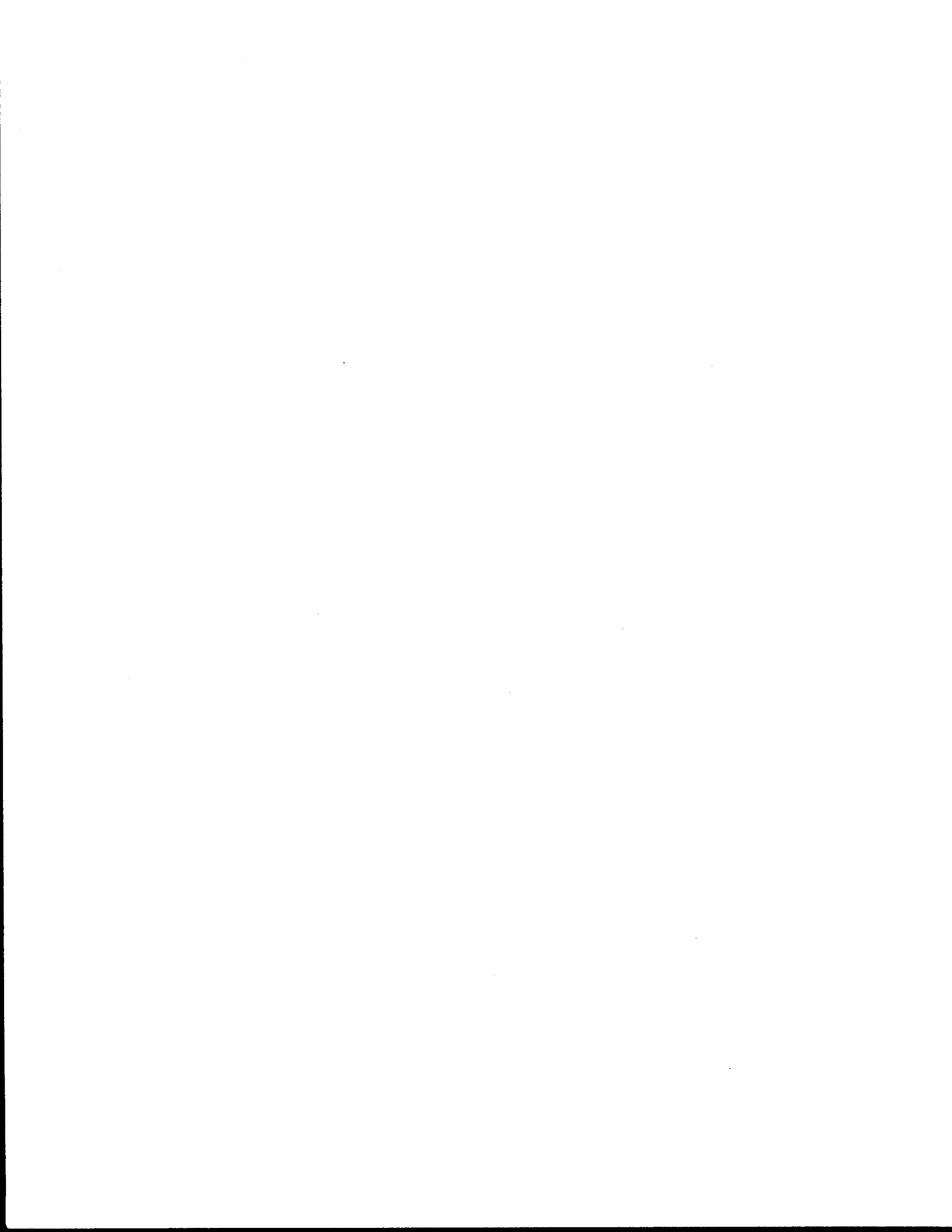


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LAYER EQUIVALENCY FACTORS AND DEFORMATION
CHARACTERISTICS OF FLEXIBLE PAVEMENTS TEST DATA

by

J. T. Hung, J-L. Briaud, and R. L. Lytton

Research Report Number 284-3a

Flexible Pavement Data Base and Design

Research Study 2-8-80-284

conducted for

The Texas State Department of Highways and
Public Transportation

in cooperation with the
U. S. Department of Transportation
Federal Highway Administration

by the

Texas Transportation Institute
Texas A&M University
College Station, Texas

January 1982



PREFACE

This document is a supplement to Research Report 284-3, "Layer Equivalency Factors and Deformation Characteristics of Flexible Pavements." It contains the collection of graphs of the pressuremeter test and the corresponding regression curves for the hyperbolic stress-strain model performed during the course of the study reported in Research Report 284-3.

The location of a particular test site and the type of pavement material in which that test was performed can be determined from Table 1 of Research Report 284-3; that table is reproduced as Table 2 of this document. The tests are numbered from 1 through 202; however, some of those numbers were used for dynaflect data and others for calibrations of the pressuremeter. The appropriate graphs for each test and for the pressuremeter calibrations are included herein.

Table 1 will indicate whether a particular test number is for a pressuremeter test, dynaflect data, or a pressuremeter calibration. If, in Table 1, a test number is found to be one assigned to a pressuremeter test, reference to Table 2 will tell where that test was performed and the type of pavement material present at that site. For example, Table 1 lists test number 95 as a pressuremeter test which will be found in Table 2. (A test number assigned to dynaflect data or to a pressuremeter calibration will not appear in Table 2.) Test number 95 is in Table 2e; from the top of Table 2e, test number 95 was performed 0.3 miles north of US 90 on SH 326; the left hand column of Table 2e gives a description of the pavement at the location of the test.

Where there is no graph for a test number, that test number was assigned to dynaflect data. Otherwise all of the pressuremeter test and calibration data are included in numerical order. For each of them, the graph of the pressuremeter test or calibration (possibly with graphs of that same curve plotted on different scales) is followed by any corresponding regression curves (again possibly with those curves plotted on different scales).

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PRESSUREMETER TEST

TEST SECTION 1	TEST NUMBER	
	118	154
	119	156

TABLE OF CONTENTS (Continued)

TEST SECTION 1	TEST NUMBER
	120 158
	121 160
	122 162
	123 164
	124 166
	125 168
	126 170
TEST SECTION 2	TEST NUMBER
	63 92
	64 94
	65 96
	66 98
	67 100
	68 102
	69 104
	70 106
	71 108
TEST SECTION 3	TEST NUMBER
	25 51
	26 53
	27 55
	28 57
	29 58

TABLE OF CONTENTS (Continued)

TEST SECTION 3	TEST NUMBER
	30 60
	31 62
	32 64
	33 65
	34 67
TEST SECTION 4	TEST NUMBER
	79 112
	80 114
	81 116
	82 118
	83 120
	84 122
	85 124
	86 126
	87 128
	88 131
TEST SECTION 5	TEST NUMBER
	91 136
	92 138
	93 140
	94 142
	95 144
	96 146
	97 148

TABLE OF CONTENTS (Continued)

TEST SECTION 6	TEST NUMBER
	47 71
	48 73
	49 75
	50 77
	51 79
	52 80
	53 82
	54 84
	56 86
	57 88
	58 90
TEST SECTION 7	TEST NUMBER
	148A 201
	149 203
	150 205
	151 207
TEST SECTION 9	TEST NUMBER
	180 237
	181 239
	182 241
	183 243
	184 245
	185 248

TABLE OF CONTENTS (Continued)

TEST SECTION 9	TEST NUMBER
	186 250
	187 252
TEST SECTION 10	TEST NUMBER
	164 213
	165 215
	166 217
	167 219
	168 221
	169 223
	170 225
	171 227
	172 230
	173 234
TEST SECTION 11	TEST NUMBER
	136 177
	137 179
	138 181
	139 182
	140 184
	141 186
	142 188
	143 190
	144 191 a
	145 193

TABLE OF CONTENTS (Continued)

TEST SECTION 11	TEST NUMBER
	146 195
	147 197
TEST SECTION 12	TEST NUMBER
	196 257
	197 259
	198 261
	199 263
	200 265
	201 267
	202 270

TABLE 1

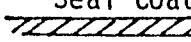
Test Number	Pressure-meter Test	Dynalect Data	CaLibration
1-24			X
25-34	X		
35-39		X	
40-41			X
42-46		X	
47-50	X		
51			X
52-57	X		
58-62		X	
63-71	X		
72			X
73-77		X	
78			X
79-88	X		
89			X
90-97	X		
98			X
99-115		X	
116-117			X
118-126	X		
127-128			X
129-133		X	
134-135			X
136-147	X		
148			X
148A-151	X		
152-161		X	
162-163			X
164-173	X		

TABLE 1 (Continued)

Test Number	Pressure-Meter Test	Dynalect Data	Calibration
174-179		X	
180-187	X		
188			X
189-193		X	
194-195			X
196-202	X		

TABLE 2. — Profiles of Test Sections and Test Data

(a) Section 1 -- (1947-1-1) on FM 1293, 1 mile West of FM 1003 (direction West)

Layers and Thickness Depth (ft)	Thickness (in.)	Test No.	Pressuremeter Modulus* (kPa)		Pressuremeter Limit Pressure* P_1 (kPa)	N** blows/ft	Water Content w %	Texas Triaxial Test Classification
			E_0	E_U & (E_R)				
0	Seal Coat  0.75							
	Iron Ore 7.25	121	21900	961000(132000)	1700	20	6.94 ⁺	3.1***
1	Select Sand 4.00	125	36700	1130000(123000)	≥ 2500			
		126	34700	713000(109000)	> 2500		11.73 ⁺	
2	Silty — Sand	120	37200	786000(110000)	> 2500	26		4.3
		124	32700	1010000(127000)	> 2500			
3	Subgrade —	123	8500	203000(42000)	840	20		4.3
		119	10200	359000(76000)	1080	16		
4	—	122	12300	237000(81000)	990			4.3
		118	10500	344000(83000)	1050	19		

* : Modulus at zero strain = initial tangent modulus on the reloading part of the first cycle

** : Blow count for driving an $1\frac{3}{8}$ inches (3.49 cm) solid rod with the SPT hammer

***: Detailed Texas triaxial test data available.

+: measured data.

TABLE 2. -- (Continued)

(b) Section 2 -- (932-1-1) on FM 365, 0.6 miles East of Port Arthur Road (direction)

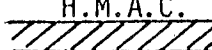
Layers and Thickness Depth (ft)	Thickness (in.)	Test No.	Pressuremeter Modulus* (kPa)		Pressuremeter Limit Pressure* P_1 (kPa)	N** blows/ft	Water Content w %	Texas Triaxial Test Classification
			E_o	E_U & (E_R)				
0	H.M.A.C.  2.00							
	Sand & Shell 12.00	71	27100	2160000(221000)	≥ 2500	42	5.62 ⁺	1.0*** (at w=7.00)
1	----- Select Sand 6.00	70	26000	1470000(138000)	2500			
	-----	66	25200	944000(81000)	2500			
	-----	69	11800	130000(61000)	1060	10	12.9	3.0*** (at w=11.0)
2	-----	65	12400	162000(92000)	980			
	Clay					8	21.0 ⁺ 25.9	4.4*** (at w=25.0)
3	Subgrade	68	4500	53000(32000)	280		31.14 ⁺	
		64	6200	53000(36000)	350	9	33.16 ⁺	
4	-----	67	4000	35000(24000)	260		35.86 ⁺	
		63	4100	40000(15000)	300	11	35.78 ⁺	

TABLE 2. — (Continued)

(c) Section 3 -- (305-7-1) on SH 87, 3 miles South of Newton County Line (direction North)

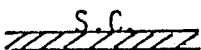




Layers and Thickness Depth (ft)	Thickness (in.)	Test No.	Pressuremeter Modulus* (kPa)		Pressuremeter Limit Pressure* P_1 (kPa)	N** blows/ft	Water Content w %	Texas Triaxial Test Classification
			E_0	E_U & (E_R)				
0	 1.5	34	26100	870000(77000)	> 2500		5.0	1*** (at w=8.3)
	Sand & Shell 12.0	32			loss press.	12.57 ⁺		
1	 12.0	28	15500	510000(42000)	2000	11.1		
	Select Sand 12.0	33	7900	242000(39000)	1375		3.0*** (at w=11.0)	
2	 12.0	31	8800	223000(45000)	1125	18	23.8	5.0*** (at w=22.6)
		27			1575	19.13 ⁺		
3	 Clay	30	11300	152000(90000)	1300		4.6	
	Subgrade	26	14200	196000(65000)	1325		19.65 ⁺	
4		29	7200	60000(34000)	525		4.6	
		25	6500	135000(52000)	575		29.31 ⁺	

TABLE 2. — (Continued)

(d) Section 4 -- (601-1-1) on SH 326, 1.6 miles South of SH 105 (direction South)






Layers and Thickness Depth Thickness (ft) (in.)	Test No.	Pressuremeter Modulus* (kPa)		Pressuremeter Limit Pressure* P_1 (kPa)	N** blows/ft	Water Content w %	Texas Triaxial Test Classification
		E_o	E_U & (E_R)				
0  H.M.A.C. 2.5							
Sand & Shell 8.0	86	41400	1450000(165000)	\geq 2500	40	6.22 ⁺	
	88	41000	1680000(418000)	> 2500			
1  Select Sand 9.0	82	43200	1270000(219000)	> 2500	12	18.52 ⁺	3.6
	85	12300	126000(97000)	775			
	81	12400	152000(93000)	815			
2  Clay					20		
3  Subgrade	84	18200	423000(150000)	1165			
	80	18400	536000(194000)	1385	19	18.26 ⁺	4.8
	87	12800	186000(100000)	675			
4  Subgrade	83	10600	254000(108000)	655			
	79	10100	207000(116000)	615	19	20.7 ⁺	

TABLE 2. — (Continued)

(e) Section 5 -- (601-2-1) on SH 326, 0.3 miles North of US 90 (direction North)

Layers and Thickness Depth (ft) Thickness (in.)	Test No.	Pressuremeter Modulus* (kPa)		Pressuremeter Limit Pressure* P_1 (kPa)	N** blows/ft	Water Content w %	Texas Triaxial Test Classification
		E_o	E_U & (E_R)				
0 <u>H.M.A.C.</u> 4.5							
Sand & Shell 5.0	97	13900	269000(101000)	1515		6.16 ⁺	
1 <u>Select</u>	95	13700	248000(56000)	1600	12		
Sand 7.5	92	13900	352000(108000)	1460			
2 <u>—</u>	91	10100	104000(68000)	710	9	22.1 ⁺	
Clay	94	10100	83000(60000)	700		28.08 ⁺	
3 <u>Subgrade</u>	90	10400	105000(106000)	1010	13		
						21.23 ⁺	
4 <u>—</u>	96	6400	78000(49000)	530	17		
	93	8800	115000(53000)	830	16	23.64 ⁺	

TABLE 2. — (Continued)

(f) Section 6 -- (932-1-2) on FM 365, 1 mile West of Port Arthur Road (direction West)

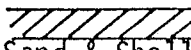
Layers and Thickness Depth (ft)	Thickness (in.)	Test No.	Pressuremeter Modulus* (kPa)		Pressuremeter Limit Pressure* P_1 (kPa)	N** blows/ft	Water Content w %	Texas Triaxial Test Classification
			E_o	E_U & (E_R)				
0	H.M.A.C.  3.0 Sand & Shell 4.0	55	43200	1260000 (857000)	2200		4.2 6.11 ⁺	
1	Select Sand 10.0	50	20900	338000 (179000)	1800	9	14.2	3.0
		57	28900	664000 (209000)	2500			
		49	11400	138000 (35000)	740		26.0 ⁺	
2	— Clay	54	6600	88000 (58000)	500		22.4	
		56	5300	100000 (68000)	580	11	22.6 ⁺	4.4
	Subgrade	48	5900	93000 (39000)	500			
3	—	53	5000	81000 (37000)	500		19.2 ⁺	
						12		5.5
4	—	52	8600	79000 (141000)	500			
		47	7400	68000 (39000)	440	16	36.7 ⁺	

TABLE 2. — (Continued)

(g) Section 7 -- (244-2-1) on SH 63, 9 miles N.W. of Jasper (direction North)

Layers and Thickness Depth (ft)	Thickness (in.)	Test No.	Pressuremeter Modulus* (kPa)		Pressuremeter Limit Pressure* P_1 (kPa)	N** blows/ft	Water Content w %	Texas Triaxial Test Classification
			E_0	E_U & (E_R)				
0	Precoated Seal Coat							
	Crushed Stone (Siltstone, cement-treated)	151	90800	3600000 (186000)	>> 2500	66	25.46 ⁺ 17.7	1.0***
1	Select Sand							
2		150	15300	485000 (226000)	1900	43	7.83 ⁺ 8.9	3.7*** (at w=8.9)
3	Clayey Sand	149	7200	80000 (39000)	525	28		4.1*** (at w=14.8)
4	Subgrade	148A	6800	77000 (42000)	525	27		3.9
						27		

NOTE: No measurements were taken at Section 8.

TABLE 2. — (Continued)

(h) Section 9 -- (367-1-46) on SH 124, 6.8 miles South of FM 1985 (direction South)

Layers and Thickness Depth (ft) Thickness (in.)	Test No.	Pressuremeter Modulus* (kPa)		Pressuremeter Limit Pressure* P_1 (kPa)	N** blows/ft	Water Content w %	Texas Triaxial Test Classification
		E_0	E_U & (E_R)				
0 L.Wt.A. 0.38 Limestone 5.0							
Sand & Shell 8.6	187	26300	1370000(129000)	> 2500	40	8.00 3.86 ⁺	2.1***
1 Lime Stabilized Clay 8.6	183	25200	1300000(126000)	> 2500	12	7.76 ⁺	
2 —	186	8500	55000(44000)	590	8	16.5 ⁺	
Clay	182	7200	57000(45000)	600			
3 —	185	4100	35000(28000)	500	9	28.0 ⁺	
Subgrade	181	4900	58000(35000)	575			
4 —	184	2400	19000(12000)	225	11	32.7 ⁺	
	180	2200	19600(10000)	200		36.0 ⁺	

TABLE 2. — (Continued)

(i) Section 10 -- (508-4-84) on SH 73, 0.5 miles West of FM 823 (direction East)

Layers and Thickness Depth (ft)	Thickness (in.)	Test No.	Pressuremeter Modulus* (kPa)		Pressuremeter Limit Pressure* P_1 (kPa)	N** blows/ft	Water Content w %	Texas Triaxial Test Classification
			E_0	E_U & (E_R)				
0	Limestone	6.0					5.71 ⁺	
	Sand & Shell	6.0	171	18800 827000(99000)	2000	28	7.11 ⁺	
1	Select Sand	6.0	167	16700 572000(100000)	2000		15.21 ⁺	
	Lime Stabilized Clay	6.0	173	31300 478000(196000)	\geq 2500	15	29.01 ⁺	
2	Clay		170	41900 1260000(390000)	2500			
			166	38400 626000(174000)	2170	13	21.2 ⁺	
3	Subgrade		169	5600 73000(45000)	800			
			165	7600 103000(63000)	870			
			172	2600 33000(16000)	300	14	26.14 ⁺	
4			168	3100 38000(18000)	350			
			164	3900 44000(27000)	350	12	34.16 ⁺	

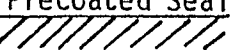




TABLE 2. -- (Continued)

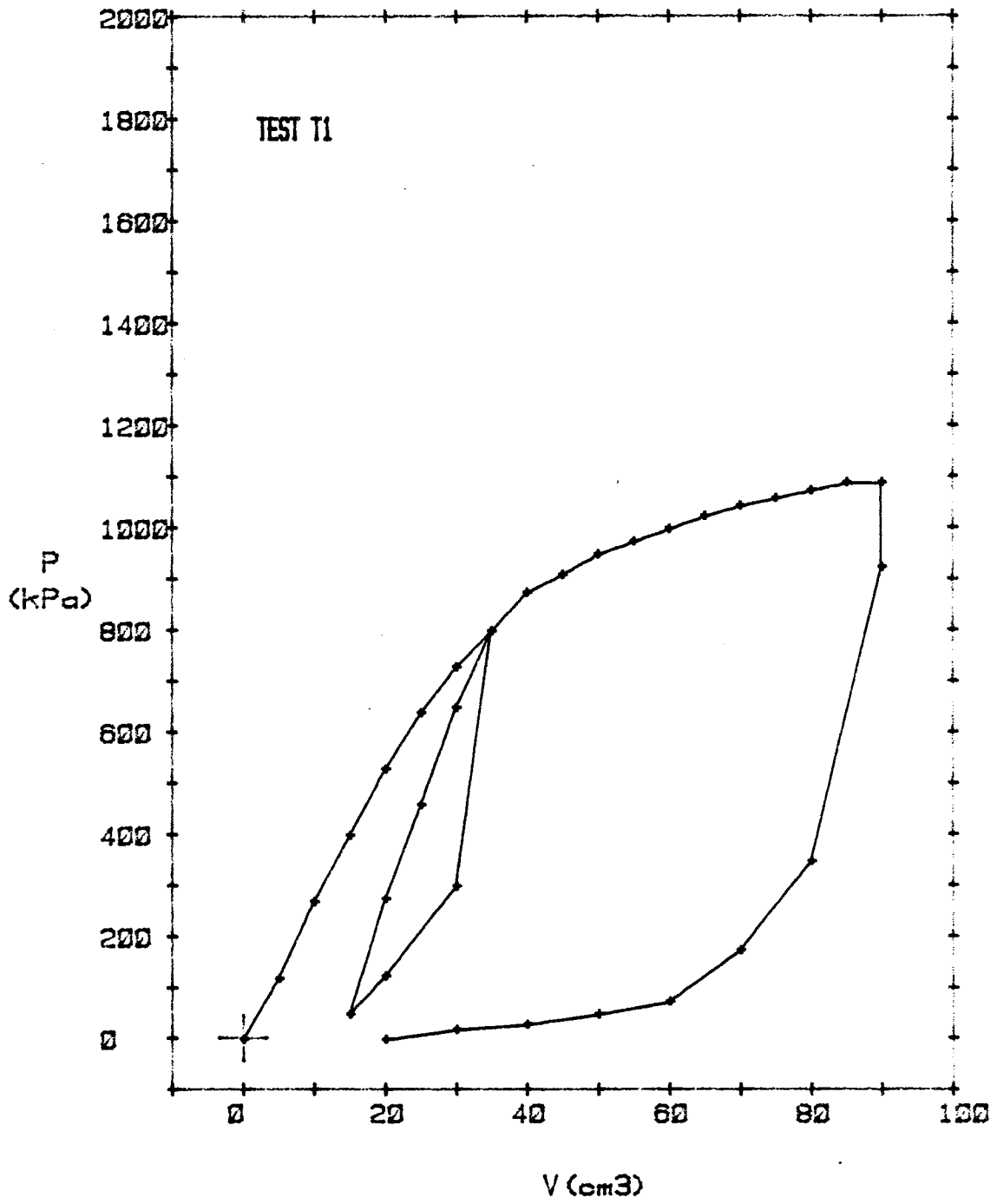
(j) Section 11 -- (244-2-1) on SH 63, 7 miles North West of US 190 (direction North)

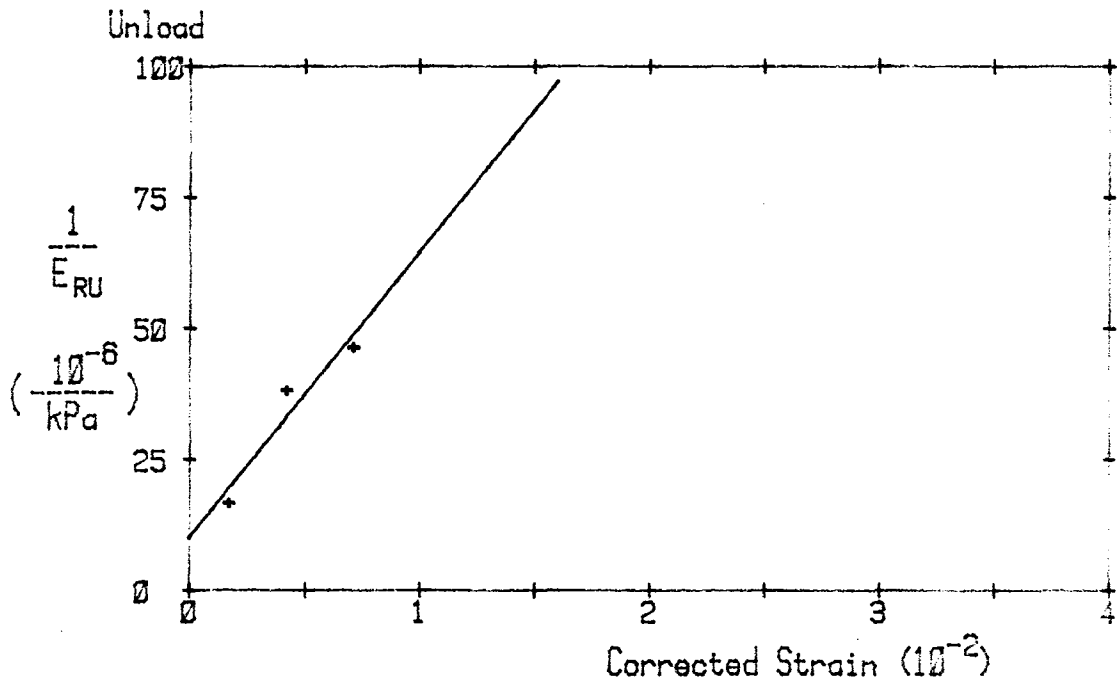
Layers and Thickness Depth (ft) Thickness (in.)	Test No.	Pressuremeter Modulus* (kPa)		Pressuremeter Limit Pressure* P_1 (kPa)	N^{**} blows/ft	Water Content w %	Texas Triaxial Test Classification
		E_o	E_U & (E_R)				
0 — <u>Seal Coat</u> 1.2							
Iron Ore 11.0	147	22900	702000(779000)	1280	15	8.27 ⁺ $w_{opt}=6.1$	1***
	143	25800	722000(110000)	1290			
1 —	139	19000	478000(68000)	1140	14	9.00 ⁺ 6.08 ⁺	3.7***
Select Sand 11.0	146	21400	873000(470000)	1720			
2 —	142	21900	1120000(201000)	1730	7	16.34 ⁺	4.2***
	138	23600	728000(183000)	1910			
Sandy 3 <u>Clay</u>	145	5900	174000(114000)	500	7	14.05 ⁺	4.2
	141	4100	112000(32000)	470			
Subgrade	137	3300	54000(18000)	350	11	14.07 ⁺	4.2
	144	5700	159000(166000)	580			
	4 —	140	7500	166000(44000)			
	136	5700	97000(34000)	610		20.25 ⁺	

TABLE 2. — (Continued)

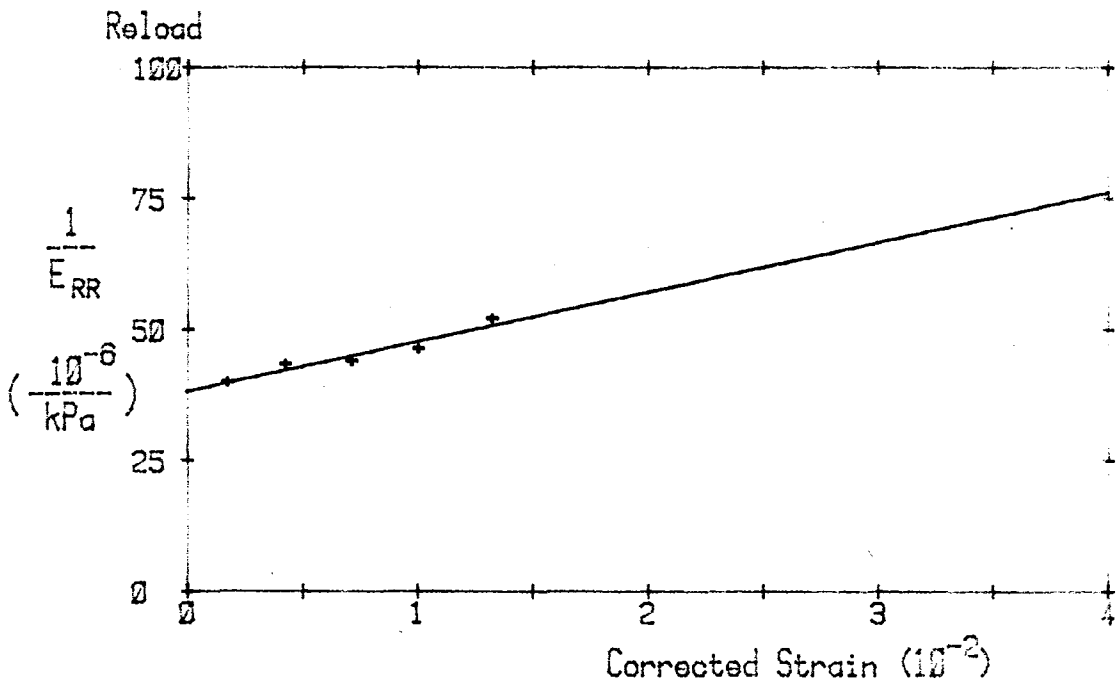
(k) Section 12 -- (214-2-1) on SH 63, 3.8 miles East of Jasper County Line (direction East)

