+10	.0631	940.0	100.0	8.46907E+08
1.33733E+10	.0564	950.0	100.0	7.54534E+08
1.33244E+10	.0506	960.0	100.0	6.74439E+08
1.32829E+10	.0455	970.0	100.0	6.04734E+08
1.32477E+10	.0411	980.0	100.0	5.43851E+08
1.32177E+10	.0371	990.0	100.0	4.90487E+08

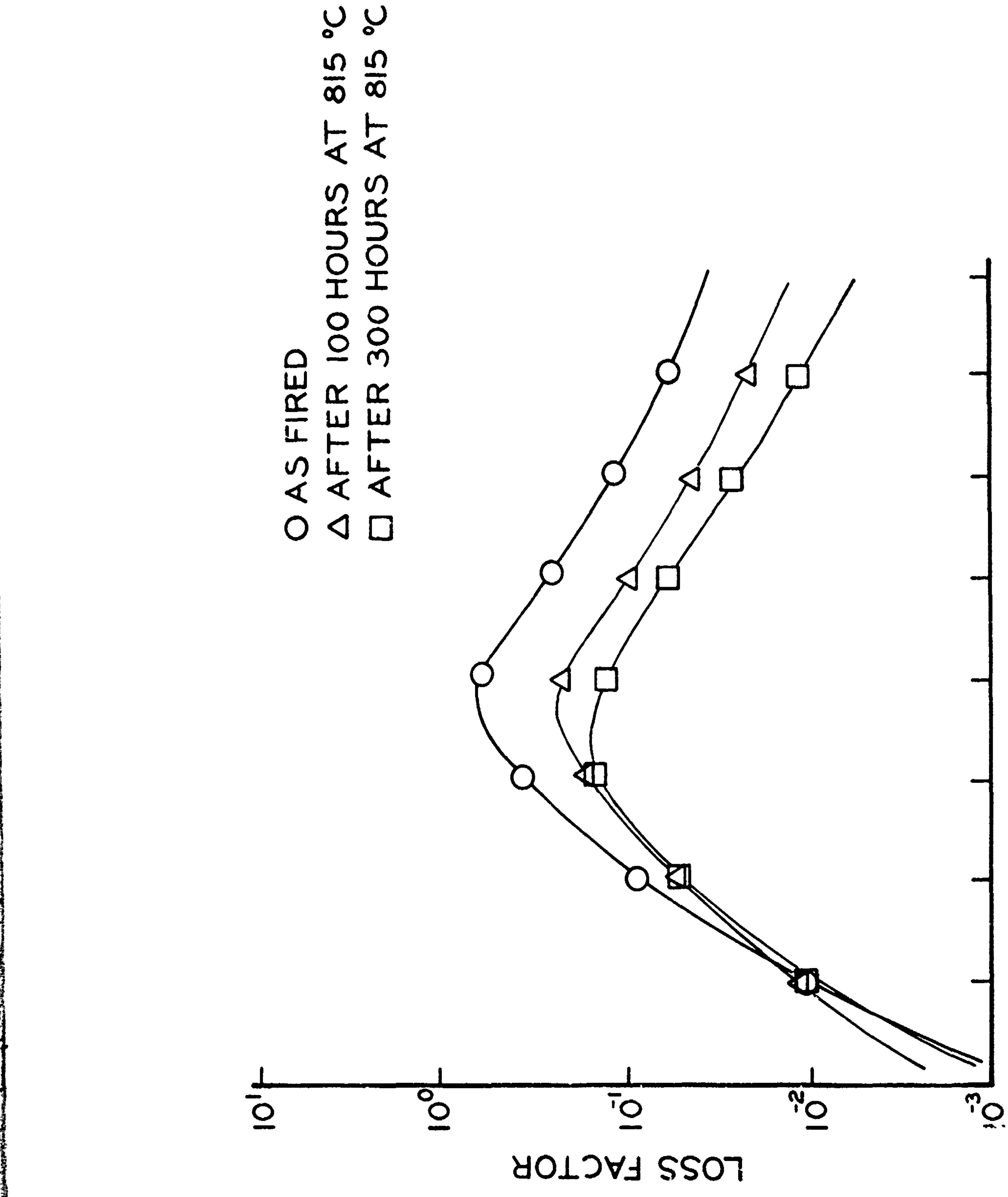

O AS FIRED
△ AFTER 100 HOURS AT 815 °C
□ AFTER 300 HOURS AT 815 °C
LOSS FACTOR
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
590
640
690
740
790
840
890
940
990
TEMPERATURE °C

TABLE 8-D

MATERIAL: SiO_2 + 10.75% CaO + 6.375% Na_2O + 6.375% $KHCO_3$ + 2% Co_2O_3

AS FIRED

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
3.63825E+10	.0255	600.0	100.0	9.27648E+08
3.58413E+10	.0377	610.0	100.0	1.35201E+09
3.51355E+10	.0539	620.0	100.0	1.89247E+09
3.42413E+10	.0743	630.0	100.0	2.54454E+09
3.31400E+10	.0991	640.0	100.0	3.28562E+09
3.18223E+10	.1280	650.0	100.0	4.07241E+09
3.02911E+10	.1599	660.0	100.0	4.84284E+09
2.85629E+10	.1934	670.0	100.0	5.52397E+09
2.66699E+10	.2267	680.0	100.0	6.04559E+09
2.46565E+10	.2577	690.0	100.0	6.35518E+09
2.25774E+10	.2848	700.0	100.0	6.43016E+09
2.04899E+10	.3065	710.0	100.0	6.28112E+09
1.84501E+10	.3223	720.0	100.0	5.94658E+09
1.65064E+10	.3321	730.0	100.0	5.48102E+09
1.46961E+10	.3363	740.0	100.0	4.94178E+09
1.30441E+10	.3357	750.0	100.0	4.37923E+09
1.15626E+10	.3313	760.0	100.0	3.83123E+09
1.02535E+10	.3240	770.0	100.0	3.32[illegible]1E+09
9.11032E+09	.3146	780.0	100.0	2.86620E+09
8.12106E+09	.3038	790.0	100.0	2.46688E+09
7.27081E+09	.2920	800.0	100.0	2.12342E+09
6.54325E+09	.2799	810.0	100.0	1.83143E+09
5.92239E+09	.2676	820.0	100.0	1.58501E+09
5.39310E+09	.2555	830.0	100.0	1.37788E+09
4.94179E+09	.2436	840.0	100.0	1.20400E+09
4.55651E+09	.2322	850.0	100.0	1.05795E+09
4.22692E+09	.2212	860.0	100.0	9.35021E+08
3.94423E+09	.2107	870.0	100.0	8.31208E+08
3.70099E+09	.2008	880.0	100.0	7.43184E+08
3.49102E+09	.1914	890.0	100.0	6.68213E+08
3.30914E+09	.1825	900.0	100.0	6.04050E+08
3.15098E+09	.1742	910.0	100.0	5.48847E+08
3.01297E+09	.1663	920.0	100.0	5.01112E+08
2.89208E+09	.1589	930.0	100.0	4.59617E+08
2.78583E+09	.1520	940.0	100.0	4.23367E+08
2.69208E+09	.1454	950.0	100.0	3.91536E+08
2.60910E+09	.1393	960.0	100.0	3.63451E+08
2.53539E+09	.1335	970.0	100.0	3.38555E+08
2.46972E+09	.1281	980.0	100.0	3.16389E+08
2.41102E+09	.1230	990.0	100.0	2.96568E+08

AFTER 112 HOURS AT 815°C

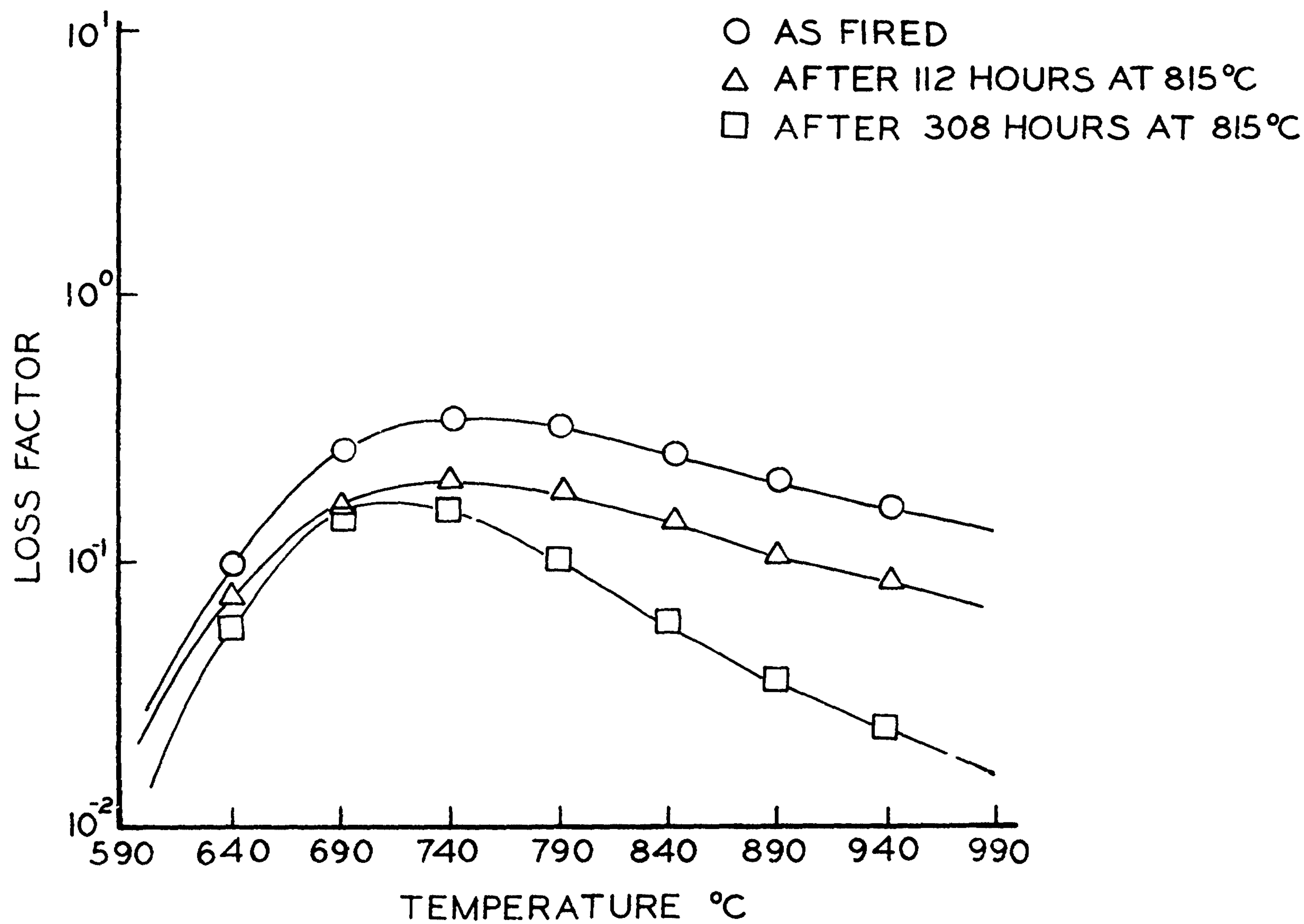
MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
3.99339E+10	.0226	600.0	100.0	9.02905E+08
3.91614E+10	.0320	610.0	100.0	1.25384E+09
3.82447E+10	.9439	620.0	100.0	1.67735E+09
3.71814E+10	.0582	630.0	100.0	2.16311E+09
3.59771E+10	.0748	640.0	100.0	2.69041E+09
3.46431E+10	.0932	650.0	100.0	3.22861E+09
3.31975E+10	.1127	660.0	100.0	3.74015E+09
3.16637E+10	.1322	670.0	100.0	4.18582E+09
3.00688E+10	.1507	680.0	100.0	4.53139E+09
2.84426E+10	.1671	690.0	100.0	4.75388E+09
2.68134E+10	.1807	700.0	100.0	4.84502E+09
2.52084E+10	.1909	710.0	100.0	4.81162E+09
2.36511E+10	.1975	720.0	100.0	4.67215E+09
2.21606E+10	.2009	730.0	100.0	4.45168E+09
2.07512E+10	.2013	740.0	100.0	4.17680E+09
1.94325E+10	.1992	750.0	100.0	3.87173E+09
1.82096E+10	.1953	760.0	100.0	3.55623E+09
1.70841E+10	.1899	770.0	100.0	3.24495E+09
1.60548E+10	.1836	780.0	100.0	2.94778E+09
1.51182E+10	.1767	799.0	100.0	2.67072E+09
1.42690E+10	.1694	806.0	100.0	2.41669E+09
1.35015E+10	.1620	810.0	100.0	2.18661E+09
1.28092E+10	.1546	820.0	100.0	1.97997E+09
1.21855E+10	.1473	830.0	100.0	1.79545E+09
1.16239E+10	.1403	840.0	100.0	1.63129E+09
1.11185E+10	.1336	850.0	100.0	1.48556E+09
1.06633E+10	.1272	860.0	100.0	1.35628E+09
1.02533E+10	.1211	870.0	100.0	1.24161E+09
9.88347E+09	.1153	880.0	100.0	1.13979E+09
9.54950E+09	.1099	890.0	100.0	1.04927E+09
9.24764E+09	.1047	900.0	100.0	9.68654E+08
8.97428E+09	.0999	910.0	100.0	8.96708E+08
8.72633E+09	.0954	920.0	100.0	8.32352E+08
8.50118E+09	.0911	930.0	100.0	7.74656E+08
8.29622E+09	.0871	940.0	100.0	7.22788E+08
8.10943E+09	.0834	950.0	100.0	6.76050E+08
7.93881E+09	.0798	960.0	100.0	6.33819E+08
7.78273E+09	.0765	970.0	100.0	5.95565E+08
7.63971E+09	.0734	980.0	100.0	5.60828E+08
7.50842E+09	.0705	990.0	100.0	5.29204E+08

TABLE 8-D

MATERIAL: SiO_2 + 10.75% CaO + 6.375% Na_2O + 6.375% $KHCO_3$ + 2% Co_2O_3 (CONCLUDED)

AFTER 308 HOURS AT 815°C

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
3.97565E+10	.0124	600.0	100.0	4.91964E+08
3.93582E+10	.0192	610.0	100.0	7.53855E+08
3.88409E+10	.0285	620.0	100.0	1.10755E+09
3.81887E+10	.0409	630.0	100.0	1.56040E+09
3.73900E+10	.0564	640.0	100.0	2.10707E+09
3.64405E+10	.0748	650.0	100.0	2.72423E+09
3.53448E+10	.0953	660.0	100.0	3.36756E+09
3.41178E+10	.1165	670.0	100.0	3.97444E+09
3.27826E+10	.1365	680.0	100.0	4.47405E+09
3.13715E+10	.1532	690.0	100.0	4.80482E+09
2.99199E+10	.1648	700.0	100.0	4.93193E+09
2.84644E+10	.1706	710.0	100.0	4.85723E+09
2.70394E+10	.1707	720.0	100.0	4.61529E+09
2.56731E+10	.1659	730.0	100.0	4.25867E+09
2.43873E+10	.1575	740.0	100.0	3.84161E+09
2.31964E+10	.1470	750.0	100.0	3.40876E+09
2.21078E+10	.1353	760.0	100.0	2.99095E+09
2.11236E+10	.1234	770.0	100.0	2.60616E+09
2.02413E+10	.1118	780.0	100.0	2.26262E+09
1.94555E+10	.1008	790.0	100.0	1.96206E+09
1.87592E+10	.0908	800.0	100.0	1.70249E+09
1.81441E+10	.0816	810.0	100.0	1.48006E+09
1.76020E+10	.0733	820.0	100.0	1.29025E+09
1.71247E+10	.0659	830.0	100.0	1.12851E+09
1.67048E+10	.0593	840.0	100.0	9.90668E+08
1.63351E+10	.0534	850.0	100.0	8.73008E+08
1.60093E+10	.0482	860.0	100.0	7.72335E+08
1.57220E+10	.0436	870.0	100.0	6.85941E+08
1.54683E+10	.0395	880.0	100.0	6.11551E+08
1.52436E+10	.0359	890.0	100.0	5.47264E+08
1.50444E+10	.0327	900.0	100.0	4.91509E+08
1.48675E+10	.0298	910.0	100.0	4.42974E+08
1.47100E+10	.0272	920.0	100.0	4.00567E+08
1.45693E+10	.0249	930.0	100.0	3.63377E+08
1.44435E+10	.0229	940.0	100.0	3.30649E+08
1.43308E+10	.0211	950.0	100.0	3.01750E+08
1.42295E+10	.0194	960.0	100.0	2.76148E+08
1.41382E+10	.0179	970.0	100.0	2.53390E+08
1.40560E+10	.0166	980.0	100.0	2.33103E+08
1.39815E+10	.0154	990.0	100.0	2.14962E+08



O AS FIRED
△ AFTER 112 HOURS AT 815°C
□ AFTER 308 HOURS AT 815°C
LOSS FACTOR
10^{1}
10^{0}
10^{-1}
10^{-2}
590 640 690 740 790 840 890 940 990
TEMPERATURE °C

TABLE 9-D

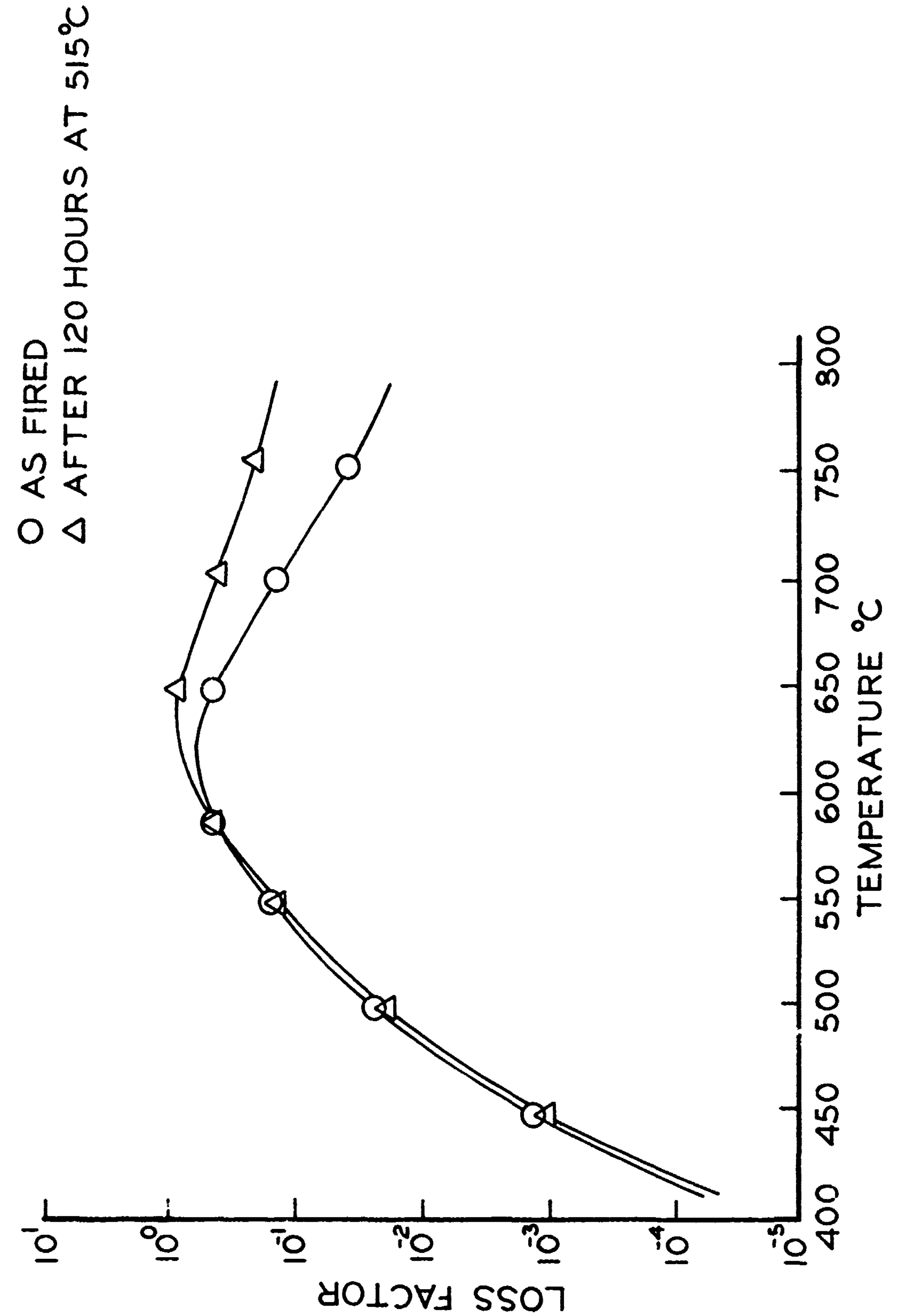
MATERIAL: BOROSILICATE + SiO_2 + 5% Na_2O + 2% Co_2O_3

AS FIRED

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
3.93747E+10	.0001	410.0	100.0	2.26514E+06
3.93742E+10	.0001	420.0	100.0	5.70363E+06
3.93728E+10	.0003	430.0	100.0	1.35527E+07
3.93688E+10	.0007	440.0	100.0	2.94647E+07
3.93586E+10	.0015	450.0	100.0	5.99704E+07
3.93347E+10	.0029	460.0	100.0	1.15119E+08
3.92831E+10	.0053	470.0	100.0	2.09677E+08
3.91784E+10	.0093	480.0	100.0	3.64079E+08
3.89769E+10	.0155	490.0	100.0	6.04725E+08
3.86103E+10	.0249	500.0	100.0	9.62717E+08
3.79777E+10	.0387	510.0	100.0	1.46952E+09
3.69446E+10	.0581	520.0	100.0	2.14762E+09
3.53564E+10	.0847	530.0	100.0	2.99497E+09
3.30731E+10	.1199	540.0	100.0	3.96513E+09
3.00373E+10	.1649	550.0	100.0	4.95375E+09
2.63441E+10	.2205	560.0	100.0	5.80771E+09
2.22711E+10	.2860	570.0	100.0	6.36996E+09
1.82156E+10	.3592	580.0	100.0	6.54306E+09
1.45562E+10	.4347	590.0	100.0	6.32706E+09
1.15263E+10	.5033	600.0	100.0	5.80099E+09
9.18035E+09	.5524	610.0	100.0	5.07162E+09
7.44532E+09	.5693	620.0	100.0	4.23825E+09
6.19507E+09	.5472	630.0	100.0	3.39021E+09
5.30353E+09	.4919	640.0	100.0	2.60889E+09
4.66750E+09	.4181	650.0	100.0	1.95158E+09
4.21064E+09	.3413	660.0	100.0	1.43715E+09
3.87904E+09	.2715	670.0	100.0	1.05317E+09
3.63546E+09	.2128	680.0	100.0	7.73706E+08
3.45430E+09	.1657	690.0	100.0	5.72283E+08
3.31791E+09	.1287	700.0	100.0	4.27123E+08
3.21409E+09	.1002	710.0	100.0	3.21963E+08
3.13416E+09	.0782	720.0	100.0	2.45159E+08
3.07201E+09	.0614	730.0	100.0	1.88540E+08
3.02320E+09	.0484	740.0	100.0	1.46391E+08
2.98457E+09	.0384	750.0	100.0	1.14710E+08
2.95370E+09	.0307	760.0	100.0	9.06680E+07
2.92885E+09	.0247	770.0	100.0	7.22574E+07
2.90871E+09	.0200	780.0	100.0	5.80366E+07
2.89227E+09	.0162	790.0	100.0	4.69608E+07
2.87874E+09	.0133	800.0	100.0	3.82663E+07

AFTER 120 HOURS AT 515°C

MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ.	LOSS MOD. PASCALS
4.54540E+10	.0000	410.0	100.0	1.88435E+06
4.54527E+10	.0001	420.0	100.0	4.83580E+06
4.54489E+10	.0003	430.0	100.0	1.13945E+07
4.54400E+10	.0005	440.0	100.0	2.49229E+07
4.54203E+10	.0011	450.0	100.0	5.10634E+07
4.53788E+10	.0022	460.0	100.0	9.87346E+07
4.52965E+10	.0040	470.0	100.0	1.81269E+08
4.51437E+10	.0070	480.0	100.0	3.17534E+08
4.48722E+10	.0119	490.0	100.0	5.32656E+08
4.44132E+10	.0193	500.0	100.0	8.57752E+08
4.36721E+10	.0304	510.0	100.0	1.32753E+09
4.25305E+10	.0464	520.0	100.0	1.97437E+09
4.08537E+10	.0690	530.0	100.0	2.81736E+09
3.85169E+10	.0999	540.0	100.0	3.84633E+09
3.54431E+10	.1412	550.0	100.0	5.00424E+09
3.16511E+10	.1951	560.0	100.0	6.17664E+09
2.72947E+10	.2638	570.0	100.0	7.20104E+09
2.26622E+10	.3488	580.0	100.0	7.90384E+09
1.81178E+10	.4500	590.0	100.0	8.15361E+09
1.40034E+10	.5643	600.0	100.0	7.90149E+09
1.05468E+10	.6809	610.0	100.0	7.18087E+09
7.82527E+09	.7768	620.0	100.0	6.07879E+09
5.78933E+09	.8200	630.0	100.0	4.74742E+09
4.32002E+09	.7972	640.0	100.0	3.44395E+09
3.28169E+09	.7302	650.0	100.0	2.39618E+09
2.55386E+09	.6477	660.0	100.0	1.65407E+09
2.04269E+09	.5663	670.0	100.0	1.15667E+09
1.68051E+09	.4924	680.0	100.0	8.27534E+08
1.42047E+09	.4279	690.0	100.0	6.07850E+08
1.23088E+09	.3725	700.0	100.0	4.58462E+08
1.09040E+09	.3251	710.0	100.0	3.54512E+08
9.84664E+08	.2848	720.0	100.0	2.80408E+08
9.03847E+08	.2504	730.0	100.0	2.26303E+08
8.41206E+08	.2210	740.0	100.0	1.85899E+08
7.92018E+08	.1958	750.0	100.0	1.55087E+08
7.52935E+08	.1742	760.0	100.0	1.31138E+08
7.21543E+08	.1555	770.0	100.0	1.12198E+08
6.96077E+08	.1393	780.0	100.0	9.69852E+07
6.75239E+08	.1253	790.0	100.0	8.45961E+07
6.58041E+08	.1130	800.0	100.0	7.43794E+07



O AS FIRED
Δ AFTER 120 HOURS AT 515°C
LOSS FACTOR
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
TEMPERATURE °C
400
450
500
550
600
650
700
750
800

APPENDIX E

MULTILAYER DAMPING SYSTEMS

The results of the multilayer porcelain enamel damping systems are listed in this Appendix as described in Section V of this report. Table 1-E is a listing of these systems by beam number. The following sections display this data in the same format as Appendix A. The data does not represent material properties; it is valid only for the geometric combinations of coatings and substrates that are listed.

TABLE 1-E

INDEX OF MULTILAYER BEAM TESTS

Beam Number	Layer	Material
01-50-1	1	Corning 0010 + 10% Al_2O_3 + 1% Co_2O_3
	2	Nickle Aluminide
	3	Magnesium Zirconate
01-51-1	1	Corning 0010
	2	Nickle Aluminide
	3	Magnesium Zirconate
01-51-2	1	O. Hommel R-1202
	2	O. Hommel R-1250
01-51-3	1	O. Hommel R-1202
	2	O. Hommel R-1250
01-55-1	1	Corning 0010 + 10% Al_2O_3 + 1% Co_2O_3
	2	Al_2O_3
01-58-1	1	UDRI 74.5% SiO_2 + 10.75% CaO + 12.75% Na_2O + 3% Al_2O_3 + 2% Ca_2O_3
	2	NiCr
01-58-2	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	O. Hommel R-1251
01-58-3	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	O. Hommel R-1251
01-58-4	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	O. Hommel R-1251
01-61-1	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	NiCr

TABLE 1-E (Concluded)

INDEX OF MULTILAYER BEAM TESTS

Beam Number	Layer	Material
01-61-2	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	NiCr
01-62-2	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	O. Hommel R-1252
01-62-3	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	O. Hommel R-1252
01-62-4	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	O. Hommel R-1252
01-62-5	1	UDRI 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3
	2	O. Hommel R-1252
01-63-1	1	O. Hommel R-1202
	2	O. Hommel R-1250
01-63-2	1	O. Hommel R-1202
	2	O. Hommel R-1250

Beam No. 01-50-1

Date 12/27/78

Damping Material Three layers: first, Corning 0010 + 10% Al_2O_3 + 1% Co_2O_3; second Nicle Aluminide; third Magnesium Zirconate

Material Thickness 0.0378 cm Material Density 4.24 g/cc

Fixture No. 2 Beam Thickness 0.0955 cm

Beam Density 9.13 g/cc Beam Length 21.107 cm

Temperature Test Range: Between 870 °C and 595 °C

Frequency Test Range: Between 100 Hz and 1,600 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.66	Temperature	860 °C
	1,000 Hz	η_D 0.66	Temperature	790 °C
Range	100 Hz	715 °C	850 °C	
	1,000 Hz	775 °C	920 °C	

Complex Modulus E_D'':

Peak	100 Hz	2.8×10^9 PAS	Temperature	770 °C
	1,000 Hz	2.8×10^9 PAS	Temperature	830 °C
Range	100 Hz	695 °C	855 °C	
	1,000 Hz	740 °C	925 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-7  THREE LAYER DAMPING TREATMENT
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM           MROM          N          ML
               A1             A2           A3         A4
   550.0  4.5000E-04  3.6600E+10      .400  2.7090E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH        FROL       C
            B1       B2        B3         B4        B5
   550.0    .057    .776    -.350  1.0241E-04   1.469
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: After test, coating was discolored to a darker shade of white. Thermal soaked for 69 hours at 760°C. Removed to room temperature after fifteen minutes; the coating flaked off the beam. This continued for approximately three hours until the entire coating came off the beam.

TABLE 2-E

Beam No. 01-50-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1600	2	102.30	93.41	101.78	102.90	2.20	.02152	.01432	
	3	288.37	261.98	286.64	290.10	6.80	.02358	.01908	
	4	570.68	515.33	568.56	576.00	14.62	.02562	.02292	
	5	943.3	834.0	938.68	948.08	18.47	.01958	.01717	
	6	1436.4	1287.44	1428.75	1441.34	24.74	.01722	.01552	
1550	2	104.19	94.2	103.51	104.58	2.10	.02092	.01502	
	3	292.20	264.3	290.42	293.60	6.25	.02139	.01811	
	4	577.06	520.43	574.31	580.51	12.18	.02111	.01931	
	5	961.84	867.2	957.05	967.25	20.04	.02084	.01914	
	6	1440.50	1288.2	1432.95	1446.67	26.76	.01852	.01722	
1500	2	105.95	95.01	105.34	106.39	2.06	.01948	.01508	
	3	295.85	266.65	292.38	299.32	6.94	.02346	.02126	
	4	583.86	524.6	580.82	587.31	12.75	.02184	.02054	
	5	974.23	867.4	965.73	985.02	19.29	.01980	.01859	
	6	1470.47	1298.0	1462.41	1478.54	31.52	.02144	.02044	
1450	2	106.92	95.85	105.92	107.92	2.00	.01871	.01611	
	3	300.77	268.35	298.09	303.52	5.48	.01822	.01661	
	4	592.68	527.23	587.21	598.15	10.94	.01846	.01746	
	5	988.80	874.18	984.13	993.04	17.50	.01771	.01629	
	6	1487.64	1308.6	1478.48	1496.8	36.00	.02420	.02337	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1400	2	108.09	96.62	106.90	109.06	2.16	.01998	.01794	
	3	304.30	270.3	301.66	306.83	5.17	.01699	.01568	
	4	599.16	532.4	594.04	603.72	9.68	.01616	.01546	
	5	999.34	880.5	992.47	1006.51	14.04	.01405	.01333	
	6	1489.85	1317.5	1480.34	1507.15	26.81	.01800	.01730	
1350	2	109.56	1327.0	108.46	110.47	2.01	.01835	.01667	
	3	307.8	887.2	305.68	310.06	4.38	.01423	.01311	
	4	605.93	536.0	602.13	609.84	7.71	.01272	.01207	
	5	1009.7	272.3	1004.34	1015.15	10.81	.01071	.01247	
	6	1504.66	97.36	1496.4	1514.64	18.24	.01212	.01153	
1300	2	110.70	97.9	109.84	111.48	1.64	.01481	.01338	
	3	310.56	274.03	308.80	312.33	3.53	.01137	.01037	
	4	611.4	538.84	608.47	614.45	6.03	.00986	.00932	
	5	1018.43	892.73	1015.[illegible]	1020.[illegible]2	10.65	.01046	.00987	
	6	1516.7	1336.11	1508.76	1523.54	14.78	.00974	.00974	
1250	2	112.20	98.8	111.97	112.53	1.10	.00981	.00850	
	3	313.25	276.1	312.04	314.31	2.27	.00725	.00635	
	4	616.80	543.5	614.88	618.98	4.10	.00665	.00620	
	5	1026.58	900.0	1023.88	1029.51	5.63	.00548	.00492	
	6	1533.8	1345.8	1532.01	1535.60	7.06	.00460	.00412	

TABLE 2-E (Concluded)

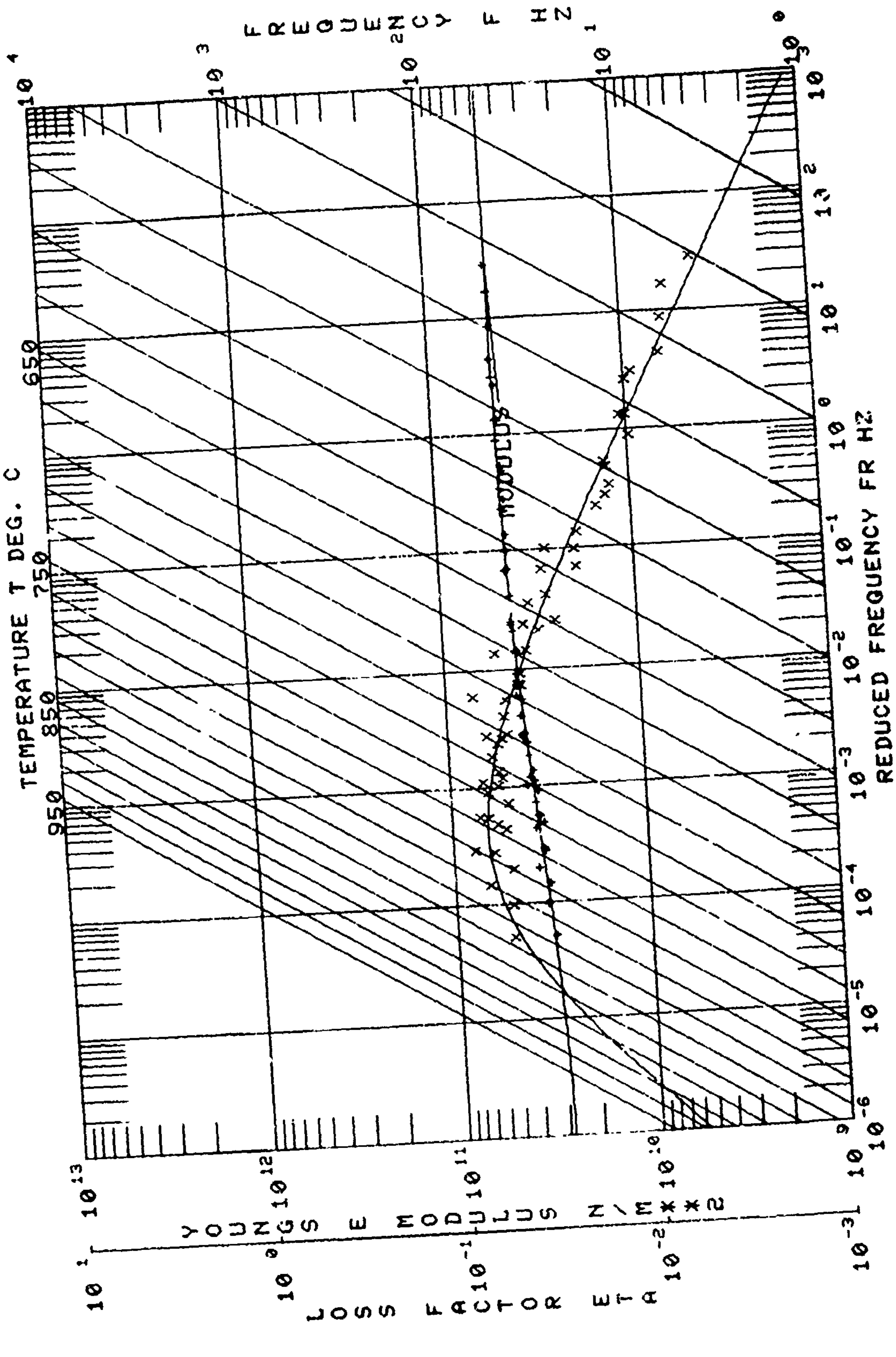
Beam No. 01-50-1

°F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1200	2	112.87	99.48	112.49	113.36	0.87	.00771	.00643	
1200	3	315.55	277.80	314.73	316.34	1.61	.00510	.00426	
1200	4	621.01	547.10	619.60	622.52	2.92	.00470	.00431	
1200	5	1033.93	906.20	1031.87	1035.79	3.92	.00373	.00319	
1200	6	1545.96	1355.20	1544.44	1547.75	6.50	.00421	.00383	X
1150	2	113.69	100.07	113.42	114.03	0.61	.00537	.00417	
1150	3	317.63	279.93	317.11	318.38	1.27	.00400	.00322	
1150	4	625.[illegible]0	550.54	624.49	626.70	2.21	.00353	.00320	
1150	5	1041.70	912.00	1040.36	1043.12	2.76	.00265	.00212	
1100	2	114.81	100.72	114.62	115.08	0.46	.00401	.00297	
1100	3	320.59	281.40	320.13	321.01	0.88	.00274	.00200	
1100	4	630.88	554.24	630.08	631.62	1.54	.00244	.00192	
1100	5	1050.15	917.90	1049.06	1051.14	2.08	.00189	.00137	

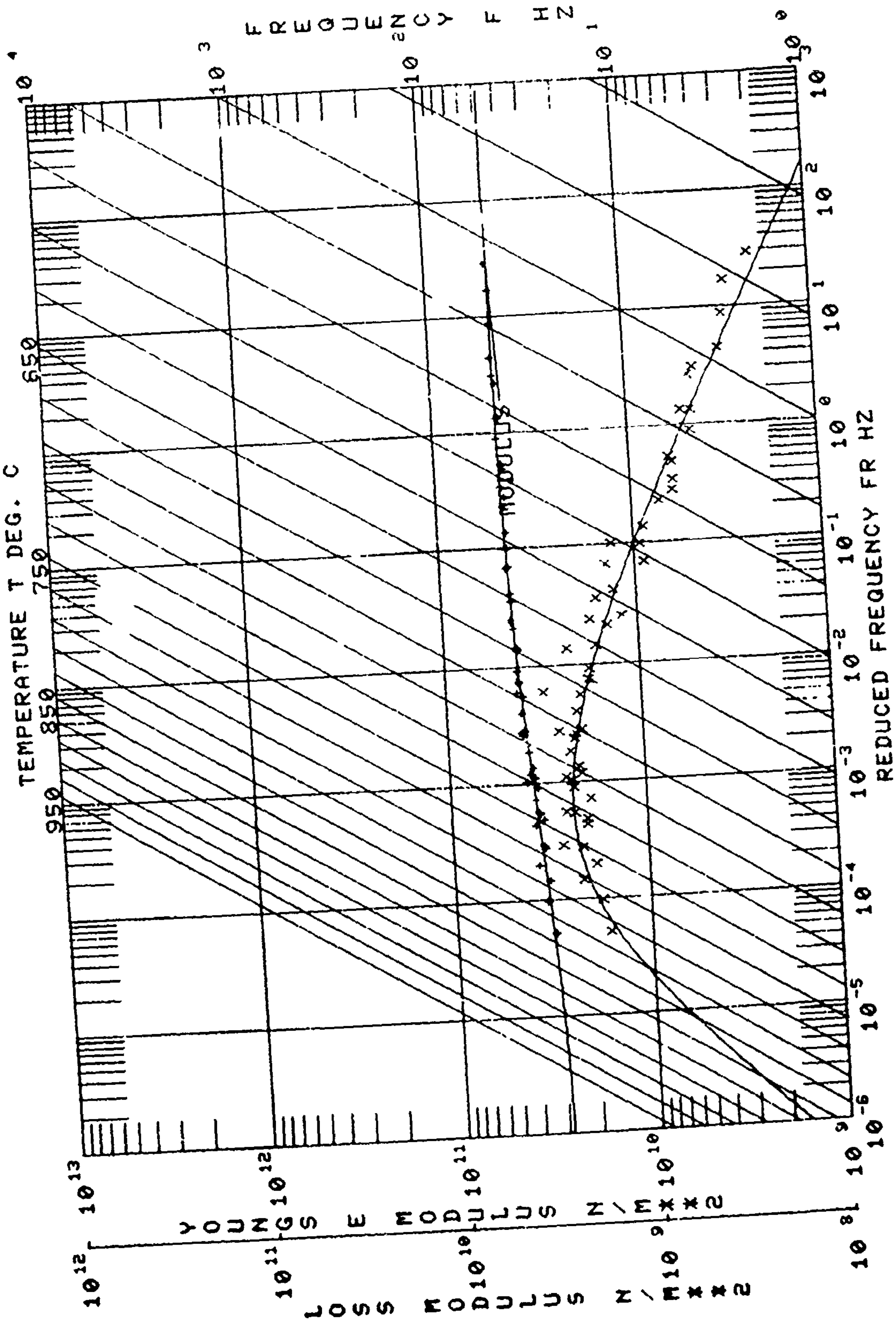
EXPERIMENTAL CODE : 43
MATERIAL :J85-7 THREE LAYER DAMPING TREATMENT
DATA SOURCES 01-50-1
MANUFACTURER :N
AFML :UDRI BEAM COATED ONE SIDE
OTHER :1,MAG ZIRC 2,NICKLE ALUMINIDE,3,0010 + 10 AL203 + 1 C0203

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	3.78539E+10	.0523	871.1	1436.4	6.	1.75629E+11	.0155	1287.4	1.97917E+09
2	3.45650E+10	.0601	871.1	943.3	5.	1.71806E+11	.0172	354.0	2.07812E+09
3	3.50149E+10	.0794	871.1	570.7	4.	1.70954E+11	.0229	515.3	2.78169E+09
4	3.33065E+10	.0678	871.1	288.4	3.	1.69660E+11	.0191	262.0	2.25679E+09
5	3.20121E+10	.0519	871.1	102.3	2.	1.69104E+11	.0143	93.4	1.66287E+09
6	3.49252E+10	.0523	843.3	104.2	2.	1.71977E+11	.0150	94.2	1.82706E+09
7	3.49592E+10	.0632	843.3	292.2	3.	1.72678E+11	.0181	264.3	2.20896E+09
8	3.60250E+10	.0666	843.3	577.1	4.	1.74354E+11	.0193	520.4	2.39929E+09
9	3.66780E+10	.0659	843.3	961.8	5.	1.77158E+11	.0191	867.2	2.41854E+09
10	3.84783E+10	.0575	843.3	1440.5	6.	1.75836E+11	.0172	1288.2	2.21368E+09
11	4.25732E+10	.0652	815.6	1470.7	6.	1.78522E+11	.0204	1298.0	2.77710E+09
12	3.99336E+10	.0611	815.6	974.2	5.	1.77240E+11	.0186	867.4	2.44131E+09
13	3.75535E+10	.0698	815.6	583.9	4.	1.77159E+11	.0205	524.6	2.62259E+09
14	3.64740E+10	.0731	815.6	295.8	3.	1.75763E+11	.0213	266.7	2.66799E+09
15	3.75801E+10	.0509	815.6	105.9	2.	1.74947E+11	.0151	95.0	1.91270E+09
16	3.83285E+10	.0543	787.8	106.9	2.	1.78054E+11	.0161	95.9	2.08161E+09
17	3.95566E+10	.0550	787.8	300.8	3.	1.78011E+11	.0166	268.3	2.17686E+09
18	4.05485E+10	.0572	787.8	592.7	4.	1.78940E+11	.0175	527.2	2.32108E+09
19	4.24644E+10	.0523	787.8	988.8	5.	1.80022E+11	.0163	874.2	2.22021E+09
20	4.41924E+10	.0738	787.8	1487.6	6.	1.81450E+11	.0234	1308.6	3.26033E+09
21	4.33624E+10	.0555	760.0	1489.9	6.	1.83828E+11	.0173	1317.1	2.40772E+09
22	4.40253E+10	.0423	760.0	999.3	5.	1.82634E+11	.0133	880.5	1.86246E+09
23	4.16493E+10	.0505	760.0	599.2	4.	1.82467E+11	.0155	532.4	2.10282E+09
24	4.13192E+10	.0511	760.0	304.3	3.	1.80607E+11	.0157	270.3	2.11326E+09
25	4.17070E+10	.0583	760.0	108.9	2.	1.80926E+11	.0179	96.6	2.43074E+09
26	4.30511E+10	.0422	732.2	307.8	3.	1.83290E+11	.0131	272.3	1.81554E+09
27	4.34643E+10	.0388	732.2	605.9	4.	1.84943E+11	.0121	536.0	1.68705E+09
28	4.54759E+10	.0392	732.2	1009.7	5.	1.85424E+11	.0125	887.2	1.78384E+09
29	4.47043E+10	.0367	732.2	1504.7	6.	1.86588E+11	.0115	1327.0	1.64099E+09
30	4.56475E+10	.0293	704.4	1516.7	6.	1.89159E+11	.0092	1336.1	1.33783E+09
31	4.67416E+10	.0308	704.4	1018.4	5.	1.87743E+11	.0099	892.7	1.44017E+09
32	4.49778E+10	.0296	704.4	611.4	4.	1.86908E+11	.0093	538.8	1.33155E+09
33	4.43321E+10	.0331	704.4	310.6	3.	1.85626E+11	.0104	274.0	1.46603E+09
34	4.37227E+10	.0430	704.4	110.7	2.	1.85752E+11	.0134	97.9	1.87973E+09
35	4.57723E+10	.0269	676.7	112.2	2.	1.89183E+11	.0085	98.8	1.23240E+09
36	4.53198E+10	.0202	676.7	313.2	3.	1.88441E+11	.0064	276.1	9.14400E+08
37	4.58106E+10	.0197	676.7	616.8	4.	1.90155E+11	.0062	543.5	9.01669E+08
38	4.74635E+10	.0154	676.7	1026.6	5.	1.90813E+11	.0049	900.0	7.29314E+08
39	4.74884E+10	.0129	676.7	1533.8	6.	1.91912E+11	.0041	1345.8	6.12665E+08
40	4.84382E+10	.0110	648.9	1546.0	6.	1.94603E+11	.0035	1355.2	5.33835E+08
41	4.82002E+10	.0100	648.9	1033.9	5.	1.93451E+11	.0032	906.2	4.79802E+08
42	4.64791E+10	.0137	648.9	621.0	4.	1.92682E+11	.0043	547.1	6.35531E+08
43	4.55025E+10	.0136	648.9	315.5	3.	1.92145E+11	.0043	278.8	6.20871E+08
44	4.61375E+10	.0204	648.9	112.9	2.	1.91796E+11	.0064	99.5	9.42514E+08
45	4.58018E+10	.0135	621.1	113.7	2.	1.96529E+11	.0042	100.7	6.16903E+08
46	4.66175E+10	.0102	621.1	317.6	3.	1.93706E+11	.0032	279.9	4.76791E+08
47	4.73465E+10	.0101	621.1	625.5	4.	1.95113E+11	.0032	550.5	4.79191E+08
48	4.91582E+10	.0066	621.1	1041.7	5.	1.95935E+11	.0021	912.0	3.24070E+08
49	5.03016E+10	.0042	593.3	1050.1	5.	1.98478E+11	.0014	917.9	2.13210E+08

50	4.85489E+10	.0060	593.3	630.9	4.	1.97751E+11	.0019	554.2	2.93064E+08
51	4.83852E+10	.0063	593.3	320.6	3.	1.95746E+11	.0020	281.4	3.03006E+08
52	4.87034E+10	.0093	593.3	114.8	2.	1.96607E+11	.0030	100.7	4.52703E+08
53	4.19132E+10	.0545	732.2	109.6	2.	1.83708E+11	.0167	97.4	2.28233E+09



TEMPERATURE T DEG. C
950
850
750
650
FREQUENCY F HZ
MODULUS
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
650
750
850
950
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-51-1

Date 1/19/79

Damping Material Three layers: first Corning 0010; second Nickle Aluminide; third Magnesium Zirconate

Material Thickness 0.0292 cm Material Density 4.57 g/cc

Fixture No. 2 Beam Thickness 0.0950 cm

Beam Density 9.13 g/cc Beam Length 20.95 cm

Temperature Test Range: Between 510 °C and 815 °C

Frequency Test Range: Between 100 Hz and 1,550 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.10	Temperature	610 °C
	1,000 Hz	η_D 0.10	Temperature	680 °C
Range	100 Hz	575 °C	715 °C	
	1,000 Hz	625 °C	780 °C	

Complex Modulus E_D'':

Peak	100 Hz	3.6×10^9 PAS	Temperature	615 °C
	1,000 Hz	3.6×10^9 PAS	Temperature	680 °C
Range	100 Hz	600 °C	* °C	
	1,000 Hz	630 °C	* °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-8
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0         FROM        MROM        N         ML
               A1          A2        A3        A4
   550.0  1.4020E+00  4.3123E+10    .747  3.7941E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL    SL      SH        FROL        C
            B1      B2      B3         B4         B5
   550.0    .095    .400   -.250 10.0000E-02   1.000
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Project J-85-8. Coating began to come off during test at approximately 760°C. Terminated test at 815°C.