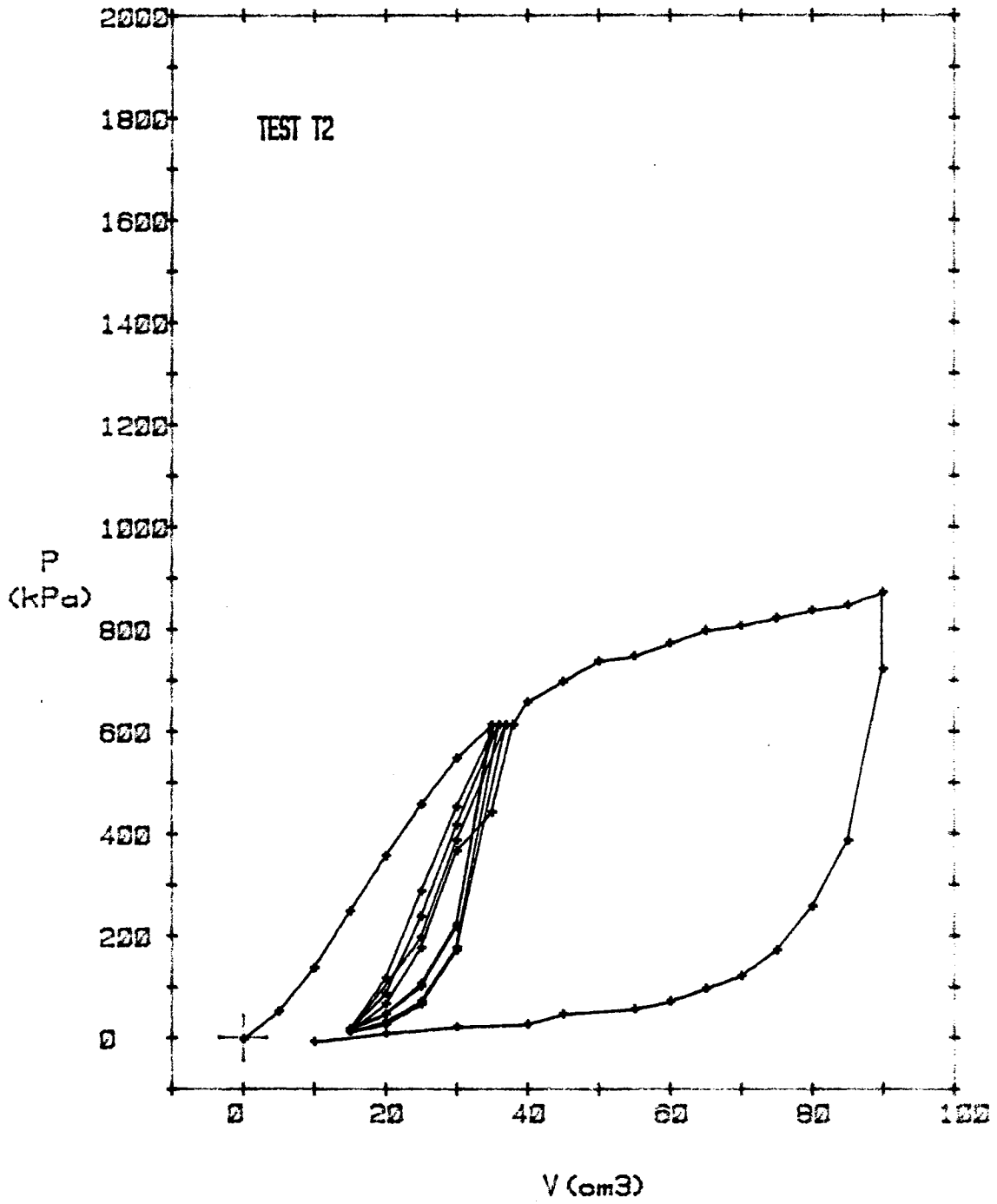
Layers and Thickness Depth (ft)	Thickness (in.)	Test No.	Pressuremeter Modulus* (kPa)		Pressuremeter Limit Pressure* P_1 (kpa)	N** blows/ft	Water Content w %	Texas Triaxial Test Classification
			E_o	E_U & (E_R)				
0	Precoated Seal 							
	3.5							
	Iron Ore	202	41200	1100000(209000)	>> 2500	33	5.2 ⁺	
	9.0	198	39300	518000(128000)	>> 2500			
1	 Select Sand							
	7.5					19	7.54 ⁺	
2		201	18400	425000(114000)	1575			
	Sandy Clay	197	11700	345000(113000)	1400	31		
3	 Subgrade	200	28800	1090000(143000)	> 2500			
						32		
4		196	23900	724000(201000)	> 2500			
		199	20500	1030000(108000)	> 2500	28		

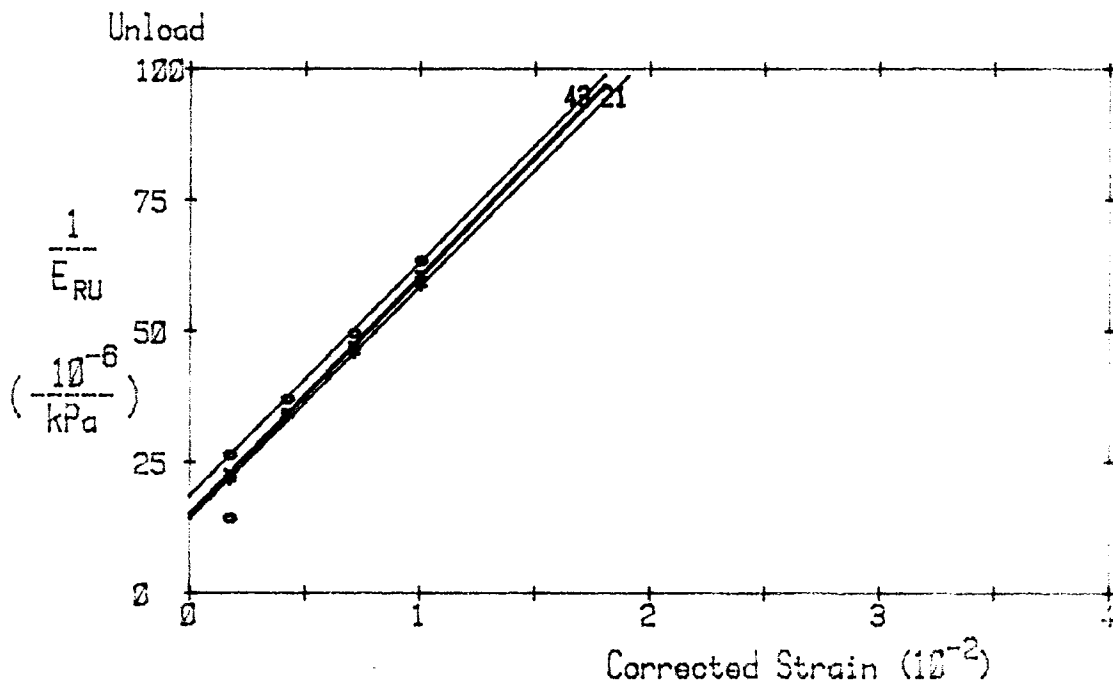




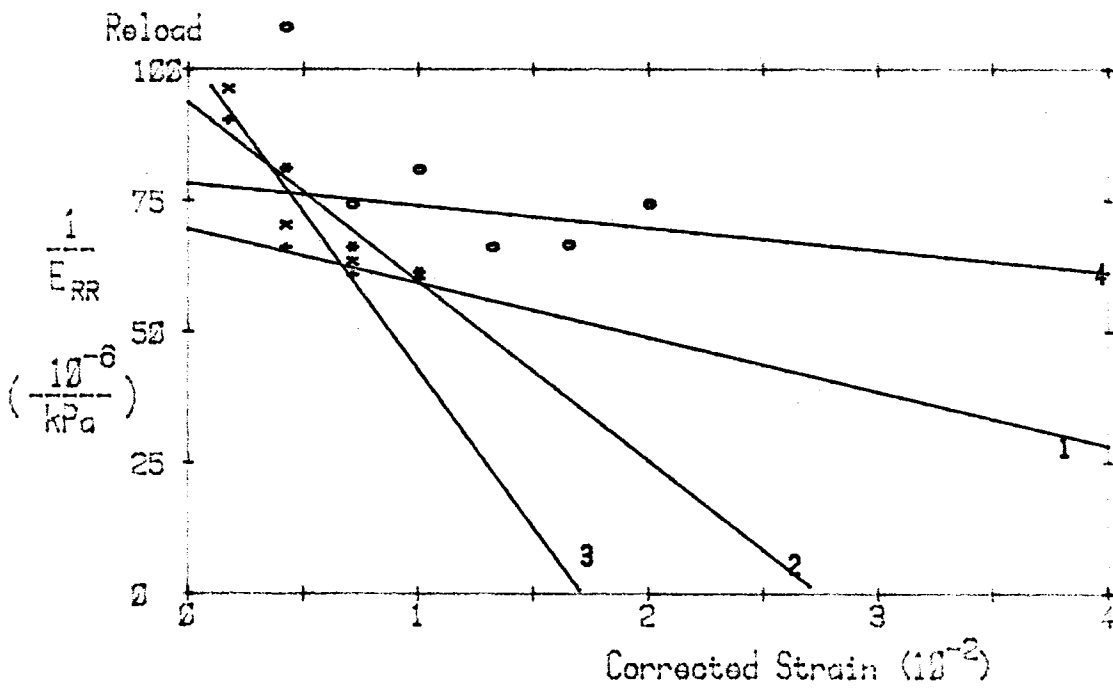
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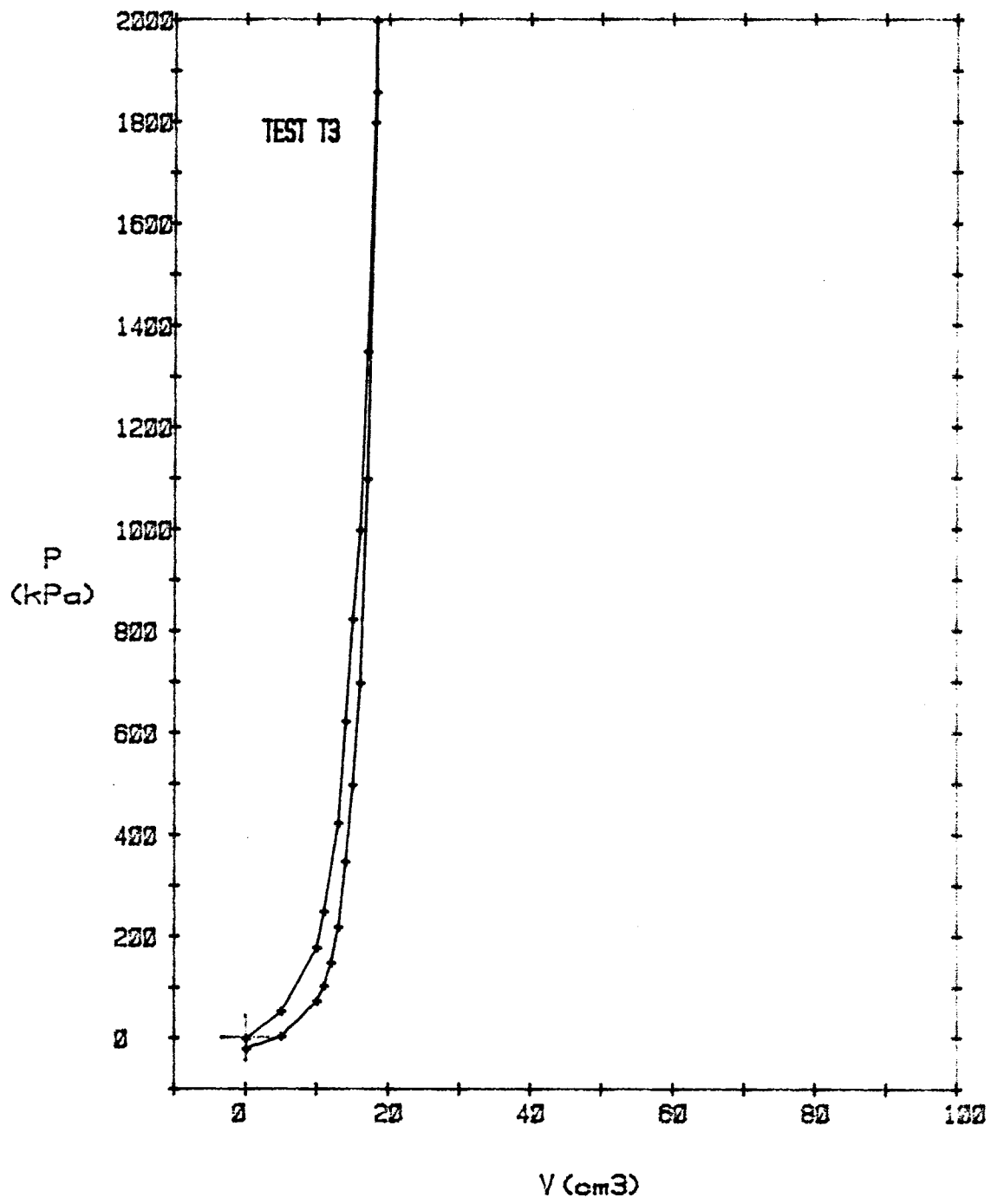


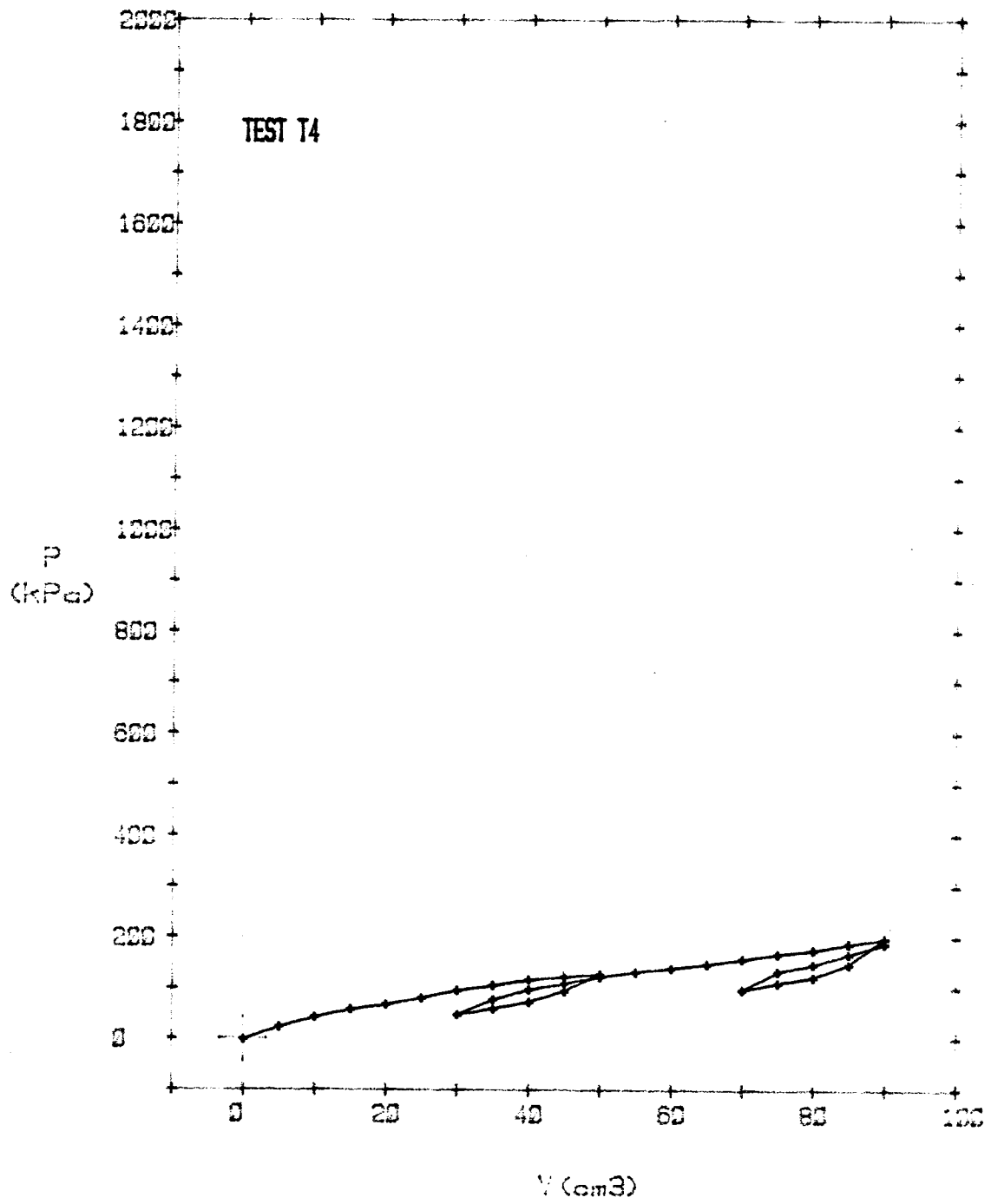


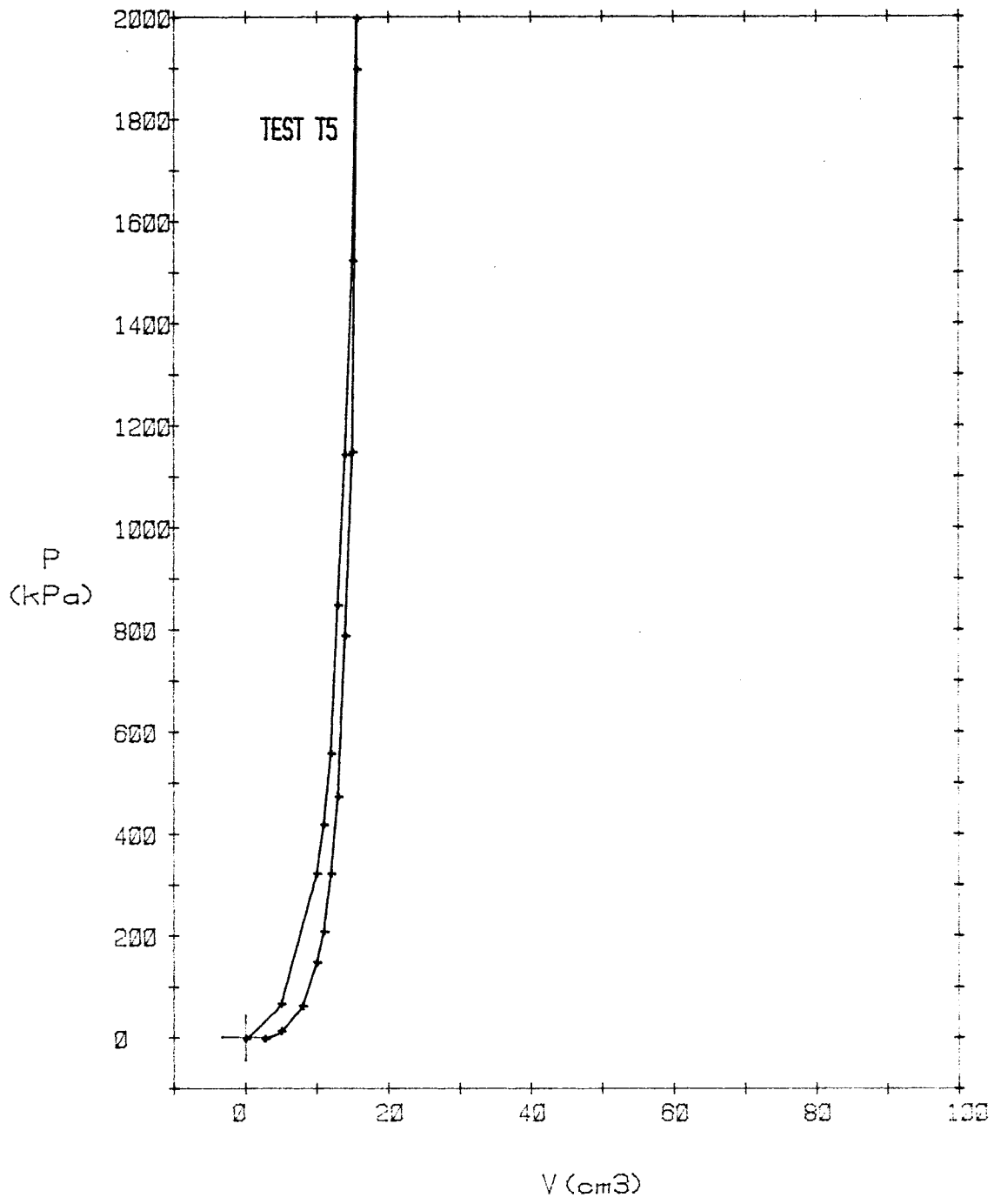


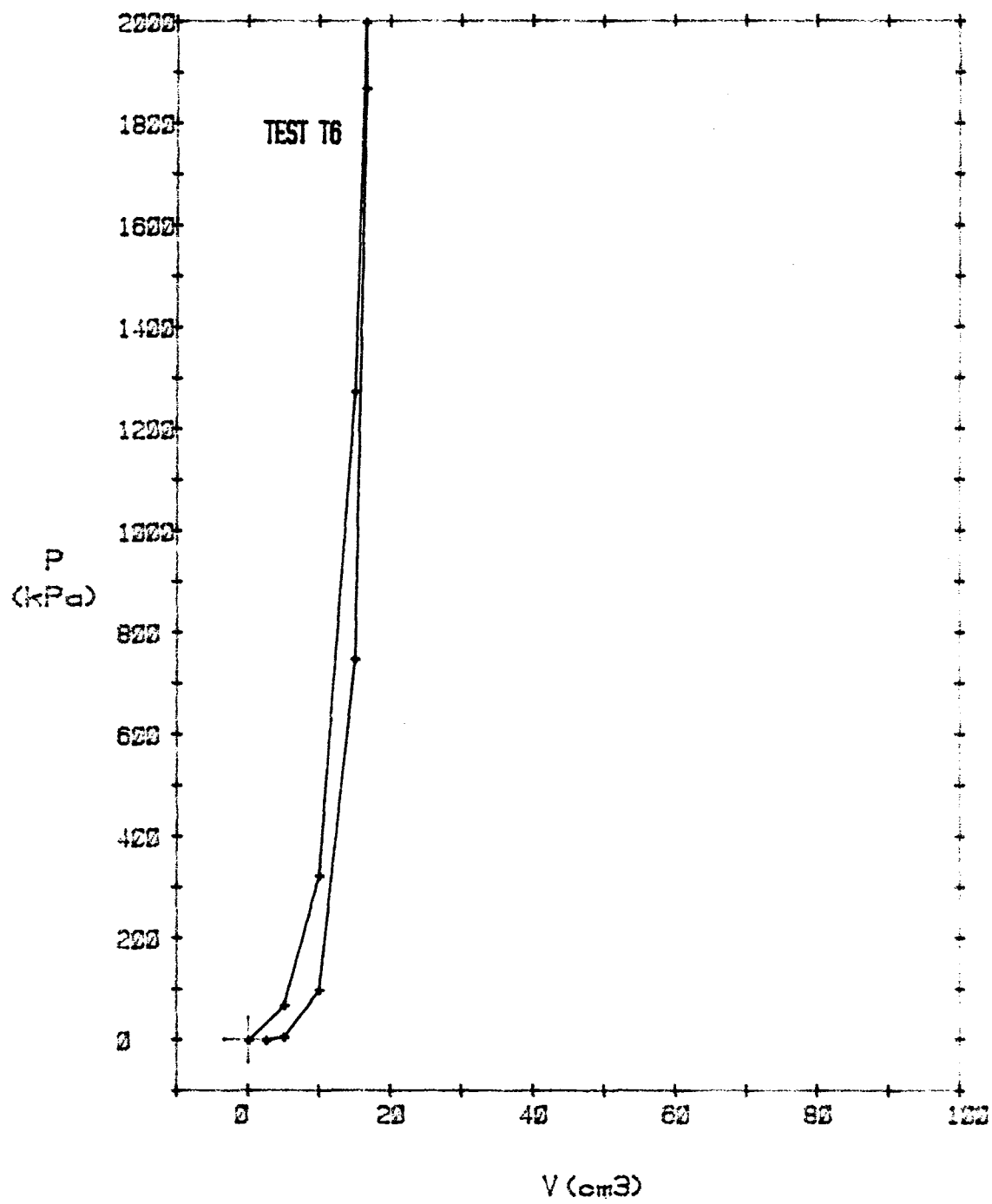
TEST T2

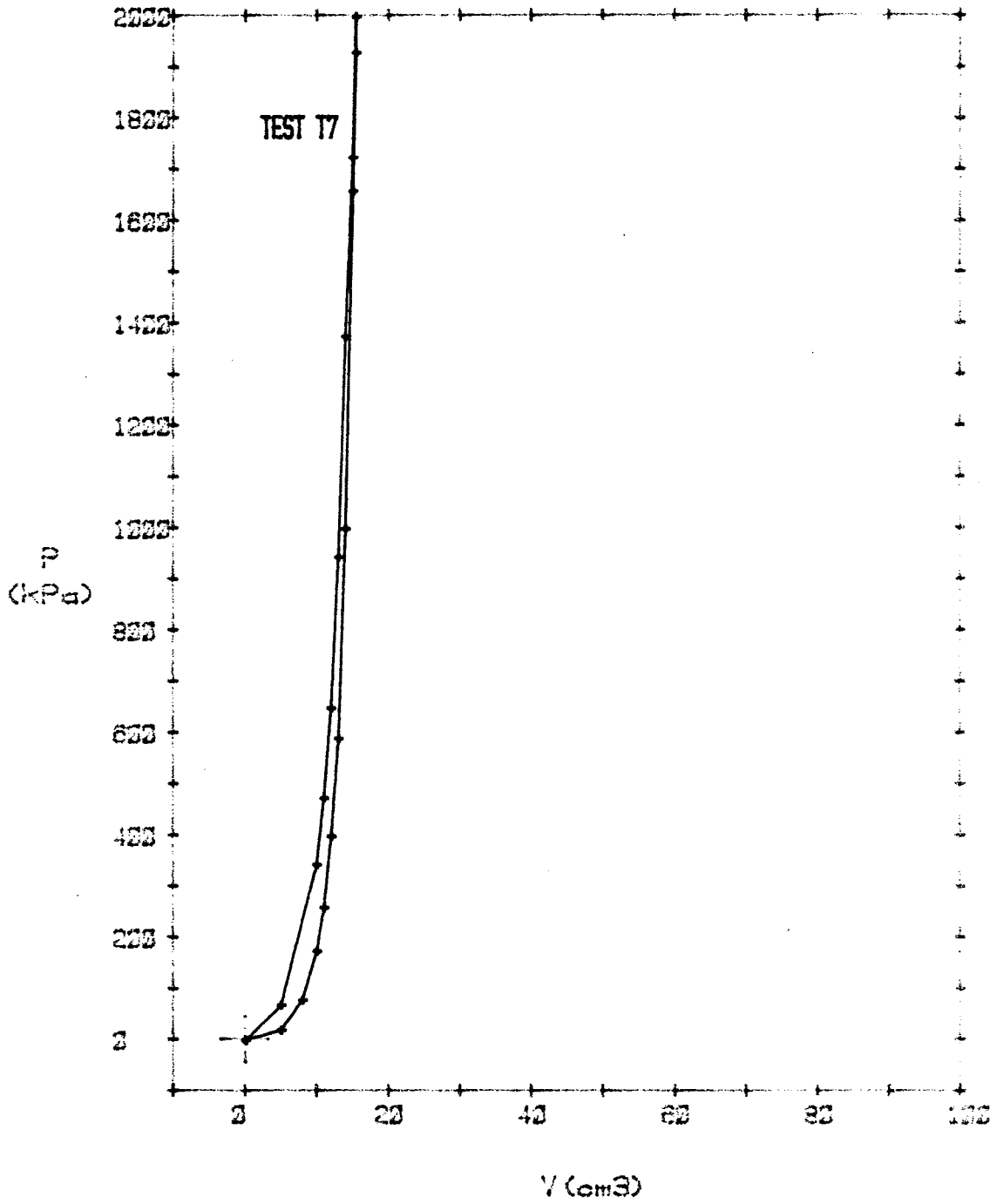


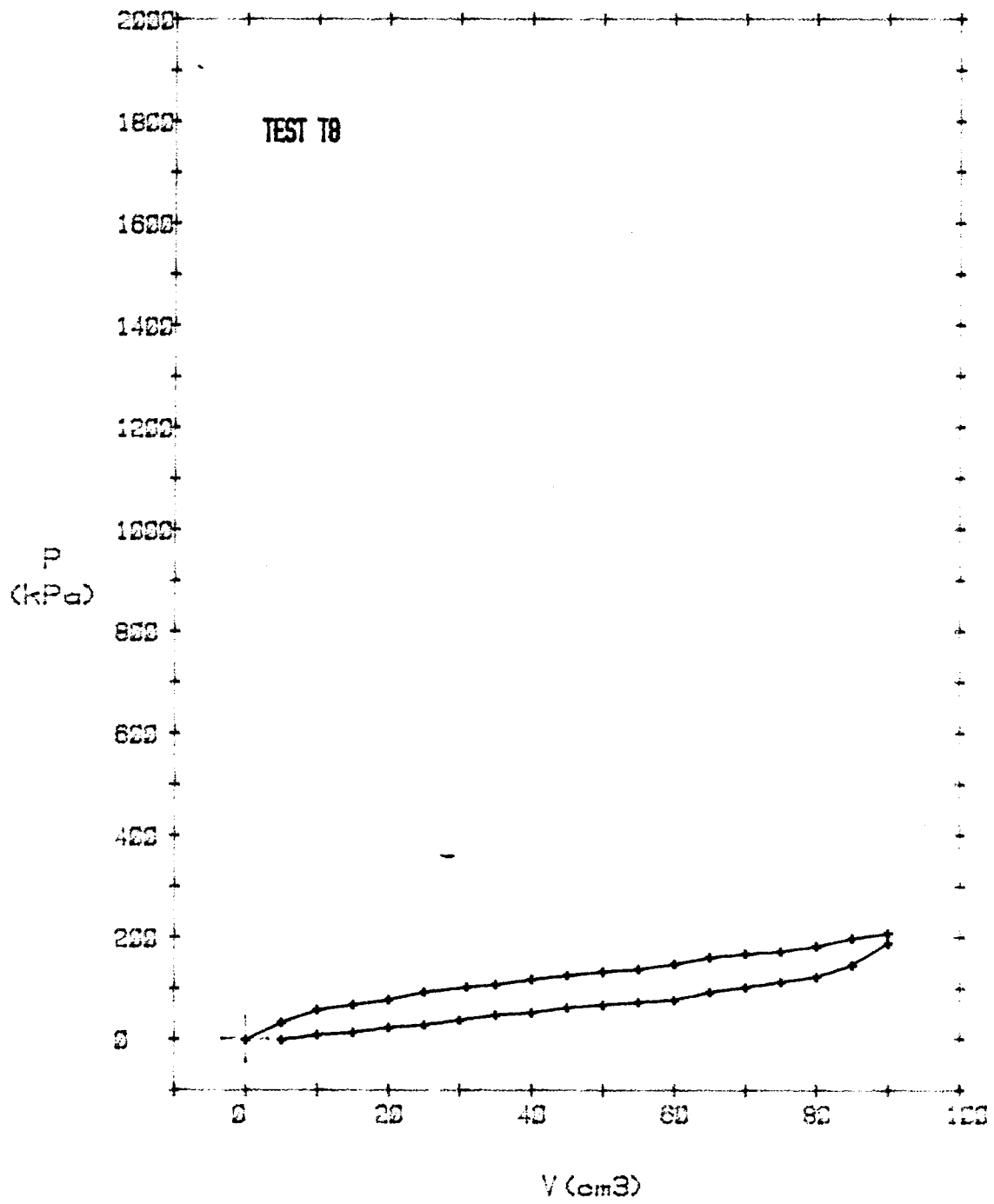


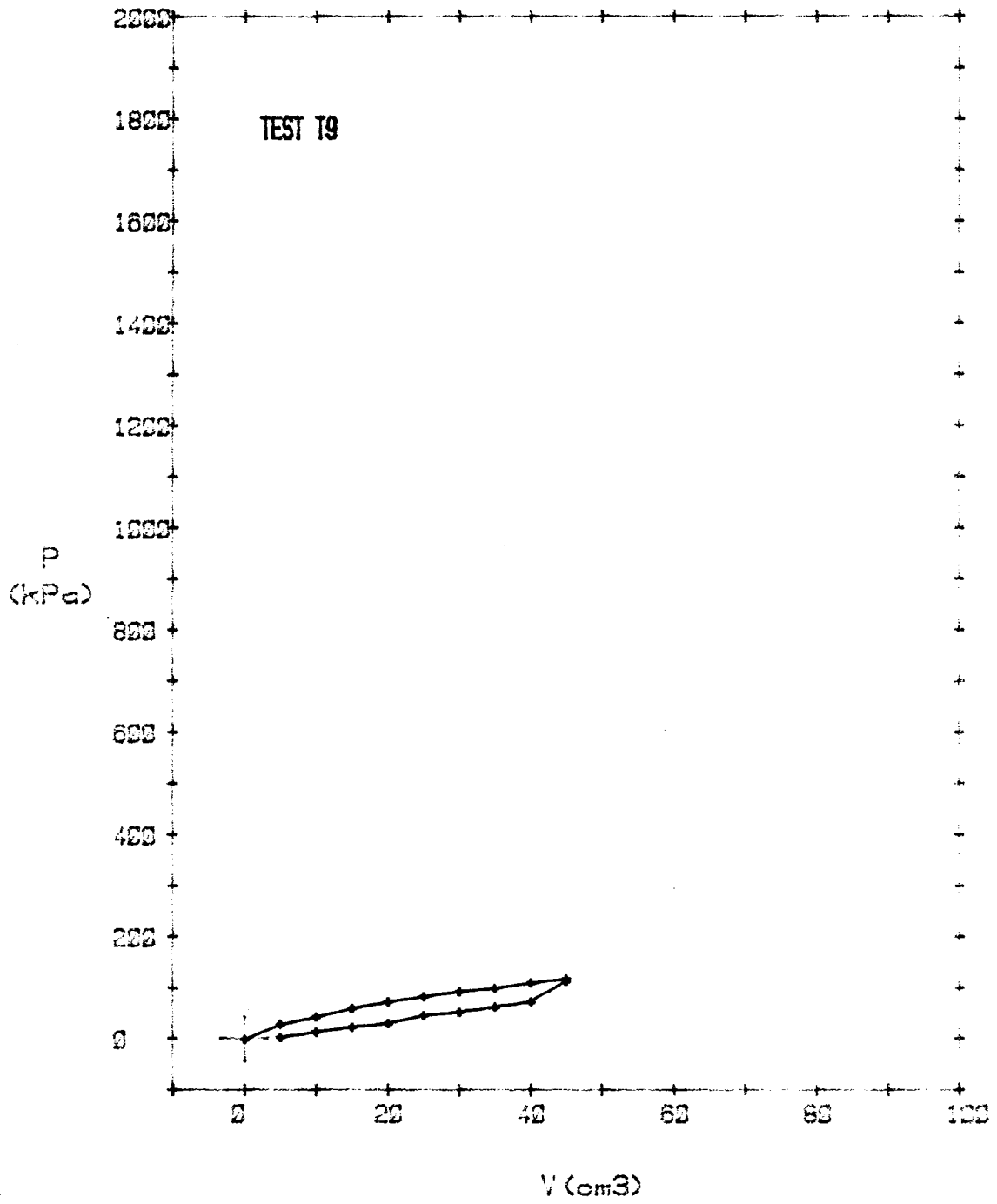


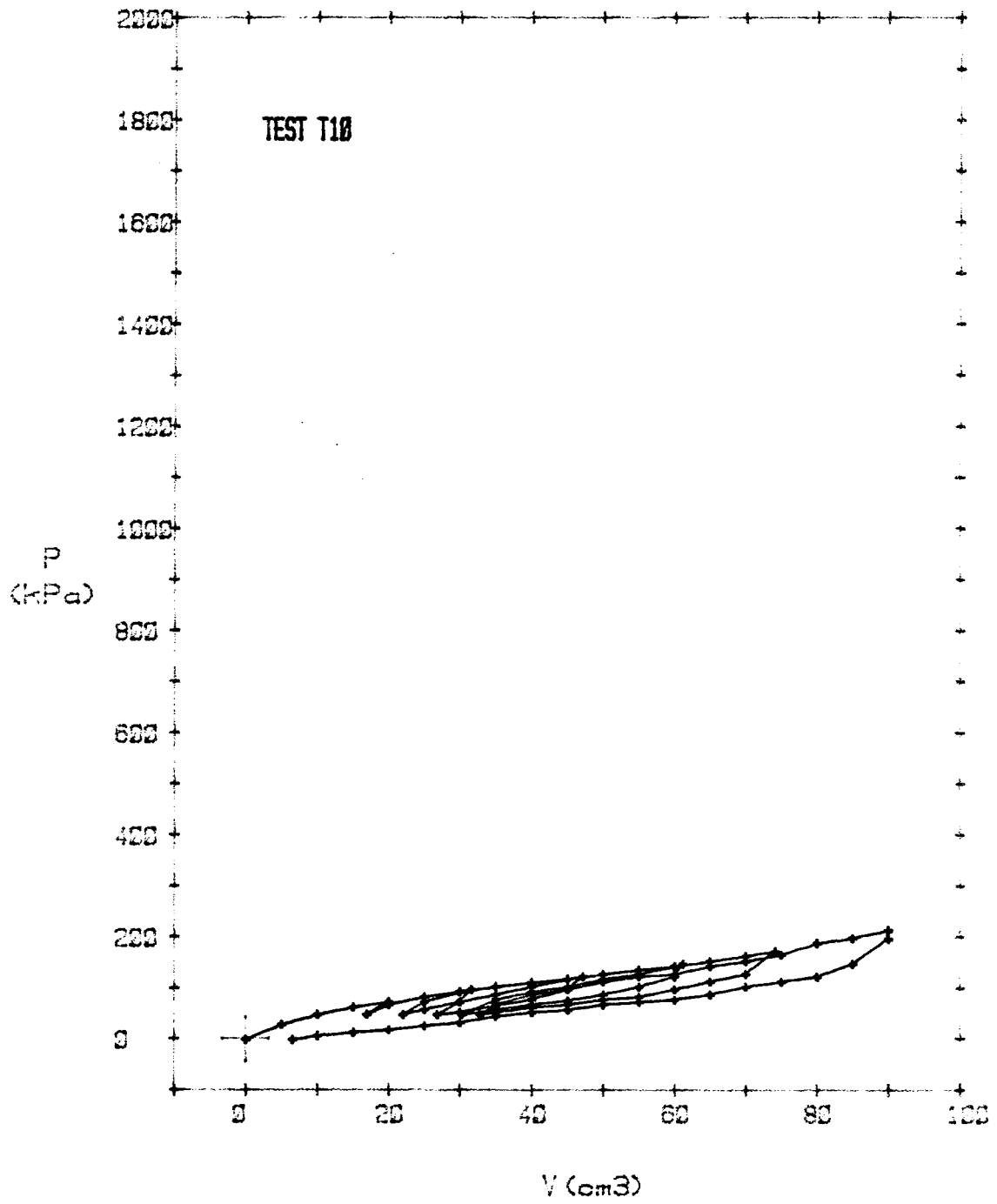


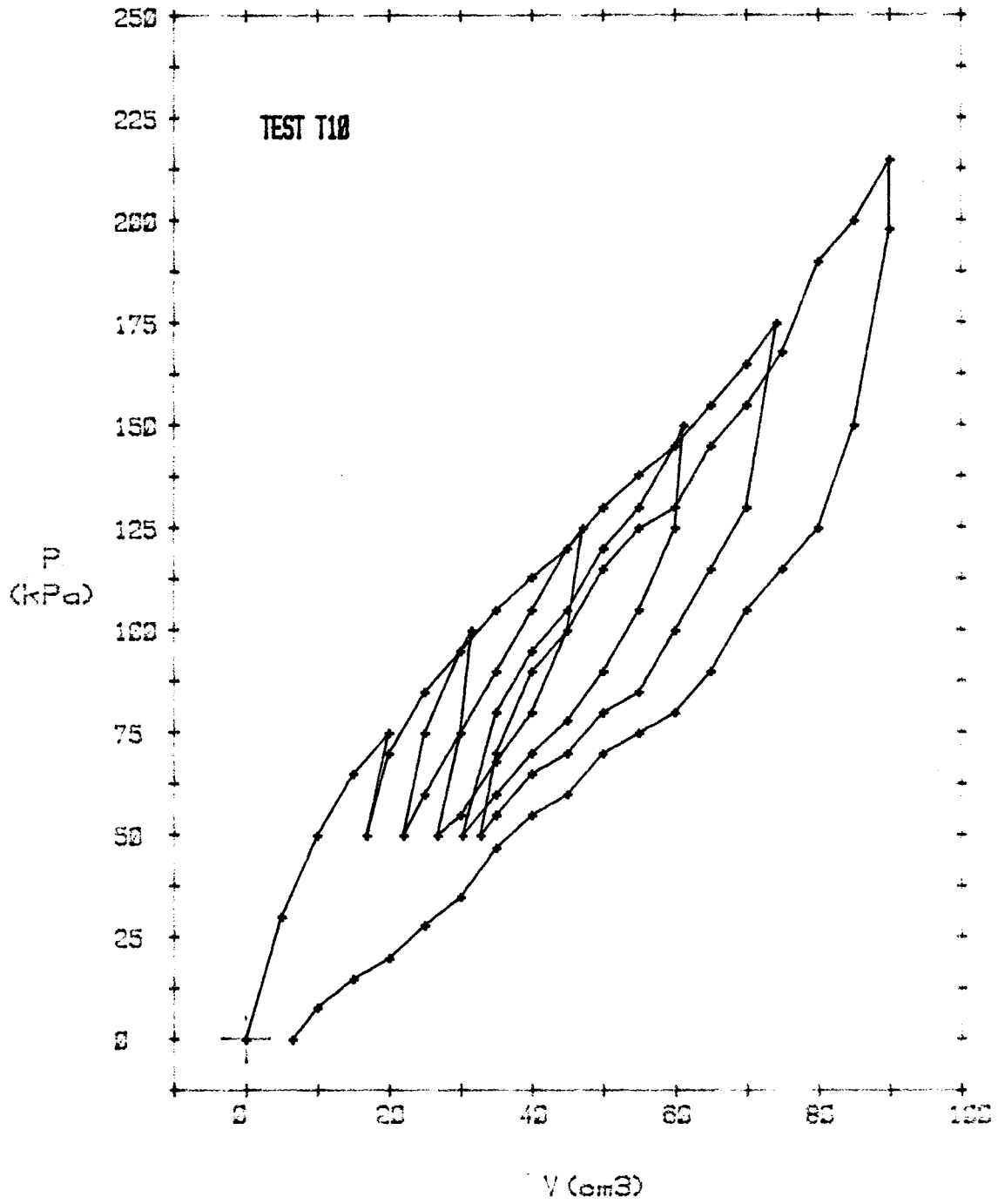


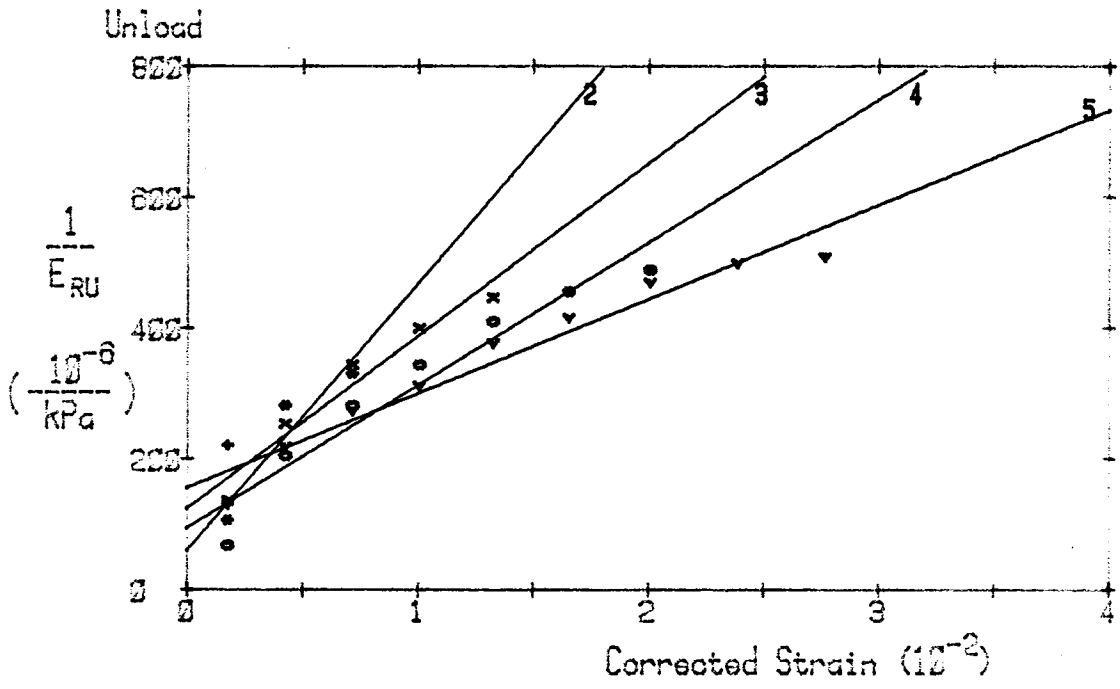




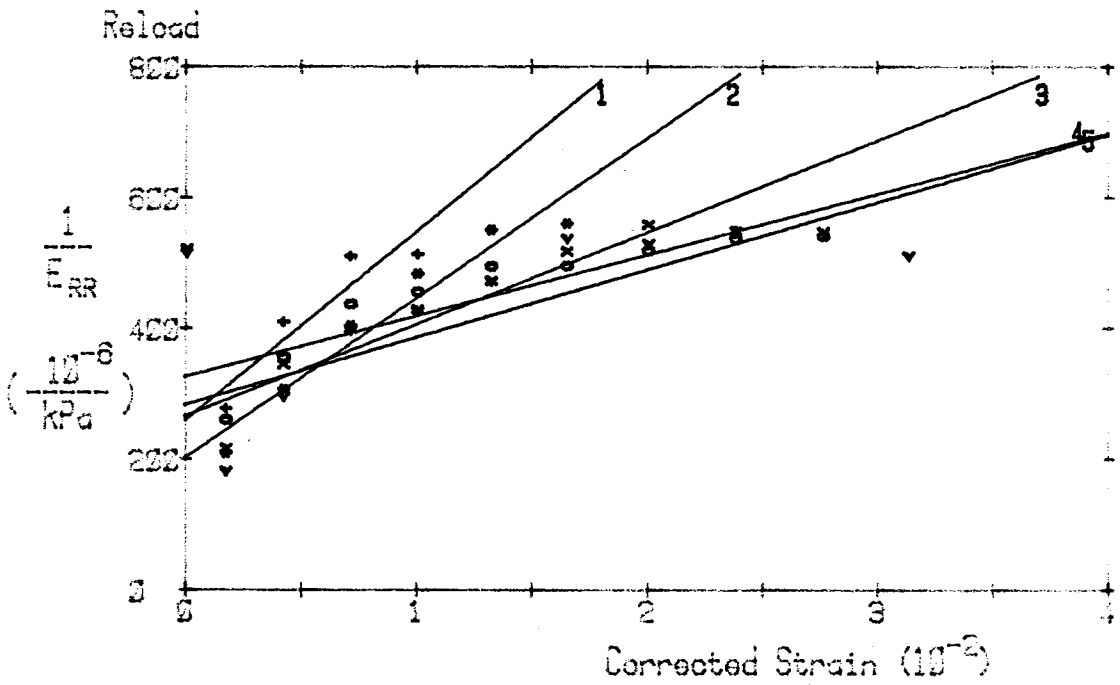