* η_D has double peak; lower peak listed above upper peak above range of test.

TABLE 3-E

Beam No. 01-51-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1500	2	103.00	95.59	101.62	104.96	3.34	.03243	.02843	
1500	3	294.69	267.76	292.88	296.50	7.11	.02414	.02184	X
1500	4	581.41	525.90	575.22	589.60	14.38	.02473	.02363	
1500	5	954.96	872.00	942.28	971.71	29.43	.03082	.02962	
1450	2	102.75	96.41	102.23	103.49	2.48	.02410	.02141	X
1450	3	289.60	269.99	286.27	291.88	5.61	.01937	.01776	
1450	4	570.80	530.31	566.87	578.39	11.52	.02018	.01938	
1450	5	941.76	878.60	833.46	852.12	18.66	.01981	.01893	
1450	6	1411.46	1325.00		1420.61	17.98	.01274	.01208	
1450	2	106.74	95.59	105.28	108.47	3.19	.02989		
1450	4	596.01	525.90	589.58	603.59	14.01	.02351		
1450	5	977.47	872.00	964.78	993.38	28.60	.02926		
1400	2	102.10	97.13	101.09	103.09	2.00	.02074	.01864	
1400	3	290.41	271.65	289.32	291.58	4.44	.01529	.01399	X
1400	4	571.68	531.70	568.21	576.80	8.59	.01503	.01444	
1400	5	945.64	885.60	937.84	953.46	16.08	.01700	.01628	
1350	2	102.72	97.91	101.91	103.53	1.62	.01577	.01404	
1350	3	290.93	273.60	289.11	292.91	3.80	.01305	.01193	
1350	4	573.36	538.20	569.51	578.71	9.20	.01605	.01557	
1350	5	951.20	892.40	942.30	962.46	18.16	.01409	.01845	
1350	6	1434.30	1334.60	1425.69	1449.08	.01631	.01579		X
1300	2	103.54	98.53	102.79	104.40	1.61	.01555	.01405	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1300	3	292.98	275.76	290.73	295.46	4.73	.01614	.01514	
1300	4	578.81	541.77	574.38	584.58	10.20	.01762	.01720	
1300	5	960.58	897.44	951.27	969.10	17.83	.01856	.01797	
1300	6	1446.76	1343.26	1433.07	1463.10	30.03	.02076	.02030	
1250	2	103.84	97.40	102.91	104.84	1.93	.01859	.01726	
1250	3	295.81	278.00	293.26	298.80	5.54	.01873	.01789	
1250	4	584.90	546.20	579.38	591.33	11.95	.02043	.02004	
1250	5	971.72	905.40	961.82	982.37	20.55	.02115	.20610	
1200	2	105.14	100.10	103.91	106.29	2.38	.02264	.02264	
1200	3	299.65	279.70	296.44	302.86	6.42	.02142	.02142	
1200	4	592.12	549.90	586.28	597.51	11.23	.01897	.01897	
1200	5	983.63	911.40	975.23	992.92	17.69	.01798	.01798	
1200	6	1476.81	1363.10	1465.34	1493.05	28.51	.01931	.01931	
1150	2	107.00	100.70	105.83	108.27	2.44	.02280	.02280	
1150	3	303.52	281.68	301.01	306.28	5.27	.01736	.01736	
1150	4	596.56	553.62	594.50	603.18	8.68	.01450	.01450	
1150	5	994.45	917.08	988.66	1000.52	11.86	.01193	.01193	
1150	6	1490.24	1372.32	1480.62	1500.30	19.68	.01321	.01321	
1100	2	108.60	101.42	107.66	109.56	1.90	.01750	.01750	
1100	3	307.10	283.80	305.27	308.80	3.53	.01143	.01143	
1100	4	605.08	557.40	602.30	608.13	5.83	.00964	.00964	
1100	5	1003.29	923.50	999.70	1007.15	7.45	.00743	.00743	

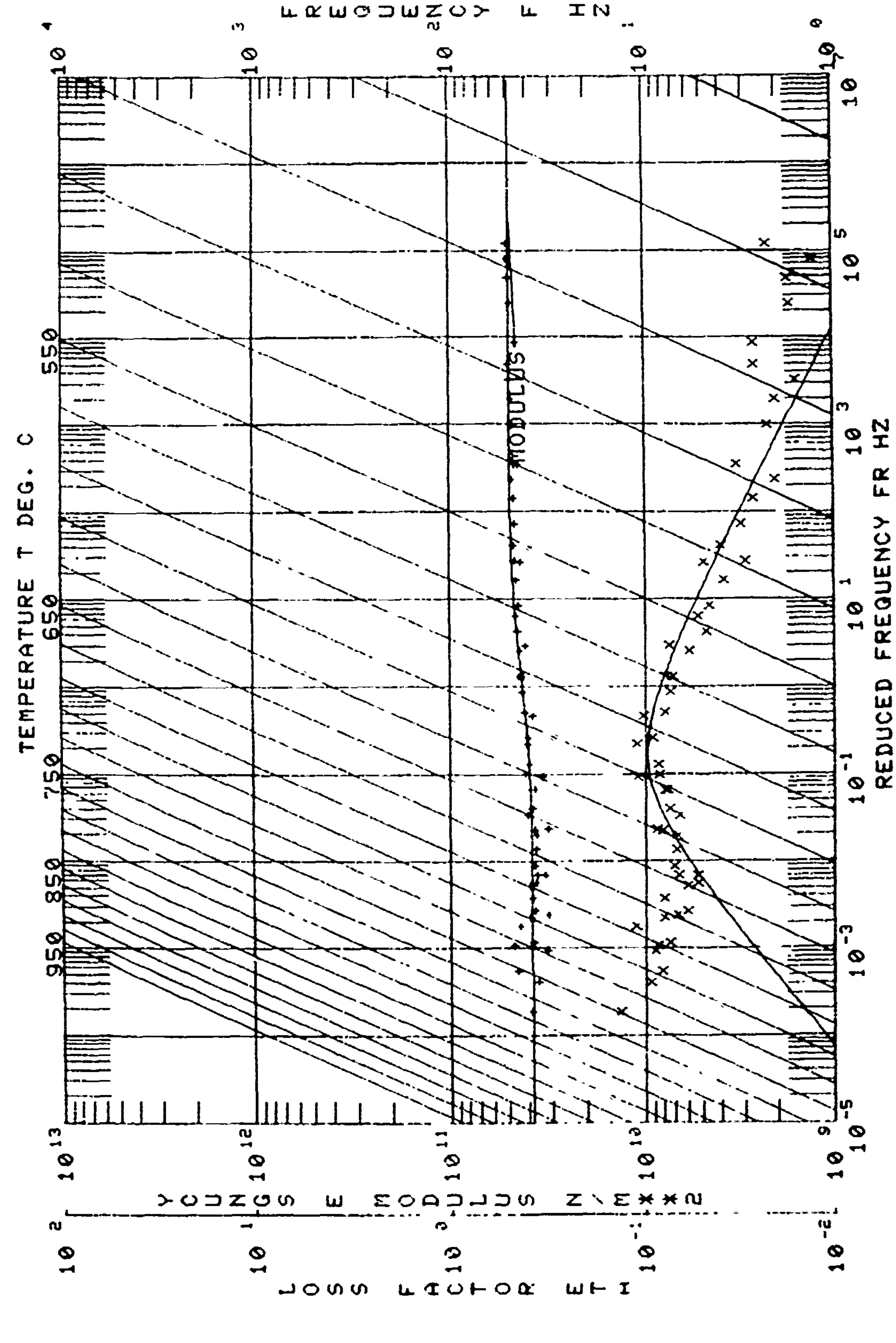
TABLE 3-E (Concluded)

Beam No. 01-51-1

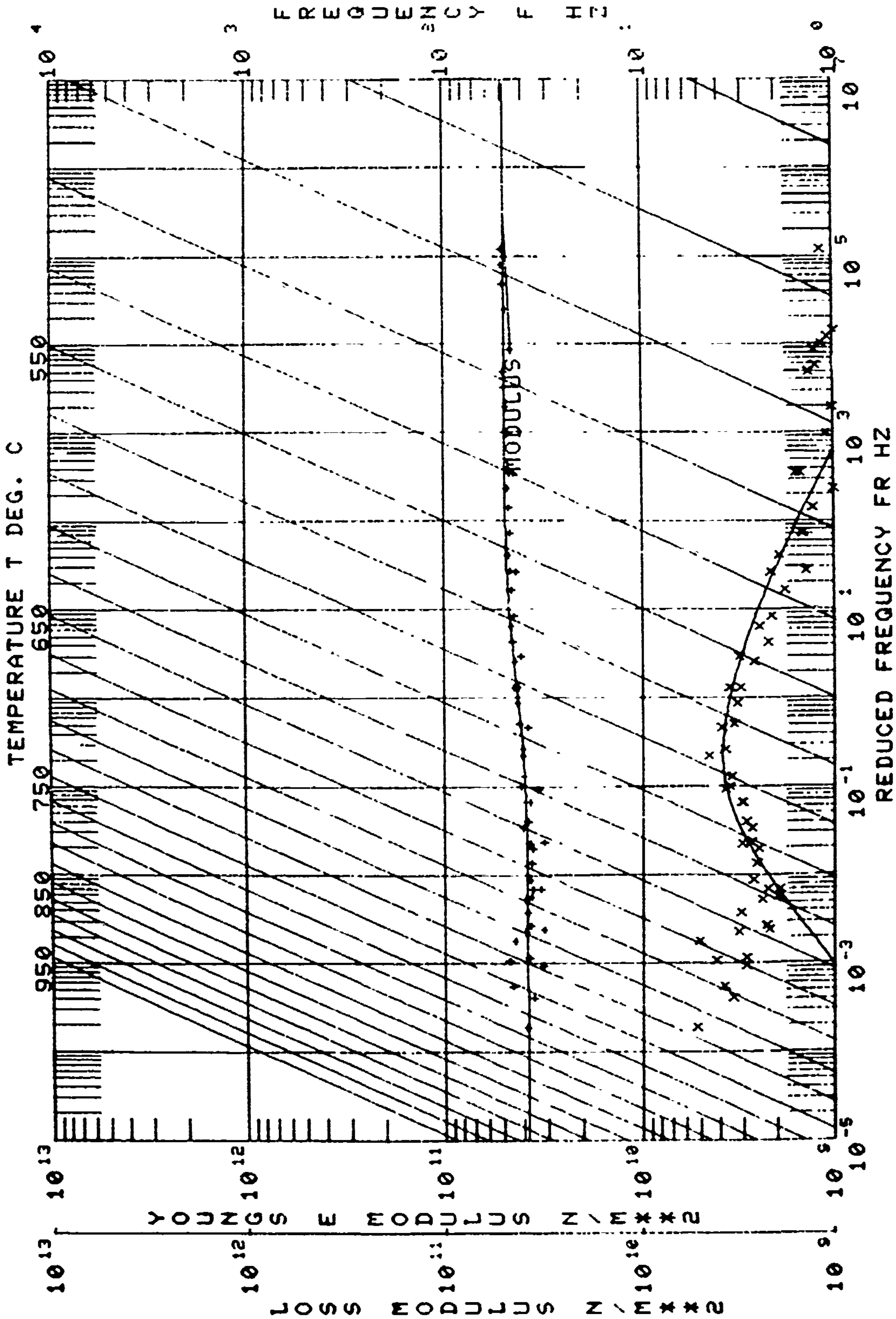
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	6	1502.34	1381.80	1494.25	1509.54	15.29	.01018	.01018	
1050	2	109.74	102.00	109.14	110.43	1.29	.01176	.01176	
1050	3	309.73	285.55	308.68	311.08	2.40	.00775	.00775	
1050	4	610.30	561.80	608.32	612.42	4.10	.00672	.00672	
1050	5	1011.71	929.20	1009.32	1014.56	5.42	.00518	.00518	
1050	6	1514.89	1399.70	1508.11	1520.46	12.35	.00815	.00815	
1000	2	110.74	102.68	110.38	111.26	0.88	.00795	.00795	
1000	3	311.94	286.80	311.12	312.90	1.78	.00571	.00571	
1000	4	614.89	564.50	613.36	616.56	3.20	.00520	.00520	
1000	5	1019.27	935.01	1017.31	1021.43	4 12	.00404	.00404	
1000	6	1524.92	1399.08	1522.38	1527.66	10.38	.00680	.00680	X
950	2	111.62	103.22	111.28	112.01	0.73	.00654	.00659	
950	3	314.43	289.20	313.88	315.23	1.35	.00429	.00429	
950	4	619.40	567.40	618.06	620.85	2.79	.00450	.00450	
950	5	1026.52	939.80	1024.96	1028.36	3.40	.00331	.00331	
950	6	1535.71	1407.10	1533.39	1537.92	8.90	.00580	.00580	X

EXPERIMENTAL CODE : 46
MATERIAL :J85-8
DATA SOURCES 01-51-1
MANUFACTURER :N
AFML :UDRI BEAM COATED ONE SIDE
OTHER :TOP:MAG. ZIRCONATE, MID:NICKLE ALUMINIDE,BOTT:0010

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	4.71351E+10	.0270	510.0	111.6	2.	2.02544E+11	.0065	103.2	1.27438E+09
2	4.93199E+10	.0173	510.0	314.4	3.	2.02798E+11	.0043	289.2	8.51077E+08
3	5.10572E+10	.0177	510.0	619.4	4.	2.03287E+11	.0045	567.4	9.06185E+08
4	5.14924E+10	.0130	510.0	1026.5	5.	2.04088E+11	.0033	939.8	6.70379E+08
5	5.15915E+10	.0229	510.0	1535.7	6.	2.05786E+11	.0058	1407.1	1.18149E+09
6	5.04679E+10	.0270	537.8	1524.9	6.	2.03446E+11	.0068	1399.1	1.36378E+09
7	5.01769E+10	.0160	537.8	1019.3	5.	2.02013E+11	.0040	935.0	8.04938E+08
8	4.96673E+10	.0207	537.8	614.9	4.	2.01214E+11	.0052	564.5	1.02945E+09
9	4.86536E+10	.0229	537.8	311.9	3.	1.99446E+11	.0057	286.8	1.11538E+09
10	4.56195E+10	.0333	537.8	110.7	2.	2.00430E+11	.0080	102.7	1.52044E+09
11	4.41021E+10	.0499	565.6	109.7	2.	1.97784E+11	.0118	102.0	2.20288E+09
12	4.71758E+10	.0315	565.6	309.7	3.	1.97711E+11	.0077	285.5	1.48806E+09
13	4.81409E+10	.0271	565.6	610.3	4.	1.99294E+11	.0067	561.8	1.30672E+09
14	4.90789E+10	.0207	565.6	1011.7	5.	1.99510E+11	.0052	929.2	1.01546E+09
15	4.77184E+10	.0335	565.6	1514.9	6.	2.03627E+11	.0082	1399.7	1.60075E+09
16	4.82603E+10	.0409	593.3	1502.3	6.	1.98452E+11	.0102	1381.8	1.97625E+09
17	4.76298E+10	.0300	593.3	1003.3	5.	1.97070E+11	.0074	923.5	1.42896E+09
18	4.71124E+10	.0391	593.3	605.1	4.	1.96184E+11	.0096	557.4	1.84114E+09
19	4.56983E+10	.0471	593.3	307.1	3.	1.95295E+11	.0114	283.8	2.15193E+09
20	4.18575E+10	.0763	593.3	108.6	2.	1.95541E+11	.0175	101.4	3.19420E+09
21	3.85223E+10	.1040	621.1	107.0	2.	1.92775E+11	.0228	100.7	4.00749E+09
22	4.34608E+10	.0731	621.1	303.5	3.	1.92388E+11	.0174	281.7	3.17813E+09
23	4.50278E+10	.0600	621.1	598.7	4.	1.93533E+11	.0145	553.6	2.69952E+09
24	4.62598E+10	.0486	621.1	994.4	5.	1.94339E+11	.0119	917.1	2.24953E+09
25	4.71410E+10	.0535	621.1	1490.2	6.	1.95738E+11	.0132	1372.3	2.52001E+09
26	4.56444E+10	.0791	648.9	1476.8	6.	1.93117E+11	.0193	1363.1	3.60854E+09
27	4.40202E+10	.0750	648.9	983.6	5.	1.91830E+11	.0180	911.1	3.30103E+09
28	4.28766E+10	.0802	648.9	592.1	4.	1.90941E+11	.0190	549.9	3.43925E+09
29	4.07852E+10	.0931	648.9	299.7	3.	1.89693E+11	.0214	279.7	3.79865E+09
30	3.41172E+10	.1113	648.9	105.1	2.	1.90484E+11	.0226	100.1	3.79712E+09
31	3.18608E+10	.0881	676.7	103.8	2.	1.87830E+11	.0173	99.4	2.80836E+09
32	3.79294E+10	.0809	676.7	295.8	3.	1.87394E+11	.0175	278.0	3.06981E+09
33	4.03445E+10	.0874	676.7	584.9	4.	1.88380E+11	.0200	546.2	3.52446E+09
34	4.13606E+10	.1124	676.7	971.7	5.	1.89420E+11	.0261	905.4	4.64726E+09
35	4.22046E+10	.0857	704.4	1446.8	6.	1.87536E+11	.0203	1343.3	3.61765E+09
36	3.96960E+10	.0785	704.4	960.6	5.	1.86104E+11	.0180	897.4	3.11781E+09
37	3.88920E+10	.0760	704.4	578.8	4.	1.85336E+11	.0172	541.8	2.95510E+09
38	3.68067E+10	.0691	704.4	293.0	3.	1.84387E+11	.0151	275.8	2.54442E+09
39	3.32104E+10	.0688	704.4	103.5	2.	1.84556E+11	.0140	98.5	2.28636E+09
40	3.22688E+10	.0696	732.2	102.7	2.	1.82241E+11	.0140	97.9	2.24500E+09
41	3.65132E+10	.0542	732.2	290.9	3.	1.81509E+11	.0119	273.6	1.97874E+09
42	3.74201E+10	.0695	732.2	573.4	4.	1.82902E+11	.0156	538.2	2.61713E+09
43	3.79280E+10	.0826	732.2	951.2	5.	1.84020E+11	.0184	892.4	3.12521E+09
44	4.08969E+10	.0675	732.2	1434.3	6.	1.85126E+11	.0158	1334.6	2.75922E+09
45	3.78507E+10	.0721	760.0	945.6	5.	1.81226E+11	.0163	885.6	2.73057E+09
46	3.95878E+10	.0615	760.0	571.7	4.	1.78510E+11	.0144	531.7	2.43652E+09
47	3.77627E+10	.0616	760.0	290.4	3.	1.78931E+11	.0140	271.7	2.32511E+09
48	3.23690E+10	.0911	760.0	102.1	2.	1.79349E+11	.0186	97.1	2.95039E+09
49	3.62808E+10	.0959	787.8	102.7	2.	1.76699E+11	.0214	96.4	3.48095E+09



TEMPERATURE T DEG. C
550
650
750
850
950
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS


TEMPERATURE T DEG. C
550
650
750
850
950
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-51-2

Date 6/8/79

Damping Material Two layers: first O. Hommel 1202; second O. Hommel 1250

Material Thickness 0.0221 cm Material Density 3.81 g/cc

Fixture No. 2 Beam Thickness 0.0950 cm

Beam Density 9.13 g/cc Beam Length 20.95 cm

Temperature Test Range: Between 650 °C and 455 °C

Frequency Test Range: Between 95 Hz and 1,580 Hz

Loss Factor η_D:

Peak	100 Hz	η_D *		Temperature	* °C
	1,000 Hz	η_D *		Temperature	* °C
Range	100 Hz	* °C	* °C		
	1,000 Hz	* °C	* °C		

Complex Modulus E_D'':

Peak	100 Hz	5.4×10^9 PAS		Temperature	565 °C
	1,000 Hz	5.4×10^9 PAS		Temperature	610 °C
Range	100 Hz	520 °C	610 °C		
	1,000 Hz	550 °C	660 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATÈRIAL :01-51-2
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM          N          ML
               A1            A2           A3         A4
   500.0  7.8095E-03  6.3407E+09    .444  8.5000E+08
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH        FROL        C
            B1       B2        B3         B4         B5
   500.0    .420    .600     -.300  3.1868E-04    1.922
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Retested 01-51-3.

* Not measured.

TABLE 4-E

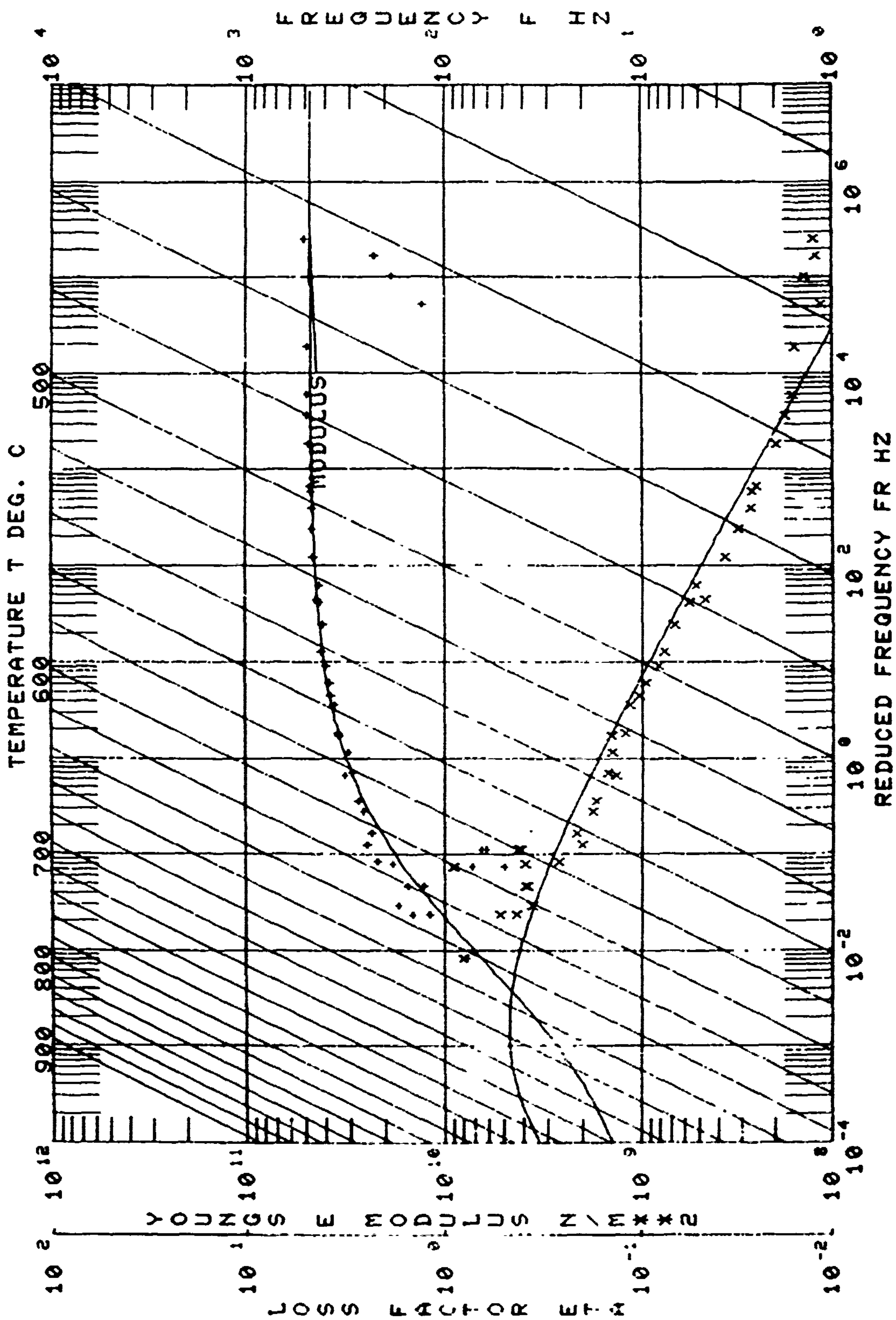
Beam No. 01-51-2

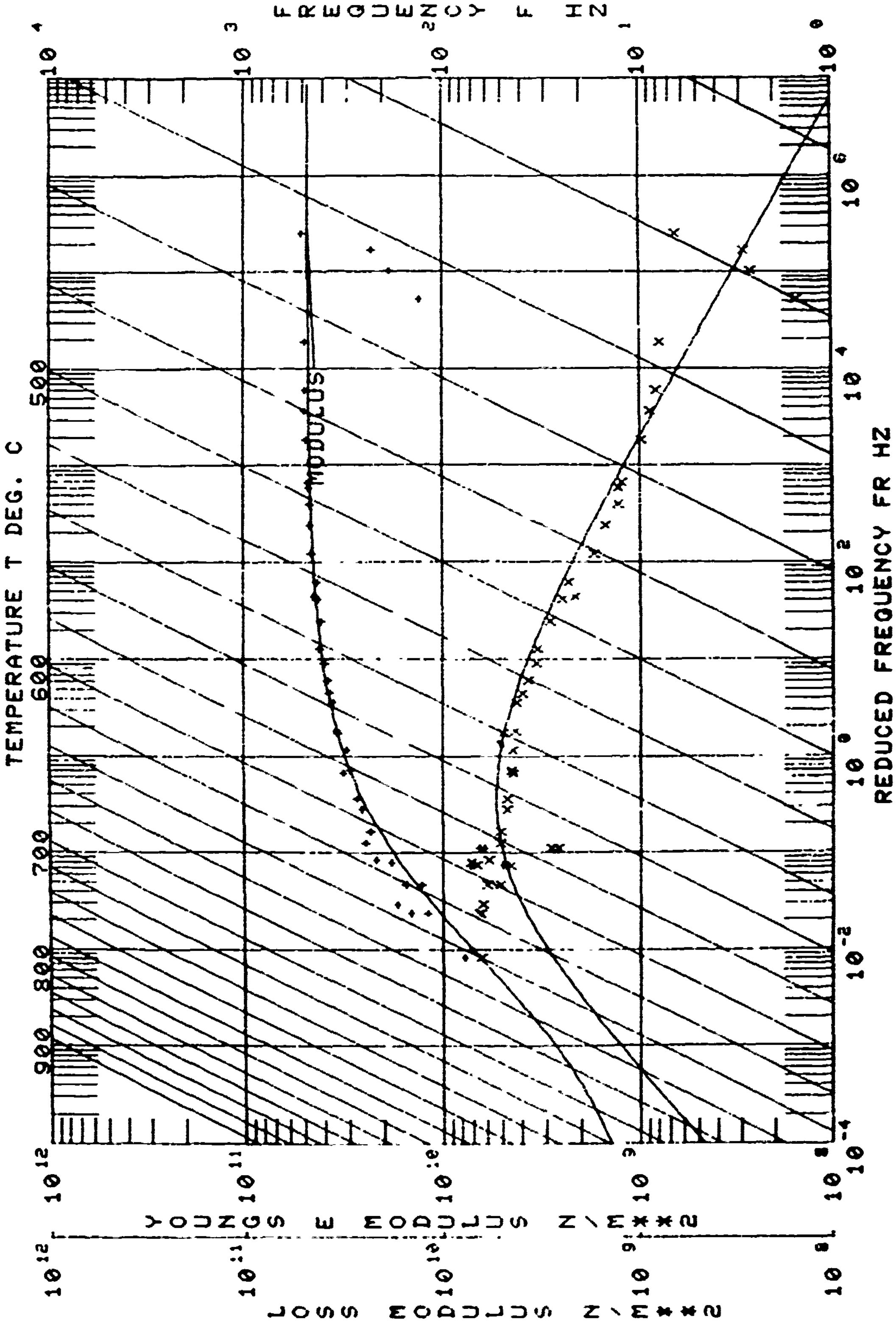
Temp. (°F)	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1200	2	96.20	100.10	94.81	97.60	5.48	.05699		X
1200	3	276.53	279.70	272.61	280.00	14.52	.05252		X
1200	4	545.60	549.90	536.65	559.12	22.47	.04118		
1200	5	922.62	911.40	896.91	947.16	50.25	.05446		
1200	6	1314.54	1363.10	1307.69	1322.67	29.43	.02239		
1200	2	97.26	100.10	94.97	100.25	5.28	.05429		
1200	3	279.40	279.70	275.34	282.66	14.39	.05149		X
1200	4	505.68	549.90	542.41	567.96	25.55	.04640		
1200	5	883.21	911.41	866.82	892.68	50.82	.05754		X
1200	5	874.42	911.40	865.56	883.28	34.82	.03982		X
1200	6	1316.47	1363.10	1309.38	1325.42	31.52	.02398		X
1150	2	101.49	100.70	99.16	103.98	4.82	.04749		
1150	3	288.89	281.68	282.58	294.81	12.23	.04233		
1150	4	570.91	553.62	561.84	582.48	20.48	.03650		
1150	5	953.40	917.08	936.73	967.70	30.97	.03248		
1150	6	1435.28	1372.32	1426.66	1455.49	56.66	.03947		X
1100	2	104.99	101.42	103.27	106.98	3.71	.03534		
1100	3	296.35	283.80	291.85	301.38	9.53	.03216		
1100	4	585.79	557.40	577.97	595.28	17.31	.02955		
1100	5	974.87	923.50	961.53	989.57	28.04	.02876		
1100	6	1472.40	1381.80	1459.36	1482.78	46.02	.03126		
1050	2	107.96	102.00	106.54	109.58	3.04	.02816		
1050	3	305.06	285.55	301.04	309.28	8.24	.02701		

Temp. (°F)	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1050	4	602.00	561.80	595.12	610.68	15.56	.02585		
1050	5	1001.66	929.20	990.01	1012.38	22.37	.02233		
1050	6	1505.75	1390.90	1492.20	1521.90	29.70	.01972		
1000	2	110.48	102.68	109.45	112.10	2.65	.02399		
1000	3	312.86	286.80	309.48	315.48	6.00	.01918		
1000	4	614.28	564.50	609.25	619.46	10.21	.01662		
1000	5	1018.96	935.01	1012.73	1027.18	14.45	.01418		
1000	6	1526.85	1399.20	1515.58	1535.61	20.03	.01312		
950	2	113.12	103.12	112.43	113.79	1.36	.01202		
950	3	318.21	289.20	316.95	319.99	3.04	.00955		
950	4	625.22	567.50	622.65	627.79	5.14	.00822		
950	5	1036.40	939.80	1032.66	1039.99	7.33	.00707		
950	6	1551.50	1497.00	1545.31	1556.21	10.90	.00703		
900	2	114.58	103.66	114.25	115.02	0.77	.00672		
900	3	322.18	291.00	321.42	323.13	1.71	.00531		
900	4	632.04	570.40	630.90	633.90	3.00	.00475		
900	5	1047.18	944.50	1044.72	1049.31	4.55	.00438		
850	2	115.57	104.19	115.38	115.87	0.49	.00424		
850	3	324.96	292.80	324.50	325.50	1.[illegible]	.00308		
850	4	637.31	573.10	636.16	638.57	2.41	.00378		
850	5	1055.18	949.10	105[illegible].40	[illegible]56.90	3.50	.00332		
850	6	1580.40	1421.00	157[illegible].36	1582.72	5.36	.00339		

EXPERIMENTAL CODE : 83
MATERIAL :01-51-2
DATA SOURCES
MANUFACTURER :O'HOMMEL R-1250/O'HOMMEL 1202
AFML :UDRI BEAM COATED ONE SIDE JUNE 15
OTHER :N

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.21945E+10	.5382	648.9	276.5	3.	1.89693E+11	.0525	279.7	6.56294E+09
2	1.31733E+10	.3972	648.9	545.6	4.	1.90941E+11	.0412	549.9	5.23205E+09
3	1.85205E+10	.3977	648.9	922.6	5.	1.91939E+11	.0545	911.4	7.36543E+09
4	6.30085E+09	.4216	648.9	1314.5	6.	1.93117E+11	.0224	1363.1	2.65667E+09
5	7.98779E+09	.8122	648.9	97.3	2.	1.90484E+11	.0543	100.1	6.48790E+09
6	1.48427E+10	.4465	648.9	279.4	3.	1.89693E+11	.0515	279.7	6.62751E+09
7	1.55575E+10	.3890	648.9	550.7	4.	1.90941E+11	.0464	549.9	6.05240E+09
8	7.41630E+09	.9274	648.9	883.2	5.	1.91939E+11	.0575	911.4	6.87806E+09
9	5.05803E+09	.9153	648.9	874.4	5.	1.91939E+11	.0398	911.4	4.62951E+09
10	2.63266E+10	.1825	621.1	953.4	5.	1.94339E+11	.0325	917.1	4.80461E+09
11	2.38619E+10	.2201	621.1	570.9	4.	1.93533E+11	.0365	553.6	5.25127E+09
12	2.21652E+10	.2688	621.1	288.9	3.	1.92388E+11	.0423	281.7	5.95833E+09
13	1.74077E+10	.3659	621.1	101.5	2.	1.92775E+11	.0475	100.7	6.36946E+09
14	3.13897E+10	.1438	593.3	974.9	5.	1.97070E+11	.0288	923.5	4.51308E+09
15	3.46144E+10	.1467	593.3	1472.4	6.	1.98452E+11	.0313	1381.8	5.07961E+09
16	4.05805E+10	.0840	565.6	1505.7	6.	2.00814E+11	.0197	1390.0	3.40735E+09
17	3.86491E+10	.0977	565.6	1001.7	5.	1.99510E+11	.0223	929.2	3.77696E+09
18	3.66056E+10	.1172	565.6	602.0	4.	1.99294E+11	.0259	561.8	4.28974E+09
19	3.53240E+10	.1247	565.6	305.1	3.	1.97711E+11	.0270	285.5	4.40651E+09
20	3.23427E+10	.1382	565.6	108.0	2.	1.97784E+11	.0282	102.0	4.47004E+09
21	3.81922E+10	.1061	537.8	110.5	2.	2.0(430E+11	.0240	102.7	4.05348E+09
22	4.27271E+10	.0787	537.8	312.9	3.	1.99446E+11	.0192	286.8	3.36208E+09
23	4.22395E+10	.0691	537.8	614.3	4.	2.01214E+11	.0166	564.5	2.91724E+09
24	4.29261E+10	.0585	537.8	1019.0	5.	2.02013E+11	.0142	935.0	2.51003E+09
25	4.37116E+10	.0537	537.8	1526.9	6.	2.03481E+11	.0131	1399.2	2.34875E+09
26	4.80476E+10	.0273	510.0	1551.5	6.	2.05756E+11	.0070	1407.0	1.31400E+09
27	4.76859E+10	.0275	510.0	1036.4	5.	2.04088E+11	.0071	939.8	1.31106E+09
28	4.71558E+10	.0321	510.0	625.2	4.	2.03358E+11	.0082	567.5	1.51432E+09
29	4.65603E+10	.0375	510.0	318.2	3.	2.02798E+11	.0095	289.2	1.74766E+09
30	4.53095E+10	.0479	510.0	113.1	2.	2.02151E+11	.0120	103.1	2.17235E+09
31	4.85940E+10	.0259	482.2	114.6	2.	2.04274E+11	.0067	103.7	1.25624E+09
32	4.94592E+10	.0203	482.2	322.2	3.	2.05330E+11	.005.	291.0	1.00281E+09
33	4.97998E+10	.0181	482.2	632.0	4.	2.05442E+11	.0048	570.4	8.99847E+08
34	5.01889E+10	.0166	482.2	1047.2	5.	2.06134E+11	.0044	944.5	8.34046E+08
35	5.23141E+10	.0127	454.4	1580.4	6.	2.09871E+11	.0034	1421.0	6.63608E+08
36	1.89003E+10	.0142	454.4	637.3	5.	7.58938E+10	.0038	573.1	2.67479E+08
37	2.32734E+10	.0124	454.4	1055.2	6.	9.36244E+10	.0033	949.1	2.89596E+08
38	1.32819E+10	.0116	454.4	325.0	4.	5.41343E+10	.0031	292.8	1.54567E+08
39	5.04219E+10	.0161	454.4	115.6	2.	2.06368E+11	.0042	104.2	8.09458E+08
40	6.65056E+09	.4296	648.9	1316.5	6.	1.93117E+11	.0240	1363.1	2.85698E+09
41	2.77883E+10	.1743	593.3	296.3	3.	1.95295E+11	.0322	283.8	4.84328E+09
42	2.98648E+10	.1528	593.3	585.8	4.	1.96184E+11	.0296	557.4	4.55568E+09
43	2.52336E+10	.2059	593.3	10F 0	2.	1.95541E+11	.0353	101.4	5.19508E+09
44	2.52336E+10	.2059	593.3	10. 0	2.	1.95541E+11	.0353	101.4	5.19508E+09


FREQUENCY F HZ
TEMPERATURE T DEG. C
MODULUS
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-51-3

Date 6/11/79

Damping Material Two layers: first O. Hommel F-1202; second O. Hommel R-1250

Material Thickness 0.0221 cm Material Density 3.81 g/cc

Fixture No. 2 Beam Thickness 0.0950 cm

Beam Density 9.13 g/cc Beam Length 20.95 cm

Temperature Test Range: Between 650 °C and 455 °C

Frequency Test Range: Between 95 Hz and 1,580 Hz

Loss Factor η_D:

Peak	100 Hz	η_D *	Temperature	* °C
	1,000 Hz	η_D *	Temperature	* °C
Range	100 Hz	* °C	* °C	
	1,000 Hz	* °C	* °C	

Complex Modulus E_D":

Peak	100 Hz	5.4×10^9 PAS	Temperature	610 °C
	1,000 Hz	5.4×10^9 PAS	Temperature	660 °C
Range	100 Hz	560 °C	670 °C	
	1,000 Hz	600 °C	740 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-51-3 RETEST of 01-51-2
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM          N          ML
              A1            A2            A3         A4
   500.0  1.0200E-03  6.4826E+05    .344  7.6209E+08
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH        FROL        C
           B1        B2        B3        B4          B5
   500.0    .402     .572    -.340  3.1868E-04    1.815
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Retest of 01-51-2 after 144 hours at 595°C.

* Not measured.

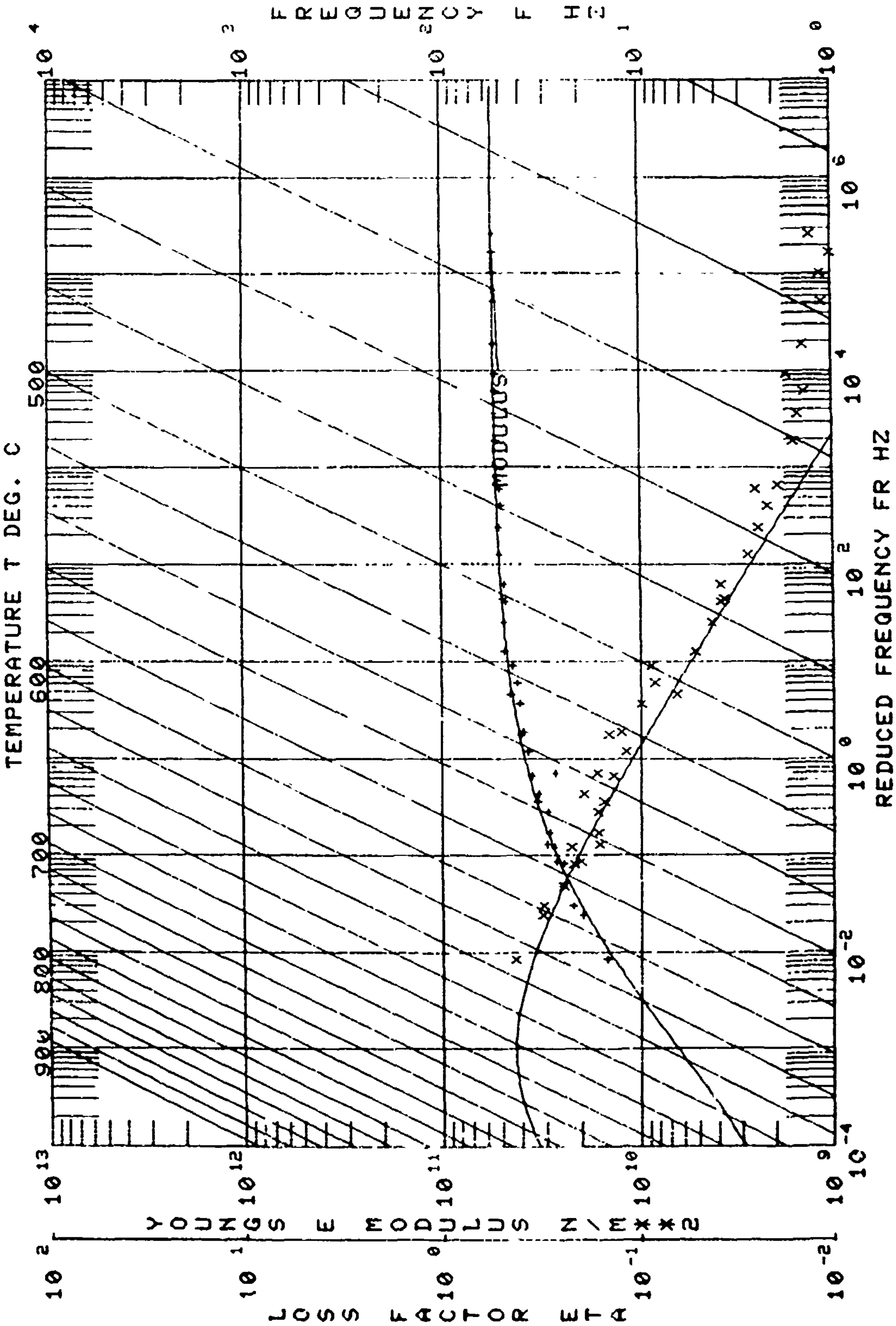
TABLE 3-E

Beam No. 01-51-3

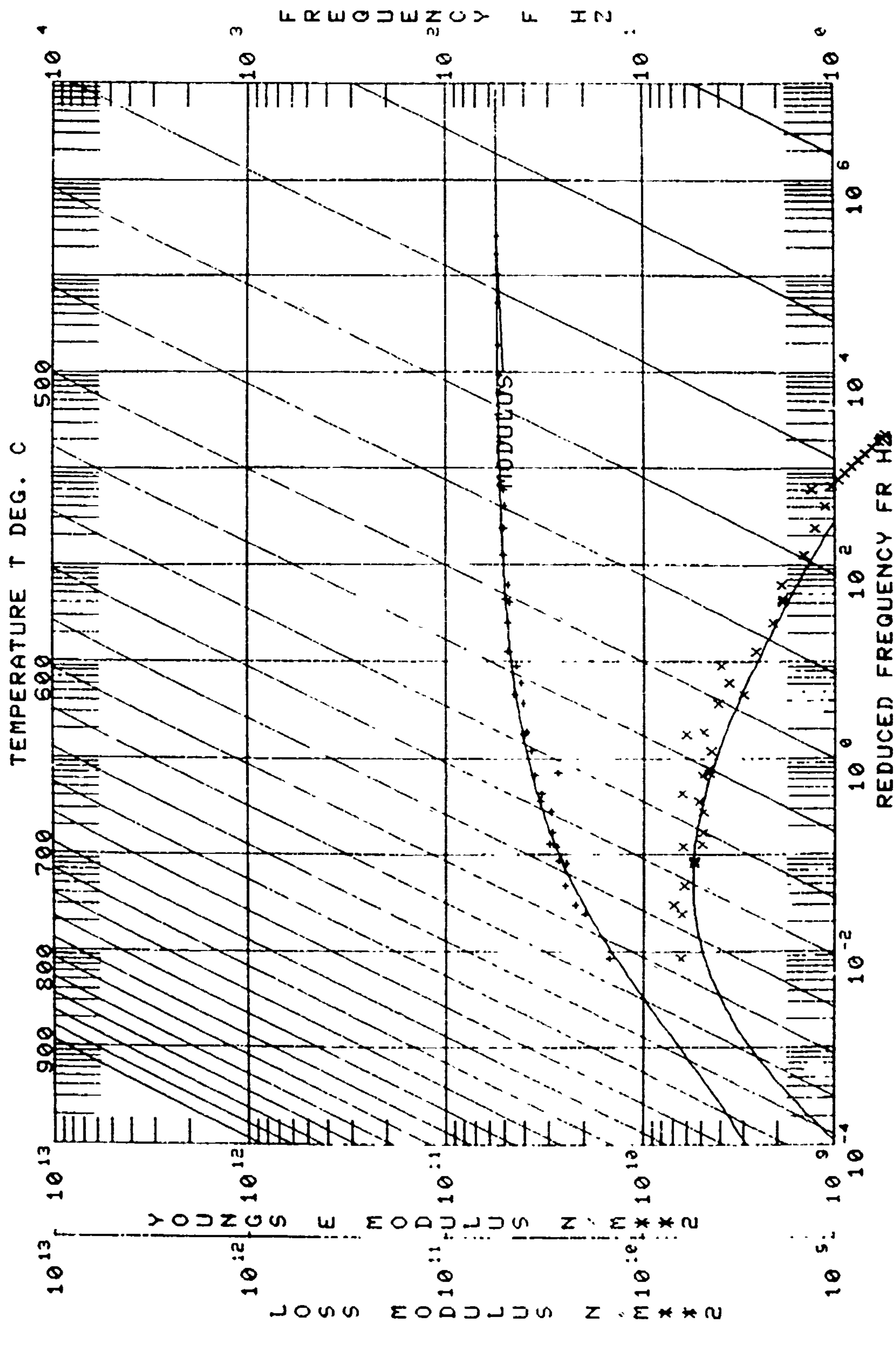
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1200	2	100.09	100.10	97.49	102.60	5.11	.05105		
1200	3	285.25	279.70	278.26	291.77	13.51	.04736		
1200	4	570.61	549.90	559.49	583.51	24.08	.04379		
1200	5	944.90	911.40	926.25	962.80	26.55	.03868		
1200	6	1425.30	1363.10	1412.80	1443.80	60.92	.04274		X
1150	2	103.44	100.70	101.54	105.76	5.22	.05046		
1150	3	293.88	281.68	288.04	299.07	11.03	.03750		
1150	4	582.23	553.62	572.05	592.21	20.17	.03464		
1150	5	964.52	917.08	950.20	981.84	31.64	.03281		
1150	6	1457.93	1372.32	1446.24	1476.70	59.86	.04106		
1100	2	106.85	101.42	105.26	108.72	3.46	.03263		
1100	3	302.30	283.80	297.45	307.25	10.00	.03311		
1100	4	598.75	557.40	589.41	607.08	17.67	.02951		
1100	5	994.71	923.50	981.23	1008.41	27.18	.02732		
1100	6	1501.50	1381.80	1489.06	1516.26	53.45	.03560		
1050	2	109.21	102.09	107.65	111.01	3.36	.03077		
1050	3	309.00	285.55	304.55	313.74	[illegible].19	.02974		
1050	4	610.72	561.82	603.78	618.58	14.80	.02423		
1050	5	1013.40	929.20	1002.74	1024.04	21.30	.02102		
1050	6	1525.00	1390.90	1515.25	1532.71	34.31	.02250		
1000	2	113.21	102.68	112.24	114.16	1.92	.01696		
1000	3	318.73	286.80	316.18	320.76	4.58	.01437		
1000	4	626.16	564.50	622.46	629.70	7.24	.01156		
1000	5	1035.30	935.01	1030.69	1041.38	10.69	.01033		
1000	6	1551.10	1399.20	1543.66	1559 78	16.12	.01039		
950	2	114.74	103.12	114.17	115.33	1.16	.01011		
950	3	322.94	289.20	321.75	324.25	2.50	.00774		
950	4	633.84	567.50	631.68	635.94	4.26	.00672		
950	5	1047.67	939.80	1044.63	050.93	6.30	.00601		
950	6	1569.78	1407.00	1563.51	1574.44	10.97	.00699		
900	2	116.15	103.66	155.86	116.49	0.63	.00542		
900	3	326.54	291.00	325.	327.28	1.47	.00450		
900	4	640.34	570.40	638.98	641.69	2.71	.00423		
900	5	1057.73	944.50	1055.70	1059.84	4.14	.00391		
900	6	1582.85	1421.00	1578.54	1586.16	7.64	.00483		
850	2	117.07	104.19	116.83	117.30	0.47	.00401		
850	3	328.90	292.80	328.33	329.41	1.08	.00320		
850	4	644.62	523.10	643.58	645.69	2.11	.00327		
850	5	1065.70	949.10	1064.02	1067.05	3.03	.00284		
850	6	1595.00	1421.00	1591.64	1597.45	5.81	.00364		

EXPERIMENTAL CODE : 85
MATERIAL :01-51-3 RETEST of 01-51-2
DATA SOURCES
MANUFACTURER :O`Hommel R-1250 over O`HommelR-1202
AFML :UDRI BEAM COATED ONE SIDE
OTHER :N

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.51273E+10	.4373	648.9	100.1	2.	1.90484E+11	.0510	100.1	6.61446E+09
2	2.03069E+10	.3185	648.9	285.2	3.	1.89693E+11	.0474	279.7	6.46687E+09
3	2.53234E+10	.2499	648.9	570.6	4.	1.90941E+11	.0438	549.9	6.32956E+09
4	2.52033E+10	.2224	648.9	944.9	5.	1.91939E+11	.0387	911.4	5.60589E+09
5	2.98172E+10	.1684	621.1	964.5	5.	1.94339E+11	.0328	917.1	5.02201E+09
6	2.97240E+10	.1683	621.1	582.3	4.	1.93533E+11	.0328	553.6	5.00265E+09
7	2.71709E+10	.2043	621.1	293.9	3.	1.92293E+11	.0375	281.6	5.55050E+09
8	2.26562E+10	.3156	621.1	103.4	2.	1.92775E+11	.0505	100.7	7.14966E+09
9	3.05307E+10	.1654	593.3	106.9	2.	1.95541E+11	.0326	101.4	5.05090E+09
10	3.36648E+10	.1567	593.3	302.0	3.	1.95295E+11	.0331	283.8	5.27492E+09
11	2.77090E+10	.1694	593.3	598.7	4.	2.10516E+11	.0295	577.4	4.69368E+09
12	3.79066E+10	.1201	593.3	994.7	5.	1.97070E+11	.0273	923.5	4.55335E+09
13	4.11645E+10	.1491	593.3	1501.5	6.	1.98452E+11	.0356	1381.8	6.13615E+09
14	4.48839E+10	.0900	565.6	1525.0	6.	2.01074E+11	.0225	1390.9	4.03837E+09
15	4.26610E+10	.0863	565.6	1013.4	5.	1.99510E+11	.0210	929.2	3.68324E+09
16	4.14743E+10	.1012	565.6	610.7	4.	1.99308E+11	.0242	561.8	4.19926E+09
17	3.95933E+10	.1274	565.6	309.0	3.	1.97711E+11	.0297	285.5	5.04305E+09
18	4.61138E+10	.0666	537.8	113.0	2.	2.00430E+11	.0170	102.7	3.07000E+09
19	4.94339E+10	.0540	537.8	318.7	3.	1.99446E+11	.0144	286.8	2.66699E+09
20	4.91647E+10	.0438	537.8	626.2	4.	2.01214E+11	.0116	564.5	2.15184E+09
21	4.86983E+10	.0394	537.8	1035.3	5.	2.02013E+11	.0103	935.0	1.91995E+09
22	4.94916E+10	.0394	537.8	1551.1	6.	2.03481E+11	.0104	1399.2	1.95219E+09
23	5.25058E+10	.0258	510.0	1569.8	6.	2.05756E+11	.0070	1407.0	1.35470E+09
24	5.17662E+10	.0223	510.0	1047.7	5.	2.04088E+11	.0060	939.8	1.15240E+09
25	5.23092E+10	.0247	510.0	633.8	4.	2.03358E+11	.0067	567.5	1.29154E+09
26	5.20839E+10	.0285	510.0	322.9	3.	2.02798E+11	.0077	289.2	1.48250E+09
27	5.37900E+10	.0196	482.2	116.1	2.	2.04274E+11	.0054	103.7	1.05689E+09
28	5.46431E+10	.0162	482.2	326.5	3.	2.05330E+11	.0045	291.0	8.86069E+08
29	5.48438E+10	.0155	482.2	640.3	4.	2.05442E+11	.0043	570.4	8.48299E+08
30	5.40671E+10	.0142	482.2	1057.7	5.	2.06134E+11	.0039	944.5	7.68089E+08
31	5.59665E+10	.0131	454.4	1595.0	6.	2.09871E+11	.0036	1421.0	7.33237E+08
32	5.56513E+10	.0102	454.4	1065.7	5.	2.08147E+11	.0028	949.1	5.68027E+08
33	5.61393E+10	.0117	454.4	644.6	4.	2.07392E+11	.0033	573.1	6.55188E+08
34	5.54452E+10	.0144	454.4	117.1	2.	2.06368E+11	.0040	104.2	7.96875E+08
35	5.57348E+10	.0115	454.4	328.9	3.	2.07878E+11	.0032	292.8	6.39982E+08
36	2.78750E+10	.2292	648.9	1425.3	6.	1.93117E+11	.0427	1363.1	6.39015E+09
37	3.31848E+10	.1965	621.1	1457.9	6.	1.95738E+11	.0411	1372.3	6.52224E+09
38	3.60596E+10	.1402	565.6	109.2	2.	1.97784E+11	.0308	102.0	5.05512E+09
39	5.43400E+10	.0176	482.2	1582.9	6.	2.07809E+11	.0048	1414.0	9.55272E+08
40	5.05621E+10	.0378	510.0	114.7	2.	2.02151E+11	.0101	103.1	1.90898E+09



FREQUENCY F HZ
TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-55-1

Date 12/13/79

Damping Material Two layers: first Corning 0010 + 10% Al_2O_3 + 1% Co_2O_3; second Al_2O_3

Material Thickness 0.0152 cm Material Density 2.93 g/cc

Fixture No. 1 Beam Thickness 0.0963 cm

Beam Density 9.13 g/cc Beam Length 20.879 cm

Temperature Test Range: Between 595 °C and 900 °C

Frequency Test Range: Between 95 Hz and 1,470 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.24	Temperature	790 °C	
	1,000 Hz	η_D 0.24	Temperature	855 °C	
Range	100 Hz	735 °C	860 °C		
	1,000 Hz	790 °C	875 °C		

Complex Modulus E_D'':

Peak	100 Hz	5.5×10^9 PAS	Temperature	770 °C
	1,000 Hz	5.5×10^9 PAS	Temperature	840 °C
Range	100 Hz	725 °C	855 °C	
	1,000 Hz	765 °C	915 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-4
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM         N          ML
               A1            A2          A3         A4
   600.0  9.0000E-04  1.6000E+10       .400  8.0000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH        FROL        C
            B1       B2        B3         B4         B5
   600.0    .253     .350     -.350  1.8000E-03    1.000
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J-85-4 project. After 100 hours at 845°C the beam was cooled to ambient temperature. After five minutes the entire coating came off the beam.

TABLE 6-E

Beam No. 01-55-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	2	103.60	101.10	103.44	103.78	0.34	0.00328	0.00258	
1100	3	290.50	283.10	290.23	290.79	0.56	0.00193	0.00133	
1100	4	571.22	555.00	570.74	571.77	1.03	0.00180	0.00140	
1100	5	947.21	921.80	946.50	947.98	1.48	0.00156	0.00090	
1100	6	1415.92	1374.10	1414.68	1416.89	2.21	0.00156	0.00111	
1150	2	102.85	100.40	102.66	103.10	0.44	0.00428	0.00342	
1150	3	288.42	281.50	288.04	288.74	0.70	0.00243	0.00179	
1150	4	567.22	551.50	566.68	567.87	1.19	0.00210	0.00168	
1150	5	940.85	915.80	940.03	941.76	1.73	0.00184	0.00117	
1150	6	1406.60	1365.20	1405.58	1407.80	2.22	0.00158	0.00112	
1200	2	101.86	99.80	101.64	102.26	0.62	0.00609	0.00509	
1200	3	285.93	279.30	285.47	286.51	1.04	0.00364	0.00286	
1200	4	562.45	548.20	261.51	263.38	1.87	6.00332	0.00286	
1200	5	933.50	909.70	932.42	939.82	2.40	0.00257	0.00189	
1200	6	1395.78	1356.20	1394.29	1397.40	3.11	0.00223	0.00180	
1200	2	101.98	99.75	101.71	102.38	0.67	0.00657	0.00557	
1200	3	286.15	279.30	285.63	286.68	1.05	0.00367	0.00301	
1200	4	562.86	548.20	562.01	563.76	1.75	0.00311	0.00266	
1200	5	933.54	909.20	932.50	934.93	2.43	0.00260	0.00192	
1200	6	1395.80	1356.20	1394.39	1397.48	3.09	0.00221	0.00178	
1250	2	101.00	99.10	100.65	101.60	0.95	0.00941	0.00793	
1250	3	283.64	277.20	282.82	284.47	1.65	0.00582	0.00510	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1250	4	558.17	544.30	556.92	559.59	2.67	0.00478	0.00433	
1250	5	930.04	903.00	929.67	931.41	3.39	0.00365	0.00295	X
1250	6	1385.75	1347.30	1283.46	1388.20	4.61	0.00333	0.00290	
1300	2	100.12	98.40	99.54	100.86	1.32	0.01318	0.01170	
1300	3	281.06	275.20	279.79	282.26	2.47	0.00879	0.00800	
1300	4	553.29	540.60	551.27	555.36	4.09	0.00739	0.00691	
1300	5	918.58	896.40	915.90	919.10	6.24	0.00679	0.00607	X
1300	6	1373.93	1338.30	1379.42	1377.42	7.00	0.00509	0.00464	
1350	2	98.95	97.90	98.26	99.94	1.68	0.01698	0.01537	
1350	3	278.94	273.20	276.25	279.70	3.45	0.01241	0.01159	
1350	4	547.82	536.60	544.84	550.81	5.97	0.01090	0.01034	
1350	5	908.55	890.00	906.66	910.80	8.07	0.00889	0.00809	X
1350	6	1352.55	1329.10	1357.81	1368.33	10.52	0.00772	0.00726	
1400	2	97.67	97.00	97.23	98.10	1.70	0.01741	0.01513	X
1400	3	275.70	270.80	274.65	276.89	4.37	0.01584	0.01463	X
1400	4	542.81	530.30	538.94	546.47	7.53	0.01387	0.01319	
1400	5	901.54	883.10	895.14	906.66	11.52	0.01278	0.01198	
1400	6	1350.71	1319.80	1342.52	1347.02	14.50	0.01074	0.01023	
1450	2	96.75	96.30	95.89	97.69	1.80	0.01860	0.01575	
1450	3	272.69	268.50	271.82	274.36	4.95	0.01816	0.01673	X
1450	4	534.52	528.50	531.71	541.11	9.40	0.01752	0.01674	
1450	5	892.55	876.30	886.19	898.55	12.36	0.01385	0.01296	

TABLE 6-E (Concluded)

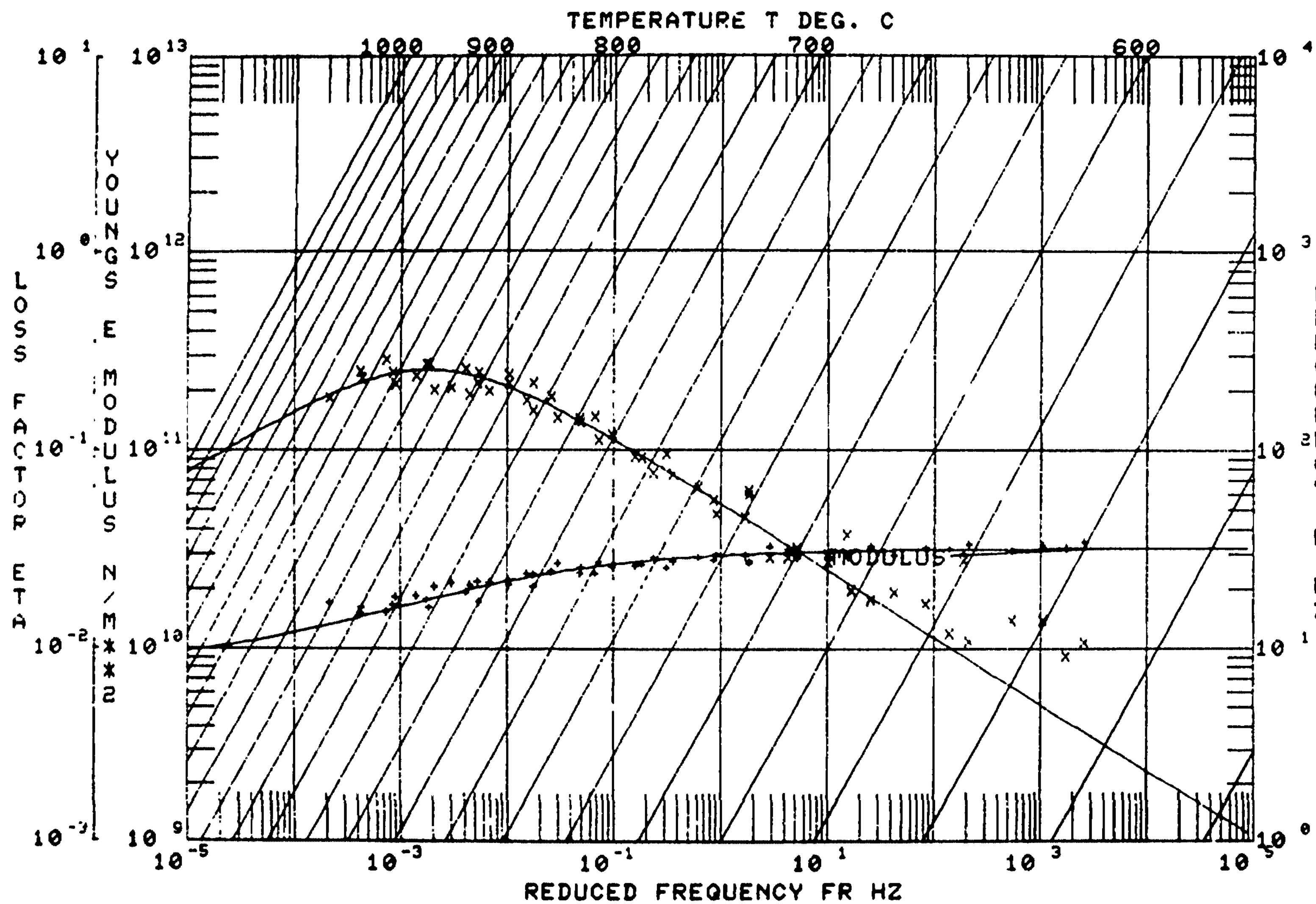
Beam No. 01-55-1

°F		f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1450	6	1336.04	1310.40	1323.20	1345.00	21.80	0.01632	0.01572	
1500	2	95.82	95.40	94.78	96.66	1.88	0.01942	0.01600	
1500	3	269.93	266.20	268.87	271.19	4.52	0.01676	0.01485	X
1500	4	530.30	524.40	525.21	535.50	10.09	0.01903	0.01783	
1500	5	882.40	869.40	878.63	885.98	14.33	0.01624	0.01519	X
1500	6	1320.00	1301.90	1313.60	1326.20	24.57	0.01861	0.01785	
1550	2	94.64	94.60	93.83	95.63	1.80	0.01902	0.01898	
1550	3	266.94	264.30	265.94	268.28	4.56	0.01709	0.01438	X
1550	4	524.64	520.10	519.39	529.60	10.21	0.01946	0.01770	
1550	5	875.70	862.50	869.88	877.62	15.09	0.01724	0.01584	X
1550	6	1309.38	1291.20	1304.56	1314.59	19.56	0.01494	0.01418	X
1600	2	93.84	[illegible]	93.03	94.76	1.73	0.01844	0.01254	
1600	3	264.47	262.70	263.46	265.88	4.71	0.01784	0.01401	X
1600	4	519.50	515.80	514.53	524.02	9.49	0.01827	0.01537	
1600	5	864.60	875.50	861.14	869.22	15.76	0.01822	0.01622	X
1600	6	1294.54	1281.40	1287.57	1302.62	29.35	[illegible]	0.02117	X
1650	2	92.80	92.50	92.10	93.70	1.60	0.01734	0.00964	
1650	3	261.78	259.50	260.83	262.03	2.34	0.01743	0.01198	X
1650	4	514.06	511.50	509.26	518.76	9.50	[illegible]	0.01448	
1650	5	856.50	848.40	852.92	860.77	15.30	0.01797	0.01472	X
1650	6	1279.02	1271.60	1270.89	1287.14	31.69	0.02477	0.02252	X

EXPERIMENTAL CODE : 33
MATERIAL :J85-4
DATA SOURCES
MANUFACTURER :NONE
AFML :BEAM COATED ON ONE SIDE
OTHER :NONE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	2.94500E+10	.0319	648.9	285.9	3.	1.81705E+11	.0029	279.3	9.38725E+08
2	3.09982E+10	.0306	648.9	562.4	4.	1.82291E+11	.0029	548.2	9.48220E+08
3	3.16902E+10	.0199	648.9	933.5	5.	1.83494E+11	.0019	909.2	6.32190E+08
4	3.33188E+10	.0182	648.9	1395.8	6.	1.83641E+11	.0018	1356.2	6.07070E+08
5	3.50450E+10	.0110	593.3	1415.9	6.	1.88521E+11	.0011	1374.1	3.85765E+08
6	3.31295E+10	.0094	593.3	947.2	5.	1.88615E+11	.0009	921.5	3.10223E+08
7	3.39350E+10	.0142	593.3	571.2	4.	1.86842E+11	.0014	555.0	4.80472E+08
8	3.18512E+10	.0142	593.3	290.5	3.	1.86683E+11	.0013	283.1	4.51798E+08
9	3.07967E+10	.0283	593.3	103.6	2.	1.86734E+11	.0026	101.1	8.72391E+08
10	2.99703E+10	.0380	621.1	102.9	2.	1.84267E+11	.0034	100.4	1.13892E+09
11	3.04588E+10	.0196	621.1	288.4	3.	1.84578E+11	.0018	281.5	5.98326E+08
12	3.30182E+10	.0172	621.1	567.2	4.	1.84493E+11	.0017	551.5	5.68032E+08
13	3.25583E+10	.0'22	621.1	940.8	5.	1.86168E+11	.0012	915.8	3.97800E+08
14	3.45218E+10	.0111	621.1	1406.6	6.	1.86086E+11	.0011	1365.2	3.84091E+08
15	3.33188E+10	.0180	648.9	1395.8	6.	1.83641E+11	.0018	1356.2	6.00324E+08
16	3.17076E+10	.0203	648.9	933.5	5.	1.83494E+11	.0019	909.2	6.42277E+08
17	3.14825E+10	.0281	648.9	562.9	4.	1.82291E+11	.0027	548.2	8.83918E+08
18	2.99673E+10	.0330	648.9	286.2	3.	1.81705E+11	.0030	279.3	9.90379E+08
19	2.60204E+10	.0973	676.7	101.0	2.	1.79456E+11	.0079	99.1	2.53293E+09
20	2.85945E+10	.0576	676.7	283.6	3.	1.79047E+11	.0051	277.2	1.64610E+09
21	3.02347E+10	.0467	676.7	558.2	4.	1.79707E+11	.0043	544.3	1.41305E+09
22	3.33206E+10	.0295	676.7	930.0	5.	1.81000E+11	.0030	903.0	9.82828E+08
23	3.24234E+10	.0297	676.7	1385.7	6.	1.81266E+11	.0029	1347.4	9.63303E+08
24	3.08161E+10	.0491	704.4	1373.9	6.	1.78825E+11	.0046	1338.3	1.51207E+09
25	2.95517E+10	.0664	704.4	918.6	5.	1.78364E+11	.0061	896.4	1.96177E+09
26	2.85634E+10	.0774	704.4	553.3	4.	1.77272E+11	.0069	540.6	2.21090E+09
27	2.70852E+10	.0934	704.4	281.1	3.	1.76[illegible]9E+11	.0080	275.2	2.53057E+09
28	2.44889E+10	.1496	704.4	100.1	2.	1.77003E+11	.0117	98.4	3.66474E+09
29	2.11413E+10	.2213	732.2	98.9	2.	1.74602E+11	.0154	97.8	4.67754E+09
30	2.44087E+10	.1464	732.2	278.0	3.	1.73918E+11	.0116	273.2	3.57323E+09
31	2.65678E+10	.1217	732.2	547.8	4.	1.74658E+11	.0103	536.6	3.23431E+09
32	2.67120E+10	.0954	732.2	908.6	5.	1.75826E+11	.0081	890.0	2.54702E+09
33	2.94901E+10	.0788	732.2	1362.6	6.	1.76375E+11	.0073	1329.1	2.32323E+09
34	1.77147E+10	.2518	760.0	97.7	2.	1.71898E+11	.0151	97.0	4.46125E+09
35	2.42971E+10	.1826	760.0	275.7	3.	1.70813E+11	.0146	270.8	4.43728E+09
36	2.76107E+10	.1472	760.0	542.8	4.	1.70555E+11	.0132	530.3	4.06299E+09
37	2.63323E+10	.1400	760.0	901.5	5.	1.73110E+11	.0119	883.1	3.68618E+09
38	2.80061E+10	.1149	760.0	1350.7	6.	1.73916E+11	.0103	1319.8	3.21720E+09
39	2.23329E+10	.2216	787.8	272.7	3.	1.67986E+11	.0167	268.5	4.94987E+09
40	2.23955E+10	.2229	787.8	536.5	4.	1.69425E+11	.0167	528.5	4.99193E+09
41	2.45211E+10	.1602	787.8	892.6	5.	1.70455E+11	.0130	876.3	3.92803E+09
42	2.52821E+10	.1901	787.8	1336.0	6.	1.71447E+11	.0157	1310.4	4.80733E+09
43	2.16150E+10	.2450	815.6	1320.0	6.	1.69230E+11	.0179	1301.9	5.29604E+09
44	2.20340E+10	.2034	815.6	882.4	5.	1.67781E+11	.0152	869.4	4.48240E+09
45	1.97859E+10	.2614	815.6	530.3	4.	1.66807E+11	.0178	524.4	5.17266E+09
46	2.10275E+10	.2041	815.6	269.9	3.	1.65121E+11	.0148	266.2	4.29175E+09
47	1.55955E+10	.2903	815.6	95.8	2.	1.66345E+11	.0160	95.4	4.52752E+09
48	1.35892E+10	.3843	843.3	94.6	2.	1.63291E+11	.0190	94.6	5.22239E+09
49	1.85899E+10	.2181	843.3	266.9	3.	1.62712E+11	.0144	264.3	4.05367E+09

50	1.80303E+10	.2780	843.3	524.6	4.	1.64082E+11	.0177	520.1	5.01215E+09
51	2.18902E+10	.2104	843.3	875.7	5.	1.65128E+11	.0158	862.5	4.60528E+09
52	2.13717E+10	.1937	843.3	1309.4	6.	1.66460E+11	.0142	1291.2	4.14071E+09
53	1.88861E+10	.3186	871.1	1294.5	6.	1.63943E+11	.0212	1281.4	6.01736E+09
54	1.68911E+10	.2523	871.1	519.5	4.	1.61380E+11	.0154	515.8	4.26085E+09
55	1.64803E+10	.2344	871.1	264.5	3.	1.60809E+11	.0140	262.7	3.26254E+09
56	1.42985E+10	.4815	871.1	93.8	2.	1.59958E+11	.0254	93.6	6.88442E+09
57	1.73783E+10	.1867	898.9	261.8	3.	1.56795E+11	.0120	259.5	3.24447E+09
58	9.11649E+10	.0638	898.9	956.5	5.	1.59773E+11	.0147	848.4	5.81782E+09
59	2.74952E+10	.0603	648.9	101.9	2.	1.81890E+11	.0051	99.8	1.65670E+09
60	2.82719E+10	.0644	648.9	102.0	2.	1.81890E+11	.0056	99.8	1.81963E+09
61	1.65069E+10	.2756	787.8	96.7	2.	1.69215E+11	.0157	96.3	4.54915E+09
62	1.54360E+10	.2540	898.9	514.1	4.	1.58701E+11	.0145	511.5	3.92145E+09
63	1.61472E+10	.3852	898.9	1279.0	6.	1.61445E+11	.0225	1271.6	6.21957E+09
64	1.89882E+10	.2409	871.1	864.6	5.	1.62421E+11	.0162	855.4	4.57494E+09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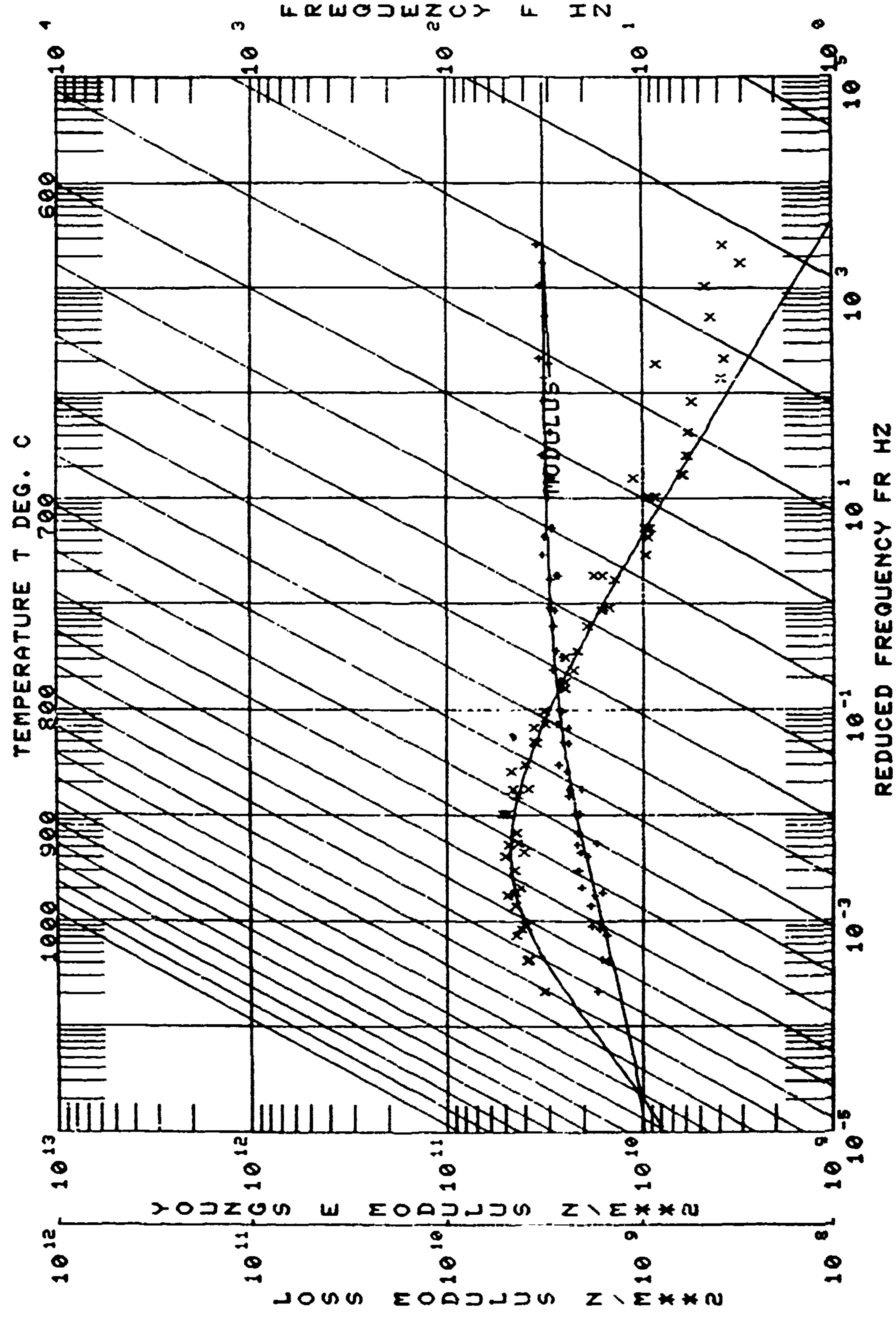
LOSS FACTOR ETA
YOUNGS E MODULUS N/M**2
FREQUENCY F HZ
MODULUS
REDUCED FREQUENCY FR HZ


TEMPERATURE T DEG. C
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REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-56-1

Date 12/27/78

Damping Material Three layers: first Corning 0010 + 10% Al_2O_3 + 1% Co_2O_3; second Nickle Aluminide; third Magnesium Zirconate

Material Thickness ______ cm Material Density 4.24 g/cc

Fixture No. ______ Beam Thickness 0.0958 cm

Beam Density 9.13 g/cc Beam Length 20.942 cm

Temperature Test Range: Between ______ °C and ______ °C

Frequency Test Range: Between ______ Hz and ______ Hz

Loss Factor η_D:

Peak 100 Hz η_D ______ Temperature ______ °C

1,000 Hz η_D ______ Temperature ______ °C

Range 100 Hz ______ °C ______ °C

1,000 Hz ______ °C ______ °C

Complex Modulus E_D'':

Peak 100 Hz ______ PAS Temperature ______ °C

1,000 Hz ______ PAS Temperature ______ °C

Range 100 Hz ______ °C ______ °C

1,000 Hz ______ °C ______ °C

NOMOGRAPH CURVE FIT EQUATION:

REMARKS: J-85-5. Coating same as 01-50-1 which failed to survive at usable temperatures. Beam was not tested.

Beam No. 01-58-1

Date 6/1/79

Damping Material Two layers: first 74.5% SiO_2 + 10.75% CaO + 12.75% Na_2O + 3% Al_2O_3 + 2% Co_2O_3; second NiCr

Material Thickness 0.0302 cm   Material Density 5.48 g/cc

Fixture No. 2   Beam Thickness 0.0970 cm

Beam Density 9.13 g/cc   Beam Length 21.67 cm

Temperature Test Range: Between 955 °C and 565 °C

Frequency Test Range: Between 85 Hz and 1,420 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.10	Temperature	690 °C
	1,000 Hz	η_D 0.10	Temperature	720 °C
Range	100 Hz	670 °C	760 °C	
	1,000 Hz	690 °C	801 °C	

Complex Modulus E_D'':

Peak	100 Hz	4.9×10^9 PAS	Temperature	695 °C
	1,000 Hz	4.9×10^9 PAS	Temperature	720 °C
Range	100 Hz	660 °C	* °C	
	1,000 Hz	685 °C	* °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERI:L :J85-15 INITIAL TEST
LOG(M)-LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM          F          ML
               A1            A2           A3          A4
   550.0  4.0000E-03  6.6000E+10     .600   4.9000E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL +((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH        FROL        C
            B1       B2        B3         B4         B5
   550.0    .060     .200     -.900  6.5000E-02    1.000
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J-85-15 project. Thermal soaked for 163 hours at 815°C. The coating began to peel off at the edges. Could not retest.

* E_D'' did not go below 0.707 multiplied by peak at upper limit of test.

TABLE 7-E

Beam No. 01-58-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1750	2	87.87	85.63	84.49	90.80	6.31	.0718[illegible]		
1750	3	247.04	240.43	241.24	252.84	22.80	.09228		X
1750	4	487.84	473.34	475.00	497.30	43.82	.08983		X
1750	5	829.51	784.86	815.41	843.61	55.42	.06681		Y
1750	6	1259.47	1175.55	1234.05	1284.89	99.91	.07933		X
1750	7	1812.01		1799.40	1825.46	51.21	.02826		X
1700	2	90.99	86.47	88.54	93.95	4.61	.05066		
1700	3	256.95	477.72	252.43	261.15	17.13	.06668		X
1700	5	853.95	792.09	822.00	880.10	58.10	.06804		
1700	6	1265.65	1185.55	1252.06	1278.11	51.19	.04045		X
1650	2	93.20	87.22	90.85	95.35	4.50	.04828		
1650	3	268.76	245.01	262.90	274.94	12.04	.04480		
1650	4	523.55	482.02	509.42	537.68	28.26	.05398		
1650	5	877.81	759.08	868.94	892.43	46.16	.05259		X
1650	6	1303.20	1196.01	1290.56	1312.94	44.00	.03376		X
1650	2	94.80	87.22	93.21	96.91	3.70	.03903	.03123	
1650	3	270.82	245.01	268.40	273.10	9.24	.03411	.02803	X
1650	4	530.42	492.02	524.12	53[illegible].22	13.10	.02470	.02072	
1650	5	888.70	799.09	874.26	907.24	32.98	.03711	.03394	
1650	6	1308.74	1196.10	1288.32	1326.35	38.03	.02906	.02655	
1600	2	95.04	88.21	94.20	96.20	3.90	.04108		X
1600	3	274.24	247.18	26930	278.92	9.62	.03508		
1600	4	528.08	496.30	521.98	543.60	21.62	.04094		

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1600	5	893.44	805.70	885.80	902.59	33.00	.03693		X
1600	6	1314.68	1205.68	1305.71	1325.80	39.48	.03003		X
1600	2	96.52	88.21	94.79	98.25	3.46	.03585	.02791	
1600	3	278.87	247.18	272.48	283.51	11.03	.03955	.03368	
1600	4	535.49	486.30	523.21	542.62	17.41	.03251	.02981	
1600	5	902.24	805.70	889.72	914.76	25.04	.02775	.02568	
1600	6	1373.40	1205.68	1291.07	1341.95	50.88	.03845	.03677	
1550	2	96.73	88.89	95.84	97.78	3.81	.03941		X
1550	3	278.31	249.15	276.56	280.31	7.36	.02648		X
1550	4	543.91	490.02	534.85	551.43	16.58	.03048		
1550	5	906.42	812.03	895.10	920.66	25.46	.02809		
1550	6	1336.93	1215.13	1332.42	1348.71	32.01	.02395		X
1550	2	58 10	88.89	96.76	99.60	2.84	.02895	.02276	
1550	3	280.28	249.15	278.64	281.92	6.45	.02301	.0185[illegible]	X
1550	4	548.21	490.02	544.32	550.63	12.40	.02262	.02089	X
1550	5	912.68	812.03	902.29	923.76	21.47	.02352	.02208	
1550	6	1348.31	1215.13	1334.26	1355.96	42.55	.03163	.03042	X
1500	2	98.63	89.69	96.78	100.35	3.57	.03620		
1500	3	282.42	215.86	278.70	285.95	7.25	.02567		
1500	4	551.36	493.85	547.61	554.73	13.99	.02538		X
1500	5	919.42	818.23	907.85	929.47	21.62	.02351		
1500	6	1364.25	1224.27	1255.66	1374.09	36.22	.02655		X
1500	2	99.40	89.69	98.83	100.79	1.96	.01972	.01559	

TABLE 7-E (Continued)

Beam No. 01-58-1

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1500	3	283.48	251.86	280.92	286.45	5.53	.01951	.01574	
1500	4	555.21	493.85	552.54	558.38	11.48	.02067	.01952	X
1500	5	923.92	818.23	915.52	935.00	19.48	.02108	.01994	
1500	6	1374.13	1224.27	1365.45	1382.81	34.12	.02483	.02395	X
1450	2	100.35	90.39	98.87	101.71	2.84	.02830		
1450	3	286.27	253.86	283.25	289.07	5.82	.02033		
1450	4	558.75	497.63	551.78	564.43	12.65	.02264		
1450	5	931.12	824.50	920.40	941.56	21.16	.02273		
1450	6	1384.72	1233.53	1367.58	1404.65	37.07	.02667		
1450	2	101.36	90.39	100.30	102.58	2.38	.02348	.02049	
1450	3	287.50		285.86	288.62	5.42	.01887	.01592	X
1450	4	563.94	497.63	558.39	570.61	12.22	.02167	.02077	
1450	5	940.35	824.50	924.80	949.90	25.10	.02668	.02586	
1450	6	1400.03	1233.53	1391.40	1409.47	35.51	.02536	.02468	X
1400	2	102.07	91.12	100.77	103.49	2.72	.02665		
1400	3	290.60	255.76	287.75	293.96	6.21	.02137		
1400	4	569.67	501.39	560.90	576.30	15.40	.02703		
1400	5	948.61	830.62	938.48	961.68	23.20	.02446		
1400	6	1412.99	1242.59	1395.12	1430.82	35.70	.02527		
1400	2	102.95	91.12	101.84	104.08	2.24	.02176	.01957	
1400	3	291.33	255.76	288.03	294.37	6.34	.02176	.01981	
1400	4	573.47	501.39	566.79	580.16	13.37	.02331	.02255	
1400	5	955.15	830.62	943.18	967.97	24.79	.02595	.02528	

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1400	6	1420.80	1242.59	1402.02	1434.66	32.64	.02285	.02226	
1350	2	104.51	91.92	103.94	105.20	2.48	.02369	.02184	X
1350	3	296.18	257.84	291.98	299.37	7.39	.02495	.02336	
1350	4	583.17	505.52	575.80	589.20	13.40	.02298	.02239	
1350	5	975.01	837.45	961.75	986.55	24.80	.02544	.02482	
1350	6	1446.02	1252.00	1422.50	1486.70	46.20	.03195	.03138	
1300	2	106.46	97.46	105.77	107.27	2.73	.02564	.02376	
1300	3	302.02	259.75	297.40	305.66	8.26	.02735	.02605	
1300	4	593.66	509.60	587.97	601.66	13.69	.02306	.02248	
1300	5	992.80	842.40	982.82	1002.07	19.25	.01939	.01880	
1300	6	1473.85	1261.00	1463.16	1487.11	23.95	.01625	.01571	
1250	2	108.46	93.11	107.90	109.22	2.59	.02392	.02220	X
1250	3	307.65	261.20	304.70	310.17	5.47	.01778	.01678	
1250	4	602.98	512.34	598.85	607.10	8.25	.01368	.01311	
1250	5	1005.08	848.63	999.62	1010.61	10.99	.01098	.01057	
1250	6	1489.62	1269.51	1482.58	1497.75	15.17	.01018	.00968	
1200	2	110.09	93.84	109.49	110.99	1.50	.01363	.01203	
1200	3	311.64	262.30	310.24	313.08	2.84	.00911	.00822	
1200	4	609.45	516.75	607.25	611.68	4.43	.00727	.00676	
1200	5	1015.37	854.80	1012.30	1018.33	6.03	.00594	.00556	
1200	6	1504.95	1278.90	1499.96	1509.20	9.24	.00614	.00558	
1150	2	111.39	94.55	111.01	111.82	0.81	.00727	.00579	
1150	3	314.82	266.16	314.03	315.58	1.55	.00492	.00414	

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TABLE 7-E (Concluded)

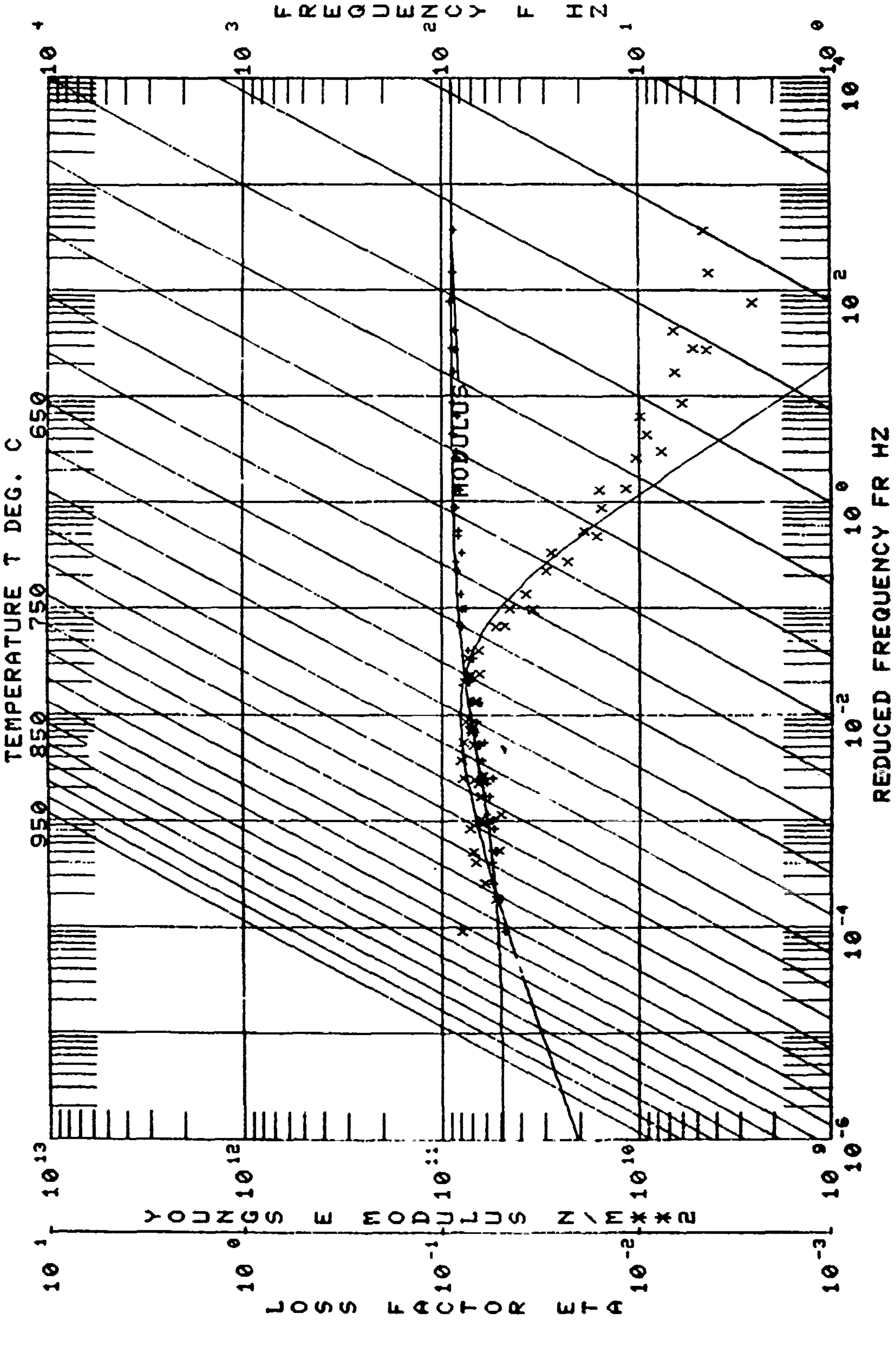
Beam No. 01-58-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	ldB
1150	4	615.00	519.95	613.68	616.30	2.62	.00426	.00369	
1150	5	1024.16	861.20	1022.38	1026.13	3.75	.00366	.00332	
1150	6	1517.48	1288.18	1514.61	1520.51	5.95	.00392	.00349	
1100	2	112.40	95.12	112.17	112.63	0.46	.00409	.00273	
1100	3	317.48	267.10	317.04	317.95	0.91	.00287	.00216	
1100	4	620.05	523.30	619.20	620.92	1.72	.00277	.00233	
1100	5	1032.52	866.10	1031.25	1033.58	2.33	.00226	.00191	
1100	6	1529.60	1296.00	1527.38	1531.56	4.18	.00273	.00235	
1050	2	113.22	95.79	113.06	113.38	0.32	.00283	.00158	
1050	3	319.76	268.50	319.51	320.01	0.50	.00156	.00093	
1050	4	624.48	526.52	623.88	625.11	1.23	.00197	.00155	
1050	5	1039.60	871.93	1038.90	1040.55	1.65	.00159	.00123	
1050	6	1540.06	1304.26	1538.60	1541.60	3.00	.00195	.00162	

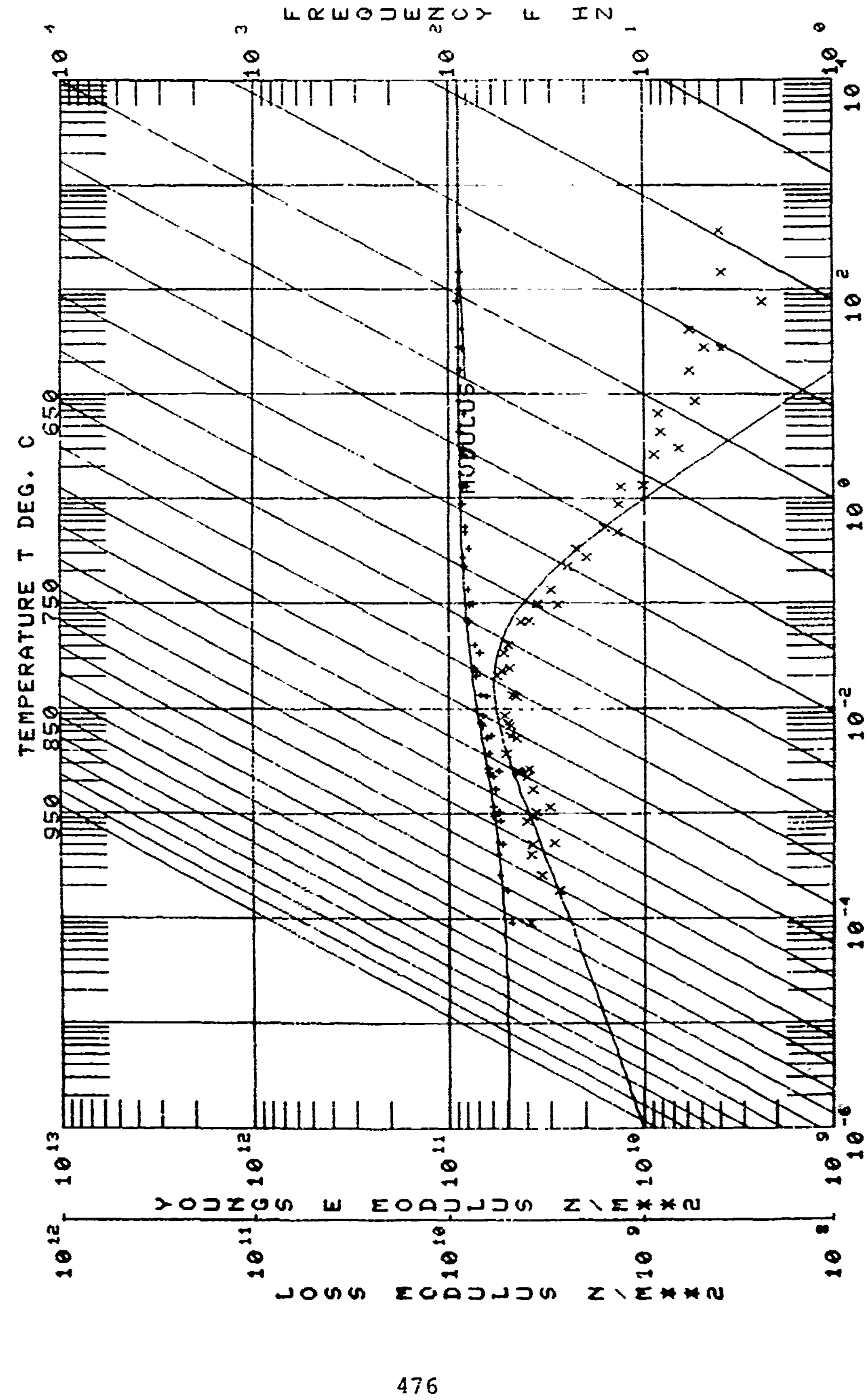
EXPERIMENTAL CODE : 52
MATERIAL :J85-15 INITIAL TEST
DATA SOURCES
MANUFACTURER :N
AFML :UDRI BEAM COATED ONE SIDE
OTHER :TOP: Ni Cr BOTTOM: 74.5% Si 02, 12.75% Na2 0, 10.75% Ca 0, 01-58-1