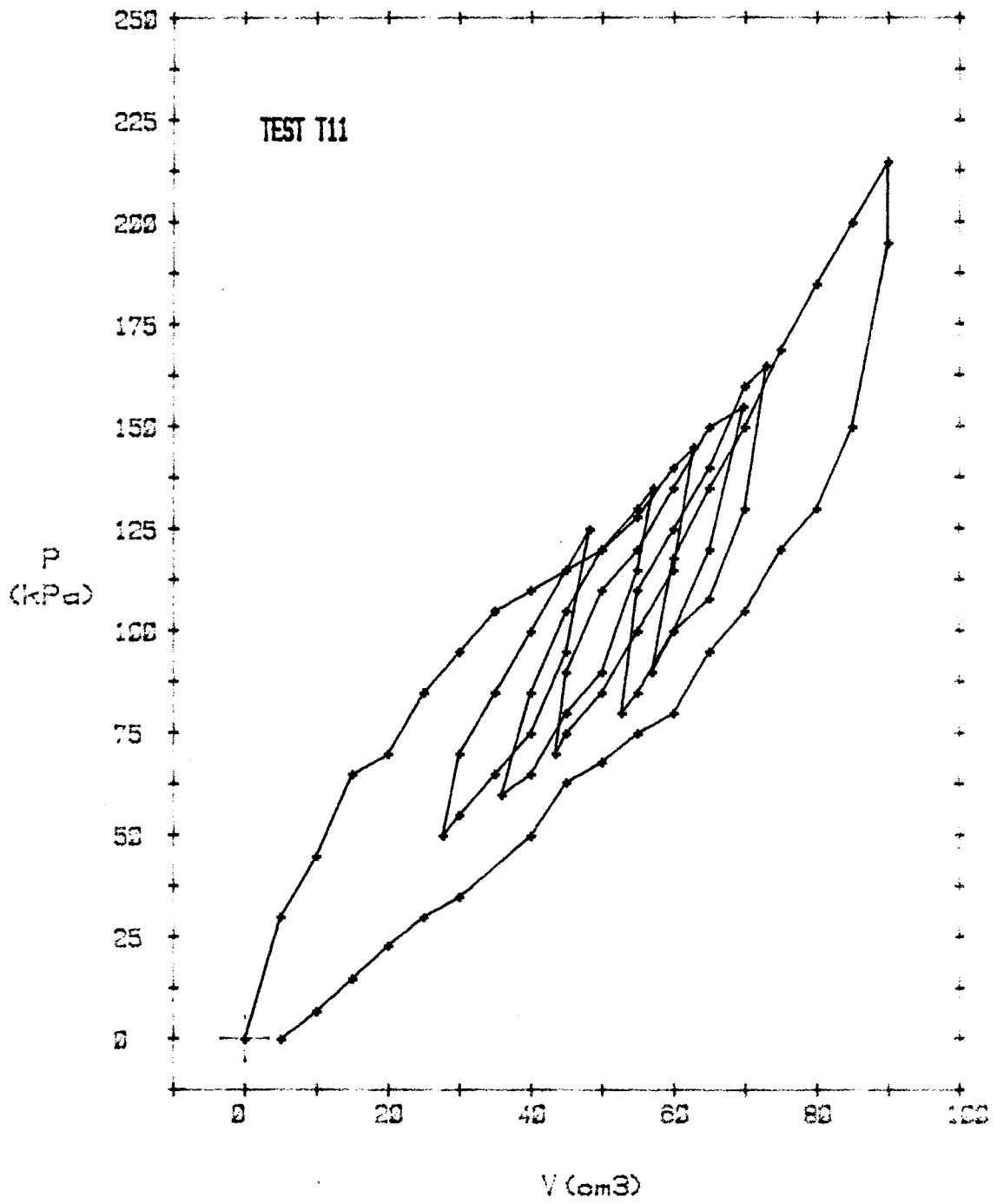


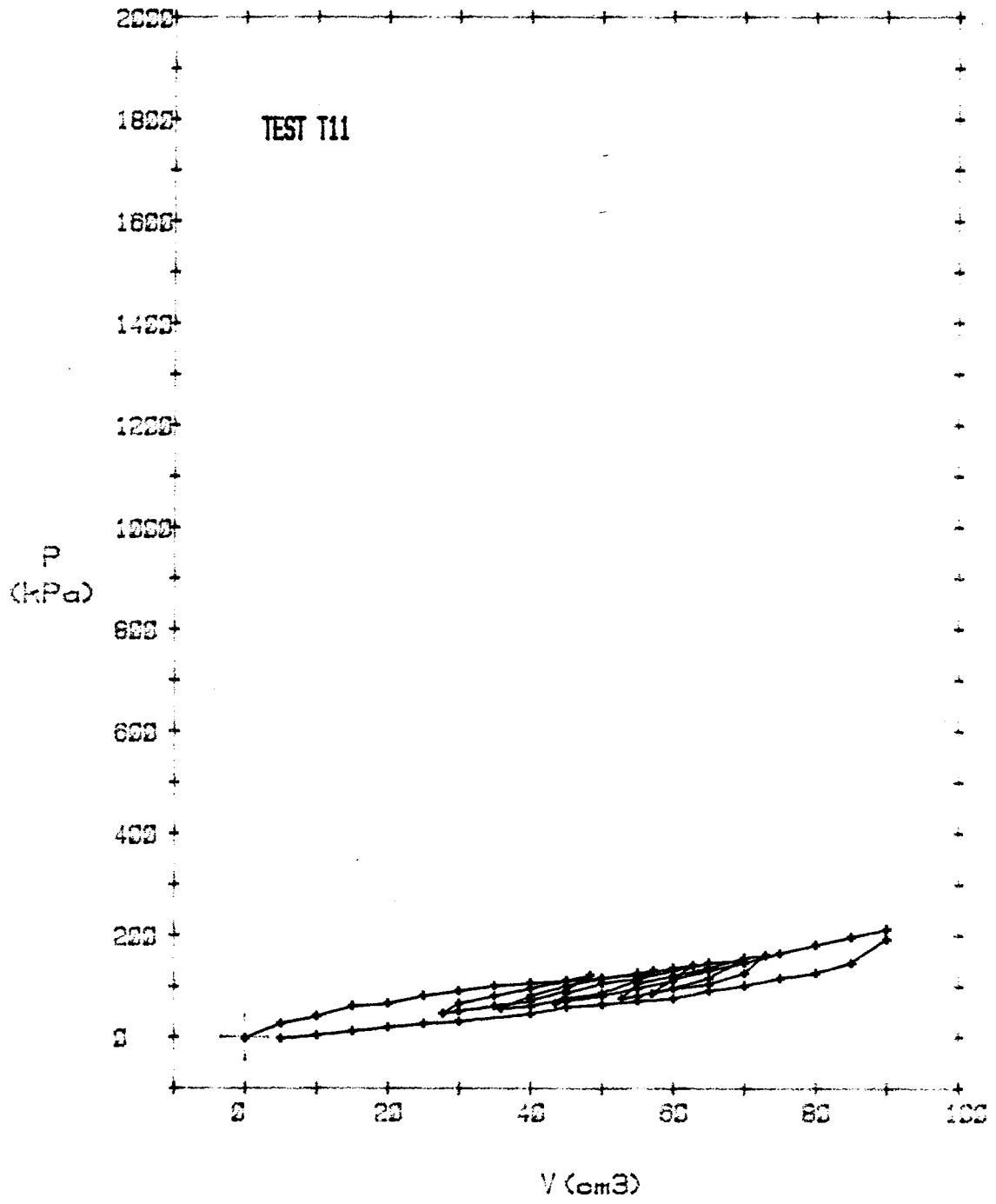


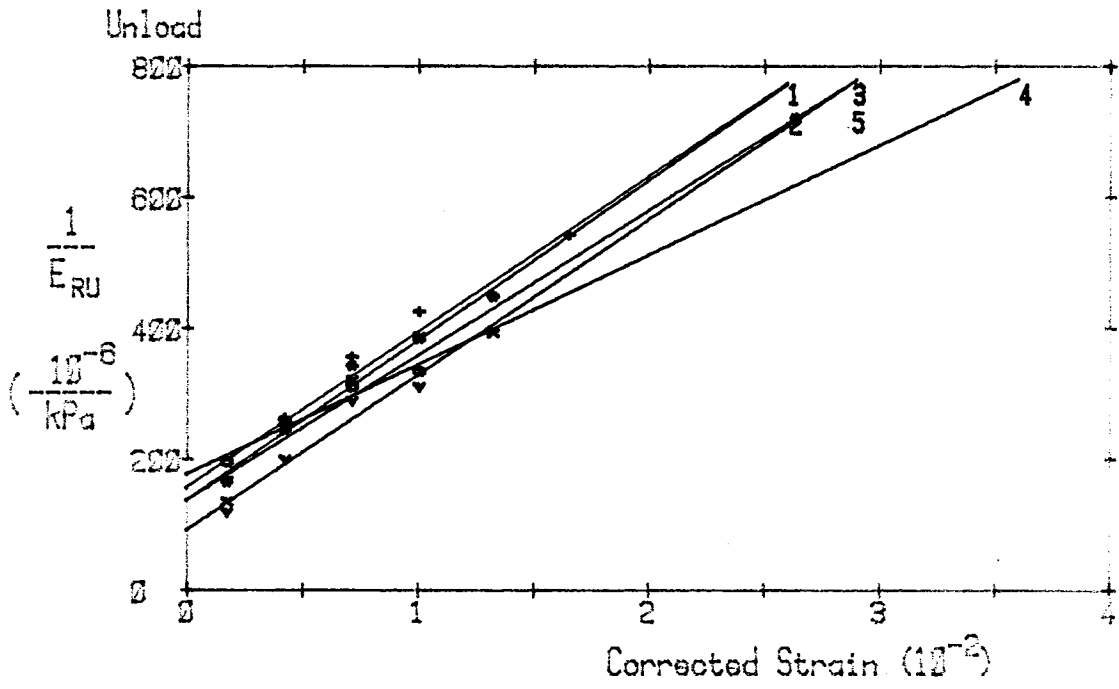


TEST T10

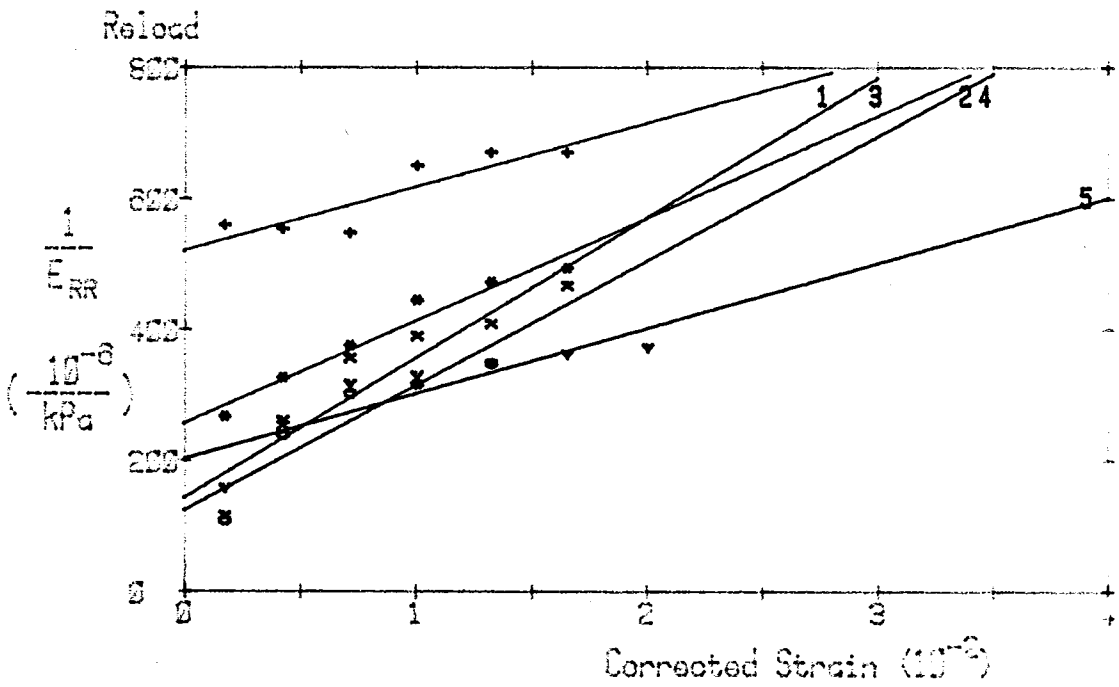


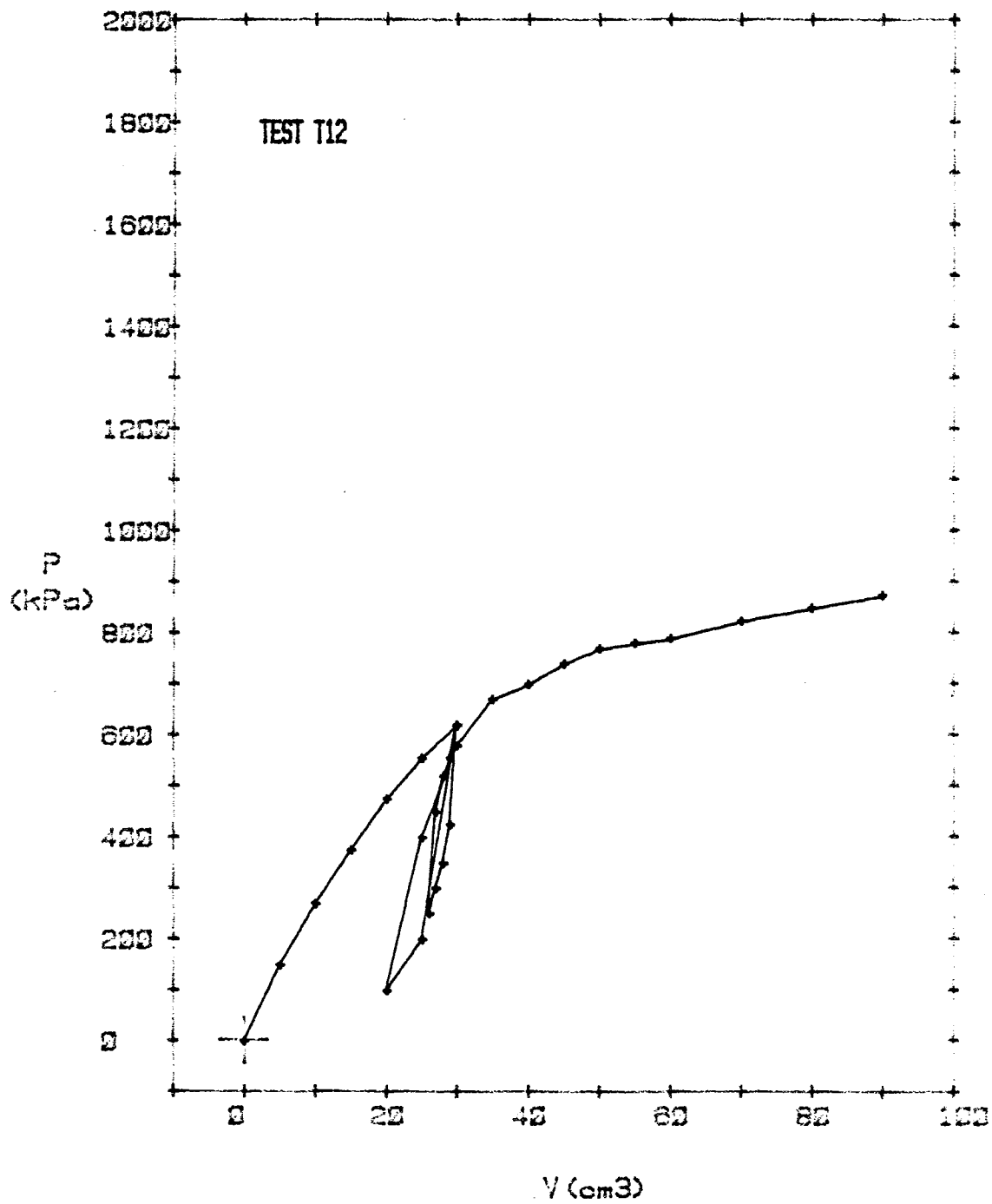


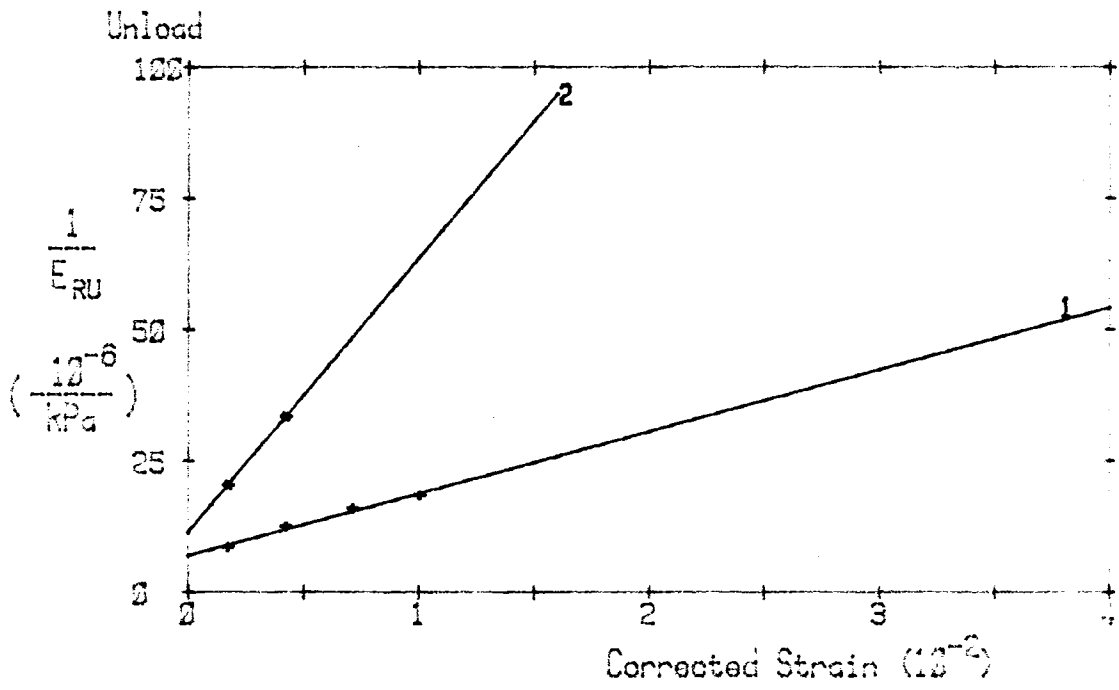




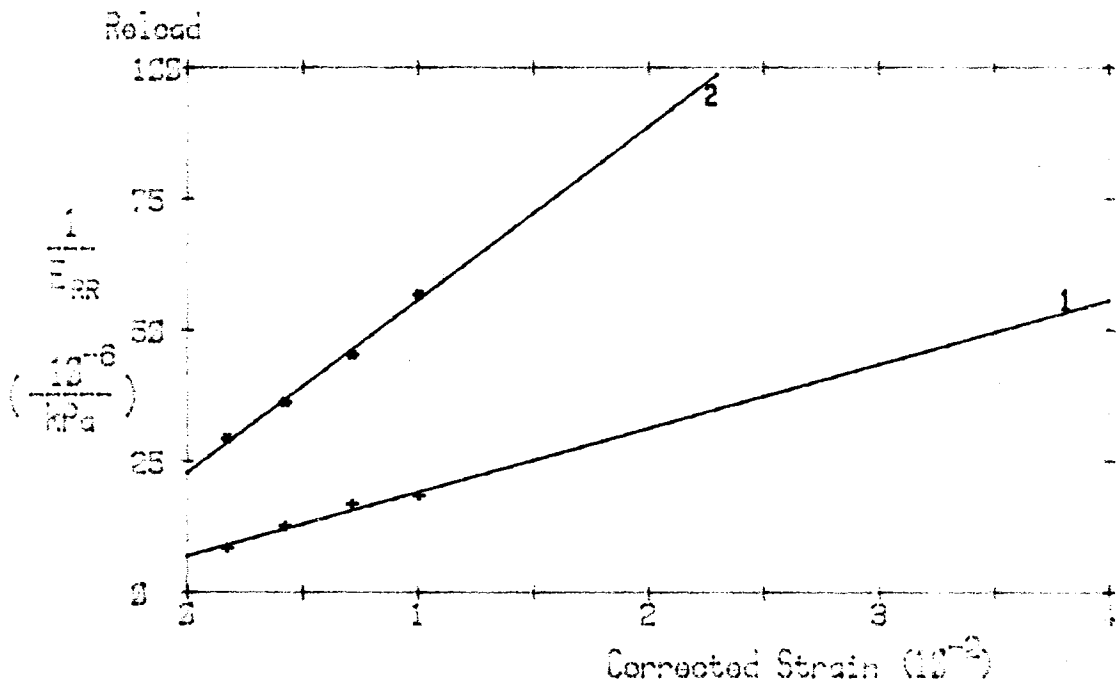
TEST T11

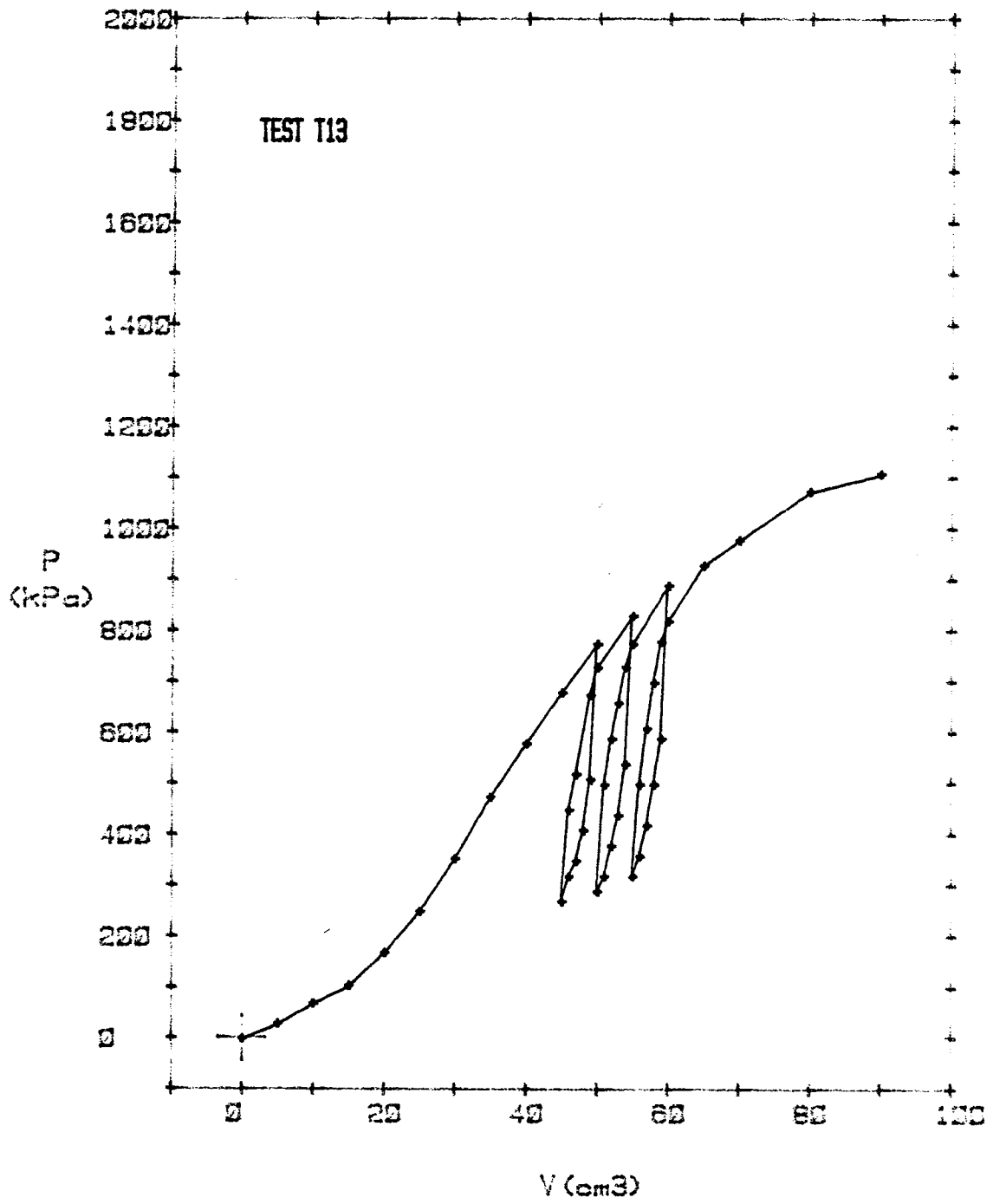


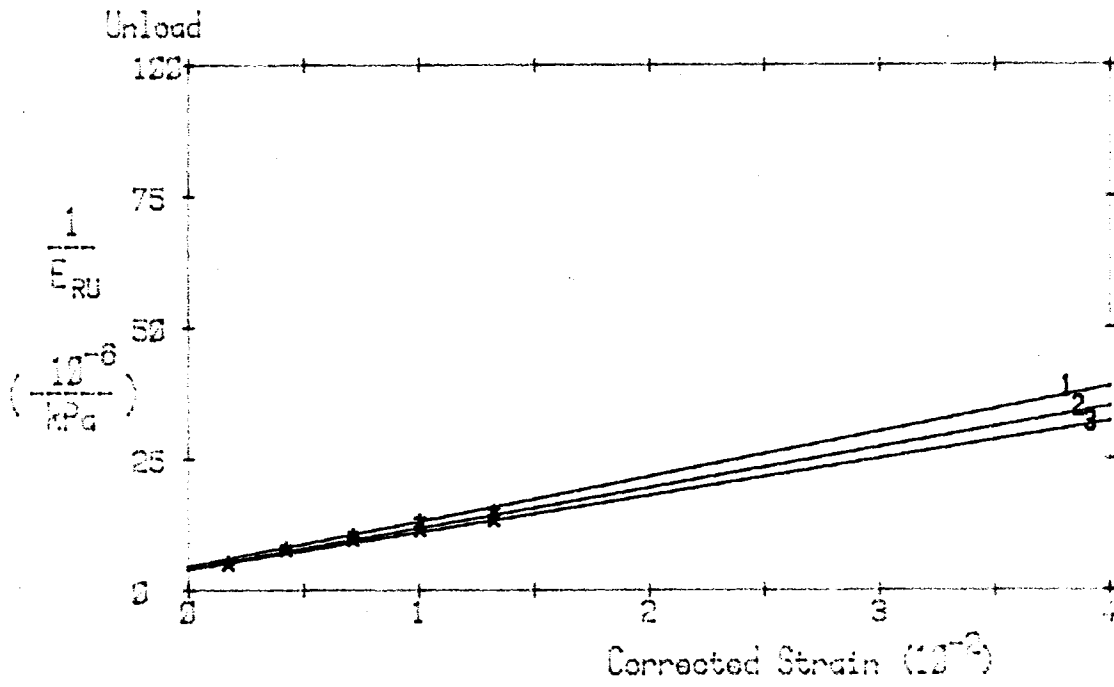




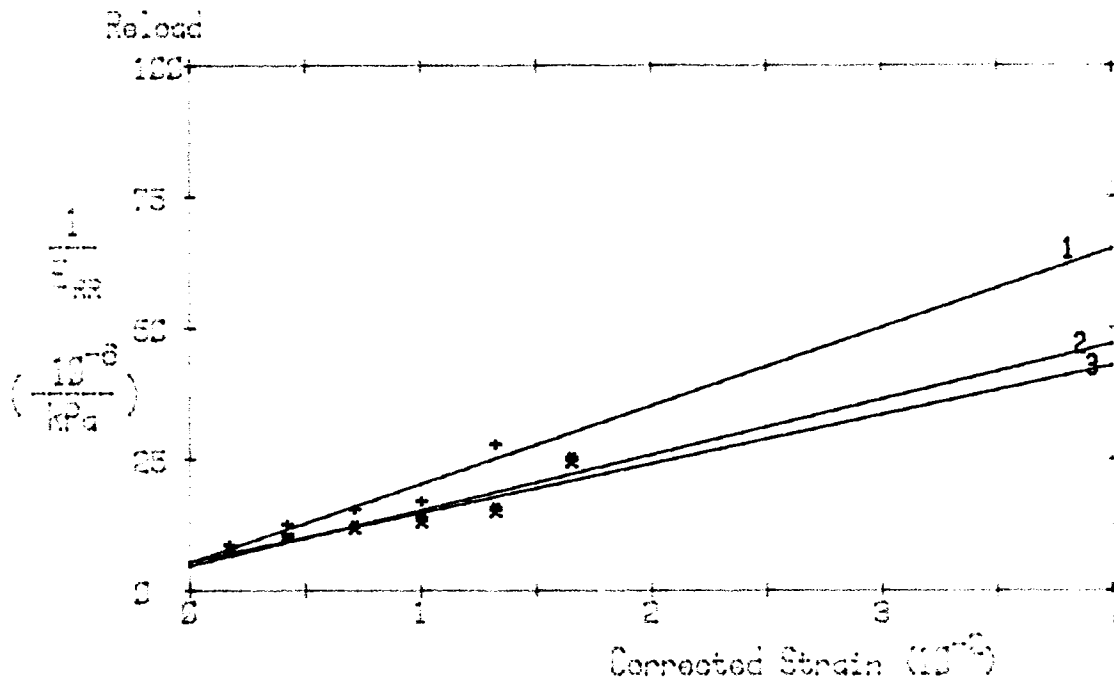
TEST T12

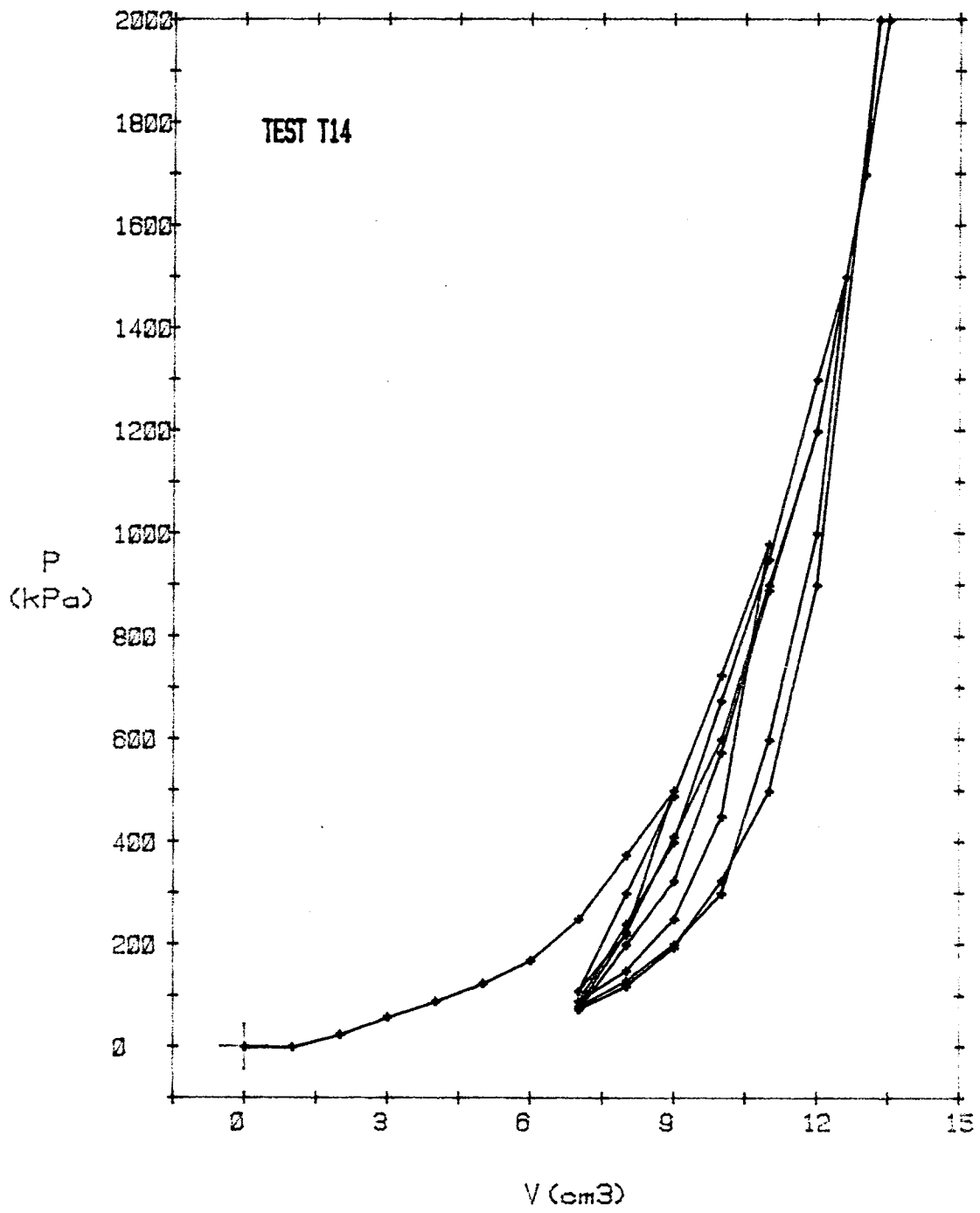


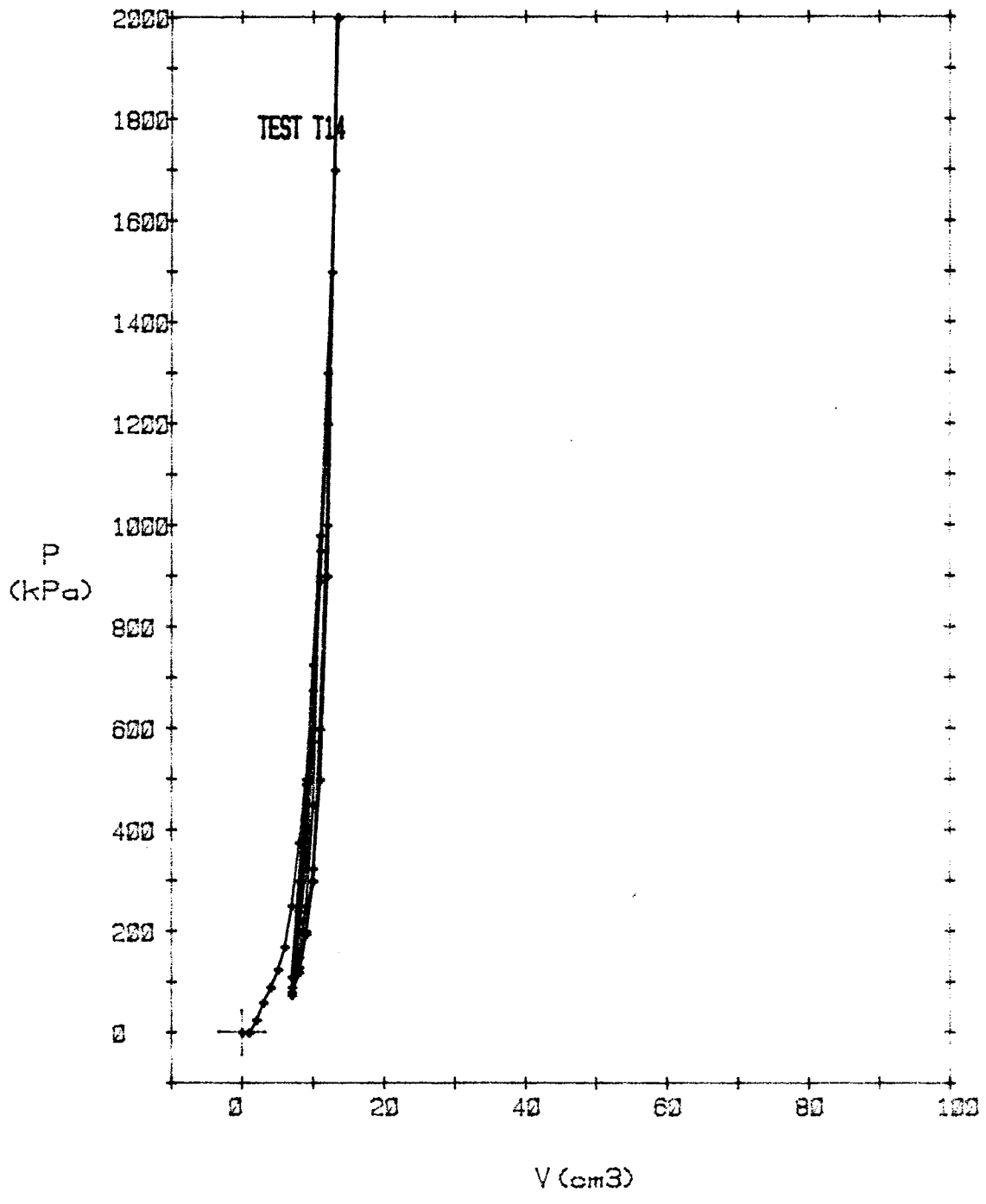


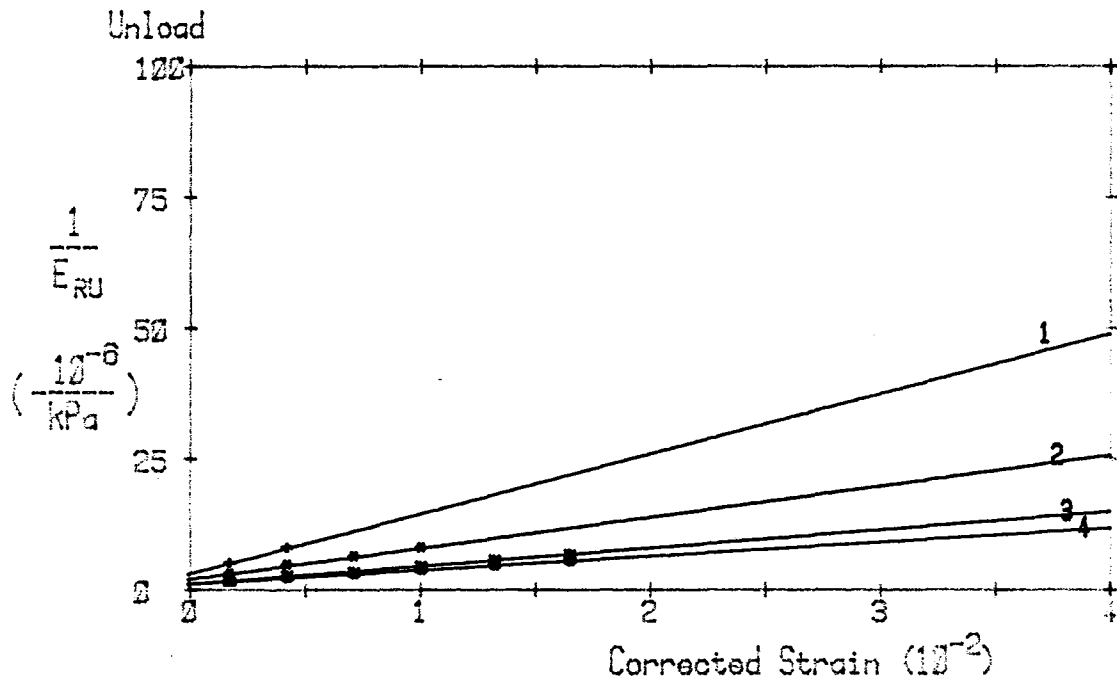


TEST T13

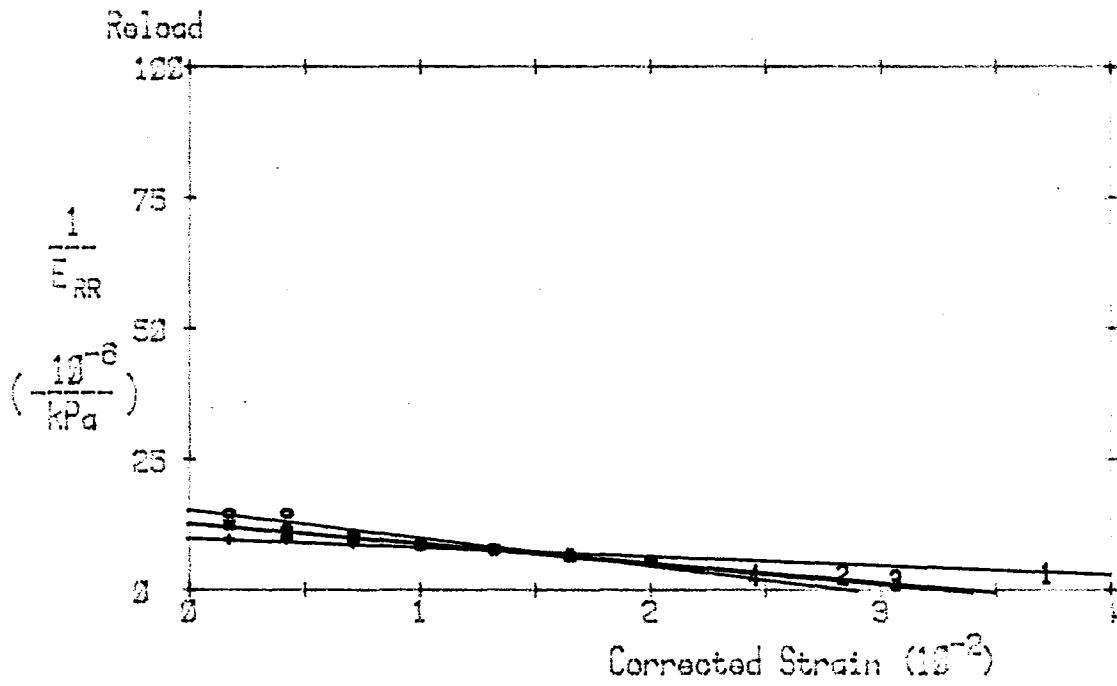


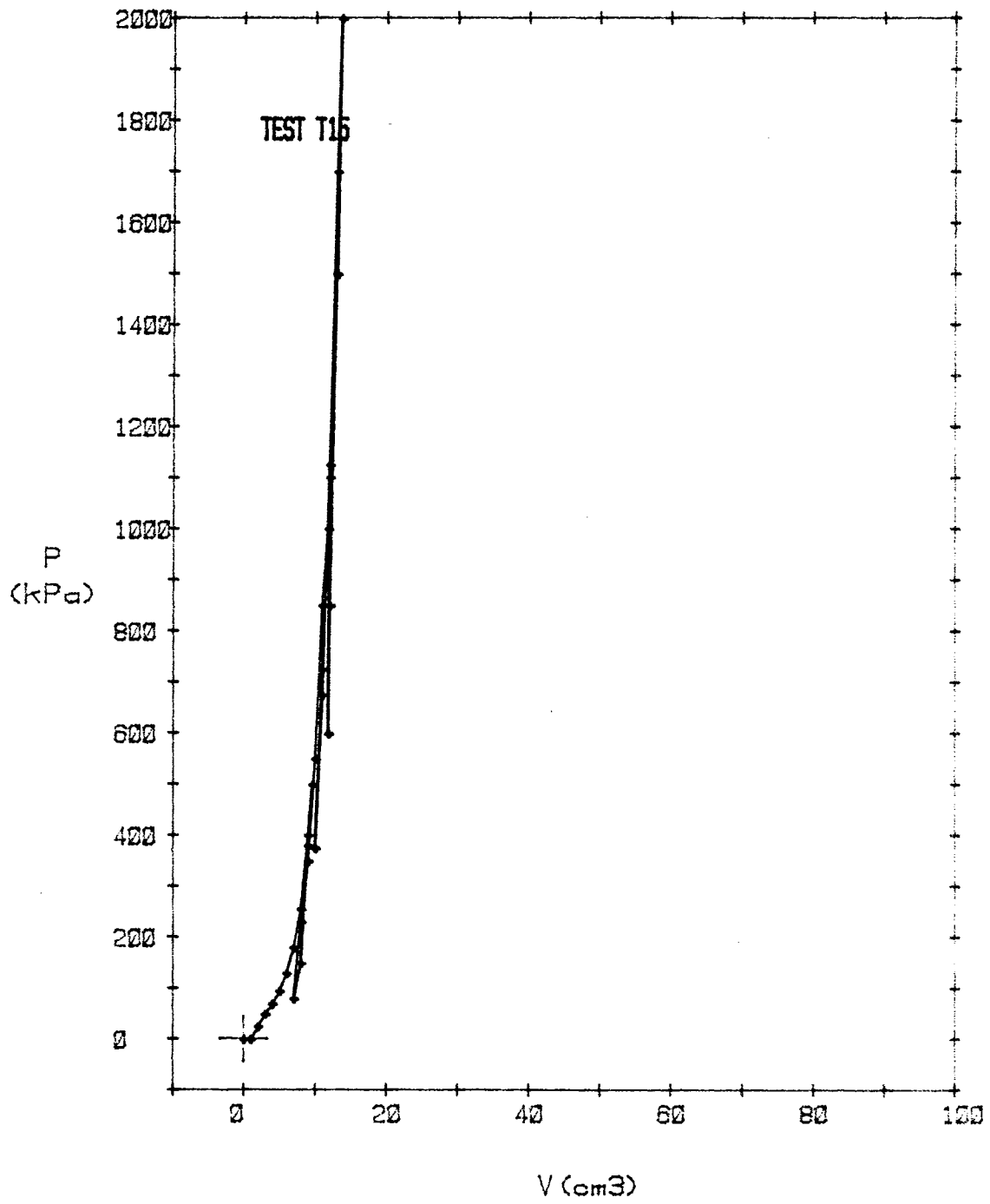


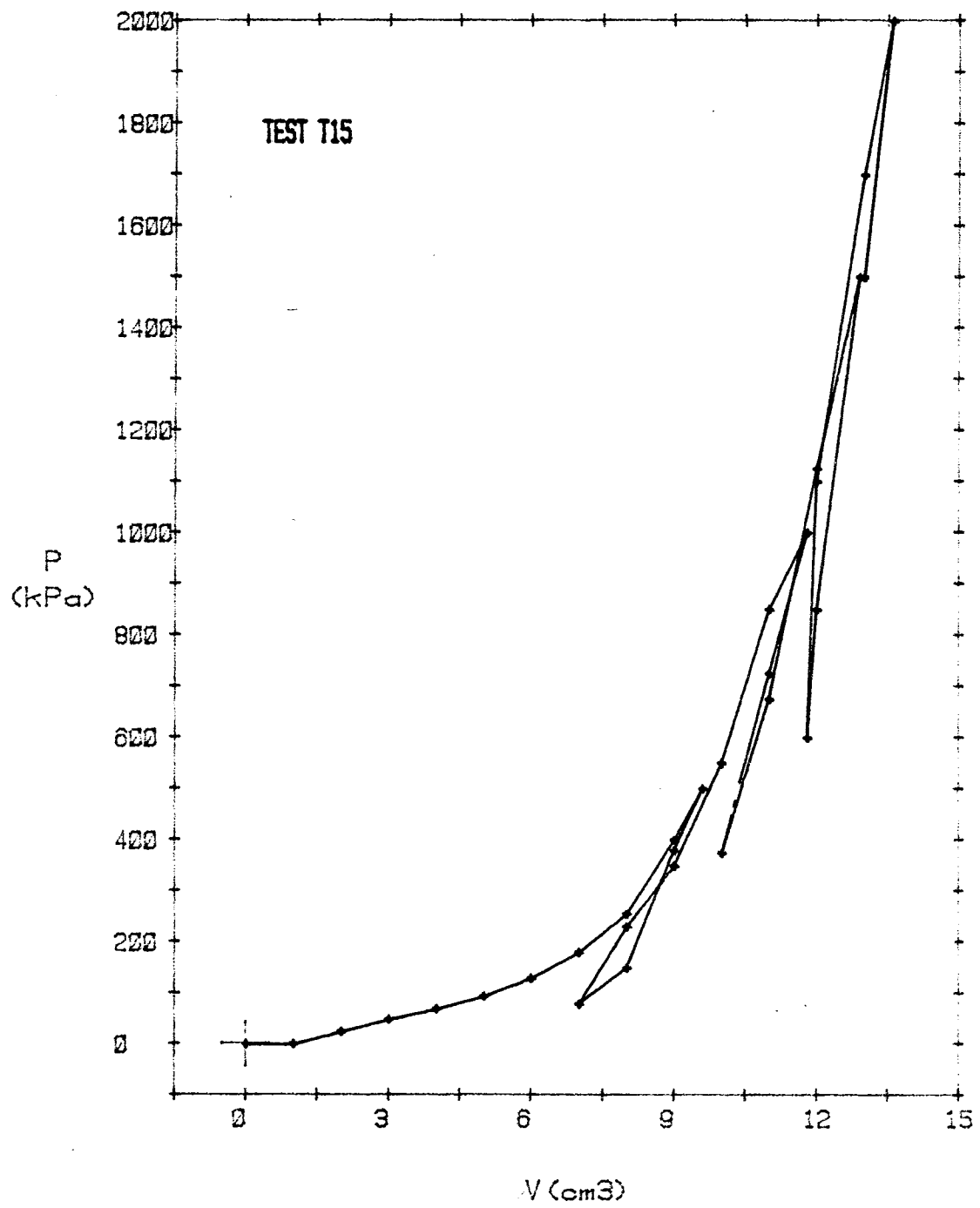


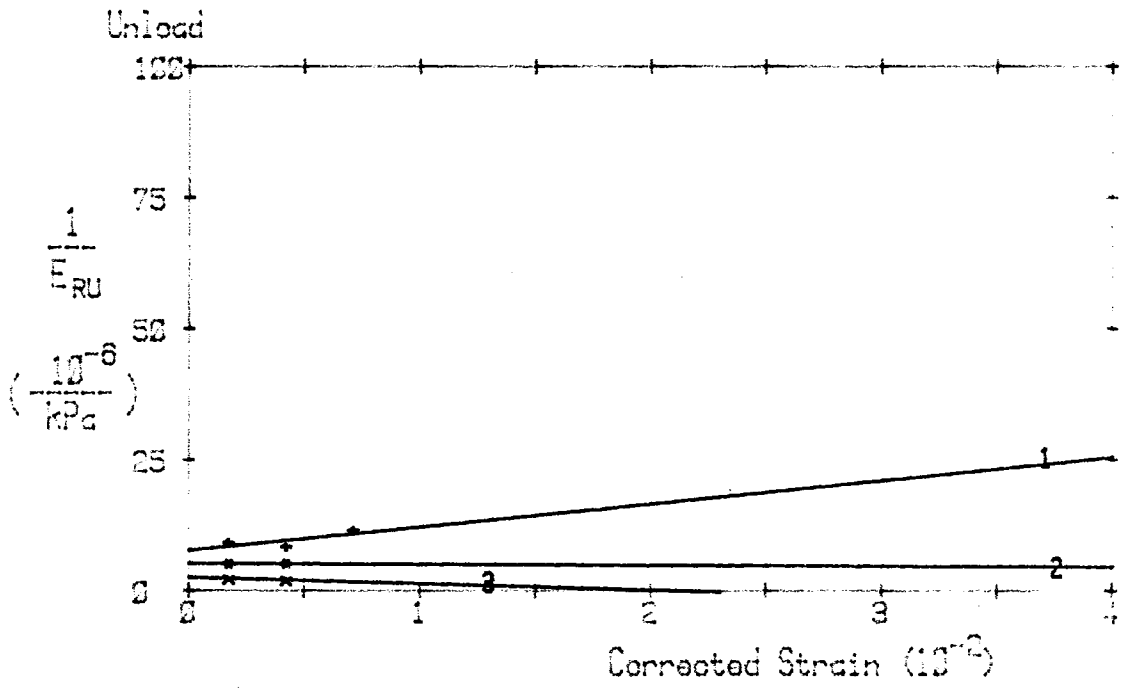


TEST T14

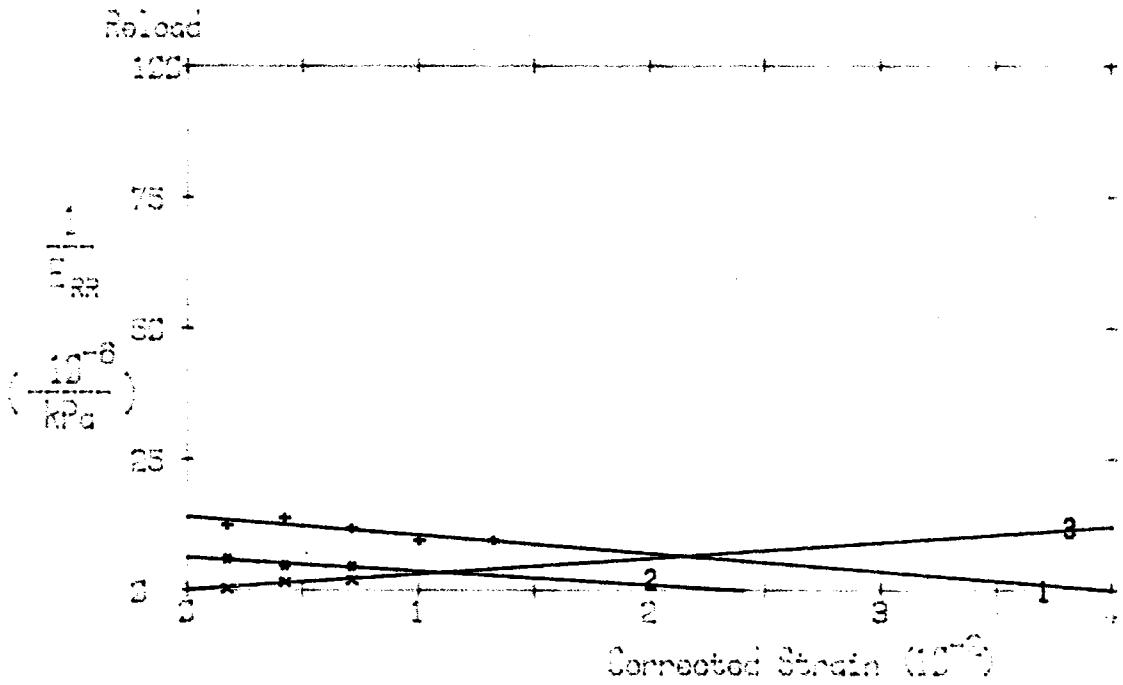


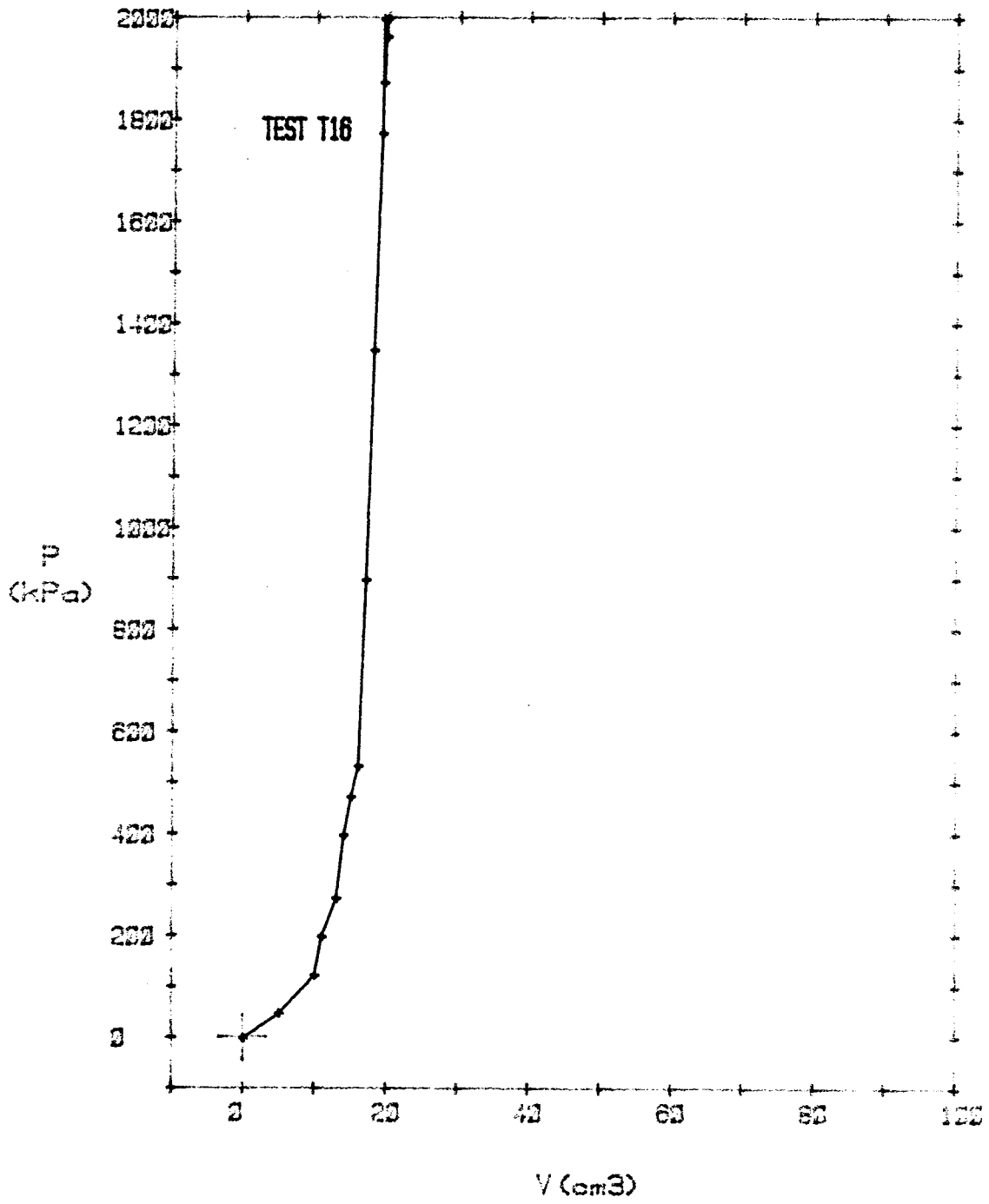


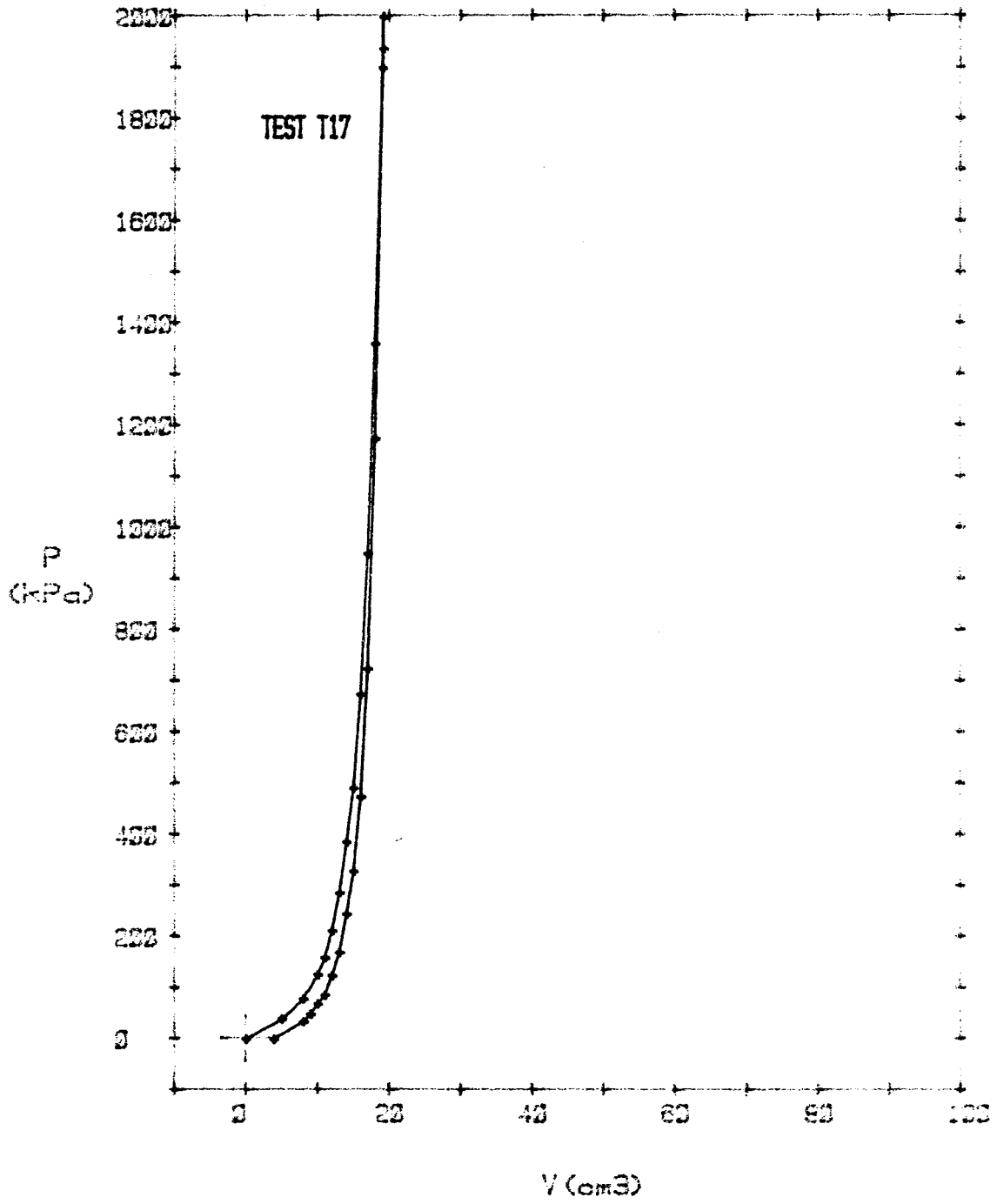


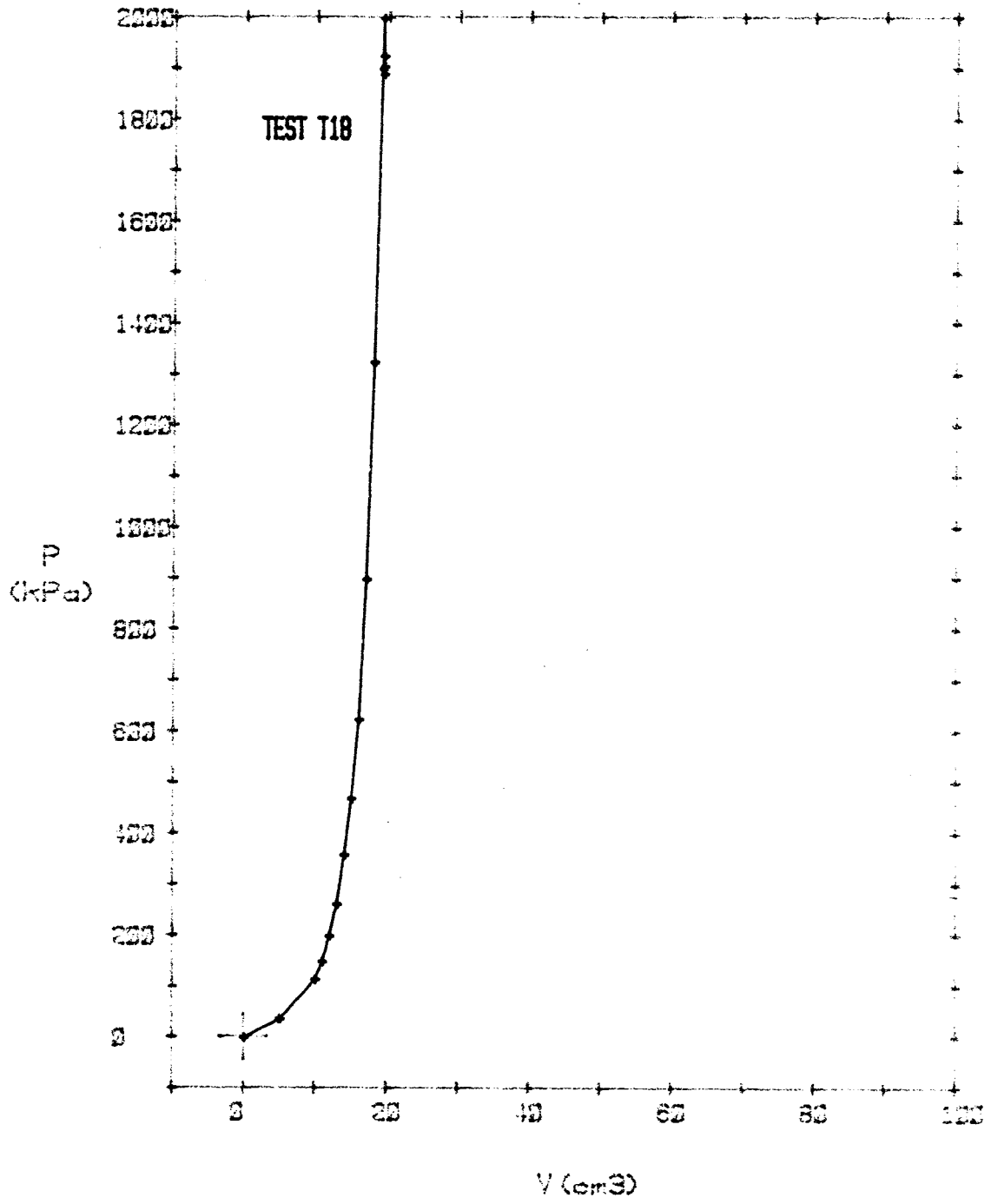