NO.	MODULUS LB/IN**2	LOSS FACTOR	TEMP. DEG. F	FREQ. HZ	MODE NO.	BEAM MOD. LB/IN**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. LB/IN**2
1	6.10770E+06	.1177	1650.0	94.8	2.	2.30137E+07	.0312	87.2	7.18954E+05
2	6.94782E+06	.0986	1650.0	270.8	3.	2.31632E+07	.0280	245.0	6.84825E+05
3	6.78416E+06	.1034	1650.0	530.4	4.	2.33466E+07	.0289	482.0	7.01660E+05
4	7.35003E+06	.1166	1650.0	888.7	5.	2.34796E+07	.0330	799.1	8.57154E+05
5	6.60153E+06	.0972	1650.0	1308.7	6.	2.36591E+07	.0265	1196.0	6.41783E+05
6	6.86088E+06	.1329	1600.0	1323.4	6.	2.40432E+07	.0368	1205.7	9.12072E+05
7	7.82887E+06	.0861	1600.0	902.2	5.	2.38702E+07	.0257	805.7	6.74010E+05
8	6.93826E+06	.1066	1600.0	535.5	4.	2.37631E+07	.0299	486.3	7.39957E+05
9	8.12367E+06	.0752	1600.0	278.9	3.	2.35753E+07	.0230	247.2	6.10741E+05
10	6.56567E+06	.1022	1600.0	96.5	2.	2.35391E+07	.0279	88.2	6.71132E+05
11	7.09120E+06	.0805	1550.0	98.1	2.	2.39034E+07	.0228	88.9	5.71000E+05
12	8.09814E+06	.0611	1550.0	280.3	3.	2.39526E+07	.0185	249.1	4.94724E+05
13	7.86273E+06	.0703	1550.0	548.2	4.	2.41280E+07	.0209	490.0	5.52509E+05
14	8.14972E+06	.0731	1550.0	912.7	5.	2.42468E+07	.0221	812.0	5.95682E+05
15	7.52468E+06	.1054	1550.0	1348.3	6.	2.44216E+07	.0304	1215.1	7.93244E+05
16	8.25712E+06	.0797	1500.0	1374.1	6.	2.47904E+07	.0239	1224.3	6.57710E+05
17	8.53049E+06	.0650	1500.0	923.9	5.	2.46184E+07	.0199	818.2	5.54444E+05
18	8.25166E+06	.0646	1500.0	555.2	4.	2.45067E+07	.0195	493.8	5.32722E+05
19	8.30438E+06	.0519	1500.0	283.5	3.	2.44765E+07	.0157	251.9	4.30631E+05
20	7.43535E+06	.0543	1500.0	99.4	2.	2.43356E+07	.0156	89.7	4.03540E+05
21	8.18168E+06	.0683	1450.0	101.4	2.	2.47170E+07	.0205	90.4	5.59071E+05
22	8.78216E+06	.0514	1450.0	287.5	3.	2.48687E+07	.0159	253.9	4.51428E+05
23	8.82637E+06	.0669	1450.0	563.9	4.	2.48833E+07	.0208	497.6	5.90619E+05
24	9.23540E+06	.0817	1450.0	940.3	5.	2.49972E+07	.0259	824.5	7.54281E+05
25	9.01455E+06	.0791	1450.0	1400.0	6.	2.51668E+07	.0247	1233.5	7.13322E+05
26	9.58742E+06	.0698	1400.0	1420.8	6.	2.55379E+07	.0223	1242.6	6.68877E+05
27	9.86628E+06	.0777	1400.0	955.2	5.	2.53696E+07	.0252	830.6	7.66417E+05
28	9.50096E+06	.0706	1400.0	573.5	4.	2.52607E+07	.0226	501.4	6.70888E+05
29	9.25144E+06	.0628	1400.0	291.3	3.	2.52404E+07	.0198	255.8	5.81045E+05
30	8.73661E+06	.0637	1400.0	102.9	2.	2.51178E+07	.0196	91.1	5.56244E+05
31	9.25890E+06	.0696	1350.0	104.5	2.	2.55608E+07	.0218	91.9	6.44796E+05
32	9.91072E+06	.0722	1350.0	296.2	3.	2.56526E+07	.0234	257.8	7.15853E+05
33	1.91841E+07	.0684	1350.0	583.2	4.	2.56786E+07	.0224	505.5	6.96565E+05
34	1.08140E+07	.0739	1350.0	975.0	5.	2.57855E+07	.0248	837.4	7.99648E+05
35	1.03567E+07	.0749	1350.0	1446.0	6.	2.59261E+07	.0246	1252.0	7.75734E+05
36	1.12828E+07	.0463	1300.0	1473.9	6.	2.63002E+07	.0157	1261.0	5.22907E+05
37	1.17508E+07	.0543	1300.0	992.8	5.	2.60943E+07	.0188	842.4	6.38497E+05
38	1.09784E+07	.0669	1300.0	593.7	4.	2.60947E+07	.0225	509.6	7.34249E+05
39	1.08289E+07	.0779	1300.0	302.0	3.	2.60340E+07	.0261	259.7	8.43478E+05
40	1.01383E+07	.0730	1300.0	106.5	2.	2.58620E+07	.0238	92.5	7.39809E+05
41	1.10287E+07	.0661	1250.0	108.5	2.	2.62269E+07	.0222	93.1	7.28579E+05
42	1.18136E+07	.0486	1250.0	307.7	3.	2.63255E+07	.0168	261.2	5.73767E+05
43	1.17828E+07	.0380	1250.0	603.0	4.	2.63761E+07	.0131	512.3	4.47954E+05
44	1.22671E+07	.0302	1250.0	1005.1	5.	2.64817E+07	.0106	848.6	3.70454E+05
45	1.17015E+07	.0283	1250.0	1485.6	6.	2.66564E+07	.0097	1269.5	3.30893E+05
46	1.20756E+07	.0162	1200.0	1504.9	6.	2.70521E+07	.0056	1278.9	1.95462E+05
47	1.26537E+07	.0158	1200.0	1015.4	5.	2.68682E+07	.0056	854.8	1.99706E+05
48	1.21333E+07	.0195	1200.0	609.4	4.	2.68321E+07	.0068	516.7	2.36655E+05
49	1.25212E+07	.0233	1200.0	311.6	3.	2.65477E+07	.0082	262.3	2.91944E+05

50	8.05454E+10	.0352	648.9	110.1	2.	1.83675E+11	.0120	93.8	2.83182E+09
51	8.37893E+10	.0167	621.1	111.4	2.	1.86465E+11	.0058	94.6	1.40342E+09
52	8.66594E+10	.0119	621.1	314.8	3.	1.88467E+11	.0041	266.2	1.02810E+09
53	8.61179E+10	.0106	621.1	615.0	4.	1.87299E+11	.0037	519.9	9.10643E+08
54	8.91596E+10	.0094	621.1	1024.2	5.	1.88034E+11	.0033	861.2	8.37859E+08
55	8.49908E+10	.0101	621.1	1517.5	6.	1.89235E+11	.0035	1288.2	8.58239E+08
56	8.69763E+10	.0068	593.3	1529.6	6.	1.91539E+11	.0024	1296.0	5.88721E+08
57	9.14361E+10	.0054	593.3	1032.5	5.	1.90180E+11	.0019	866.1	4.91642E+08
58	8.81078E+10	.0067	593.3	620.1	4.	1.89721E+11	.0023	523.3	5.85924E+08
59	8.9[illegible]376E+10	.0061	593.3	317.5	3.	1.89800E+11	.0022	267.1	5.49275E+08
60	8.62884E+10	.0078	593.3	112.4	2.	1.88720E+11	.0027	95.1	6.76598E+08
61	8.76343E+10	.0045	565.6	113.2	2.	1.91388E+11	.0016	95.8	3.97458E+08
62	9.16762E+10	.0026	565.6	319.8	3.	1.91795E+11	.0009	268.5	2.40564E+08
63	8.96987E+10	.0044	565.6	624.5	4.	1.92063E+11	.0015	526.5	3.95919E+08



FREQUENCY F HZ
TEMPERATURE T DEG. C
650
750
850
950
MODULUS
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
650
750
850
950
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-58-2

Date 6/6/79

Damping Material Two layers: first 74.5% SiO_2 + 10.75% CaO + 6.375% Na_2O + 6.375% $KHCO_3$ + 2% Co_2O_3; second O. Hommel 1251

Material Thickness 0.0168 cm Material Density 2.68 g/cc

Fixture No. 2 Beam Thickness 0.0970 cm

Beam Density 9.13 g/cc Beam Length 21.623 cm

Temperature Test Range: Between 870 °C and 565 °C

Frequency Test Range: Between 89 Hz and 1,420 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.25		Temperature	730 °C
	1,000 Hz	η_D 0.25		Temperature	790 °C
Range	100 Hz	690 °C	790 °C		
	1,000 Hz	735 °C	850 °C		

Complex Modulus E_D'':

Peak	100 Hz	1.1×10^{10} PAS		Temperature	700 °C
	1,000 Hz	1.1×10^{10} PAS		Temperature	760 °C
Range	100 Hz	660 °C	735 °C		
	1,000 Hz	710 °C	800 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-582
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM         MROM         N          ML
               A1           A2          A3         A4
   580.0  9.8000E-03  4.0000E+10     .690   2.1000E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL      SL         SH          FROL         C
            B1        B2         B3           B4          B5
   580.0     .250      .450     -.500   9.8900E-03     .990
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Retested twice: 01-58-3 and 01-58-4.

TABLE 8-E

Beam No. 01-58-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1600	2	89.87	88.21	89.20	90.47	1.27	.01413	.00703	
1600	3	252.89	247.18	251.18	254.51	3.43	.01356	.00696	
1600	4	496.26	486.30	492.84	499.68	6.84	.01378	.01108	
1600	5	822.51	805.70	814.78	828.78	13.50	.01641	.01399	
1600	6	1229.81	1205.68	1221.80	1239.80	18.00	.01464	.01283	
1550	2	90.73	88.89	90.16	91.45	1.29	.01422	.00742	
1550	3	255.76	249.15	253.61	257.80	4.19	.01638	.01185	
1550	4	501.67	490.02	497.65	505.38	7.73	.01541	.01371	
1550	5	830.95	812.05	824.60	638.25	13.65	.01643	.01483	
1550	6	1242.64	1215.13	1231.78	1254.57	22.79	.01834	.01704	
1500	2	91.81	88.69	91.14	92.49	1.35	.01470	.01040	
1500	3	259.16	251.86	257.69	260.43	5.38	.02087	.01758	X
1500	4	507.97	493.85	502.50	513.18	10.68	.02102	.01983	
1500	5	841.33	818.23	832.11	852.28	20.17	.02396	.02274	
1500	6	1260.40	1224.27	1239.23	1272.04	32.72	.02596	.02495	
1450	2	93.11	90.39	92.03	94.05	2.02	.02169	.01869	
1450	3	263.18	253.86	259.72	266.11	6.39	.02428	.02203	
1450	4	516.38	497.63	509.64	524.24	14.60	.02827	.02736	
1450	5	851.30	824.50	842.21	864.66	22.45	.02637	.02539	
1450	6	1280.65	1233.53						
1450	2	93.27	90.39	92.48	94.20	1.72	.01844	.01544	
1450	3	264.03	253.86	260.90	266.99	6.09	.02307	.02082	
1450	4	521.26	497.63	515.05	524.90	19.35	.03714	.03623	X
1450	5	863.66	824.50	848.18	871.85	23.67	.02741	.02643	
1450	6	1271.79	1253.33	1256.90	1288.51	62.10	.04883	.04801	X
1400	2	94.68	91.12	93.70	95.96	2.26	.02387	.02177	
1400	3	267.65	255.75	264.56	269.73	10.16	.03796	.03621	
1400	4	529.30	501.39	520.59	538.30	17.71	.03346	.03274	
1400	5	877.93	830.62	863.82	892.34	28.52	.0324[illegible]	.03167	
1400	6	1302.50	1242.59	1296.00	1312.90	33.21	.02550	.02481	X
1350	2	96.53	91.92	95.07	98.49	3.42	.03543	.03380	
1350	3	273.15	257.84	268.02	277.87	9.85	.03606	.03465	
1350	4	538.06	505.52	531.21	547.40	16.19	.03009	.02950	
1350	5	896.51	837.45	884.71	910.76	26.05	.02906	.02836	
1350	6	1352.10	1252.10	1343.80	1361.39	34.58	.02558	.02498	
1300	2	99.18	92.46	97.21	100.94	3.73	.03761	.03620	
1300	3	279.81	259.75	275.82	283.90	8.08	.02888	.02768	
1300	4	551.83	509.60	545.52	558.75	13.23	.02397	.02348	
1300	5	913.85	842.20	905.70	923.20	17.50	.01915	.01856	
1300	6	1376.15	1261.00	1364.18	1386.23	22.05	.01602	.01548	
1250	2	101.62	93.11	100.63	102.94	2.31	.02273	.02143	
1250	3	286.20	261.20	283.76	288.10	4.34	.01516	.01414	
1250	4	562.09	512.34	558.72	565.09	6.37	.01133	.01090	
1250	5	928.65	848.63	923.79	932.05	8.26	.00889	.00857	
1250	6	1388.75	1269.51	1383.92	1394.80	10.88	.00783	.00733	
1200	2	102.97	93.85	102.36	103.68	1.32	.01282	.01160	

TABLE 8-L (Concluded)

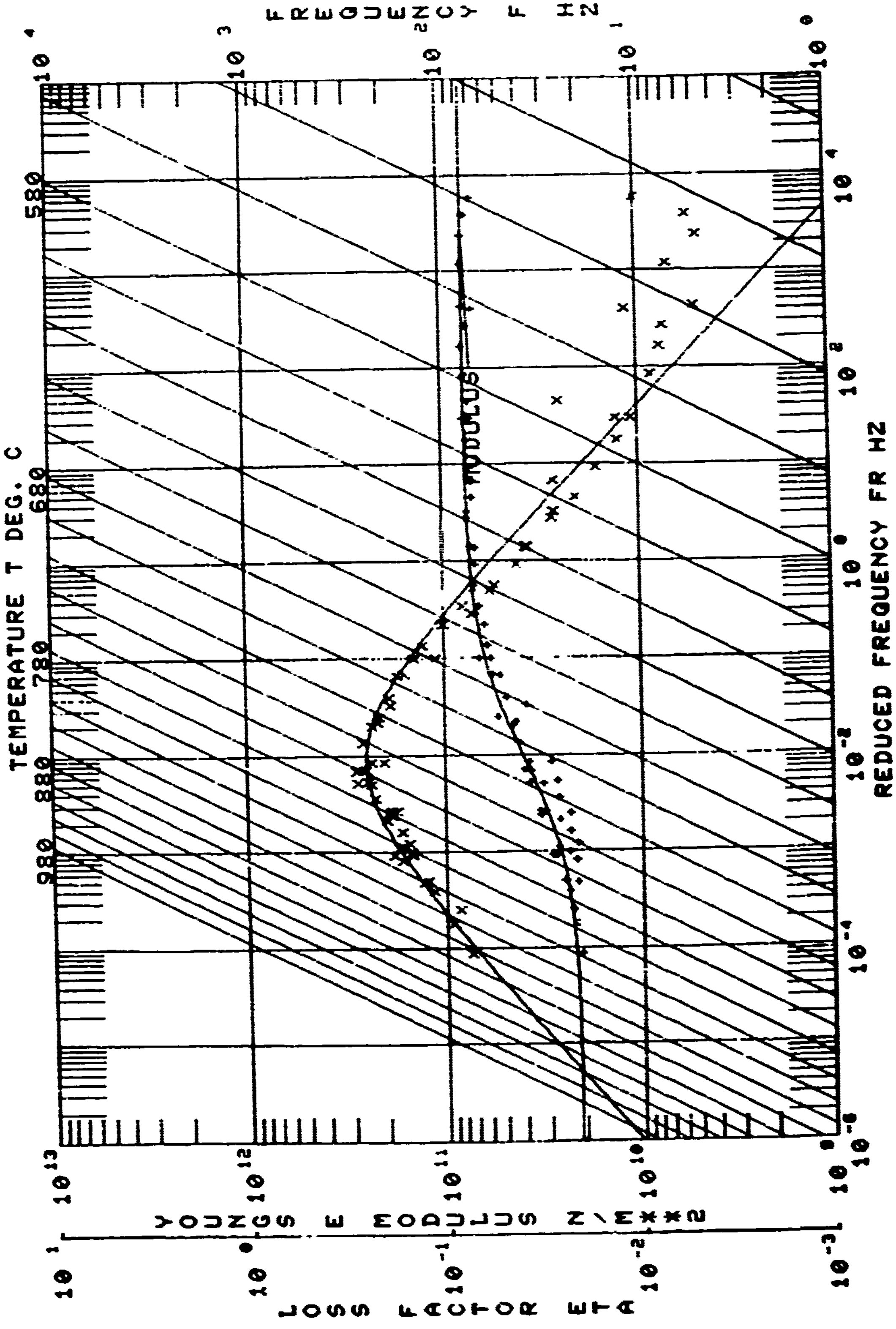
Beam No. 01-58-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	ldB
1200	3	289.24	263.50	288.00	290.45	2.45	.00947	.00757	
1200	4	567.58	513.20	562.45	569.01	3.56	.00627	.00587	
1200	5	936.50	854.80	934.70	939.05	4.35	.00464	.00416	
1200	6	1401.05	1278.20	1397.55	1405.70	8.15	.00582	.00536	
1150	2	104.18	94.55	103.80	104.50	0.70	.00672	.00558	
1150	3	292.04	266.16	291.40	292.62	1.22	.00418	.00329	
1150	4	572.38	519.95	571.55	573.46	1.71	00299	.00260	
1150	5	944.50	861.20	934.27	945.73	2.46	.00260	.00216	
1150	6	1413.35	1288.46	1410.17	1417.92	7.75	.00548	.00505	
1100	2	104.94	95.14	104.74	105.14	0.40	.00381	.00267	
1100	3	294.09	267.10	293.75	294.47	0.72	.00245	.00174	
1100	4	576.24	521.60	575.64	576.77	1.13	.00196	.00158	
1100	5	950.50	866.20	949.45	951.13	1.78	.00187	.00145	
1100	6	1413.00	1296.00	1411.25	1414.89	3.64	.00250	.00217	
1050	2	105.54	95.79	105.43	105.67	0.24	.00227	.00102	
1050	3	295.98	268.50	295.62	296.23	0.61	.00206	.00143	
1050	4	579.62	526.52	579.38	580.19	0.81	.00140	.00098	
1050	5	956.00	871.93	955.18	956.55	1.37	.00143	.00107	
1050	6	1420.40	1304.21	1418.70	1421.88	3.18	.00224	.00191	

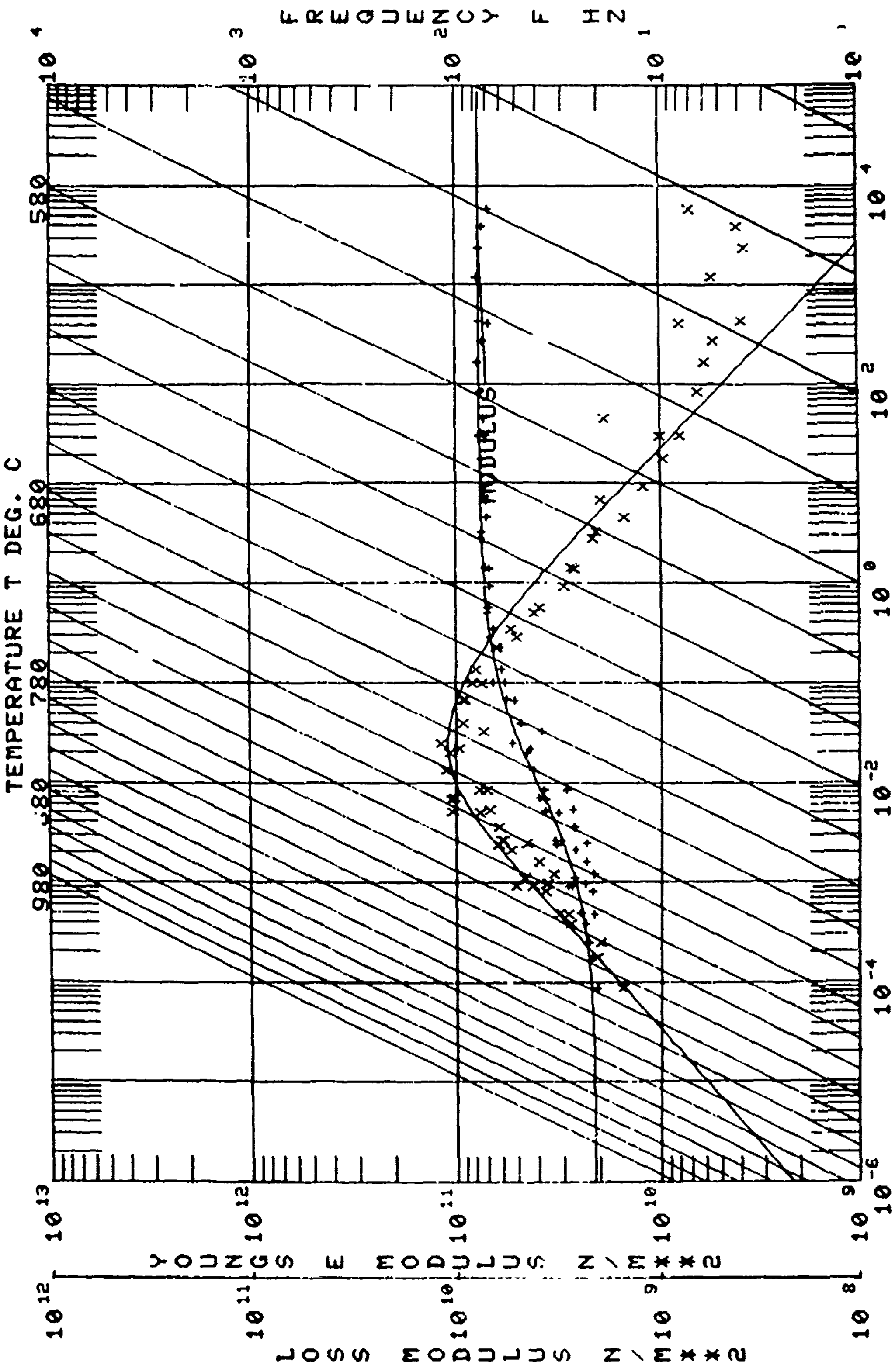
EXPERIMENTAL CODE : 79
MATERIAL :01-582
DATA SOURCES
MANUFACTURER :O'HOMMEL 1251 30% SIO2 / UD J-85-14
AFML :UDRI BEAM COATED ONE SIDE JUNE 12 1979
OTHER :N

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	2.09302E+10	.0762	871.1	89.9	2.	1.62297E+11	.0062	88.2	1.59406E+09
2	2.31369E+10	.0868	871.1	252.9	3.	1.62546E+11	.0077	247.2	2.00905E+09
3	2.19732E+10	.1326	871.1	496.3	4.	1.63841E+11	.0112	486.3	2.91311E+09
4	2.22704E+10	.1692	871.1	822.5	5.	1.64579E+11	.0143	805.7	3.76780E+09
5	2.20298E+10	.1553	871.1	1229.8	6.	1.65750E+11	.0130	1205.6	3.42149E+09
6	2.37310E+10	.1951	843.3	1242.6	6.	1.68381E+11	.0171	1215.1	4.62973E+09
7	2.39077E+10	.1686	843.3	830.9	5.	1.67175E+11	.0150	812.0	4.03033E+09
8	2.40355E+10	.1525	843.3	501.7	4.	1.66357E+11	.0137	490.0	3.66526E+09
9	2.52967E+10	.1260	843.3	255.8	3.	1.65147E+11	.0119	249.1	3.18613E+09
10	2.22243E+10	.0950	843.3	90.7	2.	1.64808E+11	.0080	88.9	2.11185E+09
11	2.41637E+10	.1132	815.6	91.8	2.	1.67788E+11	.0106	89.7	2.85509E+09
12	2.71594E+10	.1738	815.6	259.2	3.	1.68759E+11	.0171	251.9	4.72097E+09
13	2.69782E+10	.2033	815.6	508.0	4.	1.68968E+11	.0199	493.8	5.48589E+09
14	2.73170E+10	.2320	815.6	841.9	5.	1.69738E+11	.0228	818.2	6.33669E+09
15	2.77936E+10	.2527	815.6	1260.4	6.	1.70924E+11	.0251	1224.3	7.02398E+09
16	2.96740E+10	.2423	787.8	851.3	5.	1.72349E+11	.0252	824.5	7.18934E+09
17	3.23363E+10	.2412	787.8	516.4	4.	1.71564E+11	.0271	497.6	7.81313E+09
18	3.18357E+10	.1923	787.8	263.2	3	1.71450E+11	.0213	253.9	6.12308E+09
19	2.80305E+10	.1866	787.8	93.1	2.	1.70418E+11	.0187	90.4	5.23091E+09
20	2.89994E+10	.1497	787.8	93.3	2.	1.70418E+11	.0154	90.4	4.34216E+09
21	3.37050E+10	.1791	787.8	264.0	3.	1.71450E+11	.0208	253.9	6.03733E+09
22	3.79047E+10	.2836	787.8	521.3	4.	1.71564E+11	.0362	497.6	1.07499E+10
23	3.80782E+10	.2069	787.8	863.7	5.	1.72349E+11	.0264	824.5	7.87799E+09
24	2.08250E+10	.6473	787.8	1271.8	6.	1.79134E+11	.0480	1253.3	1.34791E+10
25	3.93258E+10	.1925	760.0	1302.5	6.	1.76077E+11	.0248	1242.6	7.57161E+09
26	4.41680E+10	.2232	760.0	877.9	5.	1.74917E+11	.0317	830.6	9.85650E+09
27	3.78666E+10	.2869	760.0	267.7	3.	1.74026E+11	.0362	255.8	1.08650E+10
28	3.34778E+10	.1899	760.0	94.7	2.	1.73181E+11	.0218	91.1	6.35728E+09
29	5.92553E+10	.1436	732.2	1352.1	6.	1.78783E+11	.0250	1252.1	8.51062E+09
30	5.31275E+10	.1759	732.2	896.5	5.	1.77806E+11	.0284	837.4	9.34422E+09
31	4.91469E+10	.1933	732.2	538.1	4.	1.77048E+11	.0295	505.5	9.50123E+09
32	4.61039E+10	.2382	732.2	273.2	3.	1.76868E+11	.0346	257.8	1.09836E+10
33	4.04810E+10	.2565	732.2	96.5	2.	1.76236E+11	.0338	91.9	1.03841E+10
34	5.46147E+10	.2204	704.4	99.2	2.	1.78312E+11	.0362	92.5	1.20390E+10
35	5.78235E+10	.1625	704.4	279.8	3.	1.79498E+11	.0277	259.7	9.39359E+09
36	6.15447E+10	.1320	704.4	551.8	4.	1.79917E+11	.0235	509.6	8.12311E+09
37	6.29338E+10	.1027	704.4	913.8	5.	1.79829E+11	.0186	842.2	6.46062E+09
38	6.77785E+10	.0818	704.4	1376.6	6.	1.81333E+11	.0155	1261.0	5.54258E+09
39	7.01716E+10	.0382	676.7	1388.7	6.	1.83789E+11	.0073	1269.5	2.67774E+09
40	6.99561E+10	.0435	676.7	928.7	5.	1.82585E+11	.0084	848.6	3.04098E+09
41	7.15383E+10	.0556	676.7	562.1	4.	1.81857E+11	.0109	512.3	3.97769E+09
42	7.04783E+10	.0728	676.7	286.2	3.	1.81508E+11	.0141	261.2	5.12872E+09
43	6.73841E+10	.1134	676.7	101.6	2.	1.80828E+11	.0214	93.1	7.64439E+09
44	7.23303E+10	.0591	648.9	103.0	2.	1.83714E+11	.0116	93.9	4.27754E+09
45	7.30594E+10	.0385	648.9	289.2	3.	1.84719E+11	.0076	263.5	2.81088E+09
46	7.77470E+10	.0284	648.9	567.6	4.	1.82468E+11	.0059	513.2	2.20715E+09
47	7.18446E+10	.0214	648.9	936.5	5.	1.85250E+11	.0042	854.8	1.53939E+09
48	7.26186E+10	.0275	648.9	1401.1	6.	1.86314E+11	.0054	1278.2	1.99801E+09
49	7.43589E+10	.0258	621.1	1413.4	6.	1.89317E+11	.0050	1288.5	1.91753E+09

50	7.37041E+10	.0110	621.1	944.5	5.	1.88034E+11	.0022	861.2	8.14077E+08
51	7.62475E+10	.0130	621.1	572.4	4.	1.87299E+11	.0026	519.9	9 88200E+08
52	7.42393E+10	.0168	621.1	292.0	3.	1.88467E+11	.0033	266.2	1.24479E+09
53	7.66063E+10	.0276	621.1	104.2	2.	1.86465E+11	.0056	94.6	2.11721E+09
54	7.83735E+10	.0131	593.3	104.9	2.	1.88799E+11	.0027	95.1	1.02961E+09
55	7.74100E+10	.0087	593.3	294.1	3.	1.39800E+11	.0017	267.1	6.70602E+08
56	7.94682E+10	.0077	593.3	576.2	4.	1.88490E+11	.0016	521.6	6.11484E+08
57	7.49823E+10	.0074	593.3	950.5	5.	1.90224E+11	.0015	866.2	5.53852E+08
58	7.06067E+10	.0116	593.3	1413.0	6.	1.91539E+11	.0022	1296.0	8.17194E+08
59	7.85776E+10	.0051	565.6	105.5	2.	1.91388E+11	.0010	95.8	3.97261E+08
60	7.91554E+10	.0071	565.6	296.0	3.	1.91795E+11	.0014	268.5	5.59100E+08
61	7.81995E+10	.0049	565.6	575.6	4.	1.92063E+11	.0016	526.5	3.81969E+08
62	7.53459E+10	.0055	565.6	956.0	5.	1.92749E+11	.0011	871.9	4.13018E+08
63	7.06737E+10	.0103	565.6	1420.4	6.	1.93974E+11	.0019	1304.2	7.25834E+08
64	4.32211E+10	.2657	760.0	529.3	4.	1.74166E+11	.0372	501.4	1.14833E+10



TEMPERATURE T DEG. C
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS


TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-58-3

Date 6/79

Damping Material Two layers: first 74.5% SiO_2 + 10.75% CaO + 6.375% Na_2O + 6.375% $KHCO_3$ + 2% Co_2O_3; second O. Hommel R-1251

Material Thickness 0.0168 cm   Material Density 2.68 g/cc

Fixture No. 2   Beam Thickness 0.0970 cm

Beam Density 9.13 g/cc   Beam Length 21.623 cm

Temperature Test Range: Between 870 °C and 590 °C

Frequency Test Range: Between 92 Hz and 1,430 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.20	Temperature	715 °C
	1,000 Hz	η_D 0.20	Temperature	770 °C
Range	100 Hz	690 °C	740 °C	
	1,000 Hz	730 °C	830 °C	

Complex Modulus E_D'':

Peak	100 Hz	1.1×10^{10} PAS	Temperature	710 °C
	1,000 Hz	1.1×10^{10} PAS	Temperature	760 °C
Range	100 Hz	685 °C	735 °C	
	1,000 Hz	725 °C	810 °C	

NOMOGRAPH CURVE FIT EQUATION:

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MATERIAL :01-58-3
LOG(M)•LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM        N          ML
               A1            A2         A3         A4
   580.0  1.9456E-02  5.4344E+10     .788  3.6911E+10
A•(LOG(FR)-LOG(FPOL))/C
LOG(ETA)•LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH         FROL        C
            B1       B2        B3          B4         B5
   580.0    .200     .408    -.450  1.8475E-02     .341
LOG(FR)•LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Retest of 01-58-2 after hours at °C.

TABLE 9-E

Beam No. 01-58-3

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1600	2	92.25	88.21	91.56	92.91	1.35	.0146[illegible]	.00669	
1600	3	260.62	247.18	259.93	261.47	3.02	.0116[illegible]	.00574	X
1600	4	510.48	486.30	507.63	513.18	5.55	.01087	100824	
1600	5	843.58	805.70	839.18	848.17	9.49	.01125	.00918	
1600	6	1257.54	1205.68	1246.60	1263.30	16.70	.01328	.01160	
1550	2	93.46	88.89	92.90	94.06	1.16	.01241	.00622	
1550	3	263.60	249.15	262.04	264.90	2.86	.1085	.00635	
1550	4	516.45	490.02	513.46	519.66	6.20	.01021	.01028	
1550	5	853.21	812.03	847.57	858.71	11.14	.01306	.01162	
1550	6	1271.60	1215.13	1271.80	1282.37	20.77	.016[illegible]4	.01503	
1500	2	94.40	89.69	93.91	95.08	1.17	.01239	.00826	
1500	3	266.29	251.86	264.62	267.88	3.26	.01224	.00847	
1500	4	521.85	493.85	518.19	525.73	7.54	.01445	.01330	
1500	5	862.61	818.23	856.55	870.75	14.20	.01646	.01532	
1500	6	1288.50	1224.27	1277.27	1299.73	22.46	.01743	.01655	
1450	2	95.53	90.39	94.86	96.18	1.32	.01382	.01083	
1450	3	269.30	253.86	267.23	271.52	4.29	.01593	.01298	
1450	4	528.80	497.63	523.45	534.05	10.50	.01986	.01896	
1450	5	874.96	824.50	865.71	885.90	20.19	.02308	.02226	
1450	6	1308.70	1233.53	297.03	1335.13	39.10	.02988	.02920	
1400	2	96.67	91.12	95.73	97.48	1.75	.01810	.01591	
1400	3	273.12	255.76	270.43	276.70	6.27	.02296	.02101	
1400	4	537.58	501.39	529.85	544.01	14.16	.02634	.02558	
1400	5	889.95	830.62	878.42	903.19	24.77	.02783	.02716	
1400	6	1342.75	1242.59	1329.71	1373.80	44.09	.03280	.03225	
1350	2	98.06	91.92	96.85	99.37	2.52	.02570	.02385	
1350	3	277.49	257.80	273.67	281.28	7.61	.02742	.02583	
1350	4	546.60	505.52	538.55	555.01	16.46	.03011	.02952	
1350	5	909.20	837.45	894.73	918.88	24.15	.02664	.02602	
1350	6	1365.00	1252.10	1[illegible]48.85	1381.19	32.34	.02375	.02322	
1300	2	100.31	92.46	99.00	102.02	3.02	.03011	.02870	
1300	3	283.97	259.75	280.62	287.75	7.13	.02511	.02391	
1300	4	559.63	509.60	554.56	568.19	13.63	.02436	.02387	
1300	5	923.86	842.20	916.69	931.11	14.42	.01561	.01502	
1300	6	1384.50	1261.00	1375.39	1394.00	18.61	.01344	.01290	
1300	2	100.03	92.14	98.48	101.58	3.10	.03099	.02958	
1300	3	283.92	259.75	280.64	287.54	6.90	.02430	.02310	
1300	4	559.00	509.60	555.83	562.80	13.69	.02450	.02401	X
1300	5	922.21	842.20	915.54	930.61	15.07	.01634	.01575	
1300	6	1382.73	1261.00	1374.62	1392.33	17.71	.01281	.01227	
1250	2	102.36	93.11	101.24	103.50	2.26	.02208	.02078	
1250	3	288.17	261.20	286.18	290.30	4.12	.01430	.01328	
1250	4	566.04	512.34	563.09	569.78	6.69	.01182	.01139	
1250	5	933.94	848.63	930.00	938.00	8.00	.00857	.00805	
1250	6	1395.90	1269.51	1392.51	1402.43	9.92	.00711	.00661	
1200	2	103.92	93.85	103.36	104.43	1.07	.01030	.00908	

TABLE 9-E (Concluded)

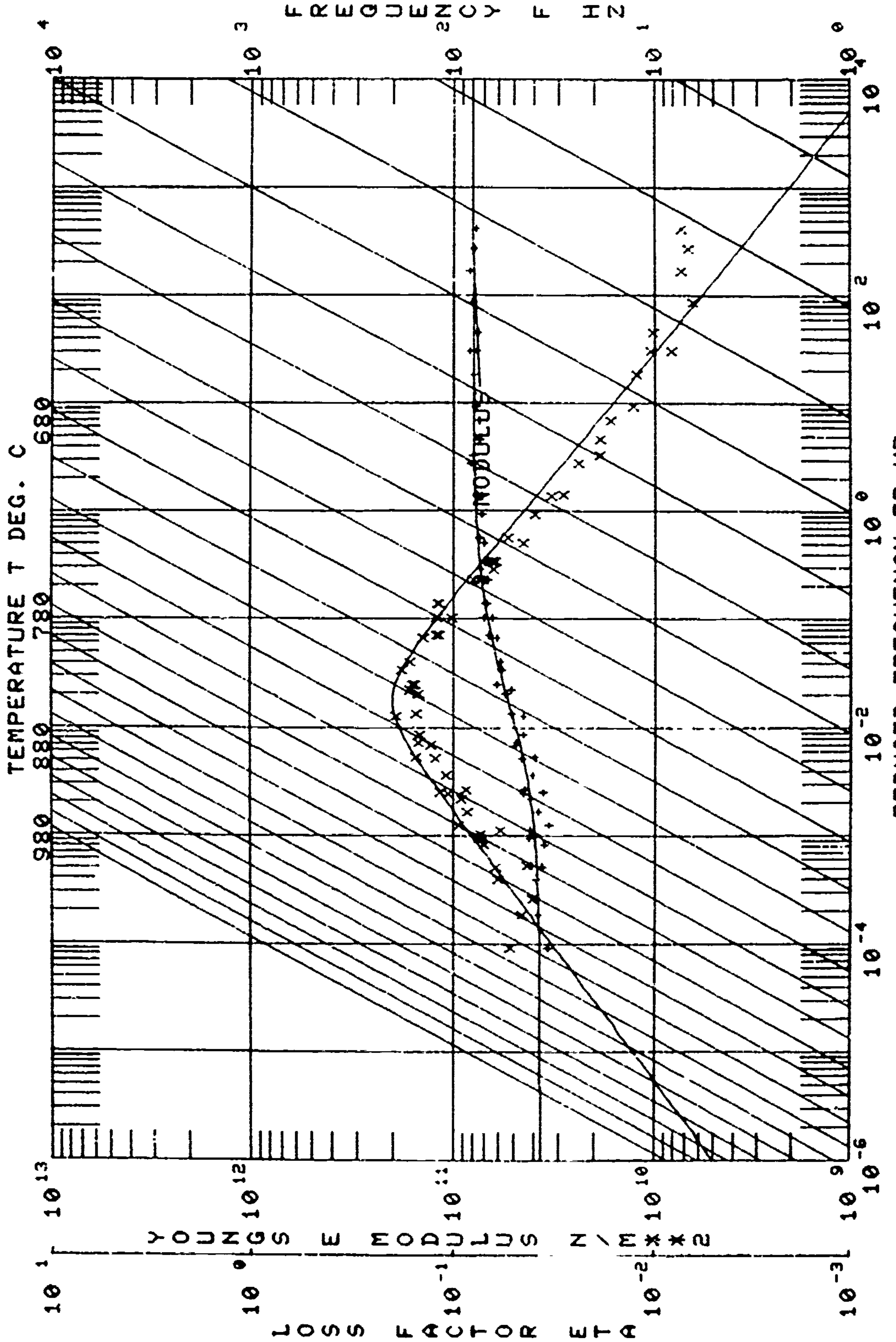
Beam No. 01-58-3

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1200	3	291.35	263.50	290.46	292.48	2.02	.00693	.00603	
1200	4	571.74	513.20	570.06	573.30	3.26	.00570	.00530	
1200	5	942.56	854.80	940.32	944.45	4.13	.00438	.00390	
1200	6	1406.28	1278.20	1406.19	1411.68	5.49	.00390	.00344	
1150	2	104.93	94.55	104.72	103.27	0.55	.00524	.00407	
1150	3	294.04	266.16	293.52	294.58	1.06	.00360	.00271	
1150	4	576.25	519.95	575.42	577.17	1.75	.00304	.00265	
1150	5	949.95	861.20	948.93	951.43	2.50	.00263	.00219	
1150	6	1419.34	1288.46	1417.50	1421.10	3.60	.00254	.00211	
1100	2	105.83	95.14	105.69	106.00	0.31	.00293	.00179	
1100	3	296.24	267.10	295.98	296.60	0.62	.00209	.00138	
1100	4	580.55	521.60	580.10	581.26	1.16	.00200	.00162	
1100	5	957.78	866.20	956.34	958.10	1.76	.00184	.00142	
1100	6	1429.03	1296.00	1427.88	1430.64	2.76	.00193	.00152	
1050	2		95.79						
1050	3		268.50						
1050	4		526.52						
1050	5		871.93						
1050	6		1304.21						

EXPERIMENTAL CODE : 82
MATERIAL :01-58-3
DATA SOURCES
MANUFACTURER :O'HOMMEL R-1251
AFML :UDREI BEAM COATED ONE SIDE 15 JUNE
OTHER :N

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	3.49452E+10	.0535	871.1	92.2	2.	1.62297E+11	.0067	88.2	1.86820E+09
2	3.96306E+10	.0416	871.1	260.6	3.	1.62546E+11	.0057	247.2	1.64724E+09
3	3.74038E+10	.0628	871.1	510.5	4.	1.63841E+11	.0082	486.3	2.35047E+09
4	3.61083E+10	.0723	871.1	843.6	5.	1.64579E+11	.0092	805.7	2.60927E+09
5	3.41856E+10	.0960	871.1	1257.5	6.	1.65772E+11	.0116	1205.7	3.28129E+09
6	3.66382E+10	.1191	843.3	1271.6	6.	1.68381E+11	.0150	1215.1	4.36355E+09
7	3.87130E+10	.0876	843.3	853.2	5.	1.67175E+11	.0116	812.0	3.39211E+09
8	4.22753E+10	.0443	843.3	263.6	3.	1.65147E+11	.0064	249.1	1.87167E+09
9	3.85507E+10	.0465	843.3	93.5	2.	1.64808E+11	.0062	88.9	1.79381E+09
10	3.98651E+10	.0610	815.6	94.4	2.	1.67788E+11	.0083	89.7	2.43325E+09
11	4.28049E+10	.0595	815.6	266.3	3.	1.68759E+11	.0085	251.9	2.54585E+09
12	4.25187E+10	.0940	815.6	521.8	4.	1.68968E+11	.0133	493.8	3.99540E+09
13	4.13047E+10	.1111	815.6	862.6	5.	1.69738E+11	.0153	818.2	4.58907E+09
14	4.05871E+10	.1567	815.6	1288.5	6.	1.70924E+11	.0212	1224.3	6.36108E+09
15	4.61478E+10	.1977	787.8	1308.7	6.	1.73519E+11	.0292	1233.5	9.12325E+09
16	4.59866E+10	.1503	787.8	875.0	5.	1.72349E+11	.0223	824.5	6.91334E+09
17	4.66148E+10	.1263	787.8	528.8	4.	1.71564E+11	.0190	497.6	5.88690E+09
18	4.55288E+10	.0880	787.8	269.3	3.	1.71450E+11	.0130	253.9	4.00570E+09
19	4.29748E+10	.0764	787.8	95.5	2.	1.70418E+11	.0108	90.4	3.28288E+09
20	4.60464E+10	.1077	760.0	96.7	2.	1.73181E+11	.0159	91.1	4.96096E+09
21	5.04034E+10	.1334	760.0	273.1	3.	1.74026E+11	.0210	255.8	6.72166E+09
22	5.30420E+10	.1564	760.0	537.6	4.	1.74166E+11	.0256	501.4	8.29687E+09
23	5.28144E+10	.1671	760.0	889.9	5.	1.74917E+11	.0272	830.6	8.82743E+09
24	5.88179E+10	.1844	760.0	1342.7	6.	1.76077E+11	.0323	1242.6	1.08452E+10
25	6.58326E+10	.1239	732.2	1365.0	6.	1.78783E+11	.0232	1252.1	8.15926E+09
26	6.26065E+10	.1433	732.2	909.2	5.	1.77806E+11	.0260	837.4	8.97162E+09
27	5.95565E+10	.1679	732.2	546.6	4.	1.77049E+11	.0295	505.5	1.00016E+10
28	5.64382E+10	.1526	732.2	277.5	3.	1.76813E+11	.0258	257.8	8.61297E+09
29	5.03950E+10	.1528	732.2	98.1	2.	1.76236E+11	.0239	91.9	7.70239E+09
30	6.22959E+10	.1590	704.4	100.3	2.	1.78312E+11	.0287	92.5	9.90795E+09
31	6.80891E+10	.1250	704.4	284.0	3.	1.79498E+11	.0239	259.7	8.51329E+09
32	7.14852E+10	.1209	704.4	559.6	4.	1.79917E+11	.0239	509.6	8.64574E+09
33	7.06442E+10	.0767	704.4	923.9	5.	1.79829E+11	.0150	842.2	5.41768E+09
34	7.18903E+10	.0655	704.4	1384.5	6.	1.81333E+11	.0129	1261.0	4.70583E+09
35	7.39580E+10	.0332	676.7	1395.9	6.	1.83789E+11	.0066	1269.5	2.45585E+09
36	7.41208E+10	.0402	676.7	933.9	5.	1.82585E+11	.0081	848.6	2.97985E+09
37	7.67081E+10	.0555	676.7	566.0	4.	1.81857E+11	.0114	512.3	4.25367E+09
38	7.55168E+10	.0652	676.7	288.2	3.	1.81508E+11	.0133	261.2	4.92704E+09
39	7.26214E+10	.1045	676.7	102.4	2.	1.80828E+11	.0208	93.1	7.59115E+09
40	7.19617E+10	.0465	648.9	102.9	2.	1.83714E+11	.0091	93.9	3.34278E+09
41	7.85206E+10	.0292	648.9	291.3	3.	1.84719E+11	.0060	263.5	2.29342E+09
42	8.33125E+10	.0245	648.9	571.7	4.	1.82468E+11	.0053	513.2	2.04192E+09
43	7.66647E+10	.0192	648.9	942.6	5.	1.85250E+11	.0039	854.8	1.47414E+09
44	7.75881E+10	.0105	621.1	1419.3	6.	1.89317E+11	.0021	1288.5	8.12409E+08
45	7.80937E+10	.0108	621.1	949.9	5.	1.88034E+11	.0022	861.2	8.41229E+08
46	8.14343E+10	.0126	621.1	576.2	4.	1.87299E+11	.0027	519.9	1.02996E+09
47	7.94584E+10	.0132	621.1	294.0	3.	1.88467E+11	.0027	266.2	1.04868E+09
48	8.21181E+10	.0193	621.1	104.9	2.	1.86465E+11	.0041	94.6	1.58190E+09
49	8.49784E+10	.0084	593.3	105.8	2.	1.88799E+11	.0018	95.1	7.09897E+08

50	8.30929E+10	.0066	593.3	296.2	3.	1.89800E+11	.0014	267.1	5.44828E+08
51	8.53057E+10	.0075	593.3	580.6	4.	1.88490E+11	.0016	521.6	6.42685E+08
52	8.04790E+10	.0069	593.3	957.3	5.	1.90224E+11	.0014	866.2	5.55274E+08
53	7.92547E+10	.0075	593.3	1429.0	6.	1.91539E+11	.0015	1296.0	5.94010E+08
54	6.23155E+10	.1630	704.4	:00.0	2.	1.77080E+11	.0296	92.1	1.01558E+10
55	6.79690E+10	.1209	704.4	283.9	3.	1.79498E+11	.0231	259.7	8.22034E+09
56	7.06668E+10	.1226	704.4	559.0	4.	1.79917E+11	.0240	509.6	8.66413E+09
57	6.93692E+10	.0814	704.4	922.2	5.	1.79829E+11	.0157	842.2	5.64801E+09
58	7.09563E+10	.0628	704.4	1382.7	6.	1 81333E+11	.0123	1261.0	4.45717E+09
59	4.03150E+10	.0748	843.3	516.4	4.	1.66357E+11	.0103	490.0	3.01530E+09
60	7.64944E+10	.0171	648.9	1408.3	6.	1.86314E+11	.0034	1278.2	1.30426E+09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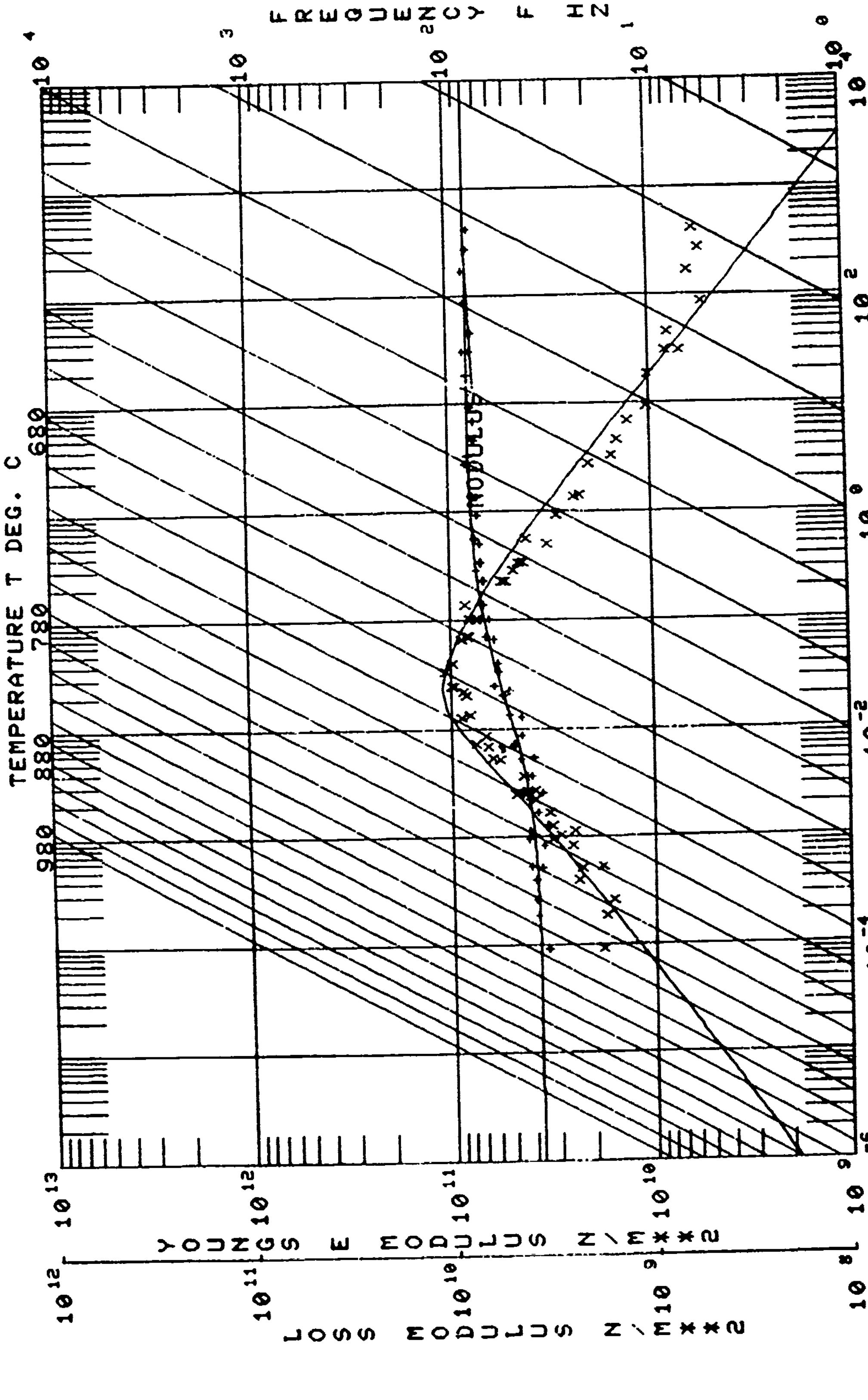
780
880
980
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS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680
780
880
980
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-58-4

Date 7/10/79

Damping Material Two layers: first 74.5% SiO_2 + 10.75% CaO + 6.375% $KHCO_3$ + 6.375% Na_2O + 2% Co_2O_3; second O. Hommel R-1251

Material Thickness 0.0168 cm Material Density 2.68 g/cc

Fixture No. 2 Beam Thickness 0.0970 cm

Beam Density 9.13 g/cc Beam Length 21.623 cm

Temperature Test Range: Between 870 °C and 620 °C

Frequency Test Range: Between 88 Hz and 1,421 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.15		Temperature	705 °C
	1,000 Hz	η_D 0.15		Temperature	760 °C
Range	100 Hz	665 °C	745 °C		
	1,000 Hz	715 °C	810 °C		

Complex Modulus E_D":

Peak	100 Hz	9×10^9 PAS		Temperature	675 °C
	1,000 Hz	9×10^9 PAS		Temperature	750 °C
Range	100 Hz	675 °C	725 °C		
	1,000 Hz	720 °C	780 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-58-4
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM         N          ML
               A1            A2          A3         A4
    600.0  8.0000E-02  5.5000E+10      .600  4.0000E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH        FROL        C
            B1       B2        B3         B4         B5
   600.0     .162     .380    -.450  7.5000E-02     .600
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Retest of 01-58-2 after 376 hours at 870°C. Resumed thermal soak: total soak was 927 hours at 870°C. Coating held up well, but disc came off beam; will not retest.