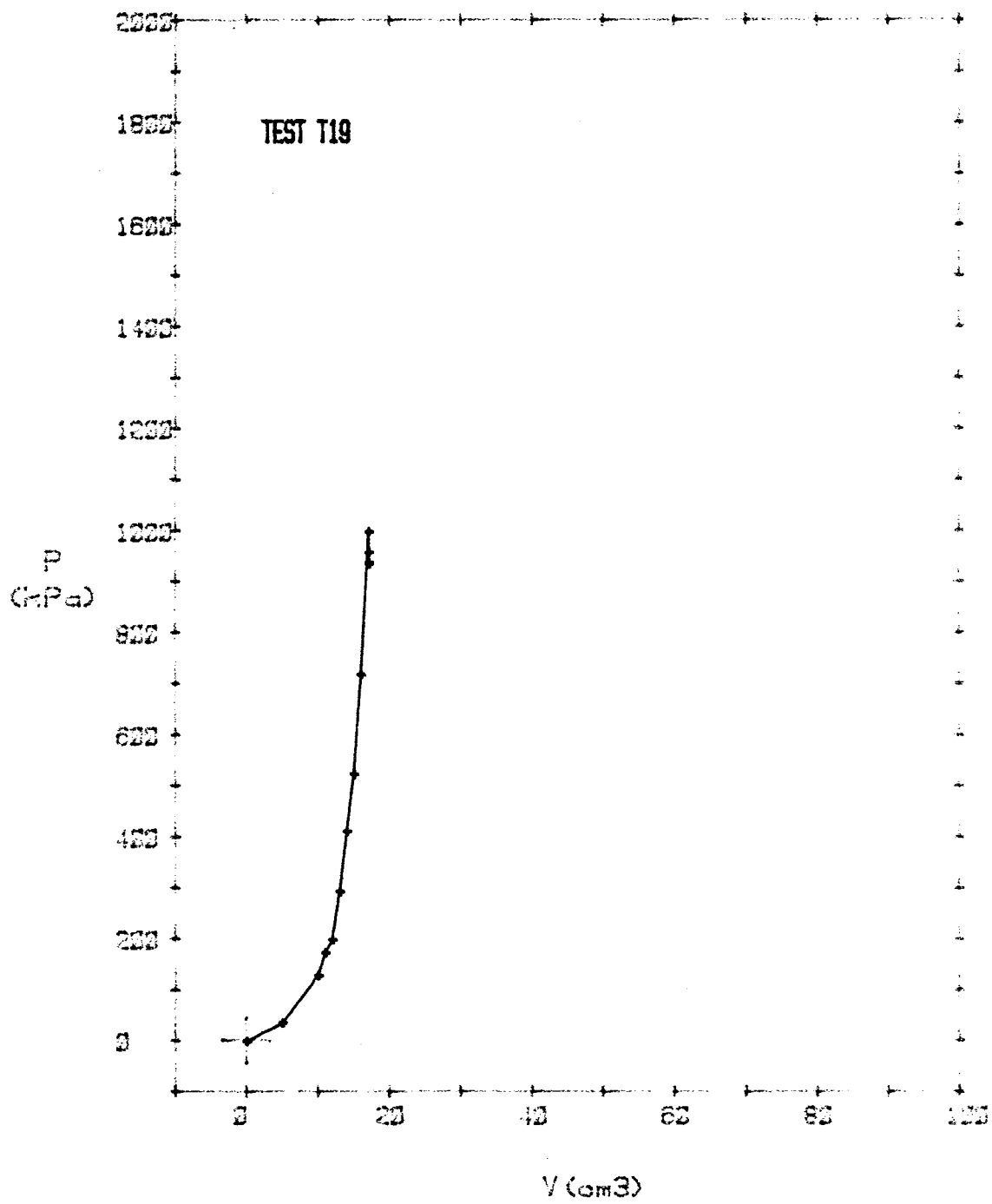
TEST T15

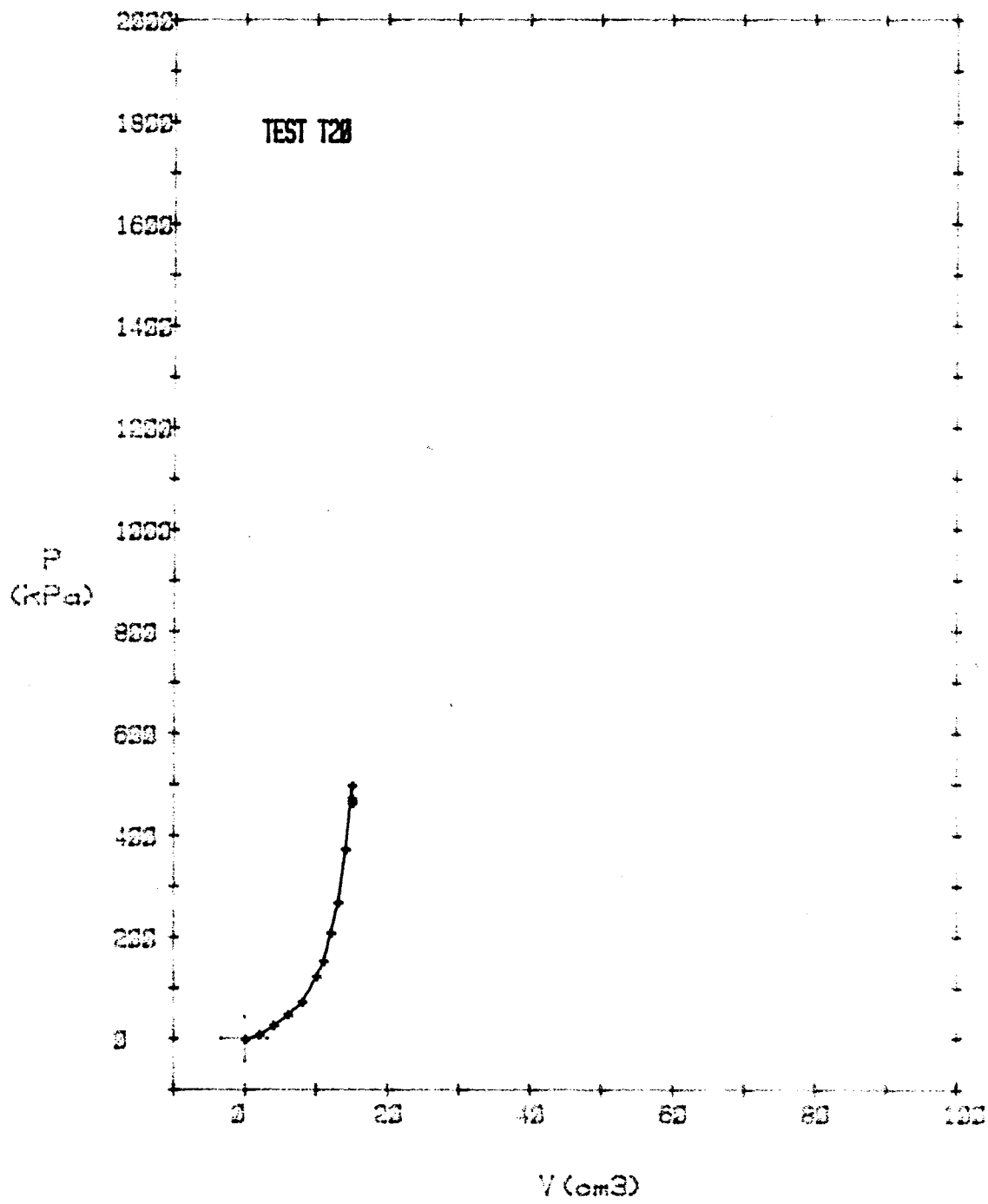


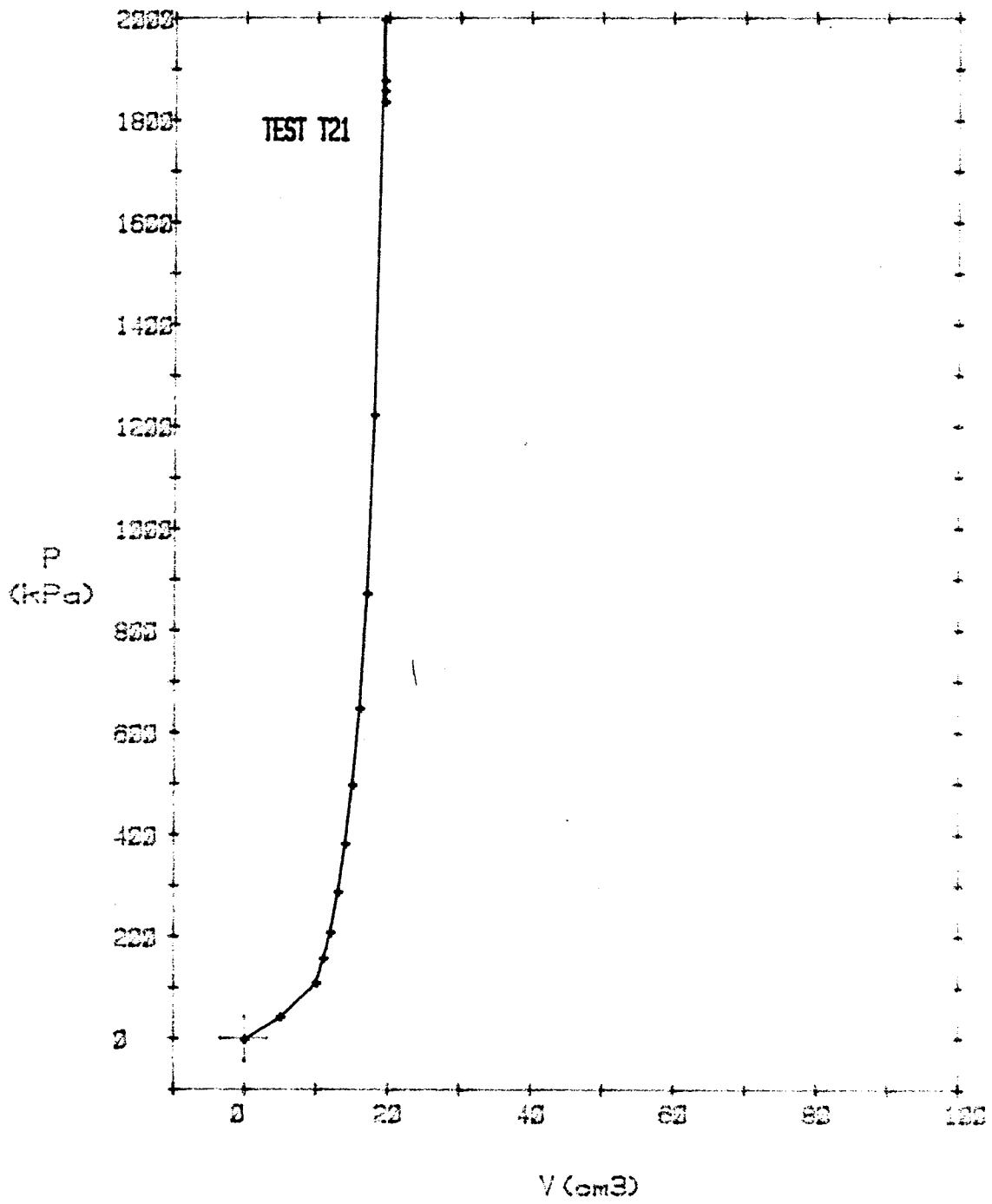


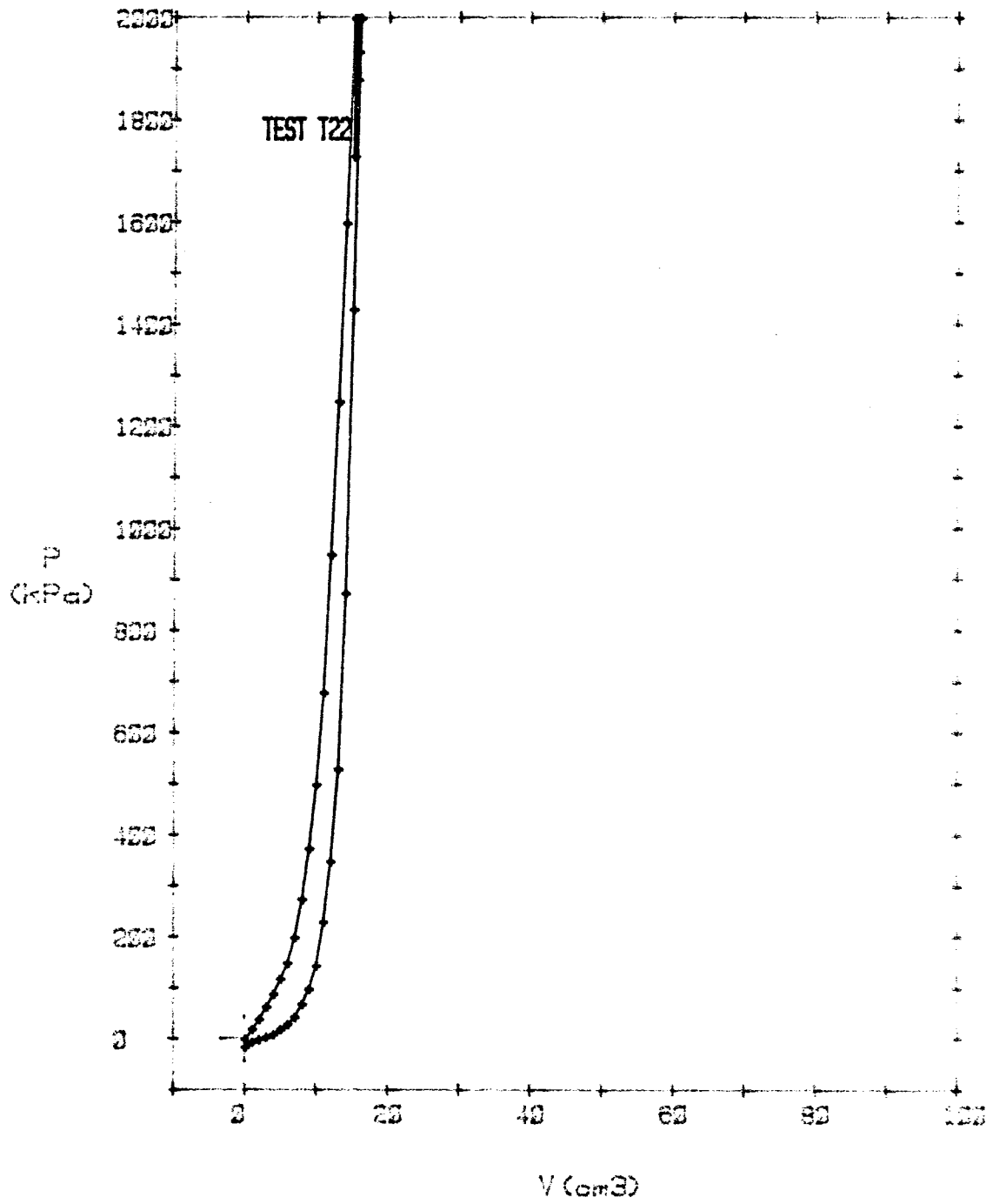


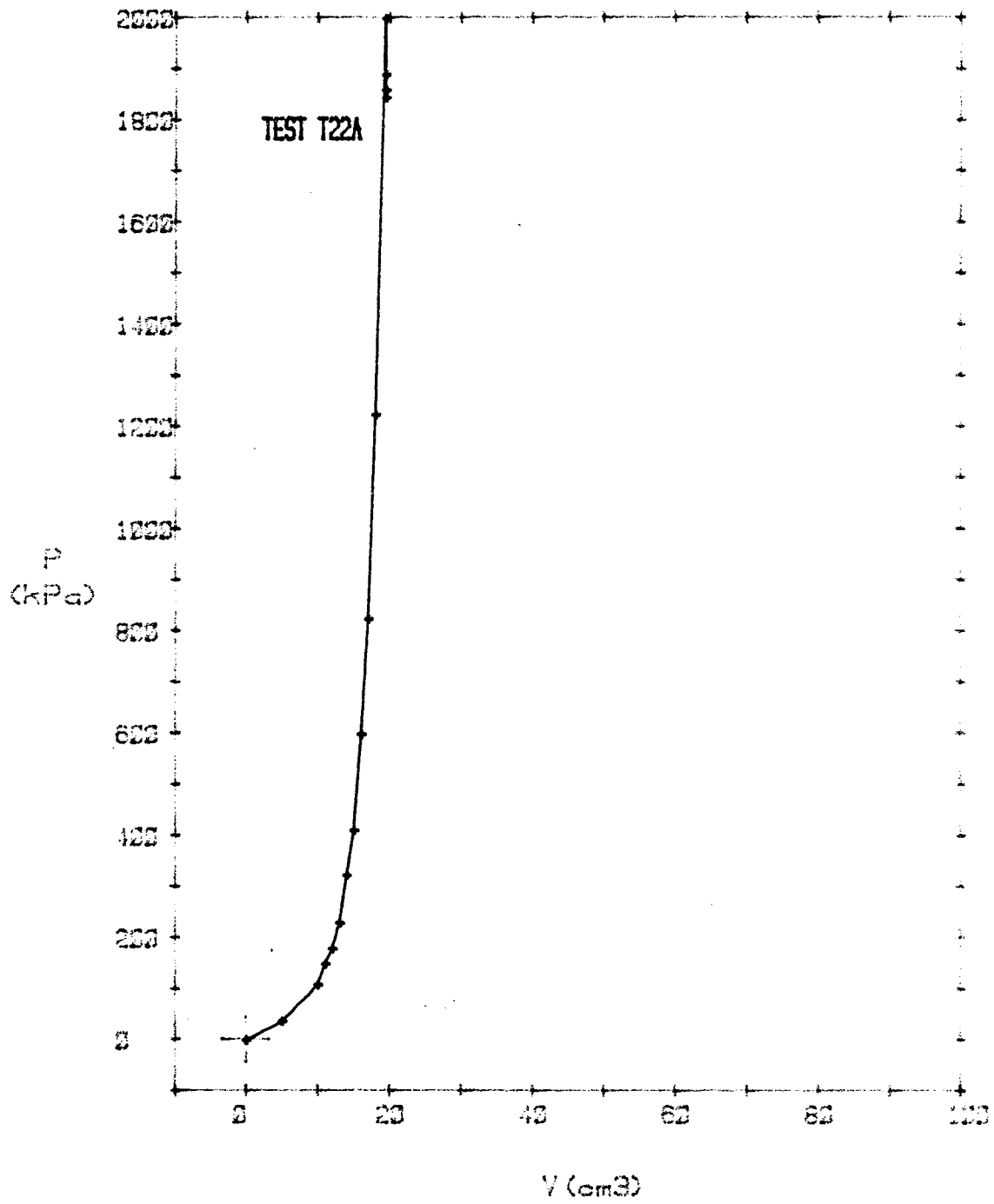


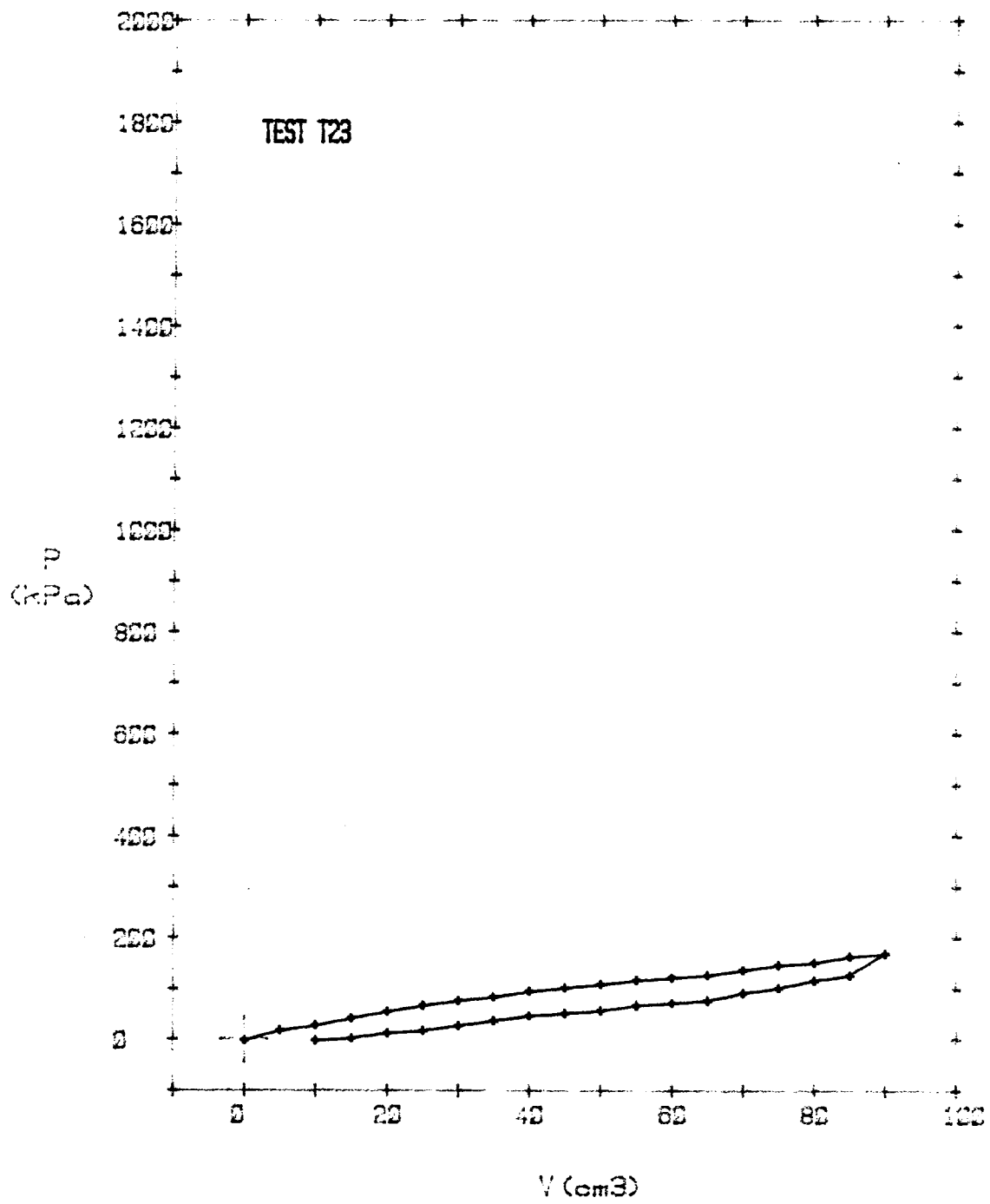


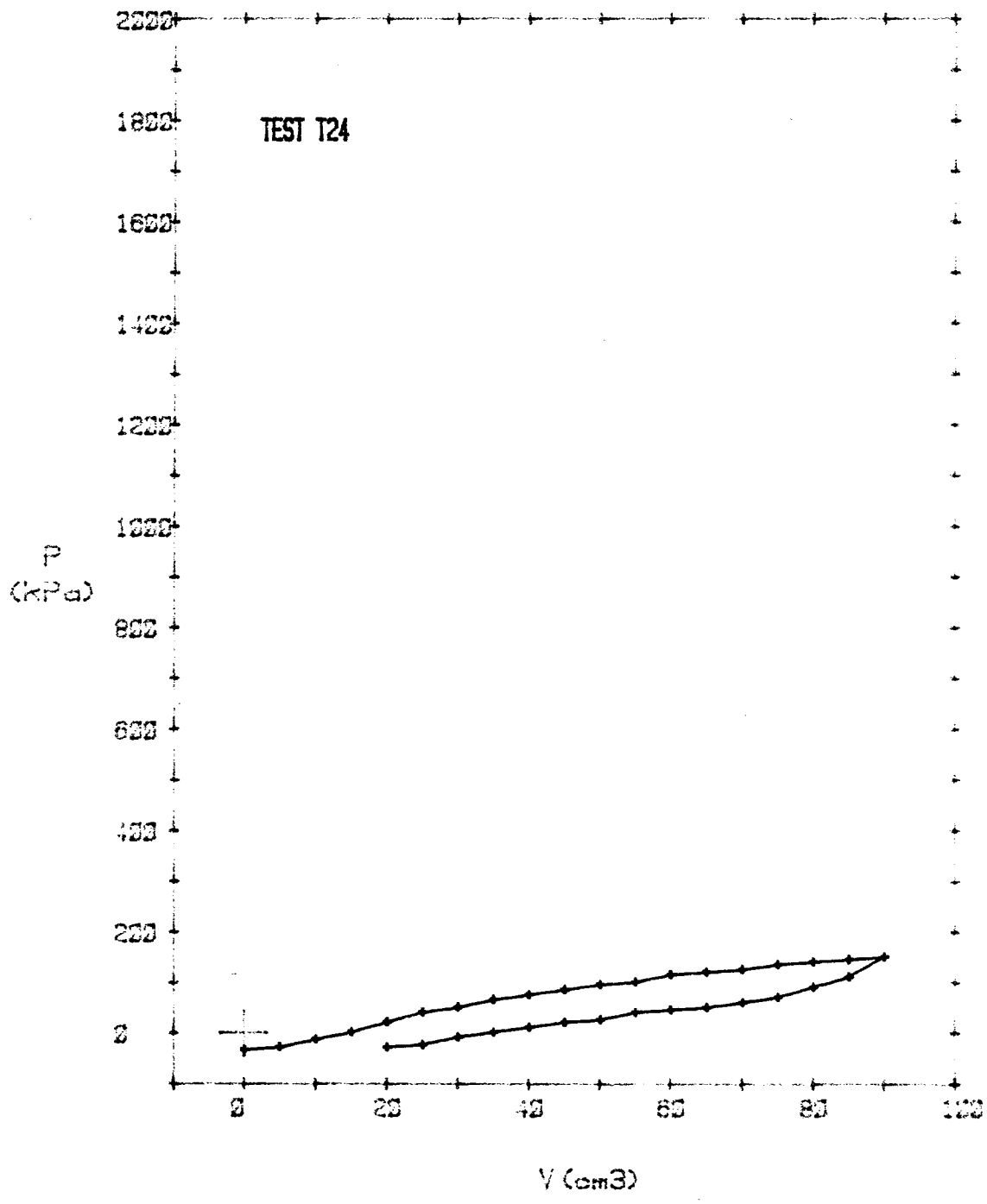


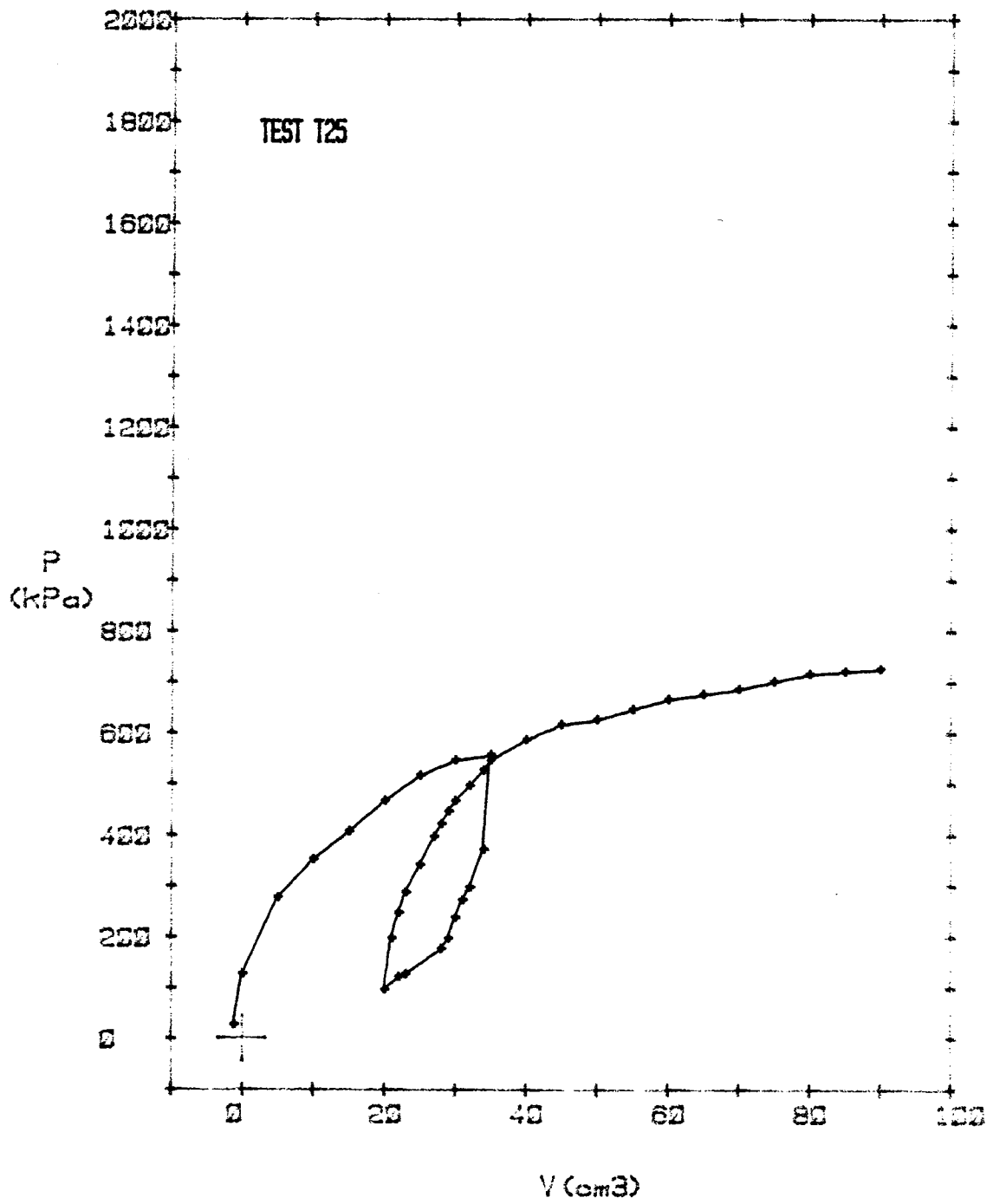


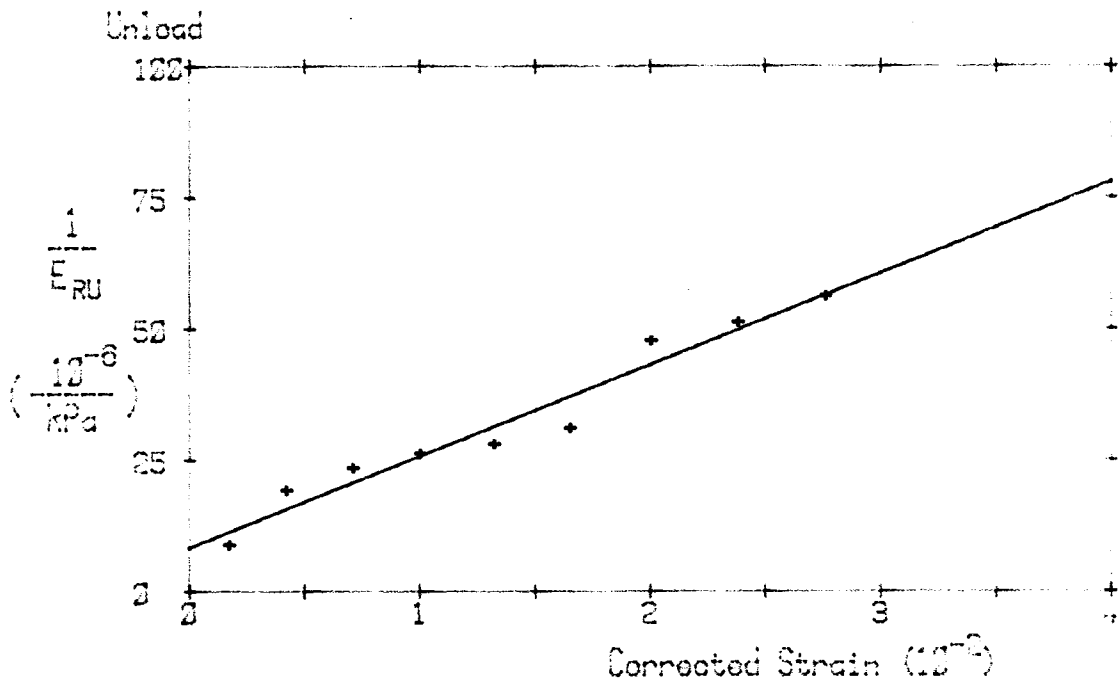




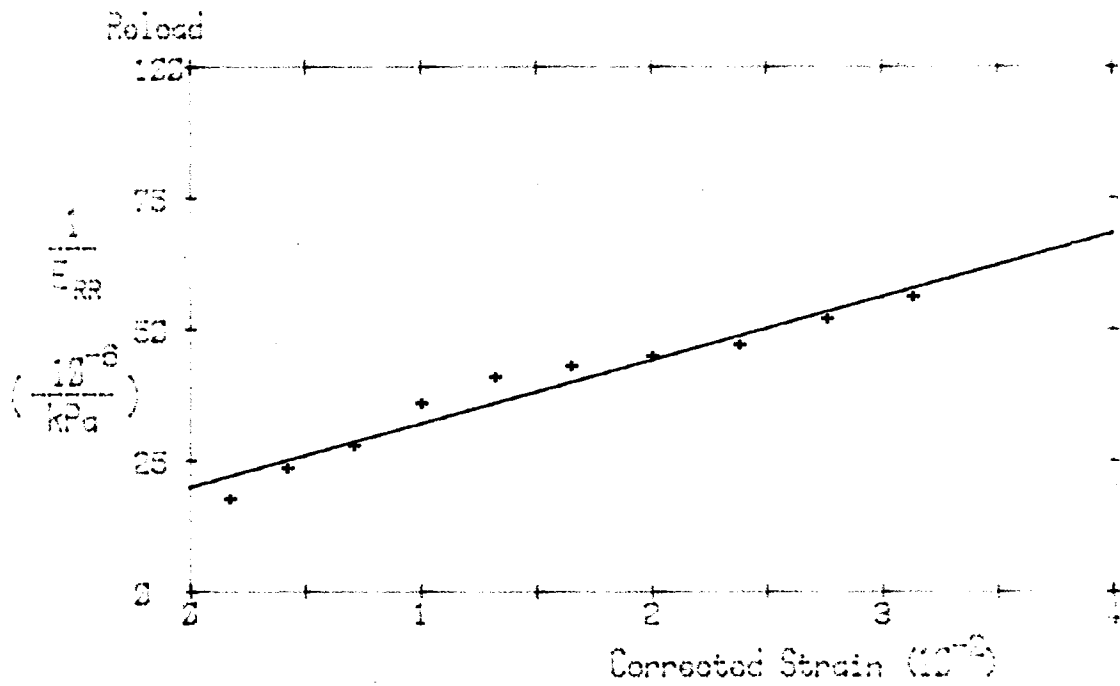