TABLE 10-E

Beam No. 91-59-4

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1600	2	93.26	88.21	92.58	93.93	1.35	.01448	.00738	
1600	3	262.66	247.18	261.29	265.11	3.82	.01454	.00794	
1600	4	515.21	486.30	512.56	518.09	5.53	.01073	.00803	
1600	5	850.04	805.70	844.93	854.30	9.37	.01102	.00860	
1600	6	1268.10	1205.68	1259.80	1275.30	15.50	.01222	.01041	
1550	2	94.36	88.89	93.75	94.89	1.14	.01208	.00528	
1550	3	266.07	249.15	264.84	267.51	2.75	.0134	.00581	
1550	4	520.73	490.02	517.895	523.59	5.70	.01094	.00924	
1550	5	858.70	812.03	853.35	863.30	10.04	.01169	.01009	
1550	6	1281.22	1215.13	1271.55	1288.99	17.44	.01361	.01231	
1500	2	95.25	89.69	94.76	95.83	1.07	.01123	.00693	
1500	3	268.77	251.86	267.22	270.46	3.24	.01205	.00885	
1500	4	527.21	293.85	522.83	530.41	7.58	.01438	.01319	
1500	5	866.90	818.23	861.46	874.20	12.74	.01470	.01348	
1500	6	1293.92	1224.27	1281.45	1303.67	22.22	.01717	.01616	
1450	2	96.49	90.39	95.79	97.01	1.22	.01264	.00964	
1450	3	271.61	253.86	269.99	273.57	3.58	.01318	.01093	
1450	4	531.88	497.63	528.34	537.27	8.93	.01679	.01588	
1450	5	878.26	824.50	869.12	886.41	17.29	.01969	.01871	
1450	6	1308.74	1233.53	1285.83	1314.86	34.03	.0260	.02518	
1400	2	97.66	91.20	97.07	98.39	1.32	.01352	.01142	
1400	3	275.14	255.76	273.40	278.11	4.71	.01712	.01537	
1400	4	540.08	501.39	534.94	545.50	10.46	.01937	.01865	

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1400	5	892.22	830.62	880.53	904.63	24.10	.02701	.02619	
1400	6	1346.90	1242.59		1353.54				X
1350	2	98.55	91.92	97.34	99.66	2.32	.02354	.02191	
1350	3	279.30	257.80	276.15	282.94	6.79	.02431	.02290	
1350	4	545.78	505.62	540.17	552.49	12.32	.02257	.02198	
1350	5	907.93	837.45	896.15	919.03	22.88	.02520	.02450	
1350	6		1252.10						
1350	2	98.08	91.92	96.93	99.16	2.23	.02274	.02111	
1350	3	279.29	257.80	275.79	282.87	7.08	.02535	.02394	
1350	4	548.12	505.62	540.92	555.09	14.17	.02565	.02526	
1350	5	905.28	837.45	883.16	914.79	31.63	.03494	.03424	
1350	6	1332.79	1252.10	1327.20	1340.77	26.67	.02001	.01941	X
1300	2	99.82	92.46	98.53	101.21	2.68	.02685	.02544	
1300	3	283.31	259.75	279.97	287.11	7.14	.02520	.02400	
1300	4	558.10	509.60	552.50	564.99	12.49	.02238	.02189	
1300	5	919.03	842.20	909.62	926.39	16.77	.01825	.01766	
1300	6	1343.21	1261.00	1335.60	1348.18	25.90	.01928	.01874	X
1250	2	102.10	93.11	101.02	103.34	2.32	.02272	.02142	
1250	3	288.57	261.20	286.10	290.77	4.67	.01618	.01516	
1250	4	566.21	512.34	563.14	569.47	6.33	.01118	.01075	
1250	5	930.90	848.63	926.18	934.69	6.51	.00914	.00862	
1250	6	1354.68	1269.51	1349.09	1360.01	21.64	.01597	.01547	[illegible]
1200	2	103.62	93.85	103.04	104.2[illegible]	1.16	.01119	.0099[illegible]	

TABLE 10-E (Concluded)

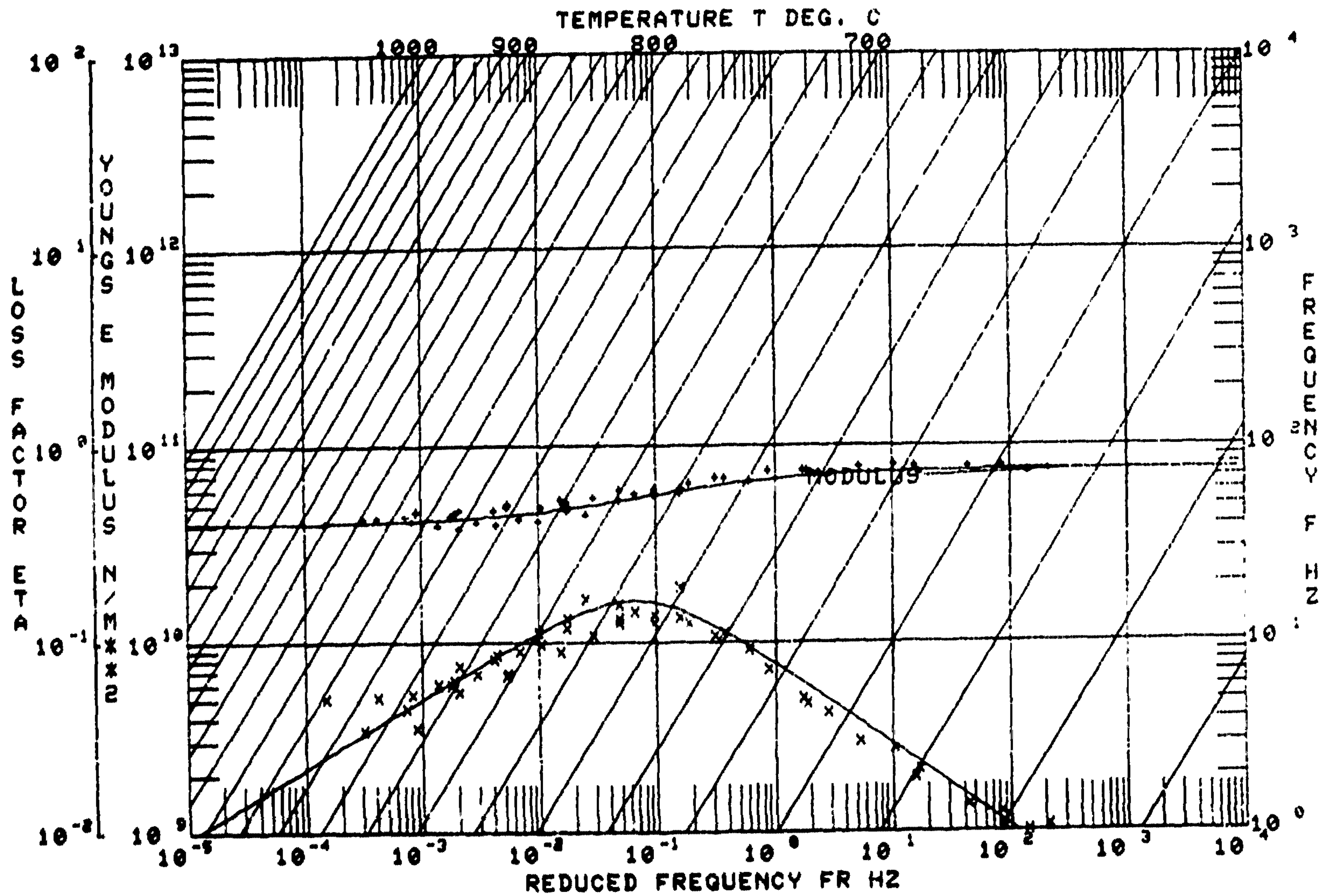
Beam No. 01-58-4

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1200	3	291.85	263.50	290.62	292.75	2.13	.00730	.00640	
1200	4	571.01	513.20	569.80	573.49	3.69	.00646	.00606	
1200	5	938.79	854.80	936.63	941.12	4.49	.00478	.00430	
1200	6	1360.80	1278.20	1357.50	1366.40	17.49	.01285	.01239	X
1150	2	104.69	94.55	104.41	104.96	0.55	.00525	.00408	
1150	3	294.24	266.16	293.76	294.89	1.13	.00384	.00294	
1150	4	576.07	519.95	575.21	577.00	1.79	.00311	.00272	
1150	5	946.31	861.20	945.23	947.57	2.34	.00247	.00203	
1150	6	1419.34	1288.46	1417.49	1421.23	3.74	.00264	.00221	

EXPERIMENTAL CODE : 92
MATERIAL :01-58-4
DATA SOURCES
MANUFACTURER :NONE
AFML :UDRI BEAM COATED ONE SIDE IO JULY 1979
OTHER :NO

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	4.07814E+10	.0519	871.1	93.3	2.	1.60909E+11	.0074	88.2	2.11465E+09
2	4.23754E+10	.0552	871.1	515.2	4.	1.62440E+11	.0080	486.3	2.33816E+09
3	4.01434E+10	.0618	871.1	850.0	5.	1.63172E+11	.0086	805.7	2.48239E+09
4	3.86424E+10	.0776	871.1	1268.1	6.	1.64354E+11	.0104	1205.7	2.99717E+09
5	4.07134E+10	.0891	843.3	1281.2	6.	1.66941E+11	.0123	1215.1	3.62841E+09
6	4.37843E+10	.0355	843.3	94.4	2.	1.63399E+11	.0053	88.9	1.55622E+09
7	4.48319E+10	.0464	815.6	95.2	2.	1.66353E+11	.0069	89.7	2.08230E+09
8	4.80347E+10	.0565	815.6	268.8	3.	1.67316E+11	.0089	251.9	2.71616E+09
9	4.83405E+10	.0840	815.6	527.2	4.	1.67523E+11	.0132	493.8	4.05835E+09
10	4.27451E+10	.1140	815.6	1293.9	6.	1.69462E+11	.0162	1224.3	4.87137E+09
11	4.57646E+10	.1704	787.8	1308.7	6.	1.72035E+11	.0252	1233.5	7.80042E+09
12	4.79250E+10	.1217	787.8	878.3	5.	1.70875E+11	.0187	824.5	5.83063E+09
13	4.98229E+10	.1000	787.8	531.9	4.	1.70097E+11	.0159	497.6	4.97990E+09
14	5.04379E+10	.0681	787.8	271.6	3.	1.69984E+11	.0109	253.9	3.43667E+09
15	4.55883E+10	.0651	787.8	96.5	2.	1.70985E+11	.0096	90.9	2.96969E+09
16	5.15774E+10	.0706	760.0	97.7	2.	1.72002E+11	.0114	91.2	3.64328E+09
17	5.47157E+10	.0912	760.0	275.1	3.	1.72538E+11	.0154	255.8	4.99231E+09
18	5.40099E+10	.1575	760.0	892.2	5.	1.73422E+11	.0262	830.6	8.50871E+09
19	6.11160E+10	.1364	732.2	907.9	5.	1.76285E+11	.0245	837.4	8.33725E+09
20	5.79312E+10	.1268	732.2	545.8	4.	1.75603E+11	.0220	505.6	7.34573E+09
21	6.03058E+10	.1282	732.2	279.3	3.	1.75301E+11	.0229	257.8	7.73184E+09
22	5.31781E+10	.1340	732.2	98.6	2.	1.74728E+11	.0219	91.9	7.12820E+09
23	5.00926E+10	.1350	732.2	98.1	2.	1.74728E+11	.0211	91.9	6.76354E+09
24	6.08089E+10	.1408	732.2	548.1	4.	1.75603E+11	.0253	505.6	8.55971E+09
25	5.91350E+10	.1952	732.2	905.3	5.	1.76285E+11	.0342	837.4	1.15417E+10
26	4.92515E+10	.1271	732.2	1332.8	6.	1.77254E+11	.0194	1252.1	6.26024E+09
27	5.04111E+10	.1219	704.4	1343.2	6.	1.79783E+11	.0187	1261.0	6.14404E+09
28	6.63311E+10	.0936	704.4	919.0	5.	1.78291E+11	.0177	842.2	6.20807E+09
29	6.89171E+10	.1130	704.4	558.1	4.	1.78378E+11	.0219	509.6	7.79039E+09
30	6.58760E+10	.1276	704.4	283.3	3.	1.77963E+11	.0240	259.7	8.40822E+09
31	5.84284E+10	.1466	704.4	99.8	2.	1.76787E+11	.0254	92.5	8.56379E+09
32	7.01656E+10	.1096	676.7	102.1	2.	1.79282E+11	.0214	93.1	7.69337E+09
33	7.58942E+10	.0738	676.7	288.6	3.	1.79956E+11	.0152	261.2	5.60210E+09
34	7.11136E+10	.0440	676.7	930.9	5.	1.81024E+11	.0086	848.6	3.12987E+09
35	5.22883E+10	.0989	676.7	1354.7	6.	1.82217E+11	.0155	1269.5	5.17016E+09
36	5.14498E+10	.0810	648.9	1360.8	6.	1.84720E+11	.0124	1278.2	4.16688E+09
37	7.30360E+10	.0218	648.9	938.8	5.	1.83665E+11	.0043	854.8	1.59035E+09
38	8.16199E+10	.0282	648.9	571.0	4.	1.80907E+11	.0061	513.2	2.30484E+09
39	7.91476E+10	.0307	648.9	291.8	3.	1.83139E+11	.0064	263.5	2.42712E+09
40	7.63538E+10	.0487	648.9	103.6	2.	1.82143E+11	.0100	93.9	3.72137E+09
41	7.95867E+10	.0196	621.1	104.7	2.	1.84870E+11	.0041	94.6	1.55982E+09
42	7.93038E+10	.0143	621.1	294.2	3.	1.86855E+11	.0029	266.2	1.13051E+09
43	8.04894E+10	.0130	621.1	576.1	4.	1.85698E+11	.002[illegible]	519.9	1.04700E+09
44	7.45203E+10	.0102	621.1	946.3	5.	1.86426E+11	.0020	861.2	7.63369E+08
45	7.69248E+10	.0110	621.1	1419.3	6.	1.87698E+11	.0022	1288.5	8.43635E+08
46	4.21403E+10	.0707	843.3	858.7	5.	1.65746E+11	.0101	812.0	2.98021E+09
47	4.48355E+10	.0615	843.3	520.7	4.	1.64934E+11	.0092	490.0	2.75839E+09
48	4.74446E+10	.0369	843.3	266.1	3.	1.63735E+11	.0058	249.1	1.74906E+09
49	4.39238E+10	.0826	815.6	866.9	5.	1.68286E+11	.0135	818.2	4.06684E+09

50	5.55915E+10	.1095	760.0	540.1	4.	1.72677E+11	.0186	501.4	6.08757E+09
51	6.02823E+10	.1341	732.2	279.3	3.	1.75301E+11	.0239	257.8	8.08207E+09
52	7.62812E+10	.0522	676.7	566.2	4.	1.80302E+11	.0107	512.3	3.98440E+09
53	4.37868E+10	.0529	871.1	262.7	3.	1.61156E+11	.0079	247.2	2.31573E+09



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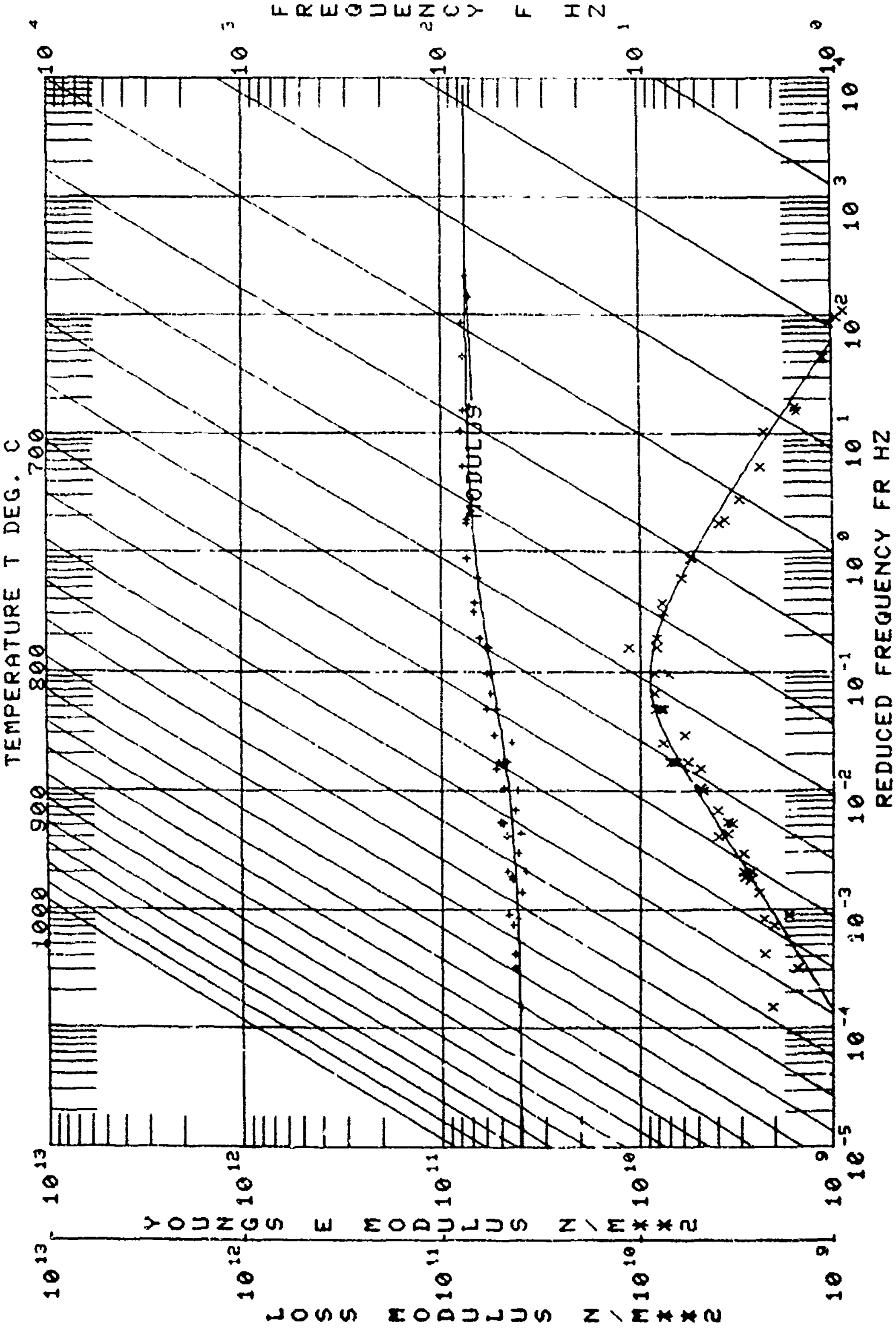
1000
900
800
700
LOSS FACTOR ETA
YOUNGS E MODULUS N/M**2
FREQUENCY F HZ
MODULUS
REDUCED FREQUENCY FR HZ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FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-61-1

Date 3/79

Damping Material Two layers: first 74.5% SiO_2 + 10.75% CaO + 6.375% Na_2O + 6.375% $KHCO_3$ + 2% Co_2O_3; second NiCr

Material Thickness 0.0305 cm Material Density 4.61 g/cc

Fixture No. 2 Beam Thickness 0.0973 cm

Beam Density 9.13 g/cc Beam Length 21.768 cm

Temperature Test Range: Between 955 °C and 595 °C

Frequency Test Range: Between 84 Hz and 1,375 Hz

Loss Factor η_D:

Peak	100 Hz	η_D	0.12	Temperature	705 °C
	1,000 Hz	η_D	0.12	Temperature	745 °C
Range	100 Hz	680 °C	770 °C		
	1,000 Hz	695 °C	840 °C		

Complex Modulus E_D'':

Peak	100 Hz	4.3×10^9 PAS	Temperature	715 °C
	1,000 Hz	4.3×10^9 PAS	Temperature	745 °C
Range	100 Hz	670 °C	765 °C	
	1,000 Hz	690 °C	805 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-16  INITIAL
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM        N          ML
               A1            A2         A3         A4
   600.0  5.9423E-05  1.7556E+10     .132   4.9644E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0    ETAFROL     SL         SH         FROL         C
           B1       B2         B3          B4          B5
   600.0    .150     .310     -.375   5.4468E-02     .800
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J85-16 test 1. Retested as 01-61-2.

TABLE 11-E

Beam No. 01-61-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1750	2	84.87	84.36	84.21	85.56	1.35	.01591	.00891	
1750	3	239.04	236.00	237.97	240.08	4.15	.01735	.01073	X
1750	4	470.77	464.00	467.10	474.49	7.39	.01570	.00980	
1750	5	781.25	769.60	775.02	787.78	12.76	.01633	.01073	
1750	6	1175.35	1153.60	1169.60	1181.37	23.13	.01968	.01496	X
1700	2	85.98	85.13	85.31	86.72	1.41	.01640	.00880	
1700	3	241.94	238.25	241.05	243.06	3.95	.01633	.00923	X
1700	4	476.27	468.30	472.69	480.14	7.45	.01564	.01044	
1700	5	790.50	776.60	783.38	797.10	13.63	.01724	.01277	
1700	6	1186.10	1163.70	1178.34	1196.58	18.24	.01538	.01179	
1650	2	87.16	85.90	86.49	87.88	1.39	.01595	.00825	
1650	3	245.30	240.50	243.43	247.16	3.73	.01521	.00871	
1650	4	482.50	472.50	479.05	486.08	7.03	.01457	.01057	
1650	5	801.04	783.60	795.37	807.10	11.73	.01464	.01112	
1650	6	1201.20	1173.60	1192.70	1211.70	19.00	.01582	.01320	
1600	2	88.40	86.62	87.64	89.04	1.40	.01584	.00874	
1600	3	248.30	242.70	247.33	249.36	3.99	.01607	.00947	X
1600	4	488.53	476.70	484.70	491.87	7.16	.01466	.01196	
1600	5	810.00	790.40	803.60	818.03	14.43	.01781	.01539	
1600	6	1216.20	1183.40	1205.78	1226.10	20.32	.01671	.01490	
1550	2	89.40	87.40	88.68	90.05	1.37	.01532	.00852	
1550	3	250.94	244.80	249.99	251.95	3.85	.01535	.01082	X
1550	4	494.32	481.00	490.14	497.97	7.83	.01584	.01414	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1550	5	821.34	797.10	815.17	828.70	13.53	.01647	.01487	
1550	6	1229.29	1193.20	1218.09	1239.65	21.56	.01754	.01624	
1500	2	90.52	88.14	89.83	91.20	1.37	.01513	.01083	
1500	3	254.22	247.00	252.42	256.66	4.24	.01668	.01348	
1500	4	500.10	485.00	495.20	504.40	9.20	.01840	.01721	
1500	5	831.34	803.80	822.86	839.97	17.11	.02053	.01931	
1500	6	1242.80	1203.00	1226.85	1254.32	27.47	.02210	.02109	
1450	2	91.46	88.87	90.77	92.23	1.46	.01596	.01296	
1450	3	257.03	249.10	255.00	260.12	5.12	.01992	.01767	
1450	4	505.20	489.10	499.64	510.78	11.14	.02205	.02114	
1450	5	842.40	810.20	831.68	853.23	21.55	.02558	.02460	
1450	6	1258.01	1212.40	1244.90	1266.17	41.80	.03323	.03241	X
1400	2	92.65	89.58	91.70	93.44	1.74	.01878	.01668	
1400	3	260.48	251.10	259.22	262.48	6.41	.02460	.02285	X
1400	4	513.75	493.00	505185	520.83	14.98	.02916	.02844	
1400	5	854.80	816.40	842.31	868.35	26.04	.03046	.02964	
1400	6	1266.04	1221.90	1248.67	1283.26	67.98	.05369	.05300	X
1350	2	93.88	90.29	92.69	94.92	2.23	.02375	.02212	
1350	3	264.40	253.10	262.73	266.50	7.41	.02808	.02667	X
1350	4	525.30	496.70	516.13	532.97	16.84	.03206	.03147	
1350	5	871.56	822.60	858.16	884.45	26.29	.03017	.02947	
1350	6	1295.20	1231.10	1282.13	1308.27	51.37	.03966	.03906	X
1300	2	95.51	90.95	94.01	96.93	2.90	.03036	.02895	

TABLE 11-E (Concluded)

Beam No. 01-61-1

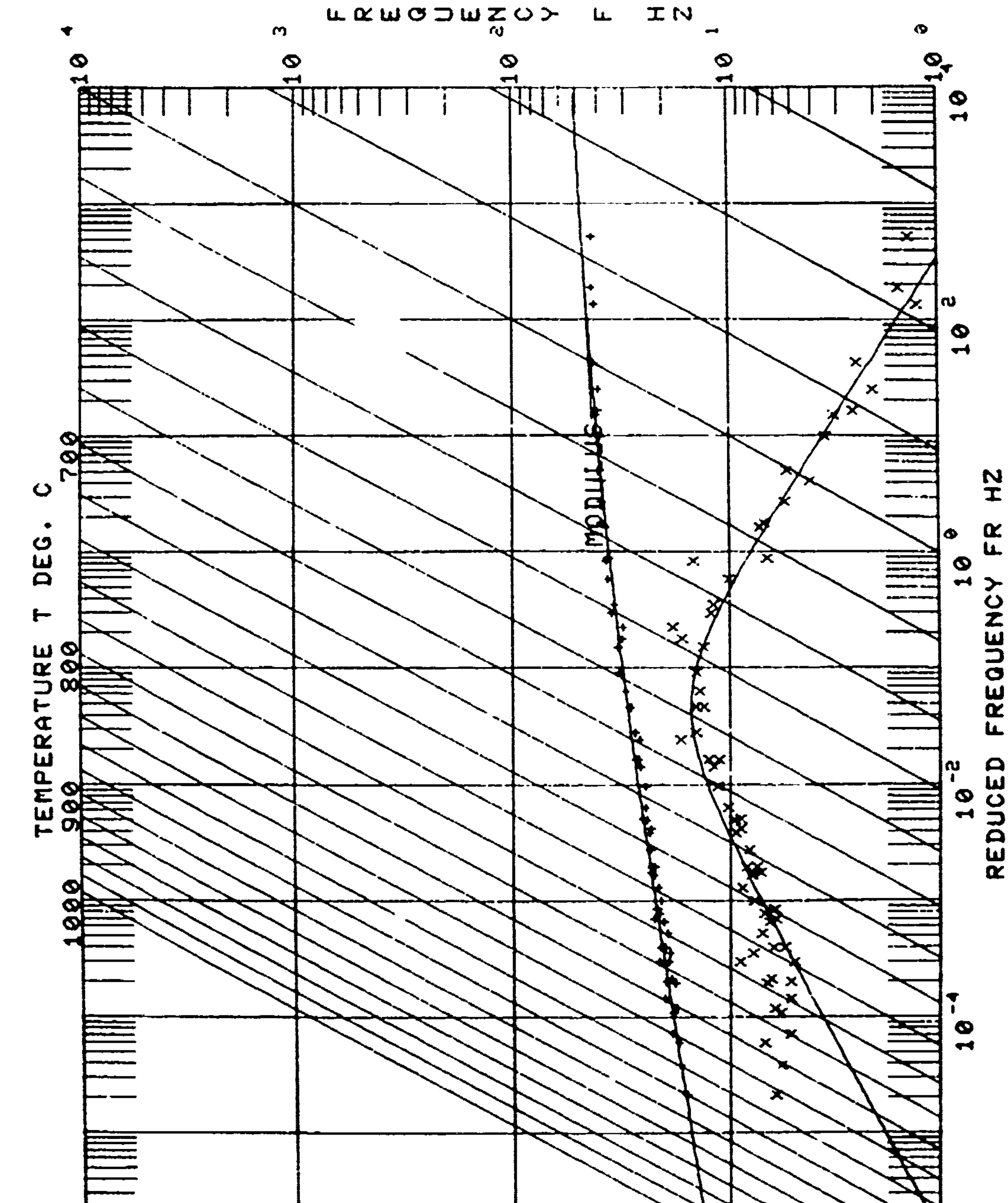
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1300	3	268.76	254.90	266.70	271.80	10.02	.03729	.03609	
1300	4	531.52	500.50	526.60	537.61	11.01	.20710	.02661	
1300	5	886.80	828.70	875.80	897.45	21.65	.02441	.02382	
1300	6	1325.50	1240.00	1317.25	1331.43	27.84	.02101	.01561	X
1250	2	97.56	91.61	96.13	98.98	2.85	.02921	.02791	
1250	3	275.16	256.75	269.51	279.39	9.88	.03591	.03489	
1250	4	540.00	504.20	534.56	545.92	9.36	.01733	.01690	
1250	5	899.35	834.40	893.20	905.70	12.50	.01390	.01338	
1250	6	1343.08	1248.70	1337.34	1351.50	14.16	.01054	.01004	
1200	2	99.29	92.26	98.41	100.20	1.79	.01603	.01681	
1200	3	279.55	258.70	277.56	281.53	3.97	.01420	.01330	
1200	4	546.80	507.60	543.98	548.87	4.89	.00894	.00954	
1200	5	908.15	840.10	905.05	911.27	6.22	.00685	.00637	
1200	6	1355.78	1257.20	1352.08	1359.57	7.49	.00552	.00506	
1150	2	100.49	92.86	100.07	100.99	0.92	.00916	.00799	
1150	3	282.05	260.00	281.09	283.11	2.02	.00716	.00627	
1150	4	552.11	510.30	550.48	553.16	2.64	.00478	.00439	
1150	5	915.86	845.30	914.25	917.53	3.28	.00358	.00314	
1150	6	1366.80	1253.40	1364.50	1368.90	4.40	.00322	.00279	
1100	2	101.41	93.47	101.16	101.67	0.51	.00503	.00389	
1100	3	284.10	261.60	283.57	284.77	1.20	.00427	.00351	
1100	4	556.08	514.00	555.20	556.90	1.70	.00306	.00268	
1100	5	922.50	850.60	921.39	923.44	2.05	.00149	.00107	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	6	1375.80	1273.10	1374.40	1377.50	3.10	.00225	.00184	

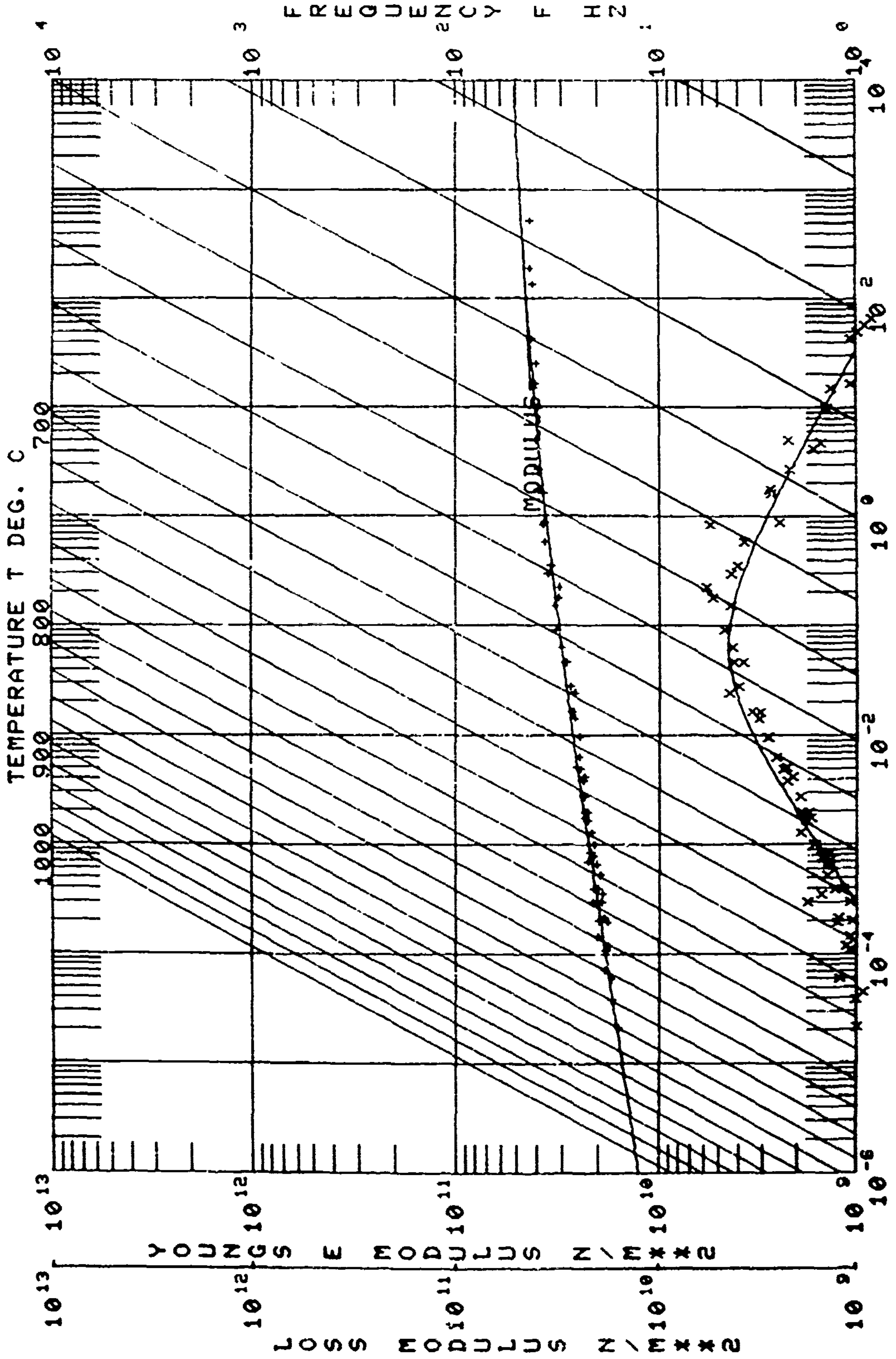
EXPERIMENTAL CODE : 54
MATERIAL :J85-16 INITIAL
DATA SOURCES
MANUFACTURER :N
AFML :UDRI BEAM COATED ONE SIDE
OTHER :TWO LAYER TOP: Ni Cr, BOTTOM: 74.5% Si O2 +10 .75%Ca O+6.37

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	1.61975E+10	.0626	954.4	84.9	2.	1.50383E+11	.0089	84.4	1.01475E+09
2	1.77230E+10	.0702	954.4	239.0	3.	1.50116E+11	.0107	236.0	1.24410E+09
3	1.82351E+10	.0630	954.4	470.8	4.	1.51113E+11	.0098	464.0	1.14945E+09
4	1.84857E+10	.0686	954.4	781.2	5.	1.52129E+11	.0107	769.6	1.26900E+09
5	1.95612E+10	.0924	954.4	1175.4	6.	1.53748E+11	.0150	1153.6	1.80732E+09
6	2.00000E+10	.0726	926.7	1186.1	6.	1.56452E+11	.0118	1163.7	1.45104E+09
7	1.94788E+10	.0796	926.7	790.5	5.	1.54909E+11	.0128	776.6	1.55009E+09
8	1.91478E+10	.0656	926.7	476.3	4.	1.53927E+11	.0104	468.3	1.25606E+09
9	1.86719E+10	.0589	926.7	241.9	3.	1.52992E+11	.0092	238.2	1.09889E+09
10	1.74057E+10	.0593	926.7	86.0	2.	1.53141E+11	.0088	85.1	1.03225E+09
11	1.88350E+10	.0530	898.9	87.2	2.	1.55924E+11	.0082	85.9	9.98692E+08
12	2.04950E+10	.0639	898.9	482.5	4.	1.56700E+11	.0106	472.5	1.31013E+09
13	2.08948E+10	.0666	898.9	801.0	5.	1.57714E+11	.0111	783.6	1.39157E+09
14	2.13929E+10	.0782	898.9	1201.2	6.	1.59126E+11	.0132	1173.6	1.67269E+09
15	2.28144E+10	.0852	871.1	1216.2	6.	1.61794E+11	.0149	1183.4	1.94307E+09
16	2.18943E+10	.0902	871.1	810.0	5.	1.60463E+11	.0154	790.4	1.97386E+09
17	2.17666E+10	.0701	871.1	488.5	4.	1.59498E+11	.0120	476.7	1.52479E+09
18	2.12358E+10	.0563	871.1	248.3	3.	1.58760E+11	.0095	242.7	1.19577E+09
19	2.05857E+10	.0532	871.1	88.4	2.	1.58549E+11	.0087	86.6	1.09415E+09
20	2.15432E+10	.0507	843.3	89.4	2.	1.61417E+11	.0085	87.4	1.09321E+09
21	2.21103E+10	.0632	843.3	250.9	3.	1.61519E+11	.0108	244.8	1.39801E+09
22	2.28922E+10	.0808	843.3	494.3	4.	1.62389E+11	.0141	481.0	1.85061E+09
23	2.37044E+10	.0832	843.3	821.3	5.	1.63195E+11	.0149	797.1	1.97114E+09
24	2.38470E+10	.0909	843.3	1229.3	6.	1.64485E+11	.0162	1193.2	2.16869E+09
25	2.49911E+10	.1155	815.6	1242.8	6.	1.67198E+11	.0211	1203.0	2.88622E+09
26	2.51146E+10	.1048	815.6	831.3	5.	1.65950E+11	.0193	803.8	2.63176E+09
27	2.41691E+10	.0957	815.6	500.1	4.	1.65101E+11	.0172	485.0	2.31275E+09
28	2.35571E+10	.0762	815.6	254.2	3.	1.64435E+11	.0135	247.0	1.79395E+09
29	2.29655E+10	.0623	815.6	90.5	2.	1.64162E+11	.0108	88.1	1.43006E+09
30	2.39070E+10	.0732	787.8	91.5	2.	1.66892E+11	.0130	88.9	1.75048E+09
31	2.46690E+10	.0977	787.8	257.0	3.	1.67243E+11	.0177	249.1	2.41024E+09
32	2.50510E+10	.1159	787.8	505.2	4.	1.67904E+11	.0211	489.1	2.90385E+09
33	2.69927E+10	.1282	787.8	842.4	5.	1.68603E+11	.0246	810.2	3.46026E+09
34	2.66100E+10	.1715	787.8	1258.0	6.	1.69821E+11	.0324	1212.4	4.56392E+09
35	2.94235E+10	.1469	760.0	854.8	5.	1.71193E+11	.0296	816.4	4.32239E+09
36	2.79527E+10	.1458	760.0	513.7	4.	1.70592E+11	.0284	493.0	4.07476E+09
37	2.65551E+10	.1212	760.0	260.5	3.	1.69940E+11	.0228	251.1	3.21745E+09
38	2.56645E+10	.0905	760.0	92.6	2.	1.69570E+11	.0167	89.6	2.32295E+09
39	2.75838E+10	.1153	732.2	93.9	2.	1.72268E+11	.0221	90.3	3.17920E+09
40	2.90067E+10	.1343	732.2	264.4	3.	1.72658E+11	.0267	253.1	3.89589E+09
41	3.27630E+10	.1460	732.2	525.3	4.	1.73162E+11	.0315	496.7	4.78393E+09
42	3.34239E+10	.1352	732.2	871.5	5.	1.73803E+11	.0295	822.6	4.52048E+09
43	3.15354E+10	.1874	732.2	1295.2	6.	1.75100E+11	.0391	1231.1	5.91043E+09
44	3.69988E+10	.0680	704.4	1325.5	6.	1.77641E+11	.0156	1240.0	2.51448E+09
45	3.70875E+10	.1031	704.4	886.8	5.	1.76391E+11	.0238	828.7	3.82262E+09
46	3.45560E+10	.1204	704.4	531.5	4.	1.75822E+11	.0266	500.5	4.15912E+09
47	3.22044E+10	.1707	704.4	268.8	3.	1.75122E+11	.0361	254.9	5.49779E+09
48	3.09292E+10	.1406	704.4	95.5	2.	1.74796E+11	.0289	30.9	4.34905E+09
49	3.57410E+10	.1242	676.7	97.6	2.	1.77342E+11	.0279	91.6	4.43751E+09

50	3.78386E+10	.1497	676.7	275.2	3.	1.77673E+11	.0349	256.7	5.66545E+09
51	3.77881E+10	.0728	676.7	540.0	4.	1.78431E+11	.0169	504.2	2.75047E+09
52	3.99664E+10	.0557	676.7	899.3	5.	1.78825E+11	.0134	834.4	2.22526E+09
53	3.95611E+10	.0422	676.7	1343.1	6.	1.80142E+11	.0100	1248.7	1.67131E+09
54	4.09915E+10	.0210	648.9	1355.8	6.	1.82603E+11	.0051	1257.2	8.60720E+08
55	4.15078E+10	.0261	648.9	908.2	5.	1.81277E+11	.0064	840.1	1.08365E+09
56	4.02279E+10	.0356	648.9	546.8	4.	1.80846E+11	.0035	507.6	1.43386E+09
57	4.11758E+10	.0546	648.9	279.5	3.	1.80383E+11	.0133	258.7	2.24880E+09
58	3.96921E+10	.0705	648.9	99.3	2.	1.79868E+11	.0168	92.3	2.79894E+09
59	4.20359E+10	.0326	621.1	100.5	2.	1.82293E+11	.0080	92.9	1.37048E+09
60	4.29272E+10	.0252	621.1	282.0	3.	1.82200E+11	.0053	260.0	1.08373E+09
61	4.38450E+10	.0141	593.3	284.1	3.	1.84449E+11	.0035	261.6	6.16268E+08
62	4.35422E+10	.0157	593.3	101.4	2.	1.84616E+11	.0039	93.5	6.81551E+08
63	4.28133E+10	.0127	621.1	915.9	5.	1.83528E+11	.0031	845.3	5.44618E+08
64	2.00985E+10	.0533	898.9	245.3	3.	1.55895E+11	.0087	240.5	1.07032E+09



TEMPERATURE T DEG. C
700
800
900
1000
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
700
800
900
1000
FREQUENCY F HZ
MODULUS
REDUCED FREQUENCY FR HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-61-2

Date 3/9/79

Damping Material Two layers: first 74.5% SiO_2 + 10.75% CaO + 6.375% Na_2O + 6.375% $KHCO_3$ + 2% Co_2O_3; second NiCr

Material Thickness 0.0305 cm Material Density 4.61 g/cc

Fixture No. 2 Beam Thickness 0.0973 cm

Beam Density 9.13 g/cc Beam Length 21.768 cm

Temperature Test Range: Between 595 °C and 955 °C

Frequency Test Range: Between 89 Hz and 1,385 Hz

Loss Factor η_D:

Peak	100 Hz	η_D	0.065	Temperature	690 °C
	1,000 Hz	η_D	0.065	Temperature	740 °C
Range	100 Hz	655 °C	720 °C		
	1,000 Hz	705 °C	785 °C		

Complex Modulus E_D'':

Peak	100 Hz	2.6×10^9 PAS	Temperature	685 °C
	1,000 Hz	2.6×10^9 PAS	Temperature	740 °C
Range	100 Hz	655 °C	720 °C	
	1,000 Hz	705 °C	785 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :J85-16 AFTER291 HRS.
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM        N          ML
               A1            A2         A3         A4
   575.0  1.2200E-02  3.8000E+10      .102  2.0000E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH         FROL        C
            B1       B2        B3          B4         B5
   575.0    .065     .310     -.445  5.4500E-02     .500
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: J85-16 second test. Retest of 01-61-1 after 100 hours at 845°C plus 191 hours at 870°C.