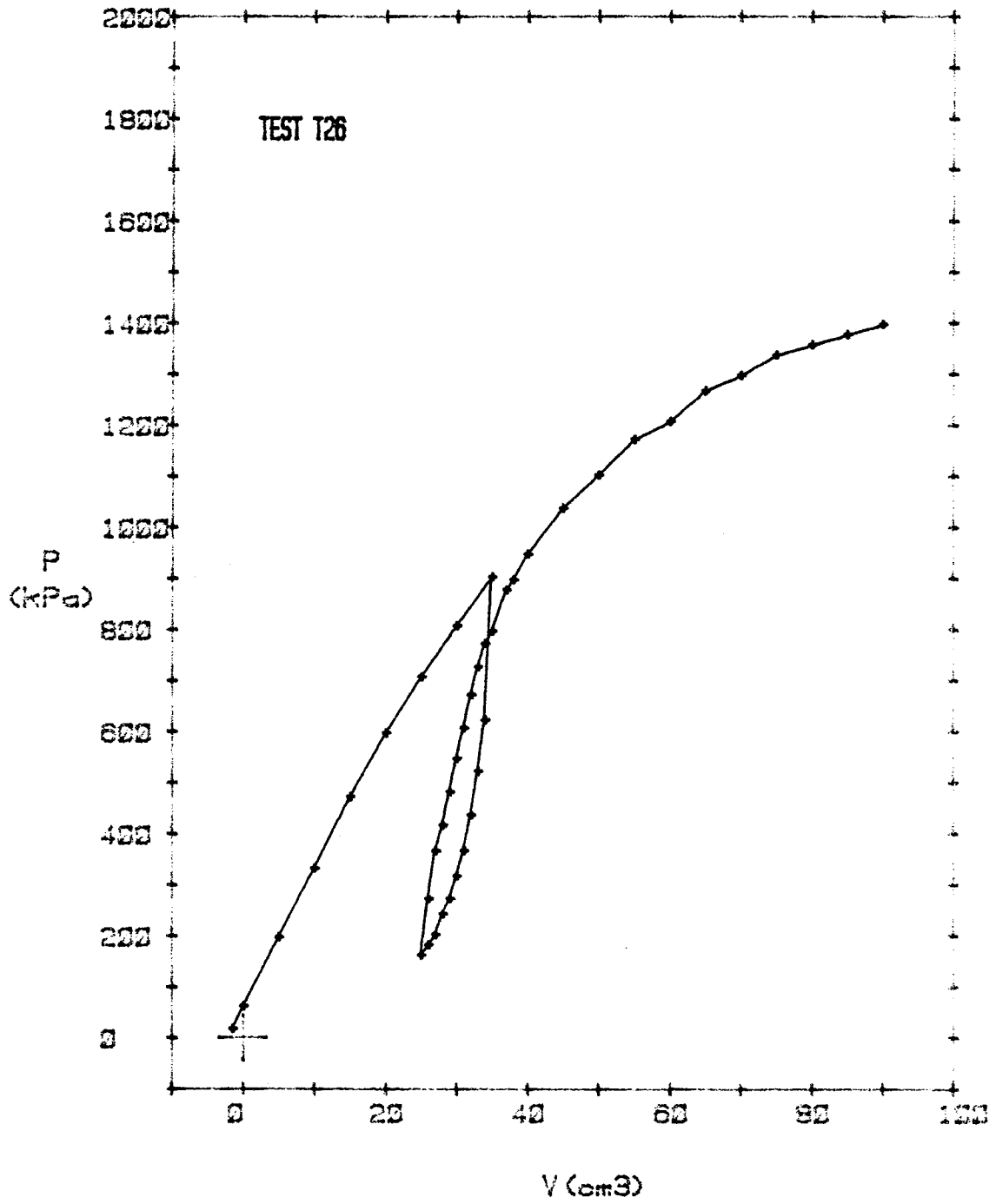


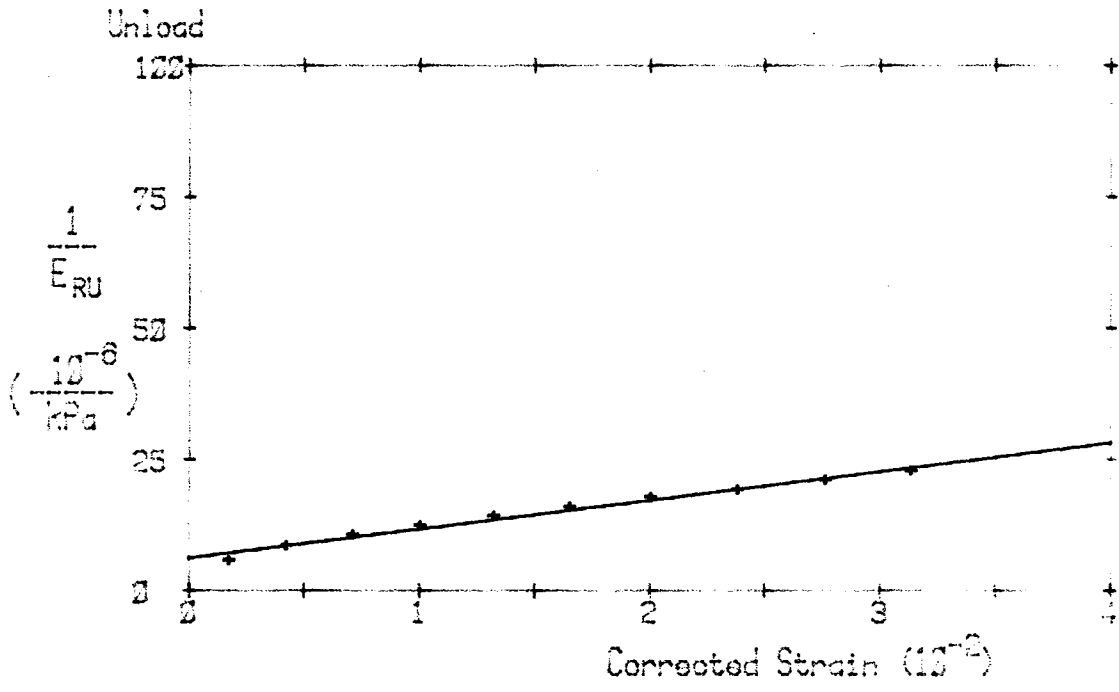




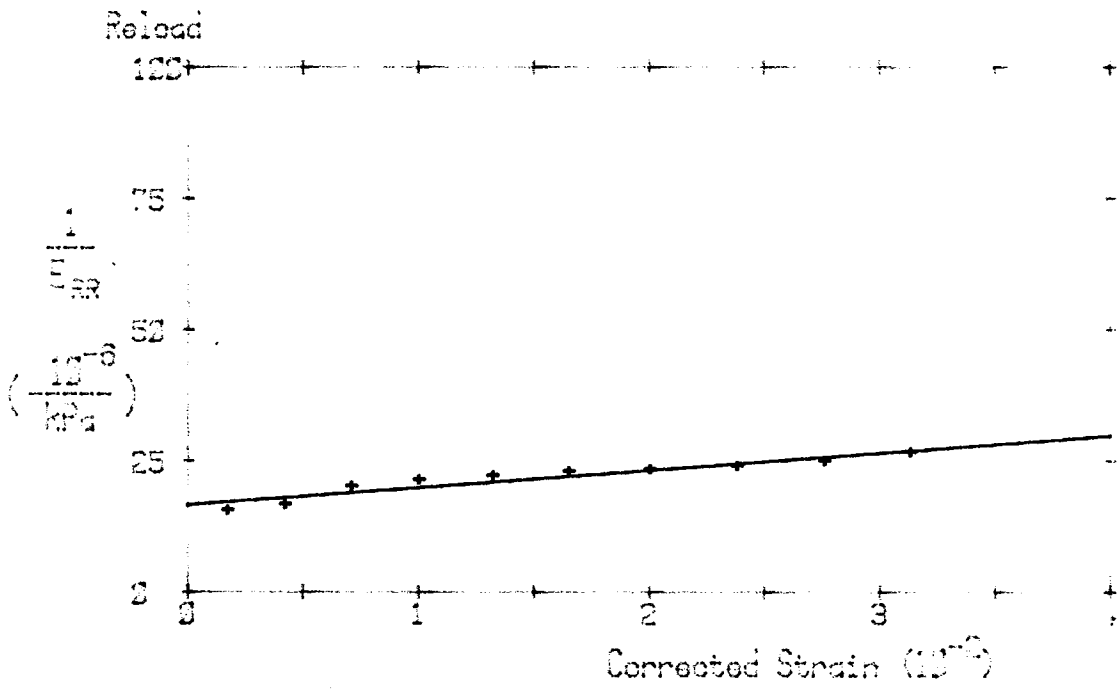
TEST T25

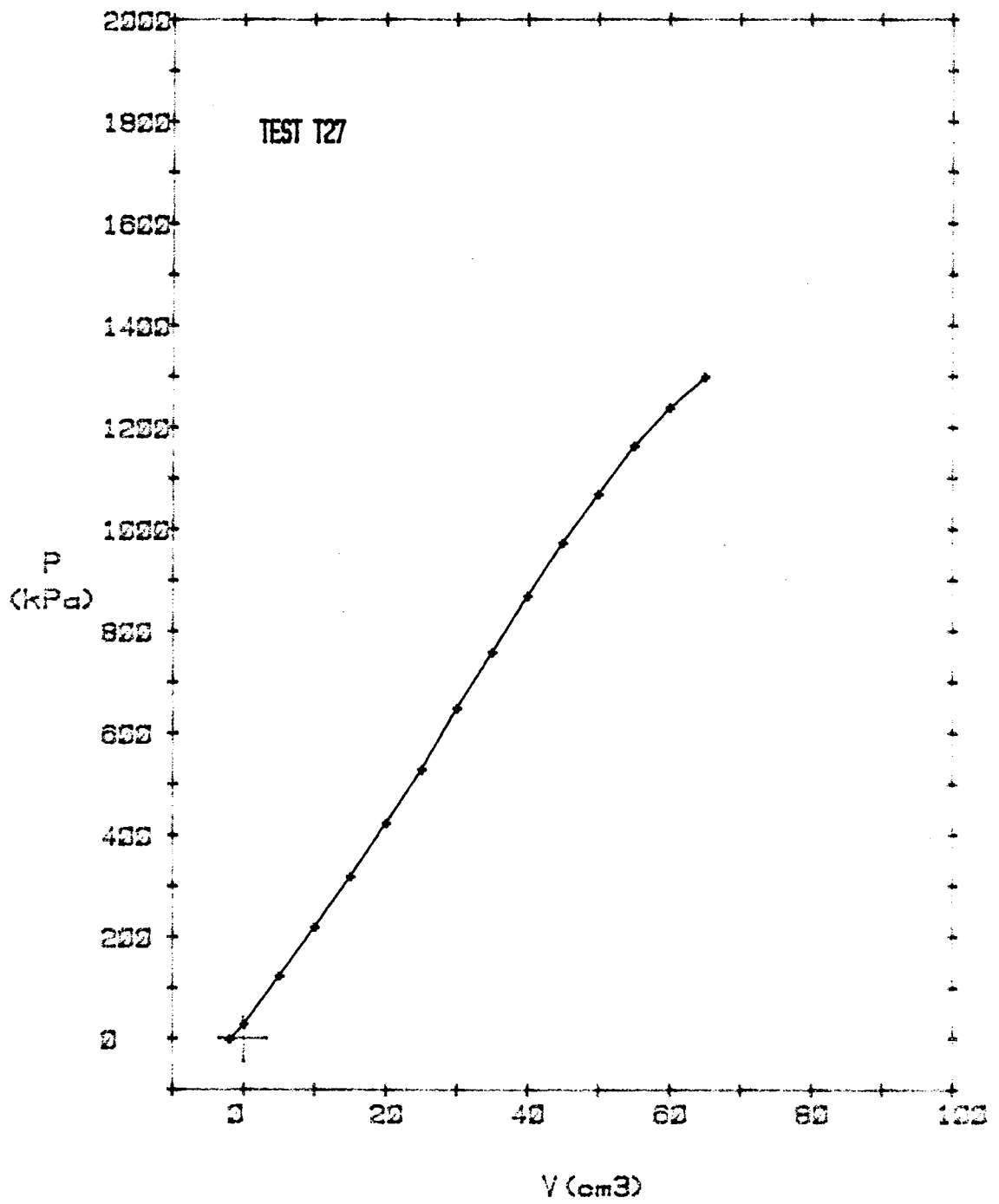


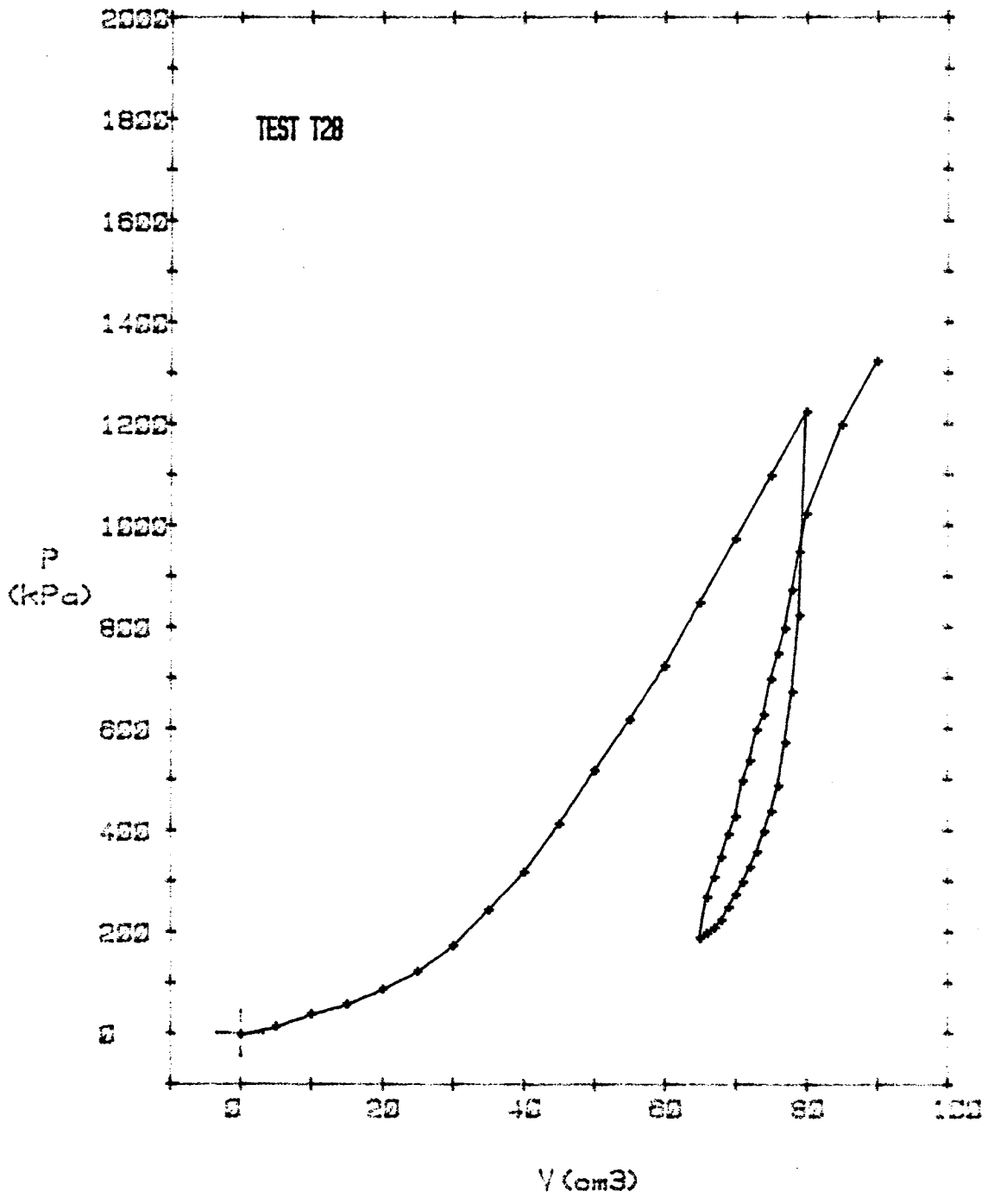


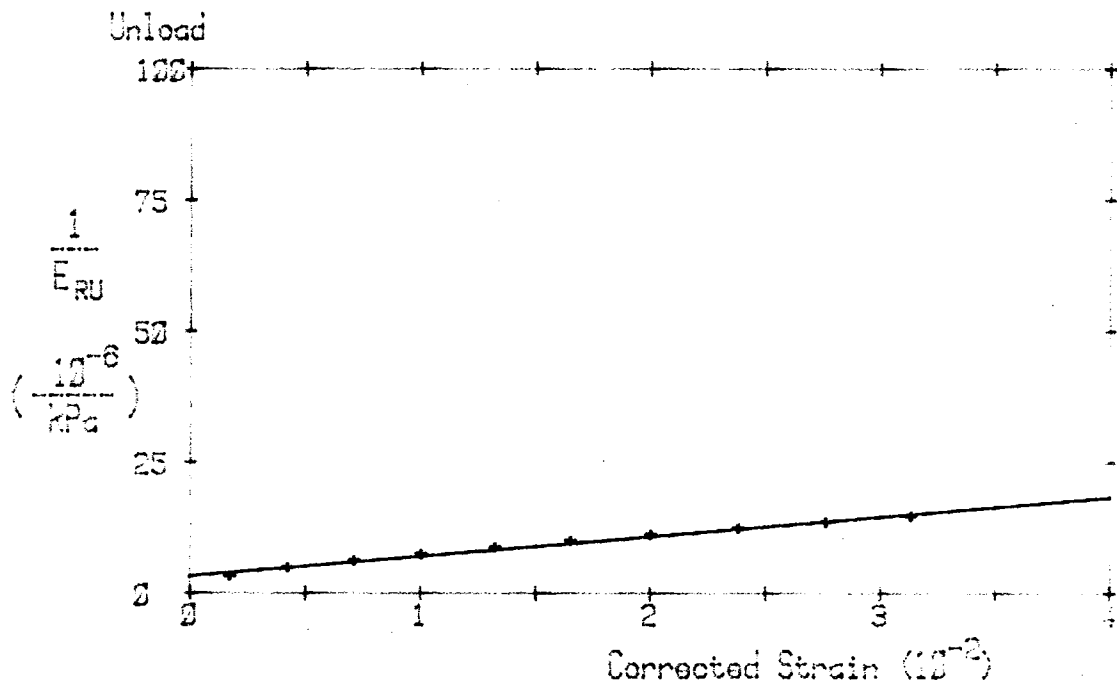


TEST T26

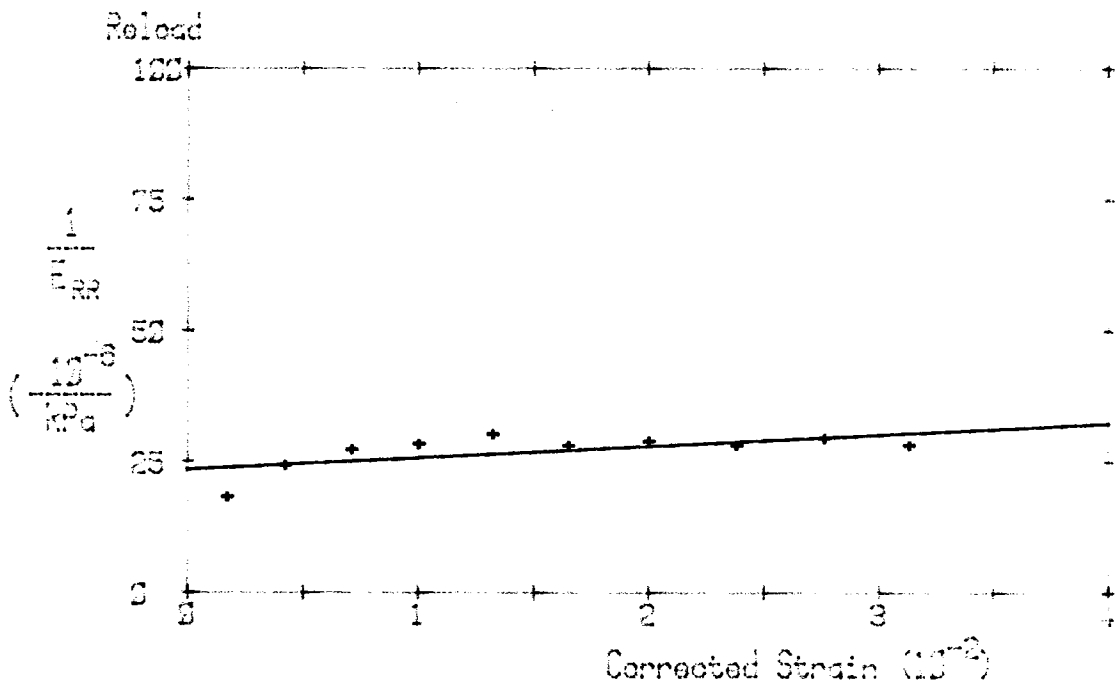


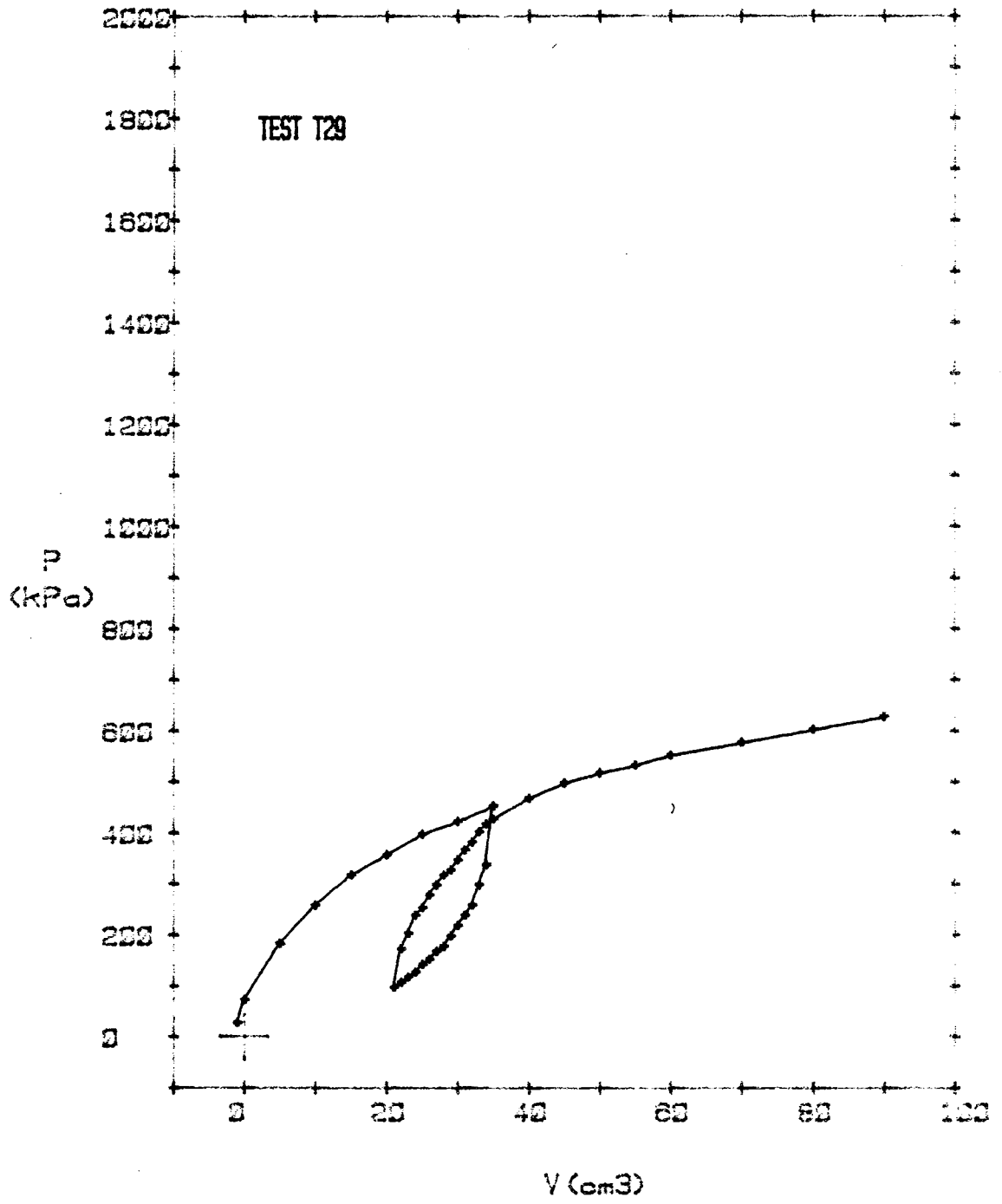


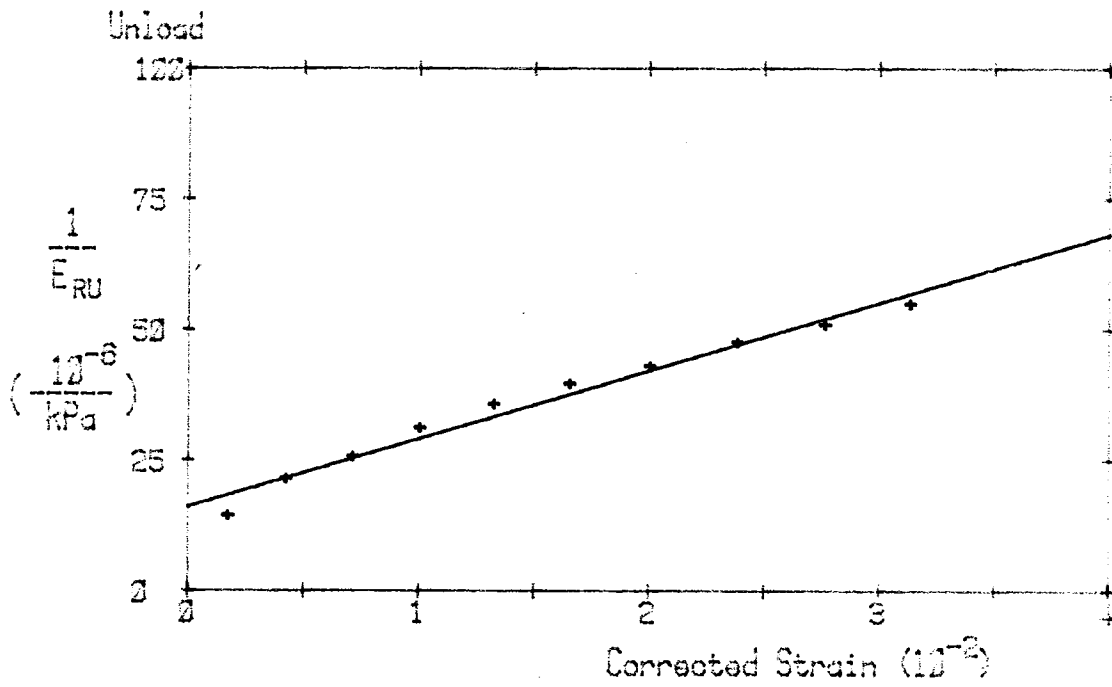




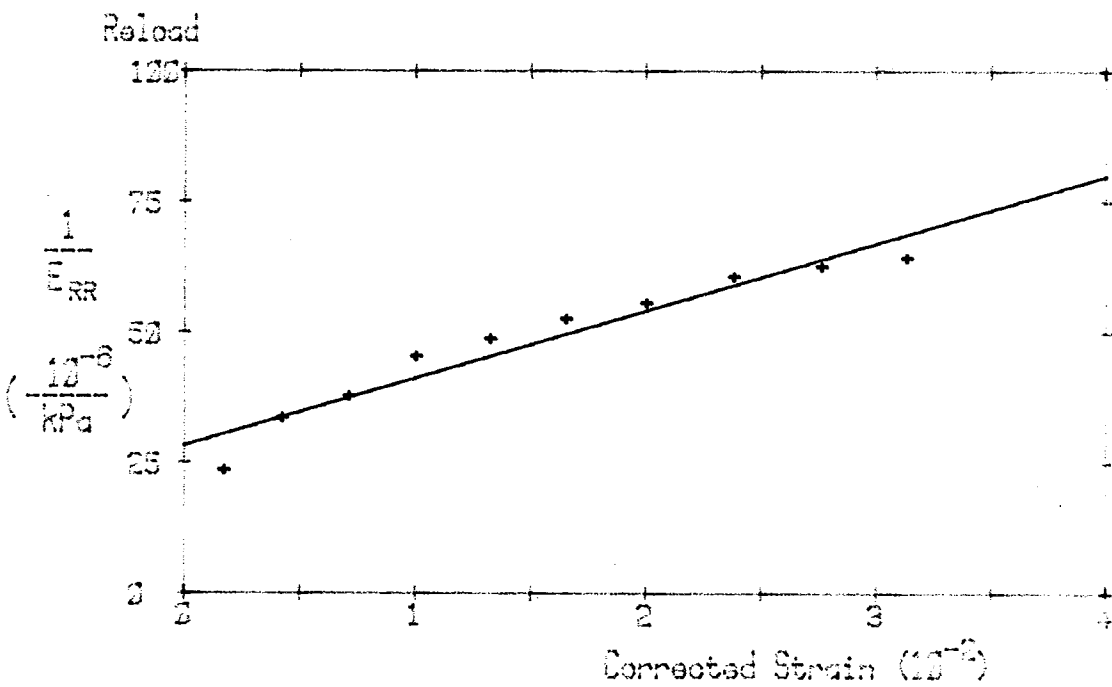
TEST T28