TABLE 12-E

Beam No. 01-61-2

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1750	2	89.49	84.36	88.77	90.32	1.55	.017516	.01052	
1750	3	251.44	236.00	249.49	253.14	3.65	.019516	.00772	
1750	5	821.86	769.60	815.60	826.65	11.05	.013445	.00785	
1750	6	1226.60	1153.60	1216.76	1234.90	18.14	.014789	.01007	
1700	2	90.61	85.13	89.84	91.34	1.50	.016554	.00895	
1700	4	500.30	468.30	496.50	502.80	6.30	.012592	.00739	
1700	5	828.91	776.60	824.20	835.06	10.86	.013101	.00845	
1700	6	1239.98	1163.70	1231.34	1247.23	15.89	.012815	.00922	
1650	2	91.90	85.90	91.16	92.49	1.32	.014363	.00666	
1650	3	257.06	240.50	255.14	259.14	3.99	.015521	.00902	
1650	4	505.77	472.50	502.64	508.42	5.78	.011428	.00742	
1650	5	839.89	783.60	835.75	844.36	8.61	.010251	.00673	
1650	6	1254.94	1173.60	1246.43	1261.77	15.34	.012223	.00960	
1600	2	92.95	96.62	92.20	93.45	1.25	.013448	.00635	
1600	3	248.45	242.70	246.14	250.11	3.97	.015979	.00938	
1600	4	510.94	476.70	507.56	512.53	4.97	.009730	.00704	
1600	5	847.73	790.40	843.59	851.58	7.99	.009425	.00731	
1600	6	1266.60	1183.40	1259.12	1272.19	13.07	.010319	.00851	
1550	2	93.84	87.40	93.38	94.38	1.00	.01065	.00385	
1550	3	262.40	244.80	261.28	263.68	2.40	.00915	.00462	
1550	4	515.25	481.00	512.43	518.35	5.92	.01149	.00979	
1550	5	856.42	797.10	851.77	860.27	8.50	.00992	.00832	
1550	6	1279.52	1193.20	1272.87	1286.90	14.03	.01096	.00966	

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1550	2	93.79	87.40	93.32	94.42	1.10	.01172	.00492	
1550	3	262.71	244.80	261.36	263.77	2.41	.00917	.00464	
1550	4	515.86	481.00	513.10	518.08	4.98	.00965	.00795	
1550	5	856.74	797.10	852.24	860.84	8.60	.01004	.00844	
1550	6	1281.65	1193.20	275.52	1288.67	13.15	.01026	.00896	
1500	2	94.94	99.14	94.39	95.27	0.88	.00928	.00498	
1500	3	265.15	247.00	263.73	266.15	2.42	.00913	.00593	
1500	4	519.89	485.00	513.77	522.24	8.47	.01629	.01430	
1500	5	865.05	803.80	860.59	869.82	9.23	.01067	.00945	
1500	6	1293.75	1203.90	1285.32	304.67	0.35	.01067	.00945	
1450	2	95.62	88.87	95.20	96.13	0.93	.00972	.00672	
1450	3	267.30	249.10	265.58	268.48	2.90	.01084	.00860	
1450	4	527.60	489.10	525.11	531.42	6.31	.01196	.01105	
1450	5	872.60	810.20	867.76	878.71	10.95	.01255	.01157	
1450	6	1306.05	1212.40	1294.72	1322.53	27.81	.02129	.02047	
1400	2	96.60	89.58	96.01	97.01	1.06	.01035	.00825	
1400	3	270.12	251.10	268.13	273.06	4.93	.01825	.01650	
1400	4	531.47	493.00	528.57	534.30	5.73	.01078	.01006	
1400	5	883.03	816.40	878.95	885.43	12.73	.01442	.01360	Y
1400	6	1321.82	1229.90	1301.93	1348.40	46.47	.03516	.03446	
1350	2	97.54	90.29	96.85	98.00	1.15	.01179	.01016	
1350	3	275.8c	253.10	[illegible]	280.22	9.02	.01494	.01353	
1350	4	536.68	496.70	[illegible]	[illegible]	9.45	.01751	.01692	

TABLE 12-E (Concluded)

Beam No. 01-61-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1350	5	892.72	822.60	886.15	899.95	13.80	.01545	.01476	
1350	6	1335.26	1231.10	1325.46	1348.11	22.65	.01690	.01636	
1300	2	98.52	90.95	97.67	91.16	1.49	.01512	.01371	
1300	3	276.93	254.90	273.53	278.94	6.41	.01953	.01833	
1300	4	542.20	500.50	534.16	545.16	11.00	.02028	.01979	
1300	5	901.89	828.70	896.59	908.24	11.65	.01291	.01232	
1300	6	1348.00	1240.00	1342.33	1356.59	14.26	.01057	.01003	
1250	2	99.70	91.61	98.89	100.45	1.56	.01565	.01435	
1250	3	280.55	256.75	277.78	281.79	3.81	.01360	.01258	
1250	4	549.06	504.20	546.20	551.54	5.34	.00973	.00930	
1250	5	911.35	834.40	907.78	914.38	6.60	.00724	.00672	
1250	6	1360.90	1248.70	1356.80	1364.70	7.90	.00580	.00530	
1200	2	100.82	92.26	100.26	101.35	1.09	.01081	.00953	
1200	3	282.56	258.70	281.38	283.58	2.20	.00779	.00689	
1200	4	553.27	507.60	551.86	554.96	3.10	.00560	.00520	
1200	5	917.92	840.10	915.95	919.93	3.98	.00434	.00386	
1200	6	1369.20	1257.20	1366.90	1371.70	4.80	.00351	.00305	
1150	2	101.70	92.88	101.39	101.69	0.57	.00550	.00443	
1150	3	284.58	261.00	284.10	285.24	1.23	.00432	.00343	
1150	4	557.40	510.90	556.61	558.33	1.72	.00309	.00270	
1150	5	924.29	845.30	923.21	925.48	2.27	.00246	.00202	
1150	6	1378.34	1265.40	1377.02	1380.68	3.06	.00222	.00179	
1100	2	102.24	93.47	102.06	102.40	0.34	.00332	.00218	

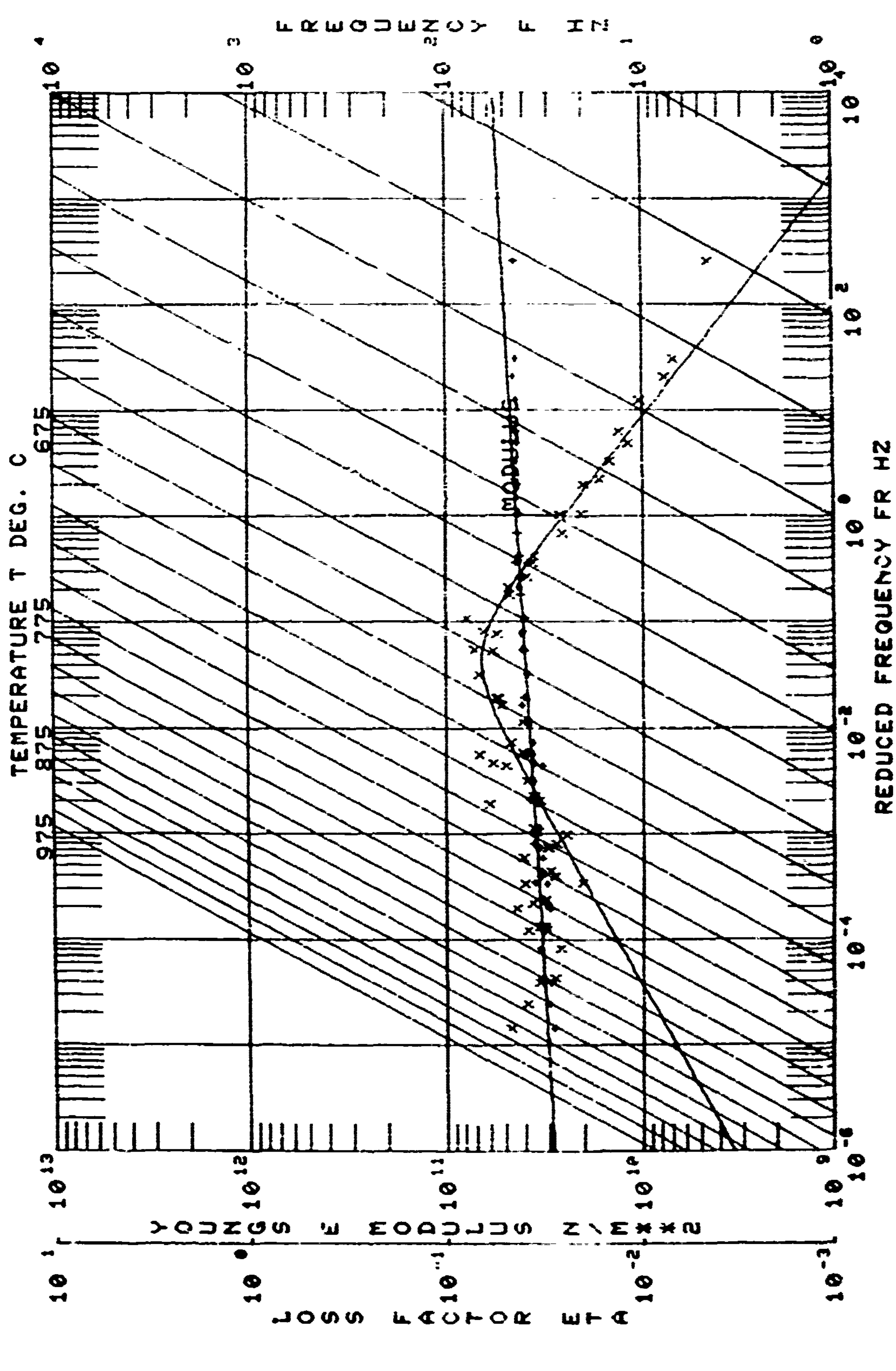
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1100	3	286.78	261.60	285.88	286.86	0.80	.00279	.00208	
1100	4	560.58	514.00	560.04	561.26	1.22	.00217	.00179	
1100	5	929.64	850.60	928.85	930.44	1.61	.00173	.00131	
1100	6	1386.00	1273.10	1384.84	1387.09	2.20	.00158	.00117	

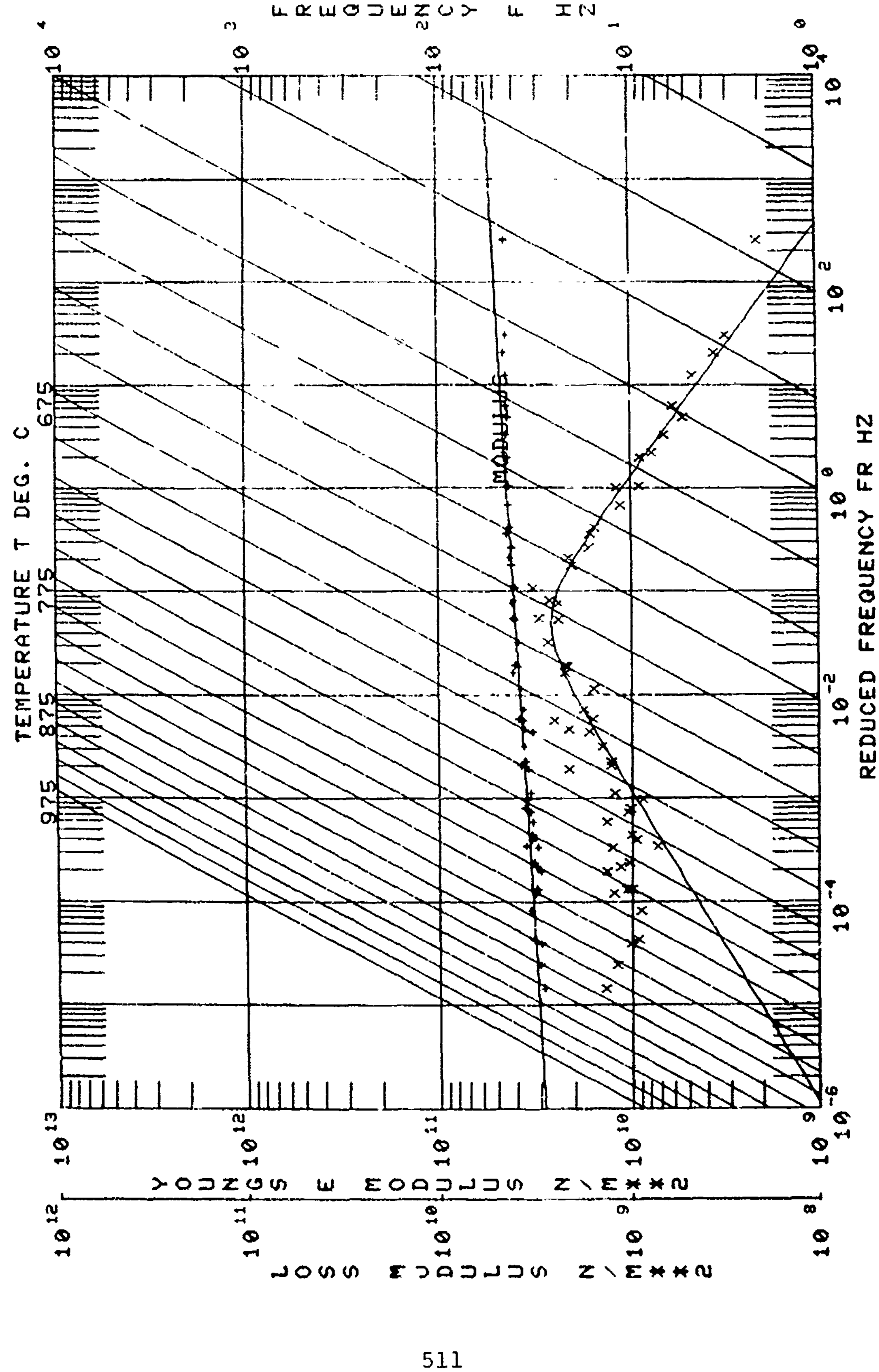
EXPERIMENTAL CODE : 57
MATERIAL :J85-16 AFTER291 HRS.
DATA SOURCES
MANUFACTURER :UDRI BEAM COATED ONE SIDE,20 MAR79
AFML :N
OTHER :2 LAYER DAMPING TREATMENT

01-61-2

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	2.92697E+10	.6479	954.4	89.5	2.	1.50383E+11	.0105	84.4	1.40181E+09
2	3.03801E+10	.0342	954.4	251.4	3.	1.50116E+11	.0077	236.0	1.04047E+09
3	3.14236E+10	.0344	954.4	821.9	5.	1.52129E+11	.0079	769.6	1.07976E+09
4	3.05580E+10	.0452	954.4	1226.6	6.	1.53748E+11	.0101	1153.6	1.38152E+09
5	3.16954E+10	.0409	926.7	1240.0	6.	1.56452E+11	.0092	1163.7	1.29555E+09
6	3.18541E+10	.0371	926.7	828.9	5.	1.54909E+11	.0084	776.6	1.18169E+09
7	3.19073E+10	.0323	926.7	500.3	4.	1.53927E+11	.0074	468.3	1.02977E+09
8	3.07196E+10	.0399	926.7	90.6	2.	1.53141E+11	.0090	85.1	1.22685E+09
9	3.27225E+10	.0289	898.9	91.9	2.	1.55924E+11	.0067	85.9	9.44154E+08
10	3.24522E+10	.0393	898.9	257.1	3.	1.55895E+11	.0090	240.5	1.27485E+09
11	3.30347E+10	.0321	898.9	505.8	4.	1.56700E+11	.0074	472.5	1.05882E+09
12	3.36327E+10	.0289	898.9	839.9	5.	1.57714E+11	.0067	783.6	9.70514E+08
13	3.32488E+10	.0417	898.9	1254.9	6.	1.59126E+11	.0096	1173.6	1.38676E+09
14	3.40806E+10	.0368	871.1	1266.6	6.	1.61794E+11	.0085	1183.4	1.25347E+09
15	3.44095E+10	.0312	871.1	847.7	5.	1.60463E+11	.0073	790.4	1.07466E+09
16	3.37232E+10	.0304	871.1	510.4	4.	1.59498E+11	.0070	476.7	1.02359E+09
17	2.13948E+10	.0555	871.1	248.5	3.	1.58760E+11	.0094	242.7	1.18659E+09
18	3.41461E+10	.0271	871.1	92.9	2.	1.58549E+11	.0064	86.6	9.23814E+08
19	1.95478E+10	.0350	843.3	93.8	2.	1.84024E+11	.0049	93.3	6.83735E+08
20	1.95934E+10	.0329	843.3	262.7	3.	1.84111E+11	.0046	261.4	6.45372E+08
21	1.97224E+10	.0563	843.3	515.9	4.	1.84786E+11	.0080	513.1	1.11047E+09
22	1.98857E+10	.0598	843.3	856.7	5.	1.86554E+11	.0084	352.2	1.18988E+09
23	1.99035E+10	.0639	843.3	1281.6	6.	1.87964E+11	.0090	1275.5	1.27102E+09
24	3.66853E+10	.0587	815.6	1293.7	6.	1.67198E+11	.0139	1203.0	2.15308E+09
25	3.66290E+10	.0396	815.6	865.1	5.	1.65950E+11	.0094	803.8	1.45183E+09
26	3.52345E+10	.0613	815.6	519.9	4.	1.65101E+11	.0143	485.0	2.15933E+09
27	3.55279E+10	.0252	815.6	265.2	3.	1.64435E+11	.0059	247.0	8.95775E+08
28	3.61815E+10	.0209	815.6	94.8	2.	1.64162E+11	.0050	88.1	7.56446E+08
29	3.67668E+10	.0282	787.8	95.6	2.	1.66892E+11	.0067	88.9	1.03756E+09
30	3.60146E+10	.0366	787.8	267.3	3.	1.67243E+11	.0086	249.1	1.31971E+09
31	3.34305E+10	.0508	787.8	527.6	4.	1.74140E+11	.0111	498.1	1.69730E+09
32	3.74503E+10	.0483	787.8	872.6	5.	1.68603E+11	.0116	810.2	1.81013E+09
33	3.77881E+10	.0854	787.8	1306.1	6.	1.69821E+11	.0205	1212.4	3.22778E+09
34	3.93873E+10	.0556	760.0	883.0	5.	1.71193E+11	.0136	816.4	2.18884E+09
35	3.81918E+10	.0418	760.0	531.5	4.	1.70592E+11	.0101	493.0	1.59708E+09
36	3.73772E+10	.0694	760.0	270.1	3.	1.69940E+11	.0165	251.1	2.59255E+09
37	3.80615E+10	.0342	760.0	96.6	2.	1.69570E+11	.0082	89.6	1.30313E+09
38	3.92426E+10	.0418	732.2	97.5	2.	1.72268E+11	.0102	90.3	1.63934E+09
39	3.95041E+10	.0695	732.2	536.7	4.	1.73162E+11	.0169	496.7	2.74575E+09
40	4.10886E+10	.0593	732.2	892.7	5.	1.73803E+11	.0148	822.6	2.43677E+09
41	4.12003E+10	.0659	732.2	1335.3	6.	1.75100E+11	.0164	1231.1	2.71616E+09
42	4.25738E+10	.0400	704.4	1348.0	6.	1.77641E+11	.0100	1240.0	1.70139E+09
43	4.26342E+10	.0488	704.4	901.8	5.	1.76391E+11	.0123	828.7	2.08199E+09
44	4.09743E+10	.0802	704.4	542.2	4.	1.75822E+11	.0198	500.5	3.28710E+09
45	4.17644E+10	.0733	704.4	276.9	3.	1.75122E+11	.0183	254.9	3.05941E+09
46	4.07092E+10	.0556	704.4	98.5	2.	1.74796E+11	.0137	90.9	2.26338E+09
47	4.28795E+10	.0569	676.7	99.7	2.	1.77342E+11	.0144	91.6	2.43847E+09
48	4.37245E+10	.0493	676.7	280.0	3.	1.77673E+11	.0126	256.7	2.15658E+09
49	4.33526E+10	.0367	676.7	549.1	4.	1.78431E+11	.0093	504.2	1.59305E+09

50	4.44748E+10	.0262	676.7	911.3	5.	1.78825E+11	.0067	834.4	1.16434E+09
51	4.40491E+10	.0209	676.7	1360.9	6.	1.80142E+11	.0053	1248.7	9.18878E+08
52	4.44024E+10	.0120	648.9	1369.2	6.	1.82603E+11	.0030	1257.2	5.34839E+08
53	4.52190E+10	.0150	648.9	917.9	5.	1.81277E+11	.0039	840.1	6.72775E+08
54	4.42591E+10	.0205	648.9	553.3	4.	1.80846E+11	.0052	507.6	9.05368E+08
55	4.48665E+10	.0268	648.9	282.6	3.	1.80383E+11	.0069	258.[illegible]	1.20423E+09
56	4.49142E+10	.0370	648.9	100.8	2.	1.79868E+11	.0095	92.3	1.66350E+09
57	4.62280E+10	.0171	621.1	101.7	2.	1.82293E+11	.0044	92.9	7.88573E+08
58	4.50546E+10	.0135	621.1	284.6	3.	1.83604E+11	.0034	261.0	6.06543E+08
59	4.51742E+10	.0106	621.1	557.4	4.	1.83205E+11	.0027	510.9	4.77640E+08
60	4.60462E+10	.0078	621.1	924.3	5.	1.83528E+11	.0020	845.3	3.60458E+08
61	4.50384E+10	.0071	621.1	1378.3	6.	1.84993E+11	.0018	1265.4	3.18149E+08
62	4.54006E+10	.0046	593.3	1386.0	6.	1.87251E+11	.0012	1273.1	2.10151E+08
63	4.21805E+10	.0533	732.2	275.8	3.	1.72658E+11	.0135	253.1	2.24747E+09
64	3.81345E+10	.1456	760.0	1321.8	6.	1.74759E+11	.0345	1229.9	5.55208E+09


TEMPERATURE T DEG. C
675
775
875
975
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA



TEMPERATURE T DEG. C
675
775
875
975
MODULUS
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-62-2

Date 6/4/79

Damping Material Two layers: first 74.5% SiO_2 + 10.75% CaO + 6.375% Na_2O + 6.375% $KHCO_3$ + 2% Co_2O_3; second O. Hommel 1252

Material Thickness 0.0183 cm Material Density 2.64 g/cc

Fixture No. 2 Beam Thickness 0.0975 cm

Beam Density 9.13 g/cc Beam Length 21.75 cm

Temperature Test Range: Between 870 °C and 620 °C

Frequency Test Range: Between 84 Hz and 1,400 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.70	Temperature	765 °C
	1,000 Hz	η_D 0.70	Temperature	830 °C
Range	100 Hz	720 °C	830 °C	
	1,000 Hz	770 °C	895 °C	

Complex Modulus E_D":

Peak	100 Hz	1×10^{10} PAS	Temperature	715 °C
	1,000 Hz	1×10^{10} PAS	Temperature	765 °C
Range	100 Hz	665 °C	760 °C	
	1,000 Hz	720 °C	815 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-62-2
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM          N          ML
               A1            A2          A3          A4
   600.0   6.0000E-03   1.0300E+10     .500   1.9000E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL      SL        SH         FROL        C
            B1        B2        B3          B4         B5
   600.0     .730     .700    -.660   4.0000E-03    1.600
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Retested three times: 01-62-3, 01-62-4, and 01-62-5.

TABLE 13-E

Beam No. 01-62-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1600	2	84.60	86.40	83.99	85.21	1.22	.01442	.00732	
1600	3	238.08	243.00	236.37	240.72	4.35	.01827	.01167	
1600	4	469.08	476.50	466.07	472.64	6.39	.01362	.01092	
1600	5	777.97	789.50	771.52	784.34	12.82	.01648	.01406	
1600	6	1166.06	1182.00	1154.45	1177.72	23.27	.01996	.01815	
1550	2	85.79	87.16	85.09	86.31	1.22	.01442	.00762	
1550	4	474.78	480.40	470.70	480.01	9.31	.01961	.01791	
1550	5	786.83	795.80	777.26	795.28	18.02	.02292	.02132	
1550	6	1179.92	1191.00	1152.07	1193.68	31.61	.02679	.02549	
1500	2	87.00	87188	86.08	87.67	1.61	.01851	.01421	
1500	4	483.64	484.20	476.20	493.12	16.29	.03498	.03379	
1500	5	791.62	801.90	781.70	804.30	22.60	.02855	.02733	
1500	6	1193.20	1200.00						
1450	2	88.43	88.60	87.32	89.45	2.13	.02409	.02109	
1450	3	248.37	248.90	245.21	249.95	9.32	.03750	.03525	X
1450	4	491.39	488.00	480 11	499.74	19.63	.03995	.03957	
1450	5	816.16	808.00	810.25	826.73	32.29	.03968	.03870	X
1450	6	1229.85	1209.10	1220.17	1247.87	54.43	.04426	.04344	
1400	2	90.20	89.30	88.82	92.03	3.21	.03559	.03349	
1400	3	254.88	250.80	251.93	257.97	11 87	.04657	.04482	X
1400	4	508.58	491.70	495.89	524.52	28.63	.05629	.05557	
1400	5	835.02	814.00	813.67	855.34	41.67	.04990	.04908	
1400	6	1263.56	1218.10	1240.52	1281.17	40.65	.03217	.03148	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1350	2	92.68	89.96	90 77	94.83	4.06	.04381	.04218	
1350	3	261.83	252.70	257.29	264.77	14.70	.05694	.05533	X
1350	4	520.77	495.50	513.47	534.03	20.56	.03948	.03888	
1350	5	[illegible]59.89	820.00	842.43	876.24	33.81	.03932	.03862	
1350	6	1293.34	1227.10	1281.72	1303.86	43.51	.03364	.03304	X
1350	2	92.49	89.98	90.00	94.04	4.04	.04368	.04205	
1350	3	261.92	252.70	258.20	264.32	11.85	.04524	.04383	X
1350	4	522.36	495.50	512 [illegible]	536.97	24.97	.04780	.04721	
1350	5	860.56	820.00	848.68	867.86	37.69	.04380	.04310	X
1350	6	1295.59	1227.10	1286.67	1305.60	37.20	.02871	.02811	X
1300	2	95.00	90.64	92.10	96.24	4.14	.04358	.04217	
1300	3	[illegible].34	254.60	260.67	274.17	8.50	.03155	.03035	
1300	4	535.08	498.90	527.15	543.35	16.20	.03028	.02973	
1300	5	881.57	825.90	874.43	886.93	24.57	.02787	.02728	
1300	6	1370.29	1236.00	1360.48	1380.48	20.00	.01458	.01404	
1250	2	97.37	91.30	95.89	98.39	2.50	.02568	.02438	
1250	3	274.94	256.45	272.25	278.08	5.83	.02120	.02018	
1250	4	539.60	502.40	535.68	542.88	7.20	.01334	.01291	
1250	5	897.01	831.80	886.73	897.95	11.23	.01258	.01206	
1250	6	1386.90	1244.50	1376.91	1397.51	20.60	.01485	.01435	
1200	2	99.36	91.92	98.75	99.96	1.21	.01218	.01096	
1200	3	278.91	258.25	277.56	280.08	2.52	.00904	.00814	
1200	4	545.87	505.60	544.13	547.58	3.45	.00632	.00592	

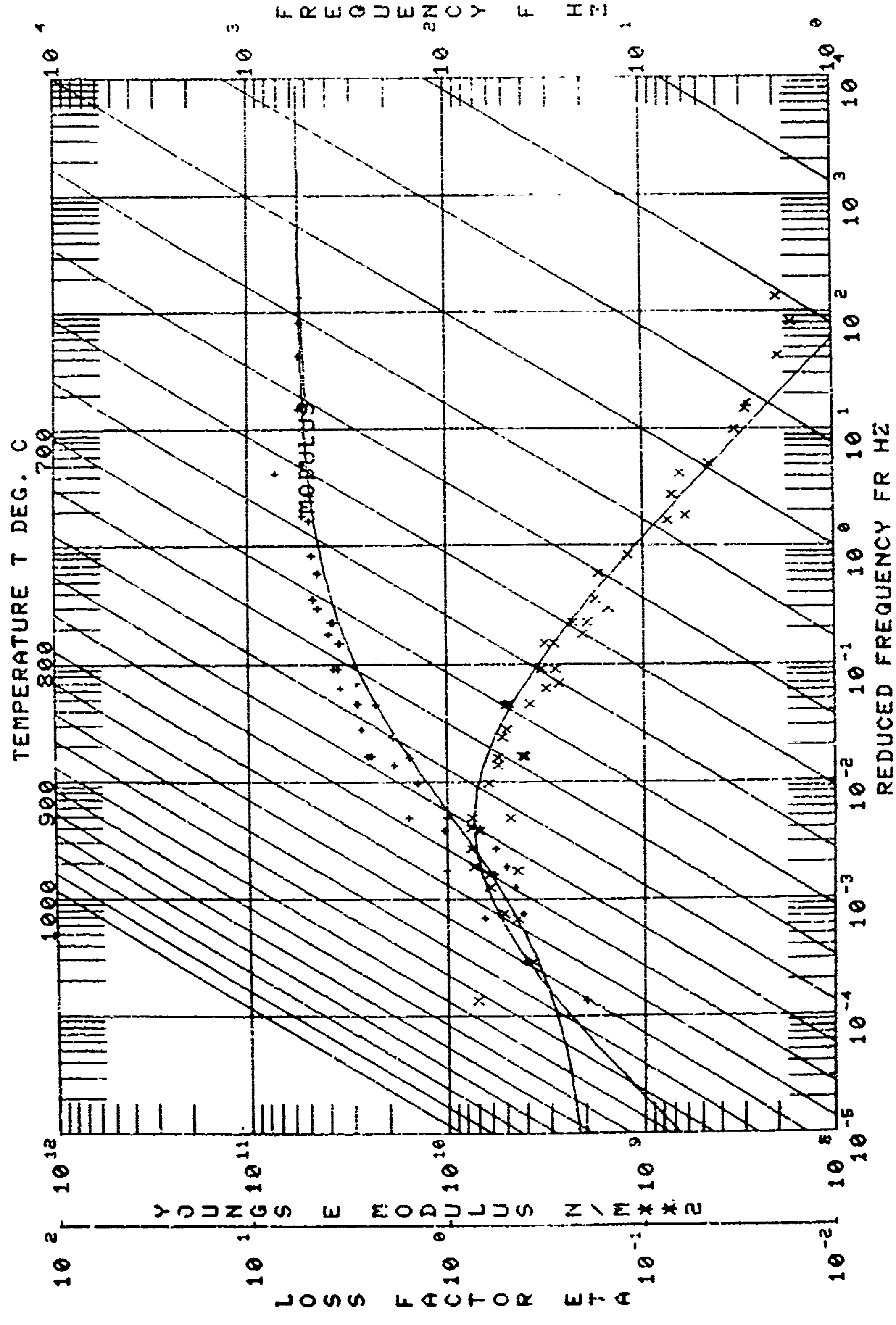
TABLE 13-E (Concluded)

Beam No. 01-62-2

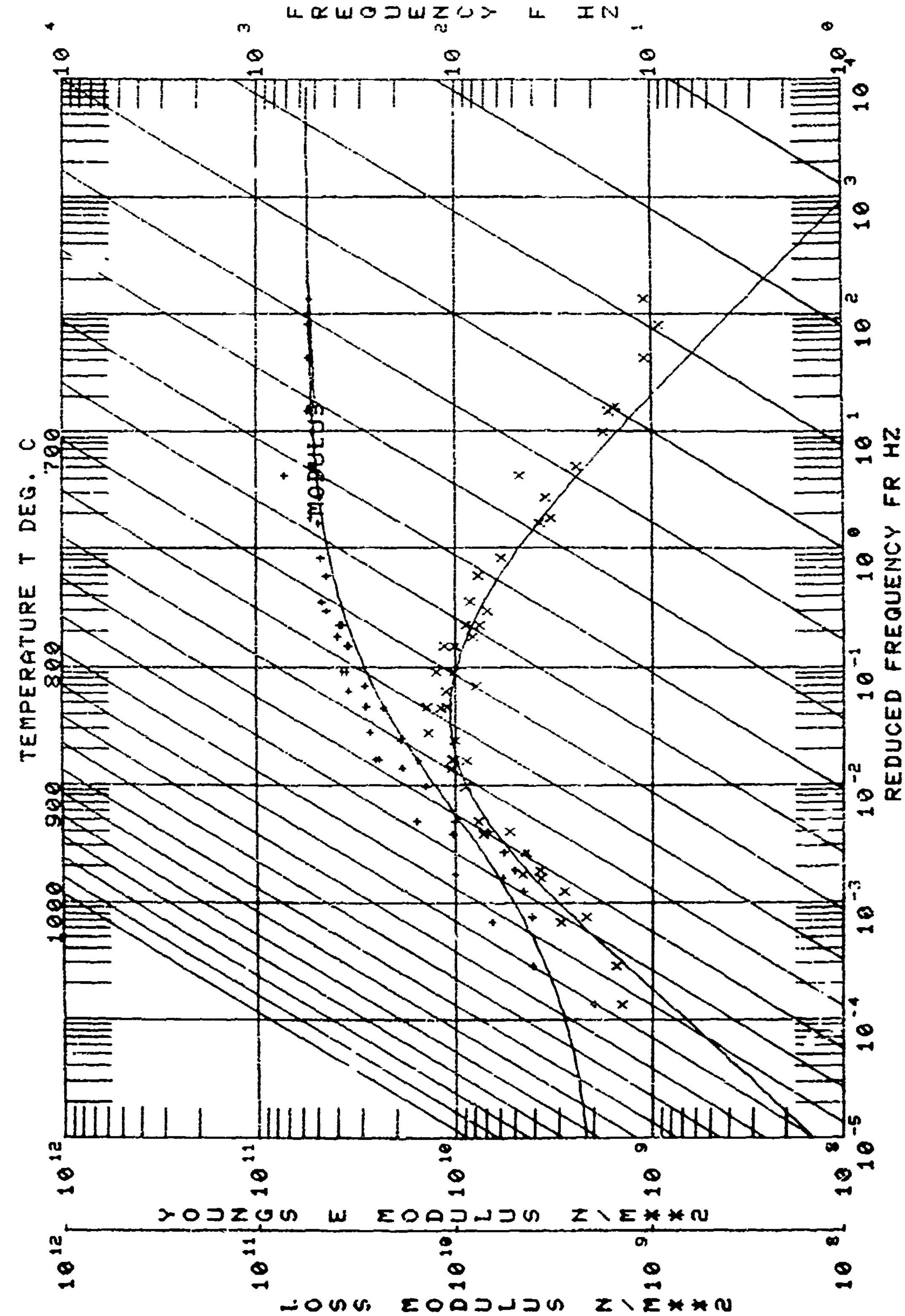
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1200	5	903.90	837.20	901.[illegible]	906.07	5.06	.00560	.00512	
1150	2	100.32	92.52	[illegible]02	100.68	0.56	.00658	.00541	
1150	3	281.52	259.80	2[illegible].84	282.10	1.26	.00448	.00359	
1150	4	530.84	508.90	549.94	551.80	1.86	.00338	.00299	
1150	5	9[illegible].08	842.80	909.25	912.90	3.65	.00401	.00357	

EXPERIMENTAL CODE : 76
MATERIAL :01-62-2
DATA SOURCES
MANUFACTURER :O'HOMMEL 1252 50% SiO2 TOP, UD J8S-14 BOTTOM
AFML :UDRI BEAM COATED ONE SIDE JUNE 5,1979
OTHER :N

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	2.01370E+09	.7215	871.1	84.6	2.	1.56390E+11	.0073	86.4	1.45295E+09
2	2.27518E+09	.1029	871.1	238.1	3.	1.57786E+11	.0012	243.0	2.34125E+08
3	4.19829E+09	.5299	871.1	469.1	4.	1.57996E+11	.0109	476.5	2.22461E+09
4	4.61564E+09	.6252	871.1	778.0	5.	1.58723E+11	.0141	789.5	2.88574E+09
5	5.13200E+09	.7489	871.1	1166.1	6.	1.60026E+11	.0185	1182.0	3.84336E+09
6	7.00472E+09	.7768	843.3	1179.9	6.	1.62472E+11	.0255	1131.0	5.44136E+09
7	5.83284E+09	.7684	843.3	786.3	5.	1.61266E+11	.0213	795.8	4.48200E+09
8	5.90917E+09	.6350	843.3	474.8	4.	1.60593E+11	.0179	480.4	3.75209E+09
9	4.16764E+09	.3750	843.3	85.8	2.	1.59153E+11	.0076	87.2	1.56302E+09
10	6.66337E+09	.4523	815.6	87.0	2.	1.61794E+11	.0142	87.9	3.01416E+09
11	1.05820E+10	.7013	815.6	483.6	4.	1.63144E+11	.0338	484.2	7.42158E+09
12	1.92836E+10	.5364	787.8	1229.9	6.	1.67448E+11	.0434	1209.1	1.03438E+10
13	1.58825E+10	.5640	787.8	816.2	5.	1.66249E+11	.0387	808.0	8.95810E+09
14	1.44009E+10	.6281	787.8	491.4	4.	1.65714E+11	.0396	488.0	9.04476E+09
15	1.03064E+10	.7600	787.8	248.4	3.	1.65541E+11	.0353	248.9	7.83334E+09
16	1.03340E+10	.4508	787.8	88.4	2.	1.64456E+11	.0211	88.6	4.65893E+09
17	1.59604E+10	.4881	760.0	90.2	2.	1.67064E+11	.0335	89.3	7.79014E+09
18	1.89428E+10	.5640	760.0	254.9	3.	1.68078E+11	.0448	250.8	1.06845E+10
19	2.75932E+10	.5071	760.0	508.6	4.	1.68237E+11	.0556	491.7	1.39927E+10
20	2.35564E+10	.5130	760.0	835.0	5.	1.68727E+11	.0491	814.0	1.20845E+10
21	2.93495E+10	.2753	760.0	1263.6	6.	1.69950E+11	.0315	1218.1	8.07908E+09
22	3.52752E+10	.2928	732.2	859.9	5.	1.71224E+11	.0386	820.0	1.03276E+10
23	3.82935E+10	.2361	732.2	1293.3	6.	1.72471E+11	.0330	1227.1	9.04234E+09
24	3.64088E+10	.2870	732.2	520.8	4.	1.70847E+11	.0389	495.5	1.04478E+10
25	2.88752E+10	.4920	732.2	261.8	3.	1.70635E+11	.0553	252.7	1.42066E+10
26	2.57094E+10	.4112	732.2	92.7	2.	1.69618E+11	.0422	90.0	1.05715E+10
27	2.46788E+10	.4244	732.2	92.5	2.	1.69618E+11	.0420	90.0	1.04725E+10
28	2.90480E+10	.3878	732.2	261.9	3.	1.70635E+11	.0438	252.7	1.12655E+10
29	3.80484E+10	.3370	732.2	522.4	4.	1.70847E+11	.0473	495.5	1.28236E+10
30	3.56550E+10	.3240	732.2	860.5	5.	1.71224E+11	.0431	820.0	1.15512E+10
31	3.92417E+10	.1971	732.2	1295.6	6.	1.72471E+11	.0281	1227.1	7.73488E+09
32	6.93225E+10	.0661	704.4	1370.3	6.	1.74981E+11	.0140	1236.0	4.58537E+09
33	4.56858E+10	.1713	704.4	881.6	5.	1.73696E+11	.0273	825.9	7.82503E+09
34	4.83115E+10	.1787	704.4	535.1	4.	1.73200E+11	.0297	498.9	8.63359E+09
35	4.05126E+10	.2083	704.4	269.3	3.	1.73210E+11	.0303	254.6	8.43961E+09
36	3.51851E+10	.3217	704.4	95.0	2.	1.72116E+11	.0422	90.6	1.13177E+10
37	4.54348E+10	.1543	676.7	97.4	2.	1.74632E+11	.0244	91.3	7.01165E+09
38	4.87818E+10	.1217	676.7	274.9	3.	1.75737E+11	.0202	256.5	5.93848E+09
39	4.98303E+10	.0766	676.7	539.6	4.	1.75639E+11	.0129	502.4	3.81910E+09
40	4.97310E+10	.0719	676.7	893.0	5.	1.76187E+11	.0121	831.8	3.57388E+09
41	7.37526E+10	.0655	676.7	1386.9	6.	1.77396E+11	.0144	1244.5	4.83352E+09
42	5.40782E+10	.0617	648.9	99.4	2.	1.77011E+11	.0110	91.9	3.33521E+09
43	5.39037E+10	.0461	648.9	278.9	3.	1.78212E+11	.0081	258.2	2.48680E+09
44	5.36068E+10	.0336	648.9	545.9	4.	1.77883E+11	.0059	505.6	1.80337E+09
45	5.38045E+10	.0291	648.9	903.9	5.	1.78482E+11	.0051	837.2	1.56506E+09
46	5.52943E+10	.0201	621.1	911.1	5.	1.80878E+11	.0036	842.8	1.11030E+09
47	5.58993E+10	.0166	621.1	550.8	4.	1.80213E+11	.0030	508.9	9.30381E+08
48	5.66227E+10	.0198	621.1	281.5	3.	1.80358E+11	.0036	259.8	1.12189E+09
49	5.67064E+10	.0297	621.1	100.3	2.	1.79330E+11	.0054	92.5	1.68455E+09



TEMPERATURE T DEG. C
700
800
900
1000
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS



TEMPERATURE T DEG. C
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-62-3

Date 6/5/79

Damping Material Two layers: first 74.5% SiO_2 + 10.75% CaO + 6.375% Na_2O + 6.375% $KHCO_3$ + 2% Co_2O_3; second O. Hommel R-1252

Material Thickness 0.0183 cm   Material Density 2.64 g/cc

Fixture No. 2   Beam Thickness 0.0975 cm

Beam Density 9.13 g/cc   Beam Length 21.75 cm

Temperature Test Range: Between 870 °C and 620 °C

Frequency Test Range: Between 85 Hz and 1,370 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.35	Temperature	765 °C
	1,000 Hz	η_D 0.35	Temperature	830 °C
Range	100 Hz	700 °C	885 °C	
	1,000 Hz	750 °C	860 °C	

Complex Modulus E_D'':

Peak	100 Hz	9×10^{10} PAS	Temperature	705 °C
	1,000 Hz	9×10^{10} PAS	Temperature	745 °C
Range	100 Hz	700 °C	750 °C	
	1,000 Hz	670 °C	810 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-62-3  RETEST 01-62-2
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM         MROM        N          ML
               A1           A2         A3         A4
   600.0   1.3181E-02  1.9912E+10    .663   7.3367E+09
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL       SH        FROL        C
            B1       B2       B3         B4         B5
   600.0    .310     .300    -.611   3.0150E-02   2.116
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Retest of 01-62-2; no thermal soak.

TABLE 14-E

Beam No. 01-62-3

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1600	2	85.70	86.40	84.93	86.29	1.36	.01587	.00877	
1600	3	240.80	243.00	438.47	242.33	3.86	.01603	.01003	
1600	4	473.88	476.50	470.22	478.00	7.78	.01642	.01372	
1600	5	785.70	789.50	779.22	791.20	11.98	.01525	.01283	
1600	6	1175.50	1182.00	1168.69	1183.24	28.59	.02432	.02251	X
1550	2	66.83	87.16	86.18	87.54	1.36	.01566	.00886	
1550	3	243.47	244.98	241.68	246.51	4.83	.01948	.01531	
1550	4	480.45	480.40	475.04	484.11	9.06	.01886	.01716	
1550	5	795.30	795.80	787.63	803.30	15.67	.01970	.01810	
1550	6	1199.24	1191.00	1192.33	1206.38	27.61	.02302	.02172	X
1500	2	87.88	87.88	87.19	88.67	1.48	.01684	.01254	
1500	3	246.76	246.95	243.45	248.93	5.48	.02221	.01901	
1500	4	487.23	484.20	482.60	493.84	11.24	.02307	.02188	
1500	5	809.80	801.90	804.13	819.13	15.00	.01852	.01730	
1500	6	1218.36	1200.00	1210.30	1225.70	30.46	.0250	.02399	X
1450	2	89.28	88.60	88.22	90.08	1.86	.02085	.01785	
1450	3	250.00	248.90	247.71	251.52	7.49	.02995	.02770	X
1450	4	498.15	488.00	493.37	501.79	16.55	.03322	.03231	X
1450	5	823.70	808.00	811.40	834.73	23.33	.02807	.02704	
1450	6	1235.33	1209.10	1228.0[illegible]	1246.87	37.00	.02996	.02914	X
1400	2	90.46	89.30	89.17	91.76	2.59	.02863	.02653	
1400	3	253.16	250.80	249.38	255.52	12.06	.04766	.04591	X
1400	4	508.96	491.70	502.00	514.44	24.45	.04803	.04731	X
1400	5	841.39	814.00	813.04	853.07	40.03	.04758	.04670	
1400	6	1265.91	1218.00	1253.47	1278.35	48.89	.03862	.03793	X
1350	2	92.51	89.98	90.56	94.10	3.54	.03827	.03664	
1350	3	265.17	252.70	262.29	269.31	7.04	.02655	.02514	
1350	4	521.35	495.50	512.46	530.31	17.85	.03424	.03365	
1350	5	860.89	820.00	852.52	869.26	32.90	.03821	.03751	X
1350	6	1297.13	1227.10	1290.01	1305.90	31.23	.02407	.02347	X
1300	2	95.14	90.64	93.10	96.84	3.74	.03931	.03764	
1300	3	269.40	254.60	264.49	274.05	9.56	.03543	.03429	
1300	4	531.06	498.90	525.00	536.93	11.93	.02246	.02197	
1300	5	880,25	825.90	868.68	890.03	2[illegible].35	.02425	.02197	
1300	6	1319.60	1236.00	1305.70	1331.46	25.76	.01952	.01898	
1250	2	97.41	91.30	96.08	98.92	2.84	.02916	.02794	
1250	3	275.33	256.45	272.39	278.18	5.79	.02103	.02013	
1250	4	539.27	502.40	535.13	543.16	8.03	.01489	.01446	
1250	5	894.92	831.80	889.95	898.84	8.89	.00993	.00941	
1250	6	1337.36	1244.50	1331.56	1343.10	11.44	.00855	.00805	
1200	2	99.21	91.92	98.56	99.89	1.31	.01320	.001198	
1200	3	279.19	258.25	277.56	280.47	2.91	.01043	.00953	
1200	4	546.10	505.60	544.28	547.96	3.68	.00674	.00634	
1200	5	903.80	837.20	901.60	906.38	4.78	.00529	.00481	
1200	6	1349.66	1253.00	1346.82	1352.88	6.06	.00449	.00403	
1150	2	100.40	92.52	99.93	100.65	0.72	.00717	.00600	

TABLE 14-E (Concluded)

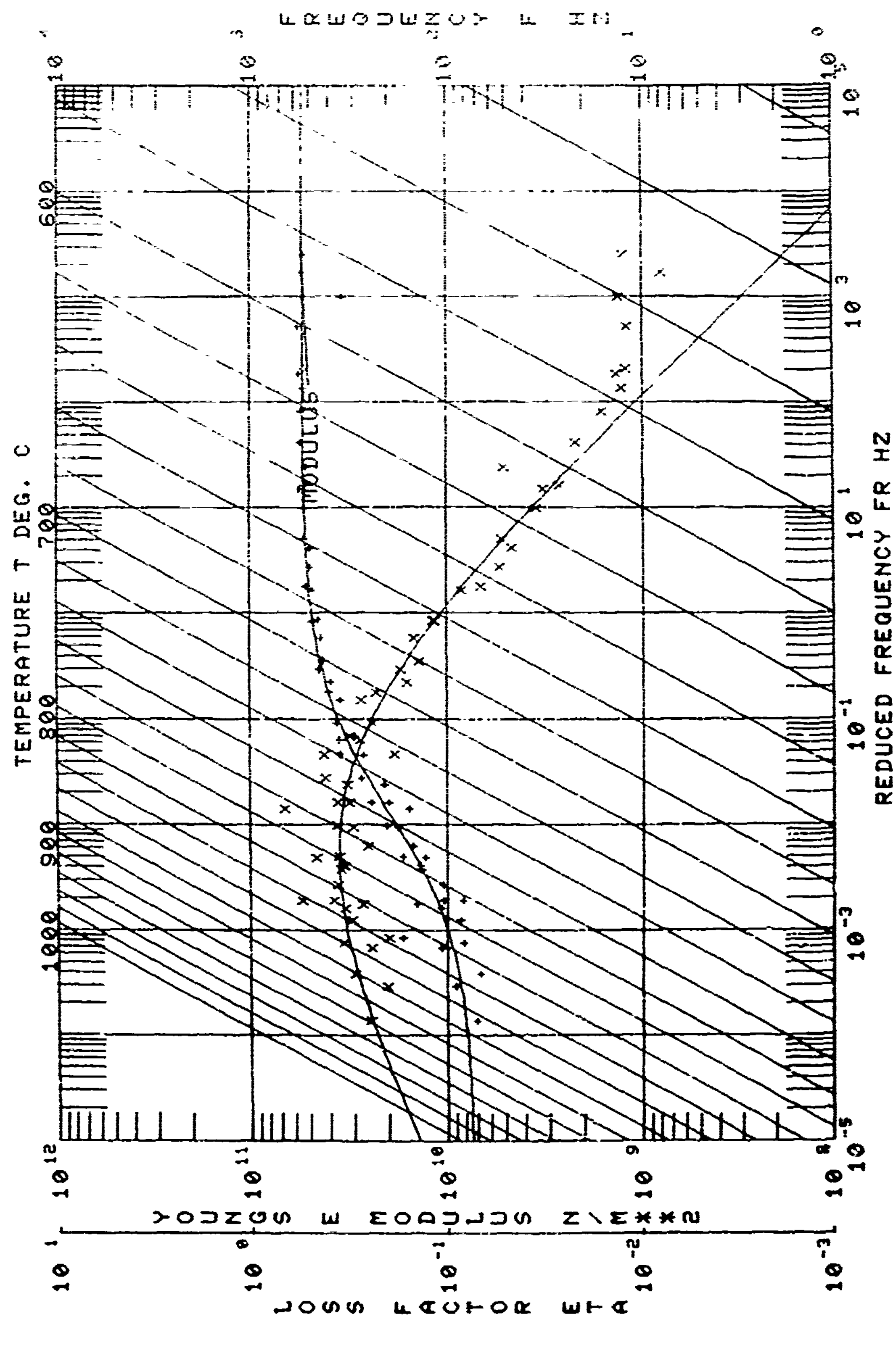
Beam No. 01-62-3

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1150	3	281.63	259.80	280.95	282.36	1.41	.00501	.00412	
1150	4	550.82	508.90	549.98	551.83	1.85	.00336	.00297	
1150	5	911.20	842.80	909.66	912.18	2.52	.00277	.00233	
1150	6	1360.42	1261.00	1358.38	1361.90	3.52	.00259	.00216	
1100	2	101.01	93.12	100.85	101.22	0.37	.00366	.00252	
1100	3	283.43	261.30	285.08	283.92	0.84	.00296	.00225	
1100	4	554.20	512.00	553.60	554.73	1.13	.00204	.00166	
1100	5	916.54	848.10	915.61	917.32	1.71	.00187	.00145	
1100	6	1368.01	1268.80	1366.87	1369.35	2.48	.00181	.00222	

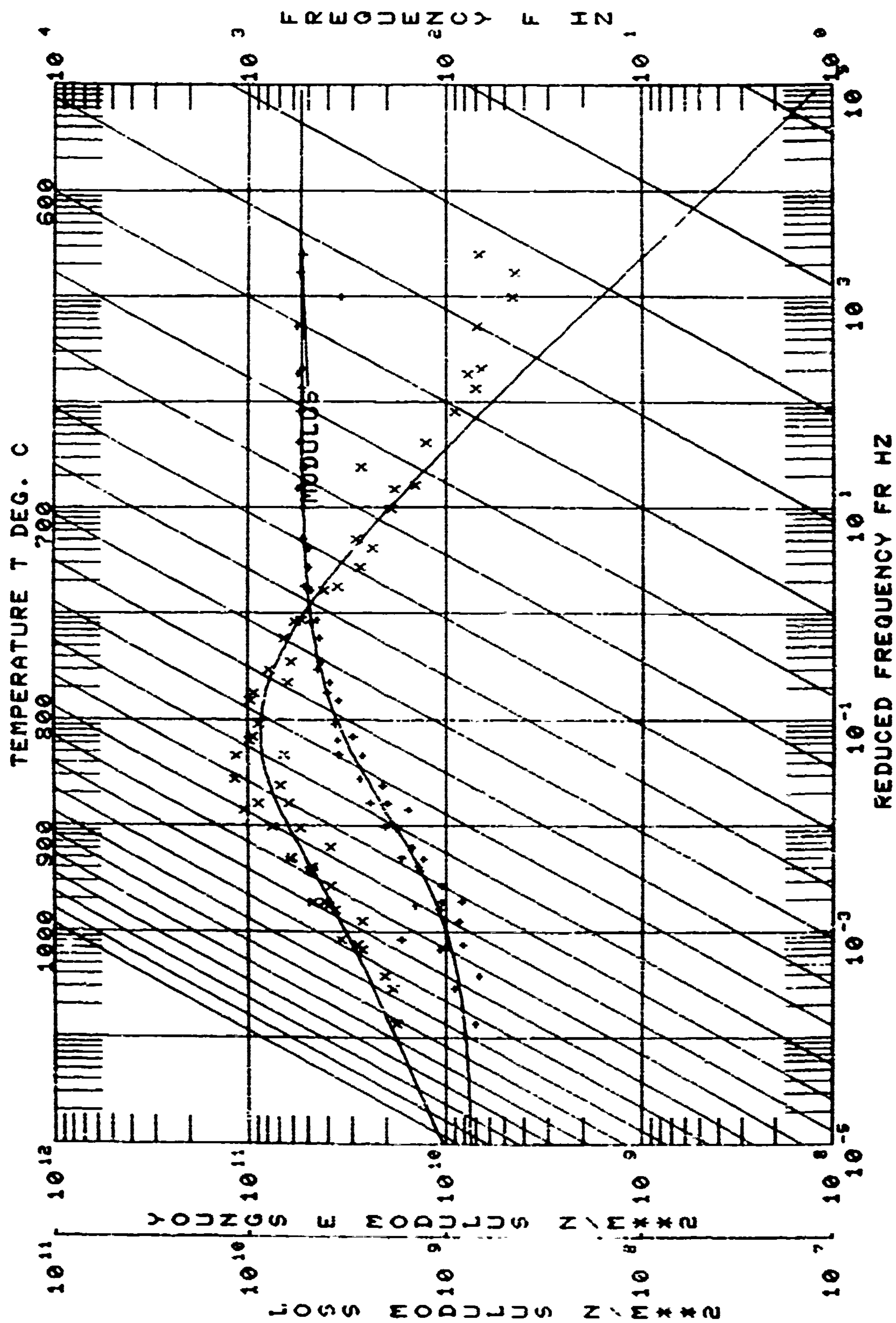
EXPERIMENTAL CODE : 78
MATERIAL :01-62-3 RETEST 01-62-2
DATA SOURCES
MANUFACTURER :0'HOMMEL 1252 50% 'UDR: J85-14
AFML :UDRI BEAM COATED ONE SIDE
OTHER :N

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	7.24027E+09	.2498	871.1	85.7	2.	1.56390E+11	.0088	86.4	1.80854E+09
2	6.90923E+09	.3012	871.1	240.8	3.	1.57786E+11	.0100	243.0	2.08094E+09
3	8.41183E+09	.3425	871.1	473.9	4.	1.57996E+11	.0137	476.5	2.88077E+09
4	8.74140E+09	.3102	871.1	785.7	5.	1.58723E+11	.0128	789.5	2.71185E+09
5	8.51989E+09	.5619	871.1	1175.5	6.	1.60026E+11	.0225	1182.0	4.78711E+09
6	1.41113E+10	.3449	843.3	1199.2	6.	1.62472E+11	.0217	1191.0	4.86728E+09
7	1.06935E+10	.3681	843.3	795.3	5.	1.61266E+11	.0181	795.8	3.93602E+09
8	1.09664E+10	.3396	843.3	480.5	4.	1.60593E+11	.0172	480.4	3.72418E+09
9	1.71690E+10	.2016	843.3	248.5	3.	1.60368E+11	.0153	245.0	3.46130E+09
10	9.20258E+09	.2047	843.3	86.8	2.	1.59153E+11	.0089	87.2	1.88358E+09
11	1.10016E+10	.2491	815.6	87.9	2.	1.61794E+11	.0125	87.9	2.74098E+09
12	1.07428E+10	.3887	815.6	246.8	3.	1.62958E+11	.0190	247.0	4.17548E+09
13	1.38707E+10	.3542	815.6	487.2	4.	1.63144E+11	.0219	484.2	4.91356E+09
14	1.52566E+10	.2579	815.6	809.3	5.	1.63748E+11	.0173	801.9	3.93420E+09
15	1.81434E+10	.3084	815.6	1218.4	6.	1.64937E+11	.0240	1200.0	5.59582E+09
16	2.14155E+10	.3284	787.8	1235.3	6.	1.67448E+11	.0291	1209.1	7.03320E+09
17	2.02119E+10	.3184	787.8	823.7	5.	1.66249E+11	.0270	808.0	6.43640E+09
18	2.07782E+10	.3704	787.8	498.2	4.	1.65714E+11	.0323	488.0	7.69714E+09
19	1.32443E+10	.4740	787.8	250.0	3.	1.65541E+11	.0277	248.9	6.27741E+09
20	1.46246E+10	.2775	787.8	89.3	2.	1.64456E+11	.0179	88.6	4.05804E+09
21	1.73059E+10	.3597	760.0	90.5	2.	1.67064E+11	.0265	89.3	6.22509E+09
22	1.57492E+10	.6808	760.0	253.2	3.	1.68078E+11	.0459	250.8	1.07227E+10
23	2.79746E+10	.4268	760.0	509.0	4.	1.68237E+11	.0473	491.7	1.19406E+10
24	2.73400E+10	.4310	760.0	841.4	5.	1.68727E+11	.0468	814.0	1.17646E+10
25	3.03444E+10	.3227	760.0	1265.9	6.	1.69922E+11	.0379	1218.0	9.79140E+09
26	3.99422E+10	.1623	732.2	1297.1	6.	1.72442E+11	.0235	1227.0	6.48310E+09
27	3.59028E+10	.2804	732.2	860.9	5.	1.71224E+11	.0375	829.0	1.00675E+10
28	3.70021E+10	.2452	732.2	521.3	4.	1.70247E+11	.0337	495.5	9.07358E+09
29	3.55160E+10	.1890	732.2	265.2	3.	1.70635E+11	.0251	252.7	6.71392E+09
30	3.59820E+10	.2820	704.4	95.1	2.	1.72116E+11	.0376	90.6	1.01487E+10
31	4.06296E+10	.2348	704.4	269.4	3.	1.73210E+11	.0343	254.6	9.54153E+09
32	4.39849E+10	.1416	704.4	531.1	4.	1.73200E+11	.0220	498.9	6.22923E+09
33	4.48230E+10	.1507	704.4	880.2	5.	1.73696E+11	.0237	825.9	6.75434E+09
34	4.61503E+10	.1189	704.4	1319.6	6.	1.74981E+11	.0190	1236.0	5.48834E+09
35	5.06456E+10	.0476	676.7	1337.4	6.	1.77396E+11	.0081	1244.5	2.40929E+09
36	5.10055E+10	.0550	676.7	894.9	5.	1.76187E+11	.0094	831.8	2.80771E+09
37	4.94661E+10	.0863	676.7	539.3	4.	1.75639E+11	.0145	502.4	4.26923E+09
38	4.96879E+10	.1198	676.7	275.4	3.	1.75764E+11	.0201	256.5	5.95349E+09
39	4.56707E+10	.1762	676.7	97.4	2.	1.74632E+11	.0279	91.3	8.04594E+09
40	5.31563E+10	.0682	648.9	99.2	2.	1.77011E+11	.0120	91.9	3.62790E+09
41	5.43162E+10	.0537	648.9	279.1	3.	1.78212E+11	.0095	258.2	2.91775E+09
42	5.38728E+10	.0359	648.9	546.1	4.	1.77883E+11	.0063	505.6	1.93401E+09
43	5.37270E+10	.0274	648.9	903.8	5.	1.78482E+11	.0048	837.2	1.46971E+09
44	5.27707E+10	.0523	648.9	1349.7	6.	1.79828E+11	.0090	1253.0	2.76026E+09
45	5.44216E+10	.0123	621.1	1360.4	6.	1.82131E+11	.0022	1251.0	6.72090E+08
46	5.53815E+10	.0131	621.1	911.2	5.	1.80878E+11	.0023	842.8	7.24979E+08
47	5.58732E+10	.0165	621.1	550.8	4.	1.80213E+11	.0030	508.9	9.24033E+08
48	5.68228E+10	.0227	621.1	281.6	3.	1.80358E+11	.0041	259.8	1.28885E+09
49	5.72080E+10	.0327	621.1	100.4	2.	1.79330E+11	.0060	92.5	1.87311E+09

50	5.76896E+10	.0138	593.3	101.0	2.	1.81663E+11	.0025	93.1	7.95876E+08
51	5.79208E+10	.0123	593.3	283.4	3.	1.82446E+11	.0022	261.3	7.13603E+08
52	3.47306E+10	.0134	593.3	534.2	4.	1.82415E+11	.0017	512.0	4.65567E+08
53	2.47933E+10	.3683	732.2	92.5	2.	1.69618E+11	.0366	90.0	9.13154E+09
54	5.58153E+10	.0082	593.3	916.5	5.	1.83160E+11	.0015	848.1	4.56243E+08
55	5.47146E+10	.0128	593.3	1368.0	6.	1.84392E+11	.0022	1268.8	6.97972E+08



TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA


TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
MODULUS

Beam No. 01-64-4

Date 6/12/79

Damping Material Two layers: first 74.5% SiO_2 + 10.75% CaO + 6.375% Na_2O + 6.375% $KHCO_3$ + 2% Co_2O_3; second O. Hommel 1252

Material Thickness 0.0183 cm Material Density 2.64 g/cc

Fixture No. 2 Beam Thickness 0.0975 cm

Beam Density 9.13 g/cc Beam Length 21.75 cm

Temperature Test Range: Between 870 °C and 620 °C

Frequency Test Range: Between 88 Hz and 1,380 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.30	Temperature	780 °C
	1,000 Hz	η_D 0.30	Temperature	725 °C
Range	100 Hz	740 °C	750 °C	
	1,000 Hz	815 °C	815 °C	

Complex Modulus E_D'':

Peak	100 Hz	9×10^{10} PAS	Temperature	720 °C
	1,000 Hz	9×10^{10} PAS	Temperature	775 °C
Range	100 Hz	740 °C	690 °C	
	1,000 Hz	800 °C	730 °C	

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-62-5 O`hommel R-1252/UDRI J85-14
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM          N          ML
               A1            A2          A3          A4
   600.0   3.4000E-02   3.3000E+10     .500   1.8000E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL      SL        SH        FROL        C
            B1        B2        B3         B4        B5
   600.0    .286     .360     -.430   3.0070E-02    .200
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Retest of 01-62-2 after 136 hours at 870°C.

TABLE 15-E

Beam No. 01-62-4

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1600	2	88.42	86.40	87.82	89.04	1.22	.01380	.00670	
1600	3	248.99	243.00	248.19	249.67	2.91	.01168	.00508	X
1600	4	488.70	476.50	485.56	491.41	5.85	.01197	.00927	
1600	5	809.37	789.50	804.41	814.72	10.31	.01274	.01032	
1600	6	1212.57	1182.00	1204.81	1221.42	16.61	.01370	.01189	
1550	2	89.16	87.16	88.61	89.71	1.10	.01234	.00554	
1550	3	250.88	244.98	250.19	251.85	3.26	.01300	.00847	X
1550	4	492.45	480.40	489.31	495.97	6.66	.01352	.01182	
1550	5	816.92	795.80	810.64	823.06	12.42	.01520	.01360	
1550	6	1221.58	1191.00	1211.60	1233.20	21.60	.01769	.01638	
1500	2	90.13	87.88	89.56	90.75	1.19	.01320	.00890	
1500	3	253.84	246.95	252.92	254.99	3.97	.01564	.01244	X
1500	4	498.26	484.20	493.78	502.67	8.89	.01784	.01665	
1500	5	826.68	801.90	818.36	834.96	16.60	.02008	.01886	
1500	6	1235.85	1200.00	1221.98	1249.23	27.50	.02250	.02104	
1450	2	91.35	88.60	90.69	92.06	1.37	.01500	.01200	
1450	3	257.09	248.90	256.00	259.15	6.19	.02407	.02182	X
1450	4	504.68	488.00	497.80	511.25	13.45	.02665	.02594	
1450	5	838.60	808.00	833.15	845.94	25.13	.02997	.02893	X
1450	6	1253.01	1209.10	1227.44	1271.22	43.78	.03494	.03412	
1400	2	92.94	89.30	91.64	93.47	1.83	.01979	.01769	
1400	3	261.15	250.80	259.35	263.05	7.27	.02784	.02609	X
1400	4	513.52	491.70	506.20	523.80	17.20	.03349	.03278	

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1400	5	855.04	814.00	838.86	868.60	29.74	.03478	.03396	
1400	6	1277.60	1218.10	1243.40	1294.00	50.60	.03961	.03892	
1350	2	94.17	89.98	92.71	95.53	2.82	.02995	.02832	
1350	3	265.76	252.70	263.53	267.87	8.53	.03209	.03068	X
1350	4	526.32	495.50	521.62	531.93	20.26	.03850	.03791	X
1350	5	873.80	820.00	859.31	885.90	26.59	.03043	.02973	
1350	6	1302.54	1227.10	1292.97	1309.20	31.90	.02443	.02389	X
1300	2	96.32	90.6[illegible]	94.73	98.00	3.27	.03395	.03254	
1300	3	272.27	254.60	268.32	275.77	7.45	.02736	.02616	
1300	4	536.62	498.90	531.24	541.30	10.06	.01875	.01826	
1300	5	889.16	825.90	881.11	896.44	15.33	.01724	.01665	
1300	6	1337.00	1236.00	1328.80	1351.50	22.70	.01698	.01644	
1250	2	98.55	91.30	97.37	99.56	2.19	.02222	.02092	
1250	3	276.85	256.45	274.61	278.88	4.27	.01542	.01440	
1250	4	542.74	502.40	539.72	545.78	6.06	.01117	.01074	
1250	5	899.33	831.80	895.84	903.49	7.65	.00851	.00799	
1250	6	1350.61	1244.50	1345.41	1357.17	11.76	.00871	.00821	
1200	2	100.00	91.92	99.48	100.48	1.00	.01000	.00878	
1200	3	280.14	258.25	279.16	281.12	1.94	.00693	.00603	
1200	4	548.31	505.60	546.77	549.69	2.92	.00533	.00493	
1200	5	907.24	837.20	905.00	909.13	4.13	.00455	.00407	
1200	6	1364.50	1253.00	1359.05	1368.14	9.09	.00666	.00620	
1150	2	101.16	92.52	100.95	101.35	0.40	.00395	.00278	

TABLE 15-E (Concluded)

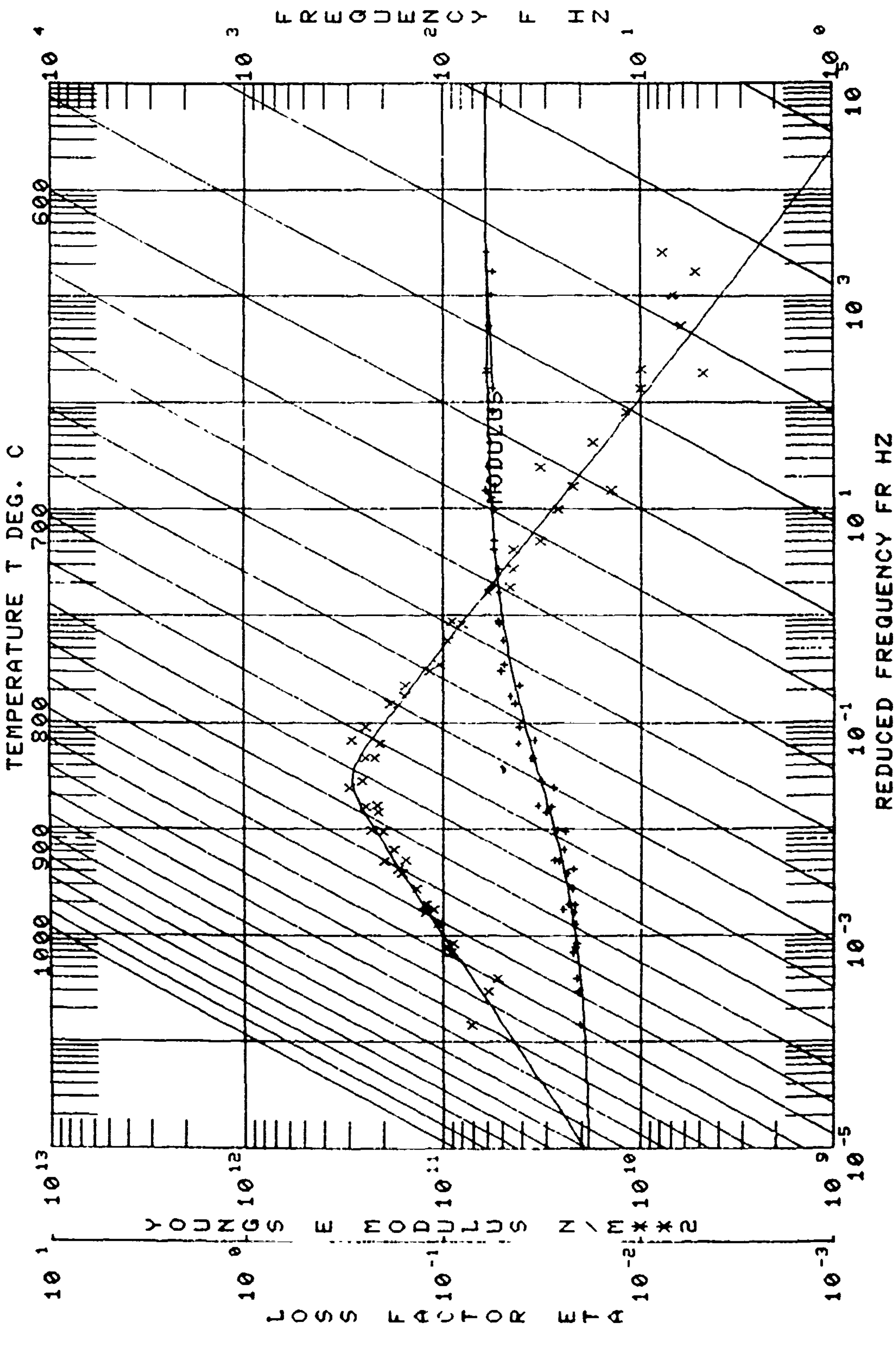
Beam No. 01-62-4

°F		f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
Temp.	Mode								
1150	3	282.48	259.80	281.89	282.96	1.07	.00379	.00335	
1150	4	552.44	508.90	551.83	553.29	1.44	.00261	.00222	
1150	5	914.16	842.80	913.09	915.20	2.11	.00231	.00187	
1150	6	1375.30	1261.00	1372.06	1379.31	3.25	.00236	.00193	
1100	2	101.58	93.10	101.49	101.70	0.21	.00207	.00093	
1100	3	284.21	261.30	283.98	284.52	0.54	.00190	.00119	
1100	4	555.75	511.90	555.36	556.29	0.93	.00167	.00129	
1100	5	919.42	848.20	918.74	920.02	1.28	.00139	.00097	
1100	6	1381.93	1269.20	1379.26	1385.28	6.02		.00150	
1050	2		93.63						
1050	3		262.80						
1050	4		514.90						
1050	5		853.50						
1050	6		1277.10						
1000	2		94.20						
1000	3		264.69						
1000	4		518.35						
1000	5		858.67						
1000	6		1284.20						

EXPERIMENTAL CODE : 81
MATERIAL :01-62-[illegible] O'hommel R-1252/UDRI J85-14
DATA SOURCES　　　　01-62-4
MANUFACTURER :N
AFML :UDRI BEAM COATED ONE SIDE 14 JUNE 79
OTHER :N

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	2.07479E+10	.0732	871.1	88.4	2.	1.56390E+11	.0067	86.4	1.51794E+09
2	2.15038E+10	.0542	871.1	249.0	3.	1.57786E+11	.0051	243.0	1.16562E+09
3	2.19668E+10	.0972	871.1	488.7	4.	1.57996E+11	.0093	476.5	2.13600E+09
4	2.18688E+10	.1091	871.1	809.4	5.	1.58723E+11	.0103	789.5	2.38575E+09
5	2.23647E+10	.1242	871.1	1212.6	6.	1.60026E+11	.0119	1182.0	2.77700E+09
6	2.26126E+10	.1717	843.3	1221.6	6.	1.62472E+11	.0164	1191.0	3.88180E+09
7	2.28492E+10	.1404	843.3	816.9	5.	1.61266E+11	.0136	795.8	3.20748E+09
8	2.20877E+10	.1251	843.3	492.5	4.	1.60593E+11	.0118	480.4	2.76401E+09
9	2.15928E+10	.0913	843.3	250.9	3.	1.60368E+11	.0085	245.0	1.97186E+09
10	2.09226E+10	.0610	843.3	89.2	2.	1.59153E+11	.0055	87.2	1.27569E+09
11	2.37175E+10	.1255	815.6	253.8	3.	1.62958E+11	.0124	247.0	2.97664E+09
12	2.42717E+10	.1649	815.6	498.3	4.	1.63144E+11	.0166	484.2	4.00200E+09
13	2.52382E+10	.1813	815.6	826.7	5.	1.63748E+11	.0189	801.9	4.57536E+09
14	2.49362E+10	.2055	815.6	1235.9	6.	1.64937E+11	.0210	1200.0	5.12560E+09
15	2.84329E+10	.3025	787.8	1253.0	6.	1.67448E+11	.0341	1209.1	8.60219E+09
16	2.89829E+10	.2510	787.8	838.6	5.	1.66249E+11	.0289	808.0	7.27513E+09
17	2.71076E+10	.2354	787.8	504.7	4.	1.65714E+11	.0257	488.0	6.38139E+09
18	2.66641E+10	.2021	787.8	257.2	3.	1.65541E+11	.0218	248.9	5.38996E+09
19	2.54107E+10	.1151	787.8	91.4	2.	1.64456E+11	.0120	88.6	2.92490E+09
20	2.80777E+10	.1582	760.0	92.5	2.	1.67064E+11	.0177	89.3	4.44180E+09
21	3.09635E+10	.2164	760.0	261.2	3.	1.68078E+11	.0261	250.8	6.70020E+09
22	3.56641E+10	.2523	760.0	855.0	5.	1.68727E+11	.0340	814.0	8.99690E+09
23	3.51194E+10	.2943	760.0	1277.6	6.	1.69950E+11	.0389	1218.1	1.03369E+10
24	4.22110E+10	.1584	732.2	1302.5	6.	1.72471E+11	.0239	1227.1	6.68524E+09
25	4.40858E+10	.1897	732.2	873.8	5.	1.71224E+11	.0297	820.0	8.36168E+09
26	4.21927E+10	.2496	732.2	526.3	4.	1.70847E+11	.0379	495.5	1.05313E+10
27	3.67091E+10	.2248	732.2	265.8	3.	1.70635E+11	.0307	252.7	8.25060E+09
28	3.39057E+10	.2199	732.2	94.2	2.	1.69618E+11	.0283	90.0	7.45641E+09
29	4.27550E+10	.2133	704.4	96.3	2.	1.72116E+11	.0325	90.6	9.11946E+09
30	4.68359E+10	.1609	704.4	272.4	3.	1.73210E+11	.0262	254.6	7.53581E+09
31	4.99821E+10	.1071	704.4	536.6	4.	1.73200E+11	.0183	498.9	5.35133E+09
32	5.06698E+10	.0969	704.4	889.2	5.	1.73696E+11	.0166	825.9	4.90797E+09
33	5.38885E+10	.0920	704.4	1337.0	6.	1.74981E+11	.0164	1236.0	4.95679E+09
34	5.66426E+10	.0448	676.7	1350.6	6.	1.77396E+11	.0082	1244.5	2.53608E+09
35	5.39623E+10	.0449	676.7	899.3	5.	1.76187E+11	.0080	831.8	2.42183E+09
36	5.29006E+10	.0819	676.7	276.8	3.	1.75737E+11	.0144	256.5	4.33227E+09
37	5.24922E+10	.1191	676.7	98.6	2.	1.74632E+11	.0209	91.3	6.25171E+09
38	5.80135E+10	.0470	648.9	100.0	2.	1.77011E+11	.0088	91.9	2.72742E+09
39	5.66109E+10	.0330	648.9	280.1	3.	1.78212E+11	.0060	258.2	1.86841E+09
40	5.63434E+10	.0270	648.9	548.3	4.	1.77883E+11	.0049	505.6	1.52345E+09
41	5.60682E+10	.0225	648.9	907.2	5.	1.78482E+11	.0041	837.2	1.25889E+09
42	6.13078E+10	.0101	621.1	1375.3	6.	1.82131E+11	.0019	1261.0	6.21913E+08
43	5.74053E+10	.0102	621.1	914.2	5.	1.80878E+11	.0019	842.8	5.87931E+08
44	5.77157E+10	.0121	621.1	552.4	4.	1.80213E+11	.0022	508.9	6.97271E+08
45	5.87711E+10	.0180	621.1	282.5	3.	1.80358E+11	.0033	259.8	1.05848E+09
46	6.19732E+10	.0143	621.1	101.2	2.	1.79330E+11	.0028	92.5	8.89285E+08
47	6.13866E+10	.0049	593.3	101.6	2.	1.81585E+11	.0009	93.1	2.99177E+08
48	5.96717E+10	.0064	593.3	284.2	3.	1.82446E+11	.0012	261.3	3.80775E+08
49	5.84597E+10	.0070	593.3	555.7	4.	1.82344E+11	.0013	511.9	4.10090E+08

50	5.77280E+10	.0053	593.3	919.4	5.	1.83203E+11	.0010	848.2	3.08242E+08
51	6.10221E+10	.0080	593.3	1381.9	6.	1.84508E+11	.0015	1269.2	4.87030E+08
52	5.32946E+10	.0607	676.7	542.7	4.	1.75639E+11	.0107	502.4	3.23664E+09
53	2.24869E+10	.0934	815.6	90.1	2.	1.61794E+11	.0089	87.9	2.09993E+09
54	5.95784E+10	.0329	648.9	1364.5	6.	1.73828E+11	.0062	1253.0	1.96304E+09
55	3.25423E+10	.2614	760.0	513.5	4.	1.68237E+11	.0328	491.7	8.50493E+09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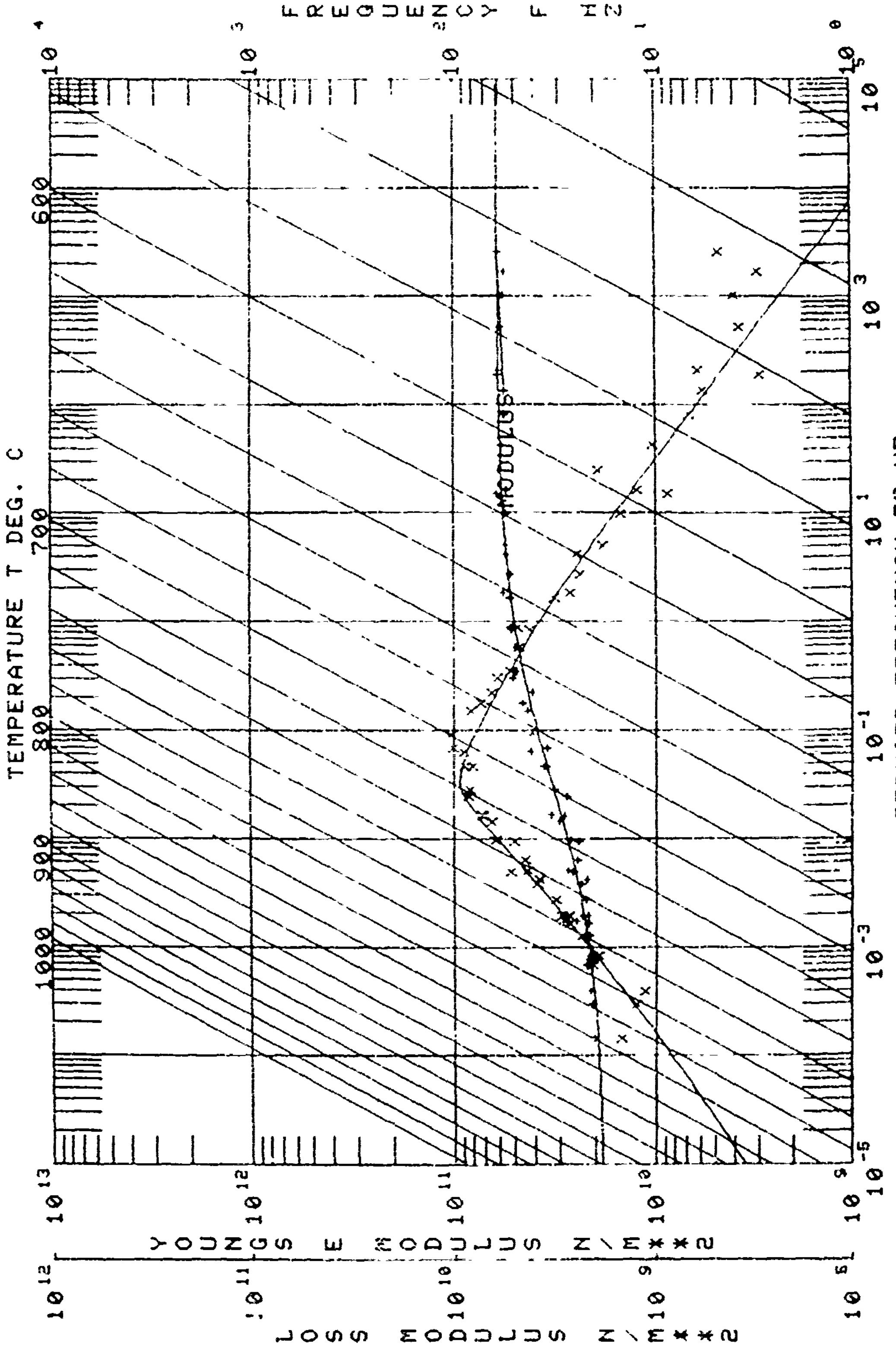
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS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700
800
900
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FREQUENCY F HZ
REDUCED FREQUENCY FR HZ
MODULUS
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2

Beam No. 01-62-5

Date 7/3/79

Damping Material Two layers: first 74.5% SiO_2 + 10.75% CaO + 6.375% Na_2O + 6.375% $KHCO_3$ + 2% Co_2O_3; second O. Hommel R-1252

Material Thickness 0.0183 cm Material Density 2.64 g/cc

Fixture No. 2 Beam Thickness 0.0975 cm

Beam Density 9.13 g/cc Beam Length 21.75 cm

Temperature Test Range: Between 870 °C and 620 °C

Frequency Test Range: Between 89 Hz and 1,370 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.24		Temperature	715 °C
	1,000 Hz	η_D 0.24		Temperature	765 °C
Range	100 Hz	745 °C	735 °C		
	1,000 Hz	810 °C	690 °C		

Complex Modulus E_D'':

Peak	100 Hz	9×10^{10} PAS		Temperature	710 °C
	1,000 Hz	9×10^{10} PAS		Temperature	760 °C
Range	100 Hz	695 °C	735 °C		
	1,000 Hz	720 °C	795 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-62-5 RETEST
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM           MROM          N          ML
               A1             A2           A3         A4
   600.0  3.9633E-02  3.7404E+10     .831  2.4540E+10
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH          FROL        C
            B1       B2        B3           B4         B5
   600.0    .236     .273     -.402  4.7806E-02      .259
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Retest of 01-62-2 after 400 hours at 870°C; coating deteriorated only slightly. Resumed heat soak for a total of 951 hours at 879°C. Coating still in very good shape and will be recoated as soon as possible.

TABLE 16-E

Beam No. 01-62-5

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1600	2	88.98	86.40	88.31	89.59	1.28	.01439	.00729	
1600	3	250.69	243.00	249.09	252.38	3.29	.01312	.00652	
1600	4	491.24	476.50	488.23	494.07	5.84	.00189	.00919	
1600	5	814.27	789.50	809.65	819.65	10.00	.01228	.00986	
1600	6	1217.50	1182.00	1210.64	1227.25	16.61	.01364	.01183	
1550	2	89.93	87.16	89.39	90.57	1.18	.01312	.00632	
1550	3	252.89	244.78	251.18	254.94	3.76	.01487	.01034	
1550	4	495.94	480.40	492.67	499.07	6.40	.01290	.01279	
1550	5	822.03	795.80	816.25	828.08	11.83	.0143[illegible]	.01279	
1550	6	1229.60	1191.00	1218.21	1240.32	22.11	.01798	.01668	
1500	2	90.82	87.88	90.18	91.37	1.19	.01310	.00880	
1500	3	255.74	246.95	253.96	257.84	3.88	.01517	.01197	
1500	4	501.50	484.20	497.24	505.35	8.11	.01617	.01498	
1500	5	831.20	801.90	823.79	839.25	15.55	.01871	.01749	
1500	6	1244.62	1200.00	1228.05	1257.80	29.75	.02390	.02289	
1450	2	91.57	88.60	90.90	92.2[illegible]	1.33	.01452	.01152	
1450	3	258.58	248.90	256.08	261.06	4.98	.01926	.01701	
1450	4	506.52	488.00	501.75	512.48	10.73	.02118	.02027	
1450	5	842.16	808.00	831.74	853.30	21.56	.02560	.02462	
1450	6	1257.32	1209.10	1233.20	1276.00	42.80	.03404	.03322	
1400	2	92.58	89.30	91.70	93.39	1.69	.01806	.01596	
1400	3	261.95	250.80	259.08	265.80	6.72	.02565	.02390	
1400	4	515.78	491.70	508.16	523.25	15.09	.02926	.02848	

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1400	5	858.34	814.00	844.90	872.02	27.12	.03160	.03078	
1400	6	1283.44	1218.10	1251.80	1301.62	49.82	.03882	.03813	
1350	2	94.24	89.98	92.94	95.57	2.63	.02791	.02628	
1350	3	266.50	252.70	263.00	271.27	8.27	.0310	.02962	
1350	4	529.46	495.50	520.23	538.69	18.46	.03417	.03428	
1350	5	879.03	820.00	863.10	889.96	26.86	.03056	.03056	
1350	6	1306.16	1227.10	1285.04	1329.08	44.04	.03372	.03312	
1350	2	94.72	89.98	93.32	96.10	2.78	.02935	.02772	
1350	3	266.55	252.70	263.27	271.94	8.67	.03253	.03112	
1350	4	529.16	495.50	524.14	533.19	17.78	.03361	.03302	X
1350	5	877.55	820.00	866.31	891.08	24.77	.02832	.02762	
1350	6	1314.49	1227.10	1296.62	1335.09	38.47	.02927	.02867	
1300	2	96.37	90.64	94.85	97.95	3.10	.03217	.03076	
1300	3	274.80	254.60	272.17	276.34	8.19	.02982	.02862	X
1300	4	538.93	498.90	532.40	546.50	14.10	.02616	.02567	
1300	5	890.95	825.90	883.85	899.74	15.89	.01783	.01724	
1300	6	1330.42	1236.00	1319.92	1342.27	22.35	.01680	.01626	
1250	2	98.54	91.30	97.60	99.61	2.01	.02040	.01910	
1250	3	277.92	256.45	276.17	280.47	4.30	.01547	.01445	
1250	4	544.75	502.40	541.92	547.58	5.66	.01039	.00996	
1250	5	902.61	831.80	898.85	906.71	7.86	.00871	.00819	
1250	6	1344.20	1244.50	1342.03	1348.63	[illegible]	.00965	.00915	X
1200	[illegible]	99.65	91.92	[illegible]	100.12	[illegible]	.00865	[illegible]	

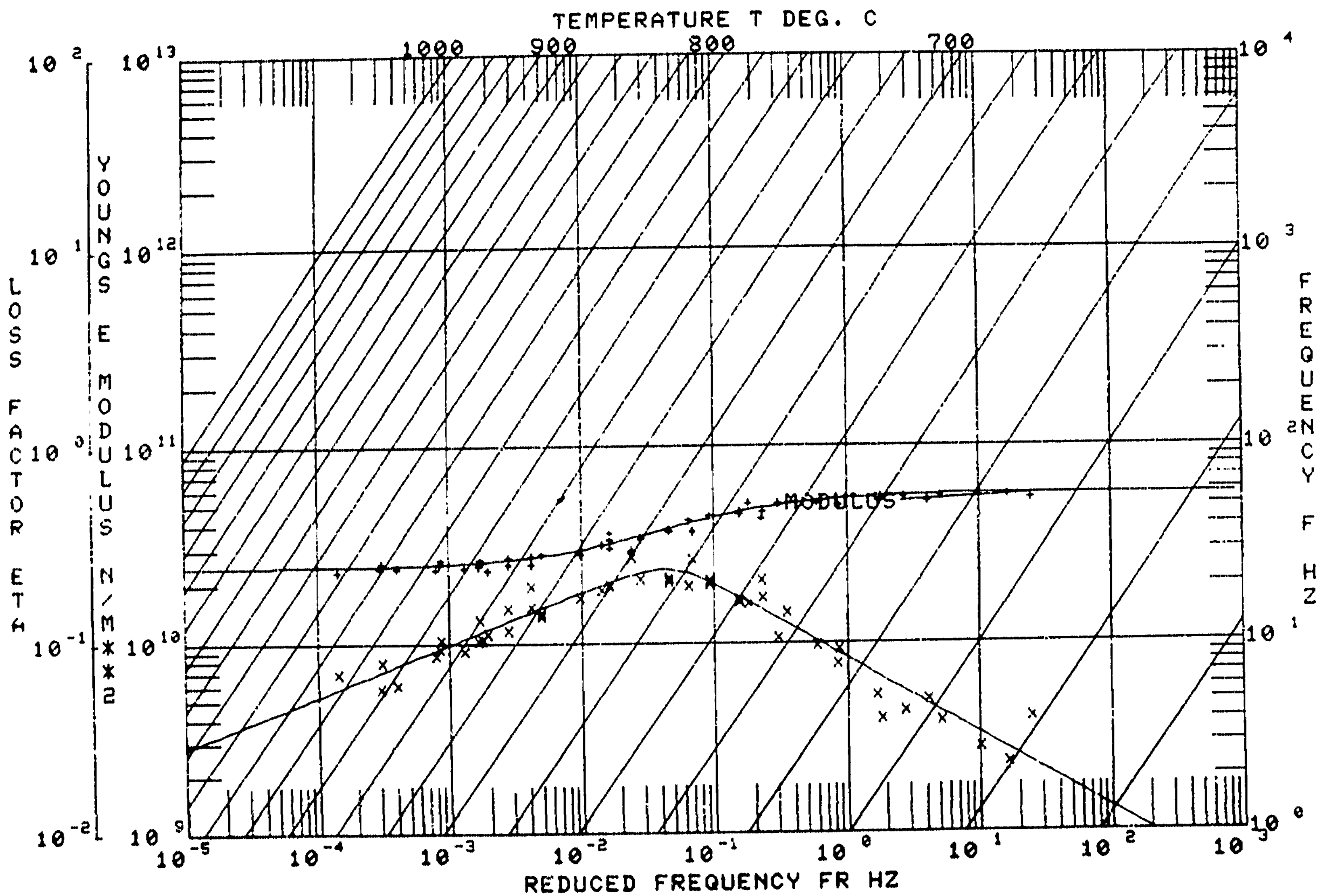
TABLE 16-E (Concluded)

Beam No. 01-62-5

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1200	3	280.26	258.25	279.14	281.45	2.31	.00824	.00734	
1200	4	549.73	505.60	547.67	550.83	3.16	.00575	.00535	
1200	5	909.71	837.20	907.33	911.80	4.47	.00491	.00443	
1200	6	1354.40	1253.00	1351.58	1356.95	10.55	.00779	.00733	X
1150	2	100.67	92.52	100.29	100.82	0.53	.00526		
1150	3	282.48	259.80	282.00	283.10	1.10	.00389		
1150	4	553.36	508.90	552.61	554.10	1.49	.00269		
1150	5	915.95	842.80	914.74	917.00	2.26	.00247		
1150	6	1363.30	1261.00	1361.00	1366.02	5.02	.00368		
1100	2	101.55	93.10	101.43	101.65	0.22	.00217		
1100	3	284.51	261.30	284.25	284.77	0.52	.00183		
1100	4	556.96	511.90	556.51	557.32	0.81	.00145		
1100	5	921.50	848.20	920.89	922.10	1.21	.00131		
1100	6	1367.62	1269.20						X

EXPERIMENTAL CODE :138
MATERIAL :01-62-5 RETEST
DATA SOURCES
MANUFACTURER :NONE
AFML :UDRI BEAM COATED ONE SIDE
OTHER :NONE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	2.36365E+10	.0712	871.1	89.0	2.	1.56390E+11	.0073	86.4	1.68382E+09
2	2.46617E+10	.0619	871.1	250.7	3.	1.57786E+11	.0065	243.0	1.52757E+09
3	2.43669E+10	.0883	871.1	491.2	4.	1.57996E+11	.0092	476.5	2.15136E+09
4	2.46780E+10	.0941	871.1	814.3	5.	1.58723E+11	.0099	789.5	2.32184E+09
5	2.42709E+10	.1153	871.1	1217.5	6.	1.60026E+11	.0118	1182.0	2.79752E+09
6	2.49368E+10	.0599	843.3	89.9	2.	1.59153E+11	.0063	87.2	1.49413E+09
7	2.57038E+10	.0961	843.3	252.9	3.	1.60106E+11	.0103	244.8	2.46897E+09
8	2.54179E+10	.1053	843.3	495.9	4.	1.60593E+11	.0112	480.4	2.67618E+09
9	2.58123E+10	.1191	843.3	822.0	5.	1.61266E+11	.0128	795.8	3.07457E+09
10	2.57545E+10	.1566	843.3	1229.6	6.	1.62472E+11	.0167	1191.0	4.03323E+09
11	2.84201E+10	.2005	843.3	1244.6	6.	1.64937E+11	.0229	1200.0	5.69899E+09
12	2.79073E+10	.1546	843.3	831.2	5.	1.63748E+11	.0175	801.9	4.31484E+09
13	2.74266E+10	.1339	843.3	501.5	4.	1.63144E+11	.0150	484.2	3.67325E+09
14	2.73246E+10	.1072	843.3	255.7	3.	1.62958E+11	.0120	247.0	2.93052E+09
15	2.61307E+10	.0813	843.3	90.8	2.	1.61794E+11	.0088	87.9	2.12551E+09
16	2.65844E+10	.1064	787.8	91.6	2.	1.64456E+11	.0115	88.6	2.82868E+09
17	2.93465E+10	.1456	787.8	258.6	3.	1.65541E+11	.0170	248.9	4.27216E+09
18	2.91535E+10	.1746	787.8	506.8	4.	1.65714E+11	.0203	488.0	5.08924E+09
19	3.11235E+10	.2015	787.8	842.2	5.	1.66249E+11	.0246	808.0	6.27283E+09
20	3.01690E+10	.2810	787.8	1257.3	6.	1.67448E+11	.0333	1209.1	8.47711E+09
21	3.75617E+10	.2735	760.0	1283.4	6.	1.69950E+11	.0381	1218.1	1.02726E+10
22	3.77146E+10	.2188	760.0	858.3	5.	1.68727E+11	.0308	814.0	8.25315E+09
23	3.48303E+10	.2151	760.0	515.8	4.	1.68237E+11	.0285	491.7	7.49073E+09
24	3.25441E+10	.1904	760.0	262.0	3.	1.68078E+11	.0239	250.8	6.19637E+09
25	2.85692E+10	.1407	760.0	92.6	2.	1.67064E+11	.0160	89.3	4.01951E+09
26	3.42901E+10	.2022	732.2	94.2	2.	1.69618E+11	.0263	90.0	6.93503E+09
27	3.82068E+10	.2103	732.2	266.5	3.	1.70635E+11	.0296	252.7	8.03496E+09
28	4.74713E+10	.1660	732.2	879.0	5.	1.71224E+11	.0275	820.0	7.88222E+09
29	4.37747E+10	.2136	732.2	1306.2	6.	1.72471E+11	.0331	1227.1	9.34987E+09
30	3.69977E+10	.2009	732.2	94.7	2.	1.69618E+11	.0277	90.0	7.43217E+09
31	3.83138E+10	.2205	732.2	266.5	3.	1.70635E+11	.0311	252.7	8.44708E+09
32	4.52165E+10	.2064	732.2	529.2	4.	1.70847E+11	.0330	495.5	9.33080E+09
33	4.65134E+10	.1693	732.2	877.6	5.	1.71224E+11	.0276	820.0	7.87455E+09
34	4.74011E+10	.1742	732.2	1314.5	6.	1.72471E+11	.0287	1227.1	8.25845E+09
35	5.09350E+10	.0947	704.4	1330.4	6.	1.74981E+11	.0163	1236.0	4.82561E+09
36	5.25212E+10	.1452	704.4	538.9	4.	1.73200E+11	.0257	498.9	7.62720E+09
37	5.20315E+10	.1630	704.4	274.8	3.	1.73210E+11	.0286	254.6	8.48163E+09
38	4.30456E+10	.2006	704.4	96.4	2.	1.72116E+11	.0308	90.6	8.63472E+09
39	5.24332E+10	.1088	676.7	98.5	2.	1.74632E+11	.0191	91.3	5.70602E+09
40	5.52397E+10	.0797	676.7	277.9	3.	1.75737E+11	.0145	256.5	4.40157E+09
41	5.55308E+10	.0547	676.7	544.7	4.	1.75639E+11	.0100	502.4	3.03735E+09
42	5.61800E+10	.0447	676.7	902.6	5.	1.76187E+11	.0082	831.8	2.51165E+09
43	5.37168E+10	.0518	676.7	1344.2	6.	1.77396E+11	.0092	1244.5	2.78344E+09
44	5.49214E+10	.0413	648.9	1354.4	6.	1.79828E+11	.0073	1253.0	2.26586E+09
45	5.77639E+10	.0239	648.9	909.7	5.	1.78482E+11	.0044	837.2	1.38234E+09
46	5.79475E+10	.0288	648.9	549.7	4.	1.77883E+11	.0054	505.6	1.66707E+09
47	5.68773E+10	.0400	648.9	280.3	3.	1.78212E+11	.0073	258.2	2.27746E+09
48	5.58538E+10	.0410	648.9	99.6	2.	1.77011E+11	.0075	91.9	2.29141E+09
49	4.55378E+10	.2131	732.2	529.5	4.	1.70847E+11	.0343	495.5	9.70433E+09
50	5.18593E+10	.0986	704.4	890.9	5.	1.73696E+	.0172	825.9	5.11468E+09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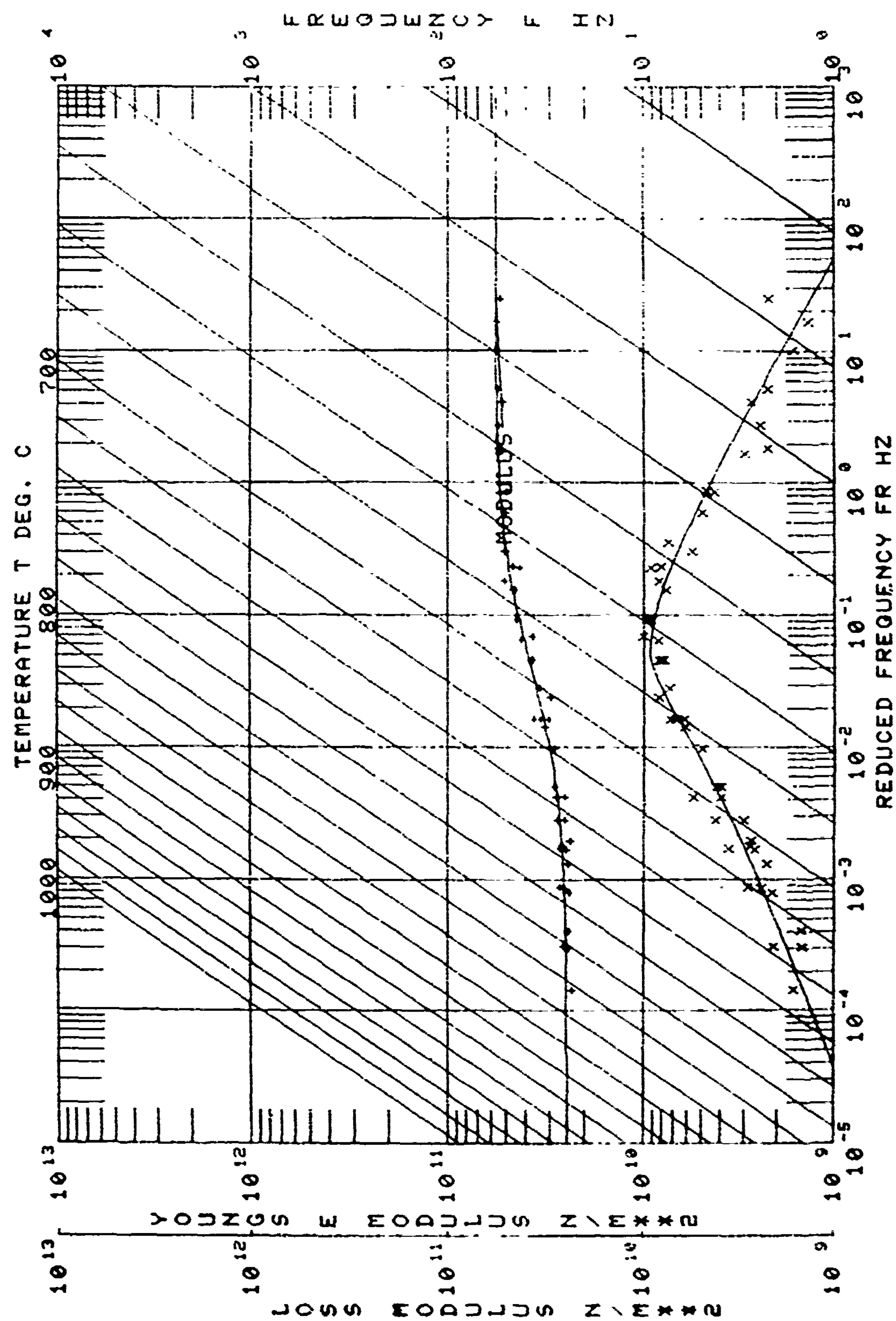
900
800
700
LOSS FACTOR ETA
YOUNGS E MODULUS N/M**2
MODULUS
FREQUENCY F HZ
REDUCED FREQUENCY FR HZ


TEMPERATURE T DEG. C
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS
700
800
900
1000

Beam No. 01-63-1

Date 4/22/79

Damping Material Two layers: first O. Hommel R-1202; second O. Hommel R-1250

Material Thickness 0.0345 cm Material Density 3.84 g/cc

Fixture No. 2 Beam Thickness 0.0965 cm

Beam Density 9.13 g/cc Beam Length 21.669 cm

Temperature Test Range: Between 760 °C and 455 °C

Frequency Test Range: Between 86 Hz and 1,525 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.50		Temperature	665 °C
	1,000 Hz	η_D 0.50		Temperature	705 °C
Range	100 Hz	620 °C	710 °C		
	1,000 Hz	675 °C	730 °C		

Complex Modulus E_D'':

Peak	100 Hz	5.8×10^9 PAS		Temperature	620 °C
	1,000 Hz	5.8×10^9 PAS		Temperature	675 °C
Range	100 Hz	575 °C	660 °C		
	1.000 Hz	620 °C	730 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :01-63-1 TWO LAYER
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0          FROM          MROM         N          ML
               A1            A2          A3         A4
   500.0  3.3000E-03  6.3000E+09     .400   7.5000E+08
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL     SL        SH        FROL        C
            B1       B2        B3         B4         B5
   500.0    .510    .700    -.450  3.3000E-03     .750
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Retest of 01-63-2.

TABLE 17-E

Beam No. 01-63-1

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δt	η_s	η_c	1dB
1400	2	96.93	91.06	86.64	97.17	0.53		.00610	
1400	3	24.275	255.75	241.77	243.68	1.91		.00787	
1400	4	478.16	500.50	476.98	479.29	4.34		.00950	X
1400	5	792.40	829.50	788.57	796.23	7.66		.00967	
1400	6	1187.60	1241.00	1179.68	1195.52	[illegible]2.13		.02621	X
1350	2	87.68	91.87	87.29	88.09	0.80		.09132	
1350	3	245.00	257.60	24[illegible].38	247.06	3.68		.01502	
1350	4	483.40	504.40	478.04	488.7[illegible]	10.72		.02218	
1350	5	806.45	8[illegible]5.50	801.96	811.48	9.88		.01726	X
1350	6	1206.64	1249.50	1202.5	1210.75	16.15		.01339	X
1300	2	88.63	92.47	87.82	8[illegible].42	1.60		.01805	
1300	3	257.00	259.55	255.05	258.95	7.66		.02982	X
1300	4	494.50	508.10	483.87	509.67	25.80		.05217	
1300	5	821.97	829.50	809.35	831.16	42.86		.0521[illegible]	X
1300	6	1309.93	1258.20	1283.70	1322.34	38.64		.02950	
125[illegible]	2	90.05	93.17	88.51	91.45	2.94		.03265	
1250	2	90.00	93.17	88.05	91.60	3.55		.03944	
1250	3	255.71	261.45	253.21	258.14	9.69		.03789	X
1250	4	508.37	511.75	487.30	522.08	34.78		.06841	
1250	5	847.79	948.00	828.19	859.47	61.47		.07251	X
1250	6	133[illegible].75	1267.00	1318.11	1350.77	32.66		.02441	
1200	2	93.26	93.86	90.16	95.53	5.37		.05758	
1200	3	2[illegible]93	253.25	262.33	269.66	14.40		.05415	X

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δt	η_s	η_c	1dB
1200	4	532.00	515.60	518.71	545.42	26.71		.050[illegible]	
1200	5	882.00	853.00	873.20	992.38	37.69		.04274	X
1200	6	1326.94	1275.50	1308.51	1342.35	33.94		.02550	
1150	2	96.58	94.52	95.53	97.93	4.72		.04883	X
1150	3	273.84	265.10	270.93	276.71	11.34		.04153	X
1150	4	540.80	519.00	533.55	547.97	14.42		.02666	
1150	5	897.30	859.90	882.09	912.59	30.50		.03399	
1150	6	1329.39	1284.10	1321.85	1338.74	3[illegible].19		.02497	X
1150	2	97.50	94.52	94.88	99.71	4.8[illegible]		.04954	
1150	3	276.52	265.10	268.88	284.77	15.89		.05746	X
1150	4	544.41	519.00	540.43	550.82	20.41		.03751	X
1150	5	916.09	859.90	902.95	931.12	28.1[illegible]		.03075	
1150	6	1357.60	1284.10	1340.07	1375.50	30.43		.02242	
1100	2	99.10	95.18	97.16	100.85	[illegible].69		.03724	
1100	3	279.61	266.80	277.05	281.79	9.31		.0333[illegible]	X
1100	4	548.85	522.45	542.93	556.46	13.53		.024[illegible]5	
1100	5	918.80	865.50	912.90	925.93	25.60		.02787	X
1100	6	1356.24	1292.40	134[illegible].62	[illegible]369.17	21.55		.01578	
1100	2	101.89	95.18	98.87	102.61	3.74		.03700	
1100	[illegible]	285.50	266.80	282.61	287.60	9.90		.03435	X
[illegible]00	4	576.21	[illegible]22.45	563.20	595.07	31.87		.05531	
[illegible]00	5	[illegible]8.34	[illegible]65.60	92[illegible].96	[illegible]55.24	[illegible]		[illegible]34	
1100	[illegible]	1401.85	[illegible]292.40	1384.38	[illegible]	[illegible].56		[illegible]	

TABLE 17-E (Concluded)

Beam No. 01-63-1

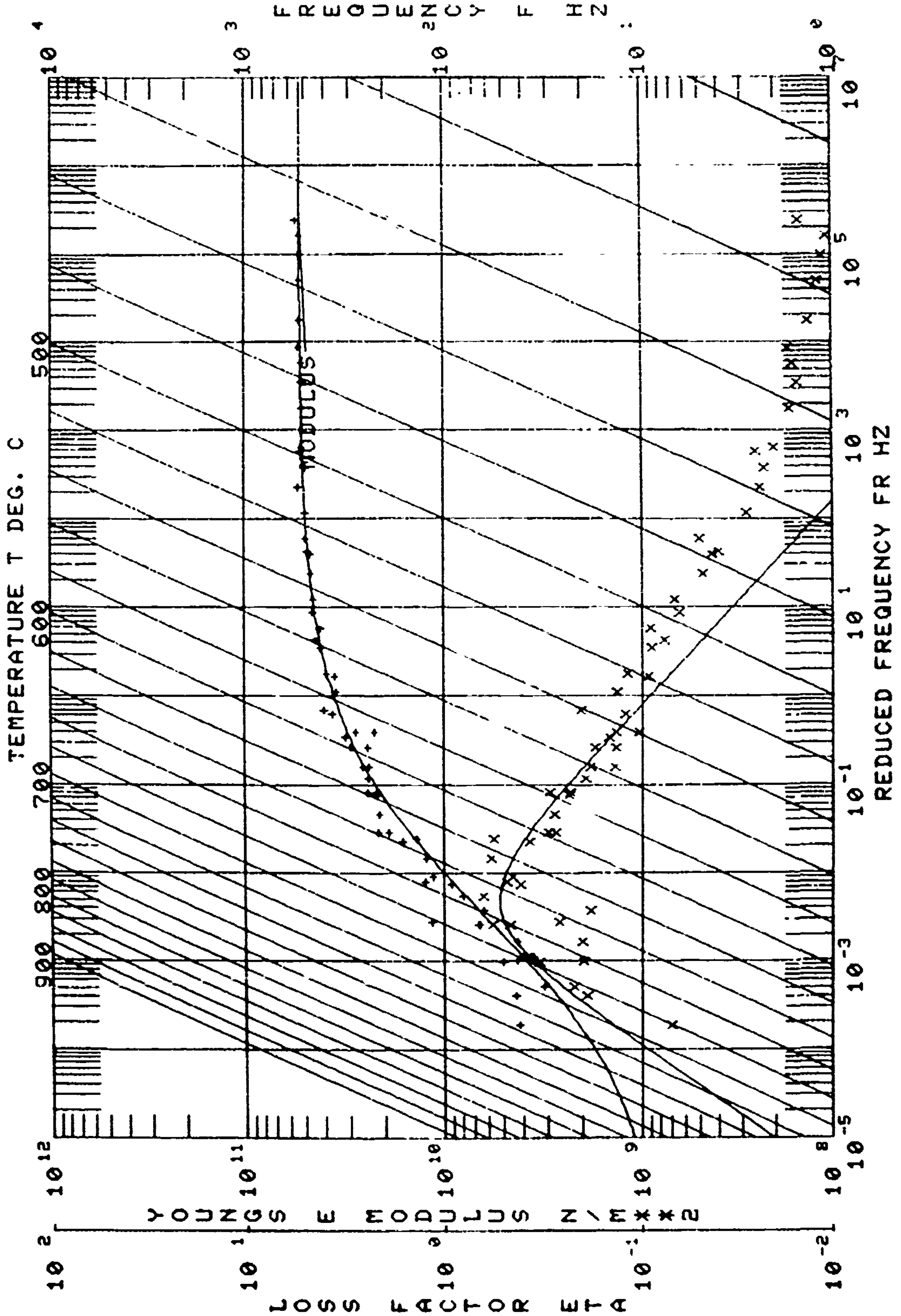
°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1050	2	104.37	95.80	102.56	105.82	3.26		.03124	
1050	3	294.88	268.50	291.64	296.37	9.29		.03152	X
1050	4	582.20	525.90	576.35	590.70	14.35		.02455	
1050	5	965.17	871.40	954.47	978.48	24.01		.02488	
1050	6	1457.66	1300.60	1443.15	1470.40	27.25		.01869	
1000	2	104.60	96.44	102.09	105.85	2.76		.02639	
1000	3	294.01	270.75	290.19	297.10	6.91		.02350	
1000	4	579.53	529.20	574.88	586.02	11.14		.01922	
1000	5	960.65	877.00	952.69	969.61	16.92		.01761	
1000	6	1446.09	1309.00	1437.35	1458.68	21.33		.01475	
1000	2	107.54	96.44	106.36	108.70	2.34		.02176	
1000	3	302.35	270.75	299.35	305.19	5.84		.01932	
1000	4	594.23	529.20	590.08	598.53	8.45		.01422	
1000	5	984.96	877.00	979.27	991.80	12.53		.01272	
1000	6	1481.22	1309.00	1466.04	1488.59	22.55		.01522	
950	2	109.44	97.01	108.83	110.14	1.31		.01197	
950	3	307.49	271.80	306.11	308.80	2.66		.00865	
950	[illegible]	602.38	532.15	600.38	605.04	4.66		.00774	
950	[illegible]	987.80	882.90	994.85	1001.71	6.86		.00688	
950	6	1499.85	1316.50	1492.60	1504.46	11.86		.00791	
900	2	110.84	97.60	110.54	111.23	0.69		.00623	
900	3	310.80	273.35	309.88	311.49	1.61		.00518	
900	4	608.86	535.15	607.54	610.40	2.86		.00470	

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
900	5	1007.54	886.90	1004.38	1009.38	5.00		.00496	
900	6	1513.20	1324.00	1508.66	1516.74	8.08		.00534	
850	2	111.81	98.12	111.55	112.01	0.46		.00414	
850	3	313.05	274.90	312.55	313.69	1.14		.00364	
850	4	613.40	538.10	612.17	614.29	2.12		.00346	
850	5	1014.50	891.20	1012.98	1016.32	3.34		.00329	
850	6	1523.10	1330.70	1519.38	1526.50	7.12		.00467	

EXPERIMENTAL CODE : 8-
MATERIAL :0163-2
DATA SOURCES
MANUFACTURER :C HOMMEL R:202/R1250
AFML :UDRI BEAM COAT ONE SIDE JUNE 2: 79
OTHER :NONE

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	2.95889E+09	.2001	760.0	86.8	2.	1.77830E+11	.0065	91.6	5.92063E+08
2	4.49736E+09	.2044	760.0	478.4	4.	1.76344E+11	.0099	500.5	9.19447E+08
3	4.59789E+09	.2035	760.0	793.2	5.	1.77256E+11	.0100	829.5	9.35554E+08
4	4.00403E+09	.3417	760.0	1182.8	6.	1.78456E+11	.0146	1241.0	1.36826E+09
5	7.37678E+09	.2613	732.2	1211.4	6.	1.80909E+11	.0194	1249.5	1.92756E+09
6	5.06447E+09	.3783	732.2	800.7	5.	1.79830E+11	.0200	835.5	1.91588E+09
7	4.54143E+09	.3696	732.2	483.0	4.	1.79814E+11	.0177	505.4	1.67833E+09
8	4.03162E+09	.1936	732.2	87.5	2.	1.78530E+11	.0083	91.8	7.80609E+08
9	5.28745E+09	.5170	704.4	248.9	3.	1.82109E+11	.0282	259.5	2.73378E+09
10	7.13602E+09	.2990	704.4	492.0	4.	1.81741E+11	.0215	508.1	2.13391E+09
11	1.17871E+10	.2913	704.4	822.7	5.	1.77256E+11	.0331	829.5	3.43300E+09
12	1.00321E+10	.3394	704.4	1226.3	6.	1.80533E+11	.0331	1248.2	3.40534E+09
13	1.33073E+10	.6038	676.7	1262.0	6.	1.86012E+11	.0730	1267.0	8.03550E+09
14	1.30832E+10	.3931	676.7	844.0	5.	1.85251E+11	.0470	848.0	5.14331E+09
15	8.30684E+09	.5090	676.7	254.5	3.	1.84785E+11	.0412	261.5	4.22825E+09
16	7.33384E+09	.4520	676.7	90.3	2.	1.83978E+11	.0329	93.2	3.31696E+09
17	1.18068E+10	.4914	648.9	92.8	2.	1.86713E+11	.0535	93.9	5.80185E+09
18	1.45224E+10	.3756	648.9	263.5	3.	1.87338E+11	.0485	263.2	5.45530E+09
19	1.61039E+10	.3787	648.9	519.8	4.	1.87145E+11	.0532	515.6	6.09884E+09
20	1.69452E+10	.3534	648.9	863.0	5.	1.87442E+11	.0517	853.0	5.98911E+09
21	2.20761E+10	.1610	648.9	1317.7	6.	1.88516E+11	.0287	1275.5	3.55474E+09
22	2.91757E+10	.0953	621.1	550.8	4.	1.89622E+11	.0206	519.0	2.77985E+09
23	2.38902E+10	.2313	621.1	275.7	3.	1.89980E+11	.0435	265.1	5.52587E+09
24	1.89528E+10	.3285	621.1	96.4	2.	1.89348E+11	.0520	94.5	6.22558E+09
25	2.86714E+10	.2335	593.3	100.7	2.	1.92002E+11	.0496	95.2	6.69533E+09
26	3.29164E+10	.1900	593.3	286.5	3.	1.92425E+11	.0442	266.8	6.25415E+09
27	3.43243E+10	.1628	593.3	564.0	4.	1.92151E+11	.0389	522.4	5.58875E+09
28	3.61233E+10	.1324	593.3	939.7	5.	1.93020E+11	.0326	865.6	4.78292E+09
29	3.83281E+10	.1273	593.3	1413.0	6.	1.93545E+11	.0325	1292.4	4.87803E+09
30	4.35998E+10	.0553	565.6	1444.0	6.	1.96009E+11	.0151	1300.6	2.40930E+09
31	4.17158E+10	.0602	565.6	962.0	5.	1.95616E+11	.0161	871.4	2.51319E+09
32	3.83442E+10	.1190	565.6	104.7	2.	1.94511E+11	.0303	95.8	4.56235E+09
33	4.46474E+10	.0529	537.8	107.3	2.	1.97119E+11	.0146	96.4	2.36231E+09
34	4.50916E+10	.0379	537.8	301.1	3.	1.97434E+11	.0105	270.2	1.70900E+09
35	4.53617E+10	.0331	537.8	590.3	4.	1.97148E+11	.0092	529.2	1.50458E+09
36	4.54584E+10	.0293	537.8	977.9	5.	1.98138E+11	.0082	877.0	1.33165E+09
37	4.68870E+10	.0285	537.8	1465.5	6.	1.98549E+11	.0081	1309.0	1.33620E+09
38	4.93783E+10	.0173	510.0	1482.4	6.	2.00830E+11	.0050	1316.5	8.55835E+08
39	4.82366E+10	.0173	510.0	990.1	5.	2.00404E+11	.0050	882.0	8.35882E+08
40	4.80661E+10	.0194	510.0	597.5	4.	1.99352E+11	.0056	532.2	9.32789E+08
41	4.81134E+10	.0199	510.0	305.2	3.	1.99705E+11	.0057	271.8	9.57635E+08
42	4.78491E+10	.0277	510.0	109.9	2.	1.99456E+11	.0079	97.0	1.32311E+09
43	5.00450E+10	.0187	482.2	110.8	2.	2.01889E+11	.0065	97.6	9.37463E+08
44	4.98202E+10	.0134	482.2	307.9	3.	2.01989E+11	.0039	273.3	6.69672E+08
45	4.97712E+10	.0130	482.2	602.9	4.	2.01607E+11	.0038	535.2	6.48104E+08
46	4.96457E+10	.0117	482.2	998.2	5.	2.02637E+11	.0034	886.9	5.82218E+08
47	5.08015E+10	.0162	482.2	1494.6	6.	2.03126E+11	.0047	1324.0	8.21887E+08
48	1.20638E+10	.4209	648.9	92.9	2.	1.86713E+11	.0467	93.9	5.07737E+09
49	1.42747E+10	.4093	648.9	263.2	3.	1.87338E+11	.0521	263.2	5.84319E+09

50	1.71386E+10	.3656	648.9	322.1	4.	1.87145E+11	.0540	515.6	6.26510E+09
51	1.96037E+10	.3017	648.9	372.8	5.	1.87442E+11	.0494	853.0	5.91527E+09
52	2.50648E+10	.2334	648.9	1333.5	6.	1.88516E+11	.0457	1275.5	[illegible]
53	3.11417E+10	.1658	621.1	1371.5	6.	1.91267E+11	.0373	1284.1	[illegible]
54	2.84077E+10	.2283	621.1	909.6	5.	1.90487E+11	.0484	859.9	6.49437E+09
55	2.56803E+10	.2469	621.1	543.6	4.	1.89622E+11	.0489	519.0	6.34122E+09
56	2.19218E+10	.3284	621.1	273.5	3.	1.89980E+11	.0579	265.1	7.19869E+09
57	1.87795E+10	.3436	621.1	96.3	2.	1.89348E+11	.0540	94.5	6.45292E+09
58	4.94309E+09	.3428	704.4	88.5	2.	1.81224E+11	.0176	92.5	1.69456E+09
59	7.33884E+09	.4520	676.7	90.3	2.	1.83978E+11	.0329	93.2	3.31696E+09
60	4.13559E+10	.0708	565.6	580.3	4.	1.94697E+11	.0188	525.9	2.92760E+09
61	3.99712E+10	.0953	565.6	294.9	3.	1.94385E+11	.0249	268.5	3.81112E+09
62	3.33771E+09	.2060	760.0	242.9	3.	1.76816E+11	.0075	255.7	6.87636E+08
63	3.73809E+09	.3556	732.2	245.1	3.	1.79383E+11	.0142	257.6	1.32939E+09
64	1.12763E+10	.4373	676.7	505.2	4.	1.84361E+11	.0463	511.7	4.93154E+09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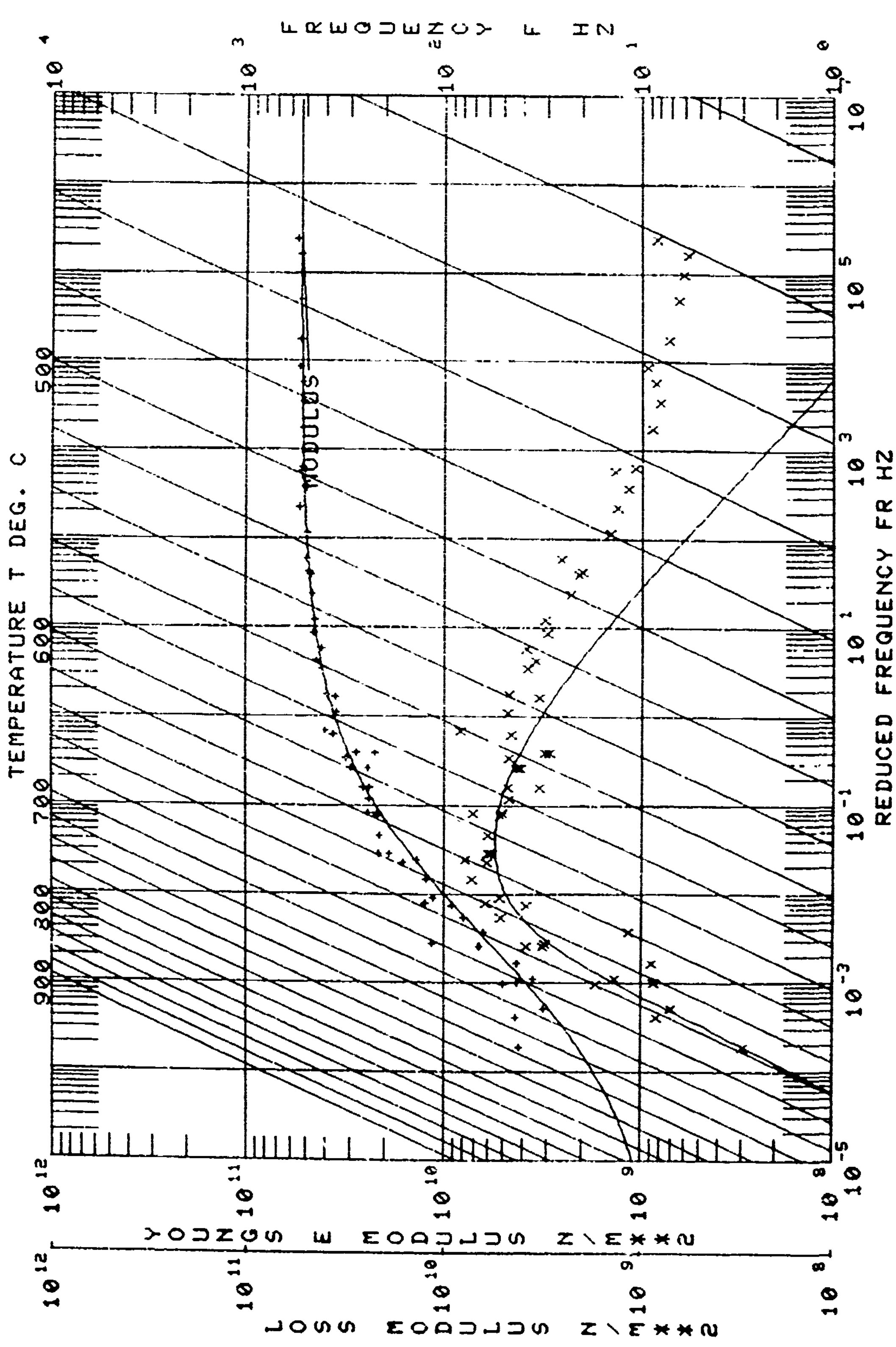
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS FACTOR ETA
MODULUS


TEMPERATURE T DEG. C
500
600
700
800
900
REDUCED FREQUENCY FR HZ
FREQUENCY F HZ
YOUNGS E MODULUS N/M**2
LOSS MODULUS N/M**2
MODULUS

Beam No. 01-63-2

Date 6/20/79

Damping Material Two layers: first O. Hommel R-1202; second O. Hommel R-1250

Material Thickness 0.0345 cm Material Density 3.84 g/cc

Fixture No. 2 Beam Thickness 0.0965 cm

Beam Density 9.13 g/cc Beam Length 21.669 cm

Temperature Test Range: Between 760 °C and 480 °C

Frequency Test Range: Between 86 Hz and 1,495 Hz

Loss Factor η_D:

Peak	100 Hz	η_D 0.45		Temperature	665 °C
	1,000 Hz	η_D 0.45		Temperature	730 °C
Range	100 Hz	600 °C	715 °C		
	1,000 Hz	650 °C	810 °C		

Complex Modulus E_D'':

Peak	100 Hz	5.5×10^9 PAS		Temperature	600 °C
	1,000 Hz	5.5×10^9 PAS		Temperature	650 °C
Range	100 Hz	550 °C	650 °C		
	1,000 Hz	590 °C	725 °C		

NOMOGRAPH CURVE FIT EQUATION:

```
MATERIAL :0163-2
LOG(M)=LOG(ML)+(2LOG(MROM/ML))/(1+(FROM/FR)**N)
  T0         FROM        MROM        N         ML
              A1          A2         A3        A4
  500.0   3.9174E-03  6.9999E+09    .415   9.4827E+08
A=(LOG(FR)-LOG(FROL))/C
LOG(ETA)=LOG(ETAFROL)+((SL+SH)A+(SL-SH)(1-SQRT(1+A**2)))C/2
  T0     ETAFROL    SL       SH        FROL        C
           B1       B2       B3        B4          B5
  500.0    .406     .600    -.314   3.3237E-03    .657
LOG(FR)=LOG(F)-12(T-T0)/(525/1.8+T-T0)
```

REMARKS: Retest of 01-63-1 after 144 hours at 595°C.

TABLE 18-E

Beam No. 01-63-2

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1400	2	86.82	91.60	86.53	87.09	0.56	.00645		
1400	3	242.93	255.75	241.99	243.81	1.82	.00749		
1400	4	478.43	500.50	475.86	480.58	4.72	.00987		
1400	5	793.25	829.50	789.19	797.11	7.92	.00998		
1400	6	1182.83	1241.00	1174.40	1191.70	17.30	.01463		
1350	2	87.49	91.78	87.16	87.89	0.73	.00834		
1350	3	245.15	257.60	243.40	246.88	3.48	.01420		
1350	4	483.00	505.40	478.63	487.17	8.54	.01768		
1350	5	800.66	835.50	793.25	809.79	16.04	.02003		
1350	6	1211.45	1249.50	1201.75	1225.25	23.50	.01940		
1300	2	88.54	92.47	87.69	89.25	1.56	.01762		
1300	3	248.93	259.55	245.42	252.43	7.01	.02816		
1300	4	491.95	508.10	483.80	499.70	15.97	.03246		
1300	5	922.70	829.50	806.41	833.65	27.24	.03311		
1300	6	1226.30	1258.20	1209.96	1250.01	40.05	.03266		
1250	2	90.26	93.17	88.87	91.84	2.97	.03290		
1250	3	254.45	261.45	249.34	259.83	10.49	.04123		
1250	4	505.23	511.75	491.84	515.24	23.40	.04632		
1250	5	844.00	848.00	824.39	864.06	39.67	.04700		
1250	6	1262.00	1267.00	1235.23	1282.09	97.09	.07297		X
1250	6	1263.99	1267.00	1249.02	1284.22	69.17	.05473		X
1200	2	92.83	93.86	90.86	95.03	4.97	.05354		
1200	3	263.53	263.25	256.74	269.52	12.78	.04850		

Temp. °F	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1200	4	519.79	515.60	504.74	532.40	27.66	.05321		
1200	5	862.98	853.00	845.53	890.10	44.57	.05165		
1200	6	1317.74	1275.50	1294.18	1332.01	37.83	.02871		
1200	2	92.94	93.86	90.66	95.00	4.34	.04570		
1200	3	263.24	263.25	259.28	266.26	13.17	.05211		X
1200	4	522.13	515.60	509.58	537.76	28.18	.05397		
1200	5	872.27	853.00	862.62	884.56	43.11	.04940		X
1200	6	1333.46	1275.50	1317.97	1248.95	60.88	.04566		
1150	2	96.37	94.52	94.02	99.03	5.01	.05199		
1150	3	275.67	255.10	270.68	282.66	11.98	.04346		
1150	4	550.81	519.00	544.40	555.67	11.27	.02064		
1150	5		859.90						
1150	6		1284.10						
1150	2	96.30	94.52	93.60	98.80	5.20	.05400		
1150	3	273.52	265.10	269.55	277.61	15.84	.05791		X
1150	4	543.57	519.00	530.85	557.45	26.60	.04894		
1150	5	909.55	859.90	888.18	932.20	44.02	.04840		
1150	6	1371.50	1284.10	1356.35	1382.40	51.19	.03733		X
1100	2	100.69	95.18	98.54	103.53	4.99	.04956		
1100	3	286.54	266.80	279.88	292.54	12.66	.04418		
1100	4	563.98	522.45	554.90	576.86	21.96	.03894		
1100	5	939.70	865.60	932.69	948.29	30.65	.03262		
1100	6	[illegible]	1292.40	[illegible]	[illegible]	45.90	.03249		

TABLE 18-E (Concluded)

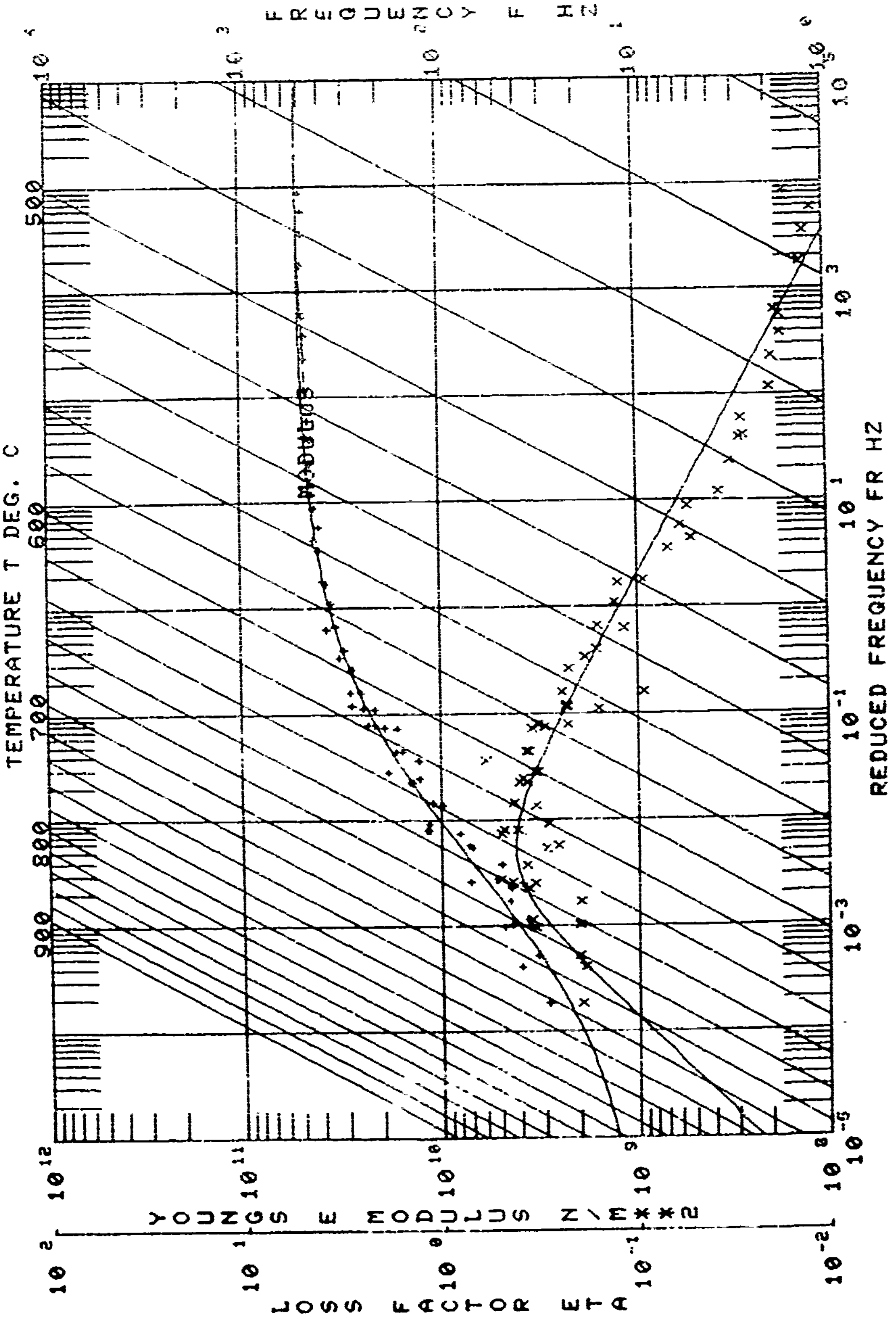
Beam No. 01-63-2

°F Temp.	Mode	f_c	f_n	f_L	f_R	Δf	η_s	η_c	1dB
1050	2	104.66	95.80	103.16	106.34	3.18	.03038		
1050	3	294.89	268.50	291.00	298.33	7.33	.02486		
1050	4	580.26	525.90	575.06	586.00	10.94	.01885		
1050	5	961.98	871.40	954.38	969.85	15.47	.01608		
1050	6	1444.40	1300.60	1435.68	1457.44	21.84	.01512		
1000	2	107.34	96.44	106.55	108.12	1.57	.01463		
1000	3	301.14	270.25	299.54	302.71	3.17	.01053		
1000	4	590.30	529.20	587.57	593.02	5.45	.00923		
1000	5	977.86	877.00	975.86	979.92	7.98	.00816		X
1000	6	1465.48	1309.00	1460.23	1472.06	11.83	.00807		
950	2	108.85	97.01	108.46	109.32	0.86	.00790		
950	3	305.16	271.80	304.23	306.60	1.74	.00570		
950	4	597.53	532.15	596.04	599.35	3.32	.00556		
950	5	990.12	882.00	987.70	992.61	4.91	.00496		
950	6	1482.41	1316.50	1479.06	1486.50	7.44	.00502		
900	2	110.03	97.60	109.73	110.33	0.60	.00545		
900	3	307.94	273.35	307.28	308.48	1.20	.00390		
900	4	602.95	535.15	601.66	603.94	2.28	.00378		
900	5	998.16	886.90	996.48	999.86	3.38	.00339		
900	6	1494.46	1324.00	1491.19	1497.22	6.53	.00473		

EXPERIMENTAL CODE : 75
MATERIAL :01-63-1 TWO LAYER
DATA SOURCES
MANUFACTURER :O`HOMMEL TOP:R-1250 BOTTOM:R-1202
AFML :UDRI BEAM COATED ONE SIDE
OTHER :NN

NO.	MODULUS N/M**2	LOSS FACTOR	TEMP. DEG. C	FREQ. HZ	MODE NO.	BEAM MOD. N/M**2	COMPOSITE LOSS FAC.	BEAM FREQ. HZ	COMPLEX MOD. N/M**2
1	4.23677E+09	.0718	760.0	86.9	2.	1.75739E+11	.0033	91.1	3.04329E+08
2	3.20153E+09	.2252	760.0	242.7	3.	1.76816E+11	.0079	255.7	7.21065E+08
3	4.39229E+09	.2012	760.0	478.2	4.	1.76344E+11	.0095	500.5	8.83616E+08
4	4.39697E+09	.2056	760.0	792.4	5.	1.77256E+11	.0097	829.5	9.03840E+08
5	6.45733E+09	.1852	732.2	806.4	5.	1.79830E+11	.0123	835.5	1.19609E+09
6	3.62339E+09	.3874	732.2	245.0	3.	1.79383E+11	.0150	257.6	1.40382E+09
7	4.43894E+09	.1937	732.2	87.7	2.	1.78530E+11	.0091	91.8	8.59627E+08
8	5.13797E+09	.3388	704.4	88.6	2.	1.81224E+11	.0181	92.5	1.74073E+09
9	1.17618E+10	.2688	704.4	257.0	3.	1.82109E+11	.0298	259.5	3.16201E+09
10	8.17130E+09	.6440	704.4	494.5	4.	1.81741E+11	.0522	508.1	5.26213E+09
11	1.16042E+10	.4647	704.4	822.0	5.	1.77256E+11	.0521	829.5	5.39277E+09
12	2.33918E+10	.1554	704.4	1309.9	6.	1.83379E+11	.0295	1258.0	3.63471E+09
13	2.72701E+10	.1165	676.7	1337.7	6.	1.86012E+11	.0244	1267.0	3.17668E+09
14	1.40685E+10	.5712	676.7	847.0	5.	1.85251E+11	.0725	848.0	8.03528E+09
15	1.26065E+10	.5878	676.7	508.4	4.	1.84361E+11	.0684	511.7	7.41060E+09
16	9.32724E+09	.4223	676.7	255.7	3.	1.84785E+11	.0379	261.5	3.93924E+09
17	6.76002E+09	.5836	676.7	90.0	2.	1.83978E+11	.0394	93.2	3.94490E+09
18	1.28148E+10	.4932	648.9	93.3	2.	1.86713E+11	.0576	93.9	6.32083E+09
19	1.65873E+10	.3767	648.9	265.9	3.	1.87338E+11	.0542	263.2	6.24877E+09
20	2.16055E+10	.2846	648.9	532.0	4.	1.87145E+11	.0502	515.6	6.14916E+09
21	2.21614E+10	.2380	648.9	882.0	5.	1.87442E+11	.0427	853.0	5.27471E+09
22	2.38170E+10	.1353	648.9	1326.9	6.	1.88516E+11	.0255	1275.5	3.22139E+09
23	2.83666E+10	.1061	621.1	1357.6	6.	1.91067E+11	.0224	1284.1	3.00866E+09
24	3.03468E+10	.1386	621.1	916.1	5.	1.90487E+11	.0307	859.9	4.20737E+09
25	2.60812E+10	.1872	621.1	544.4	4.	1.89622E+11	.0375	519.0	4.88212E+09
26	2.46770E+10	.2987	621.1	276.5	3.	1.89980E+11	.0575	265.1	7.37146E+09
27	2.17924E+10	.2815	621.1	97.5	2.	1.89348E+11	.0495	94.5	6.13372E+09
28	2.97484E+10	.0170	593.3	101.1	2.	1.92002E+11	.0037	95.2	5.05704E+08
29	3.18929E+10	.1508	593.3	285.5	3.	1.92425E+11	.0344	266.8	4.81053E+09
30	4.06852E+10	.2081	593.3	576.2	4.	1.92151E+11	.0553	522.4	8.46698E+09
31	3.57252E+10	.1363	593.3	938.3	5.	1.92976E+11	.0333	865.5	4.86793E+09
32	3.59725E+10	.0947	593.3	1401.9	6.	1.93545E+11	.0232	1292.4	3.40672E+09
33	4.66447E+10	.0657	565.6	1457.7	6.	1.96009E+11	.0187	1300.6	3.06529E+09
34	4.27562E+10	.0919	565.6	965.2	5.	1.95616E+11	.0249	871.4	3.92791E+09
35	4.23984E+10	.0912	565.6	582.2	4.	1.94697E+11	.0247	525.9	3.86743E+09
36	3.99613E+10	.1209	565.6	294.9	3.	1.94885E+11	.0315	268.5	4.83165E+09
37	3.74552E+10	.1246	565.6	104.4	2.	1.94511E+11	.0312	95.8	4.66526E+09
38	4.52518E+10	.0781	537.8	107.5	2.	1.97119E+11	.0218	96.4	3.53370E+09
39	4.59641E+10	.0689	537.8	302.3	3.	1.98165E+11	.0193	270.7	3.16808E+09
40	4.75419E+10	.0496	537.8	594.2	4.	1.97148E+11	.0142	529.2	2.35944E+09
41	4.78453E+10	.0444	537.8	985.0	5.	1.98138E+11	.0127	877.0	2.12241E+09
42	5.04850E+10	.0516	537.8	1481.2	6.	1.98549E+11	.0152	1309.0	2.60457E+09
43	5.34393E+10	.0262	510.0	1499.9	6.	2.00830E+11	.0079	1316.5	1.39838E+09
44	5.08722E+10	.0233	510.0	997.0	5.	2.00404E+11	.0069	882.0	1.18746E+09
45	5.49332E+10	.0247	510.0	602.4	4.	1.92666E+11	.0077	523.2	1.35718E+09
46	5.07005E+10	.0293	510.0	307.5	3.	1.99705E+11	.0086	271.8	1.48782E+09
47	4.98751E+10	.0410	510.0	109.4	2.	1.99456E+11	.0120	97.0	2.03848E+09
48	5.25974E+10	.0208	482.2	110.8	2.	2.01829E+11	.0062	97.6	1.09628E+09
49	5.30416E+10	.0173	482.2	310.8	3.	2.01989E+11	.0052	273.3	9.15337E+08

50	5.31682E+10	.0156	482.2	608.9	4.	2.01607E+11	.0047	535.2	8.30608E+08
51	6.29055E+10	.0166	482.2	1007.5	5.	2.02637E+11	.0050	886.9	8.76309E+08
52	5.51922E+10	.0175	482.2	1513.2	6.	2.03125E+11	.0053	1324.0	9.64354E+08
53	5.62919E+10	.0152	454.4	1523.1	6.	2.05186E+11	.0047	1330.7	8.55861E+08
54	5.41541E+10	.0109	454.4	1014.5	5.	2.04606E+11	.0033	891.2	5.91075E+08
55	5.44477E+10	.0114	454.4	613.4	4.	2.03835E+11	.0035	538.1	6.21960E+08
56	5.42030E+10	.0121	454.4	313.0	3.	2.04286E+11	.0036	274.9	6.53691E+08
57	5.43736E+10	.0137	454.4	111.8	2.	2.04046E+11	.0041	98.1	7.44123E+08
58	6.87097E+09	.4760	676.7	90.1	2.	1.83978E+11	.0327	93.2	3.27072E+09
59	2.28815E+10	.1377	621.1	1329.3	6.	1.91067E+11	.0250	1284.1	3.15174E+09
60	2.48438E+10	.1762	621.1	897.3	5.	1.90487E+11	.0340	859.9	4.37713E+09
61	2.43659E+10	.1397	621.1	540.8	4.	1.89622E+11	.0267	519.0	3.40349E+09
62	2.21771E+10	.2340	621.1	273.8	3.	1.89980E+11	.0416	265.1	5.19025E+09
63	1.94756E+10	.3021	621.1	96.6	2.	1.89348E+11	.0488	94.5	5.88363E+09
64	2.44694E+10	.1963	593.3	99.1	2.	1.92002E+11	.0372	95.2	4.80292E+09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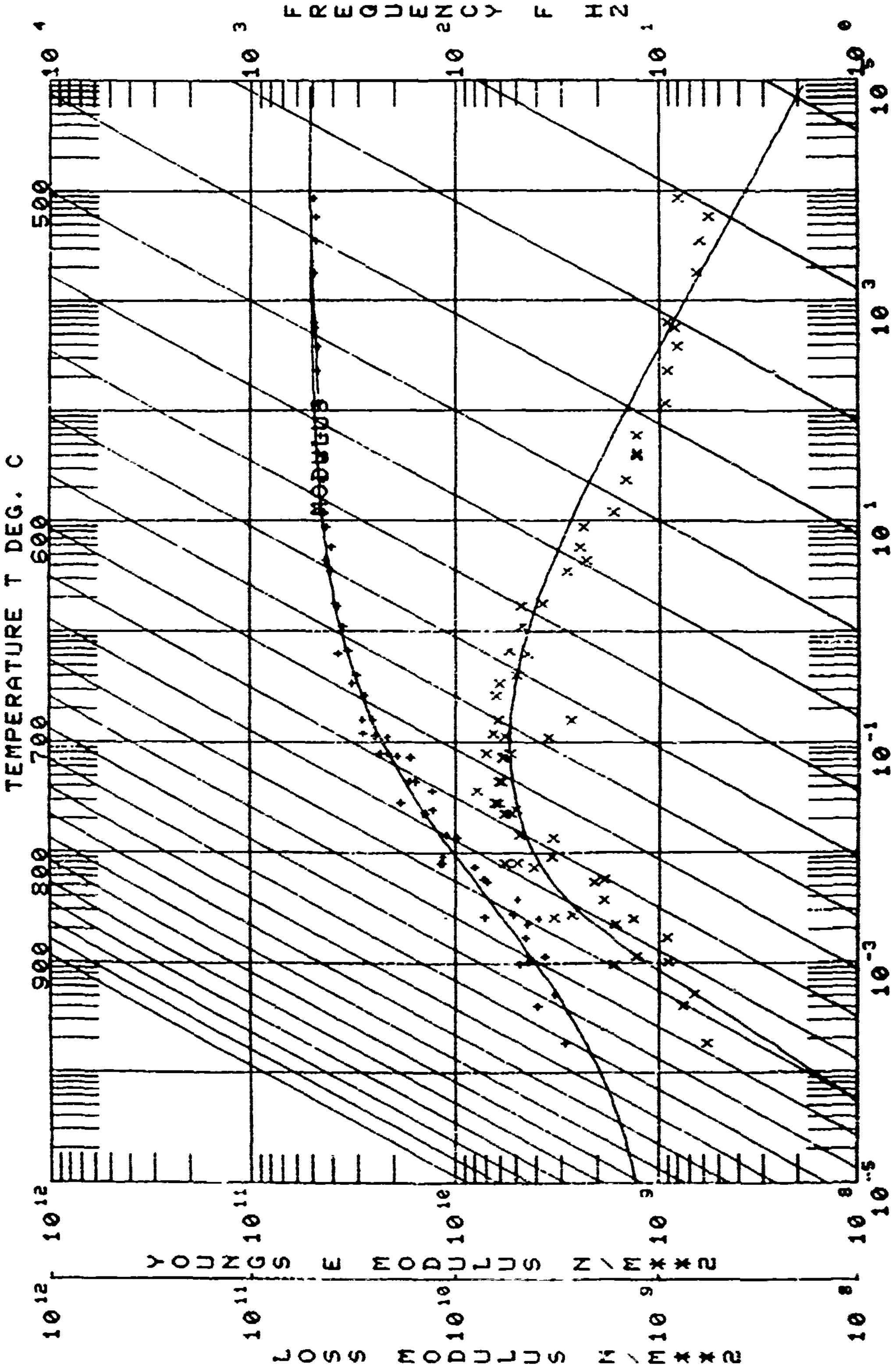

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