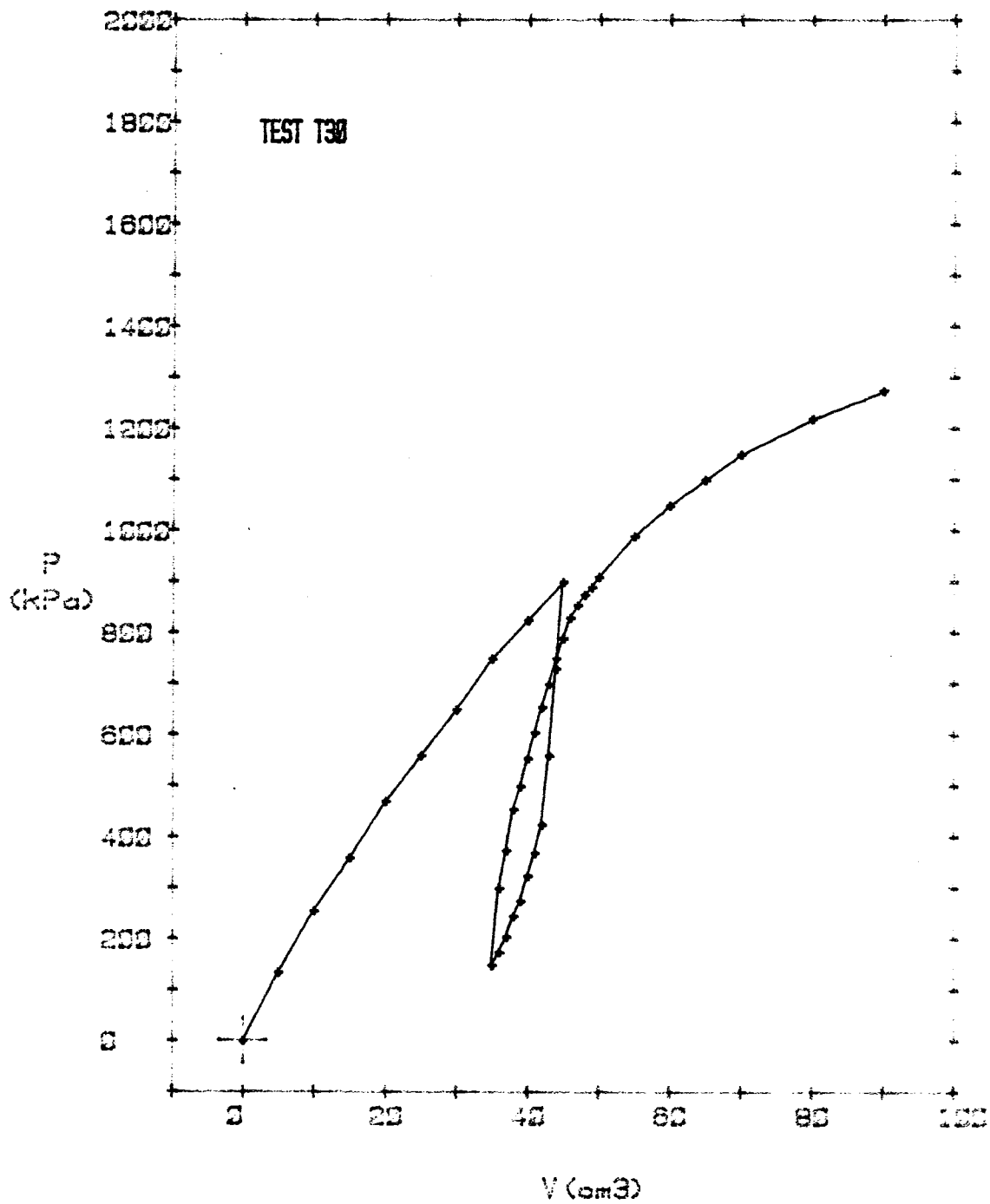


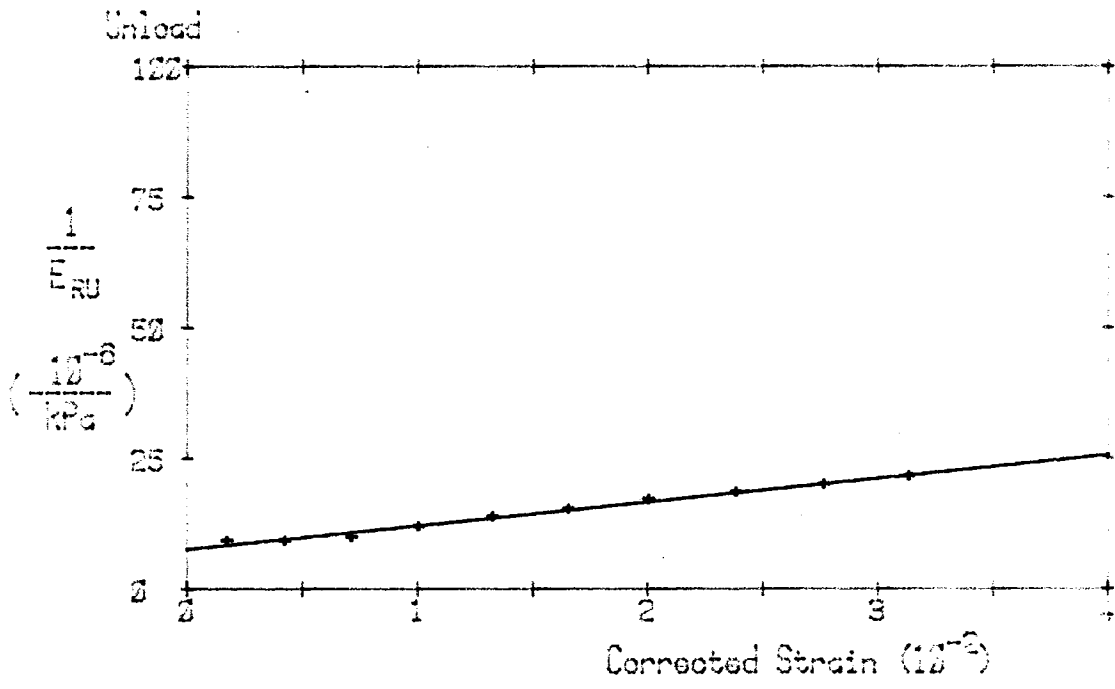




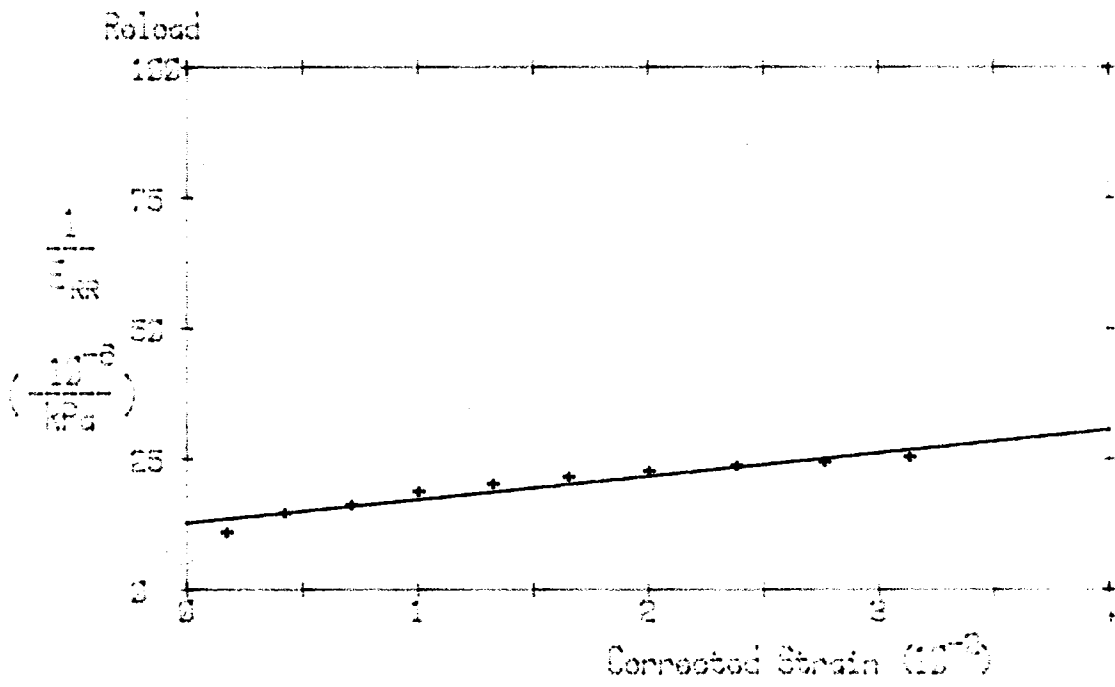
TEST T29

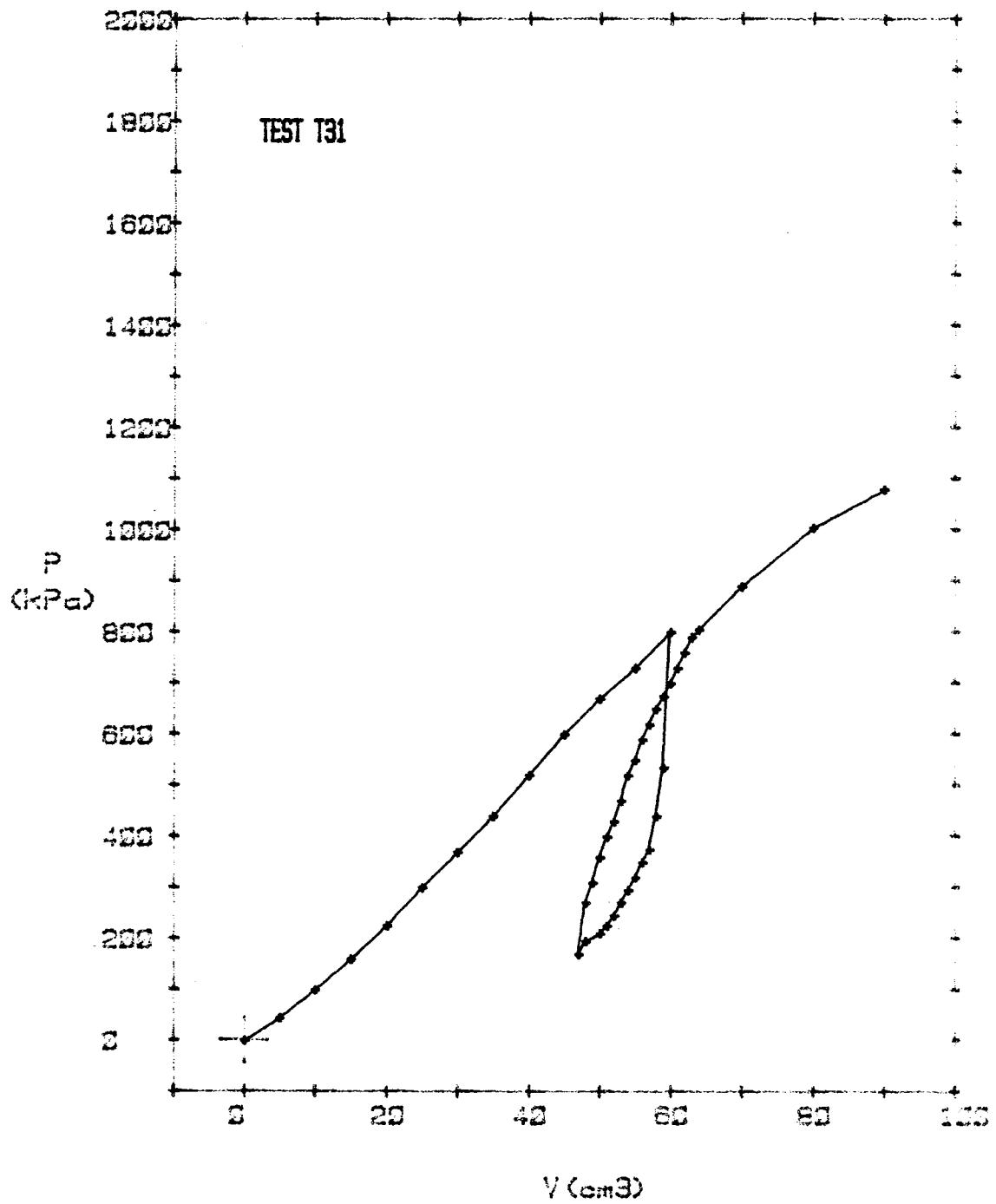


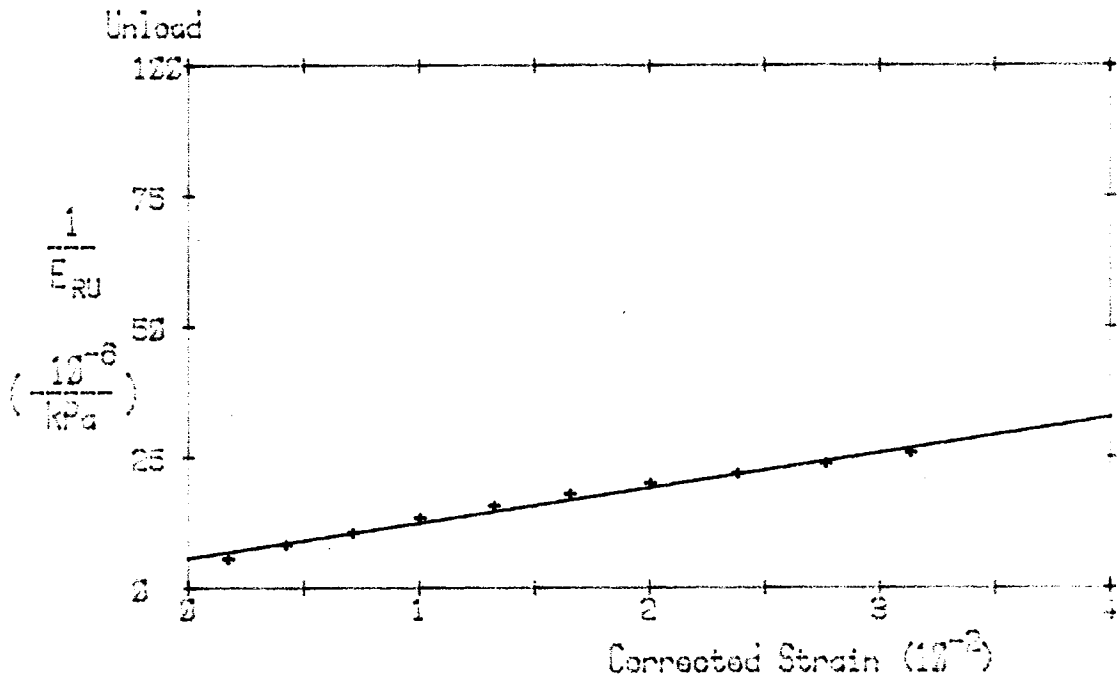




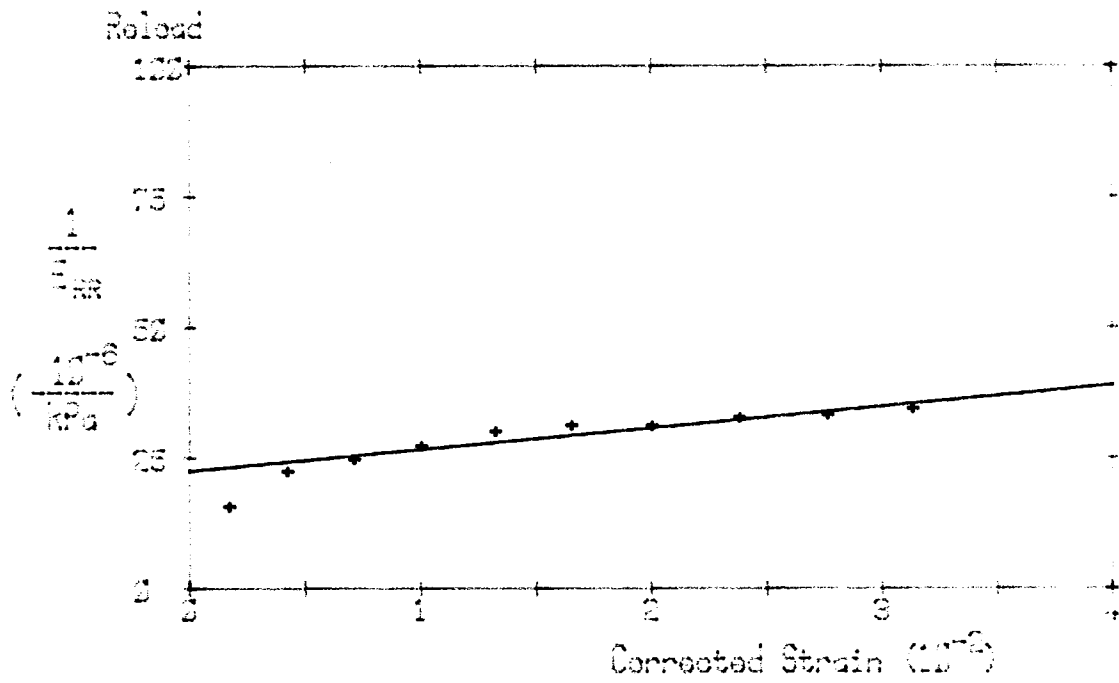
TEST T30

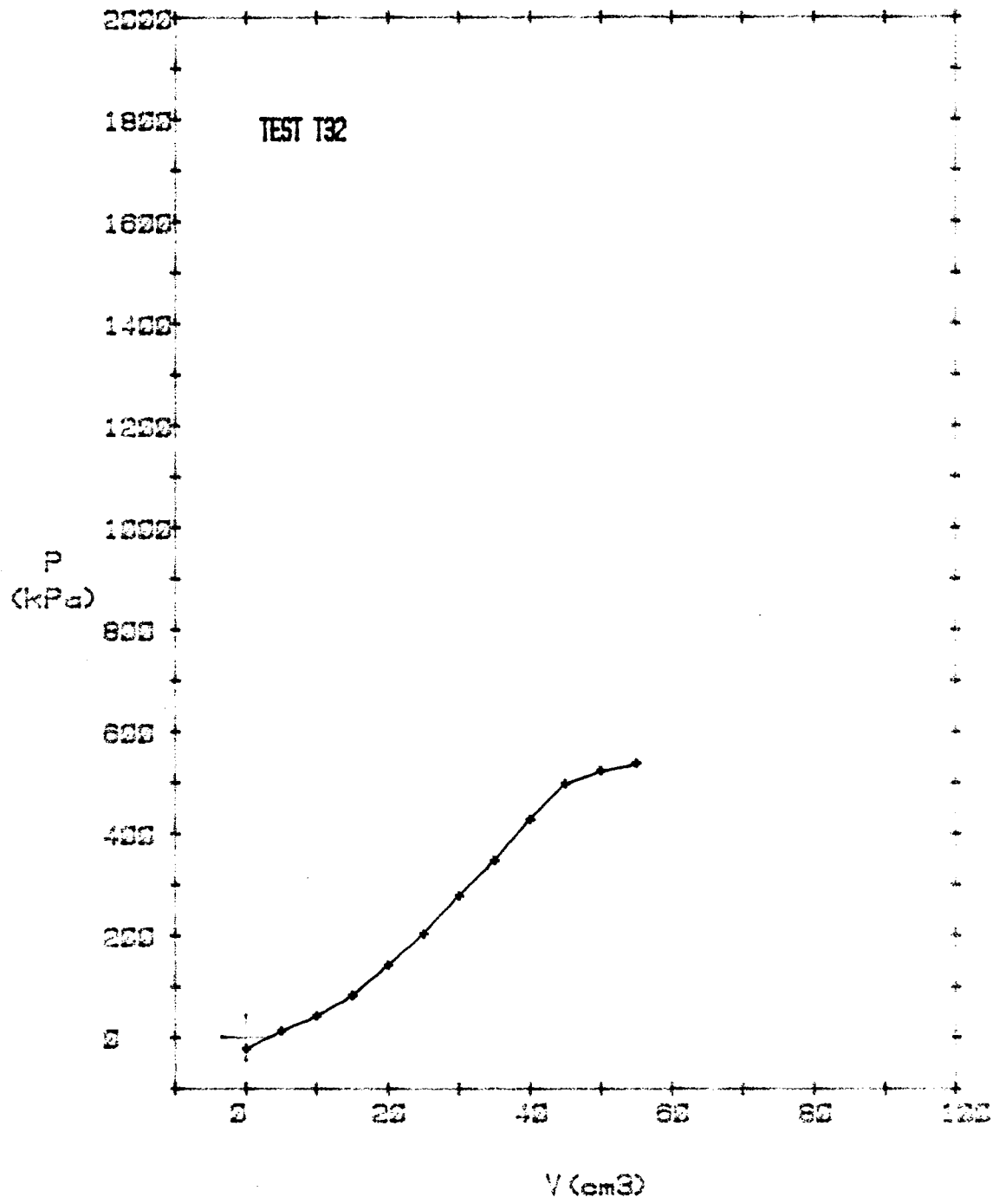


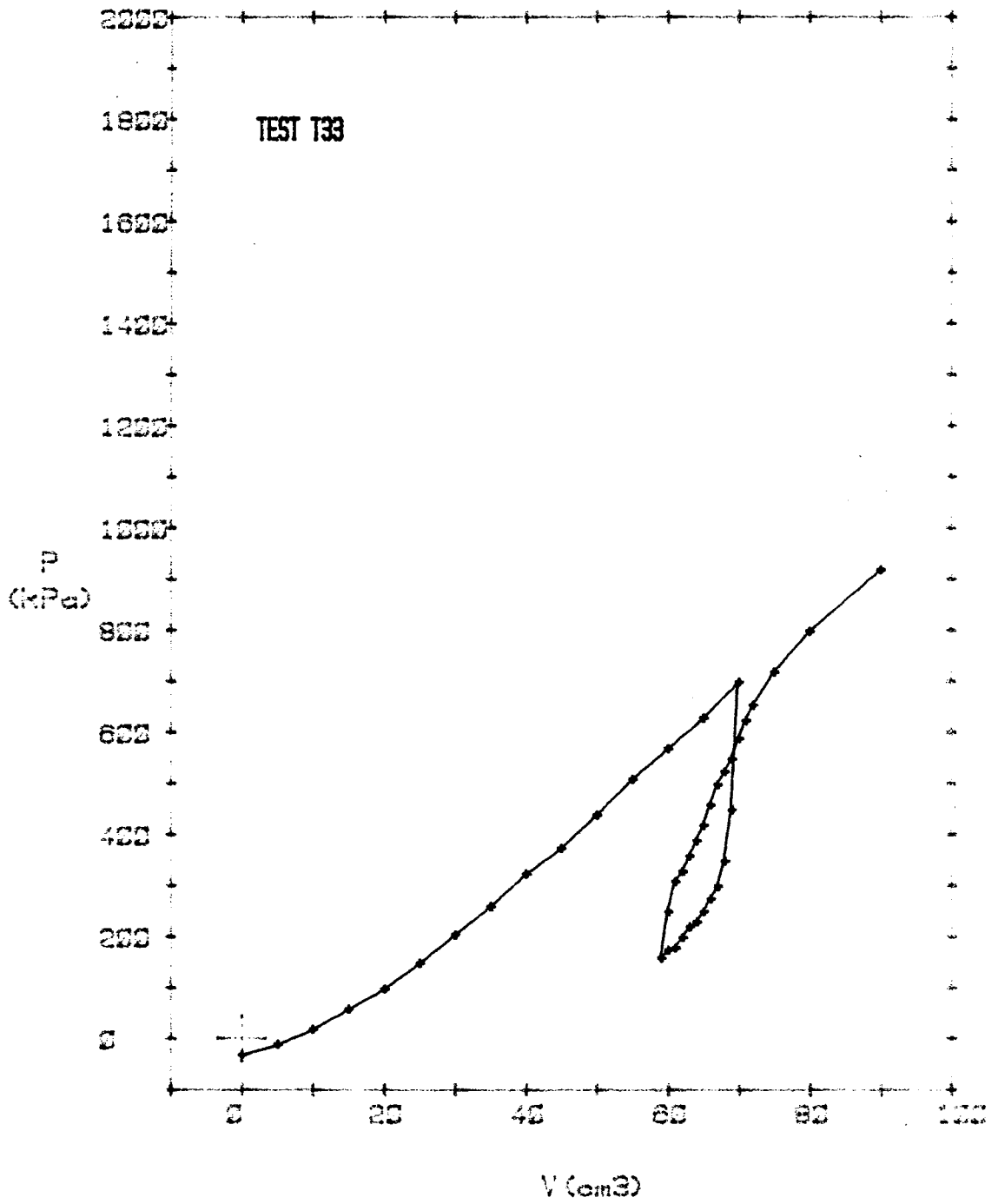


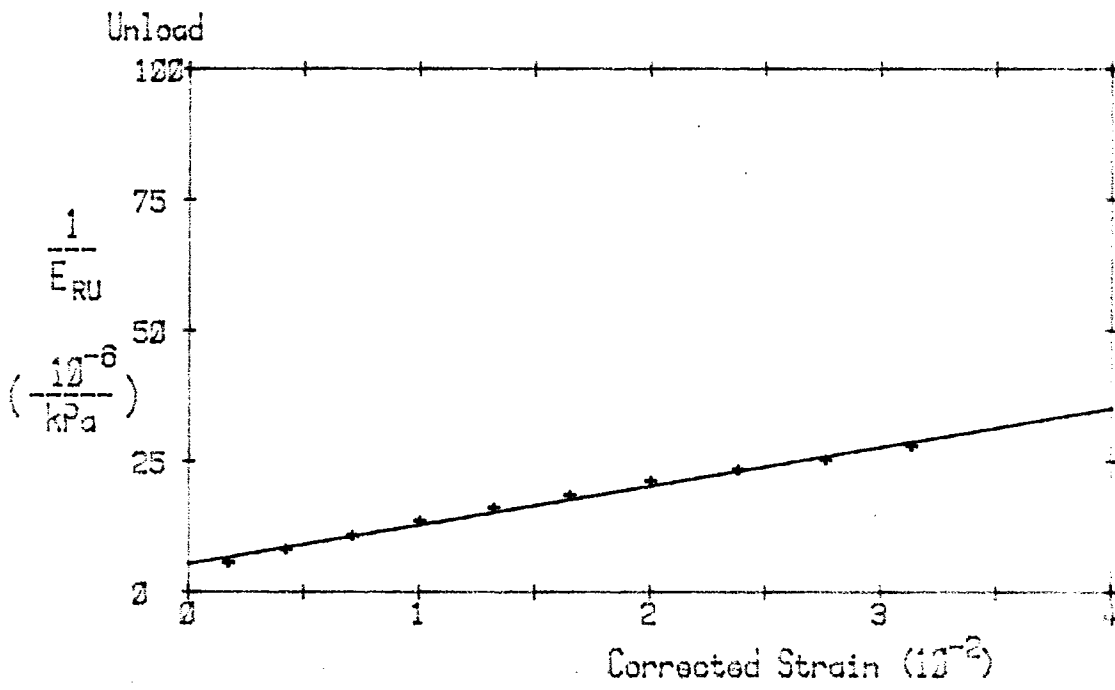


TEST T31

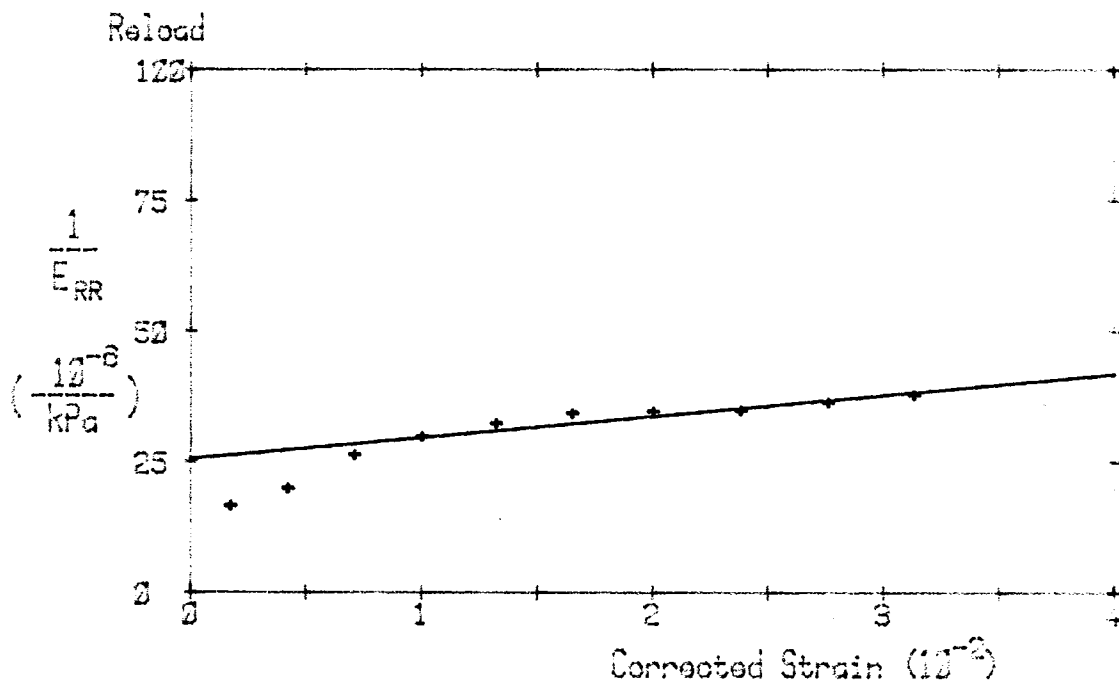


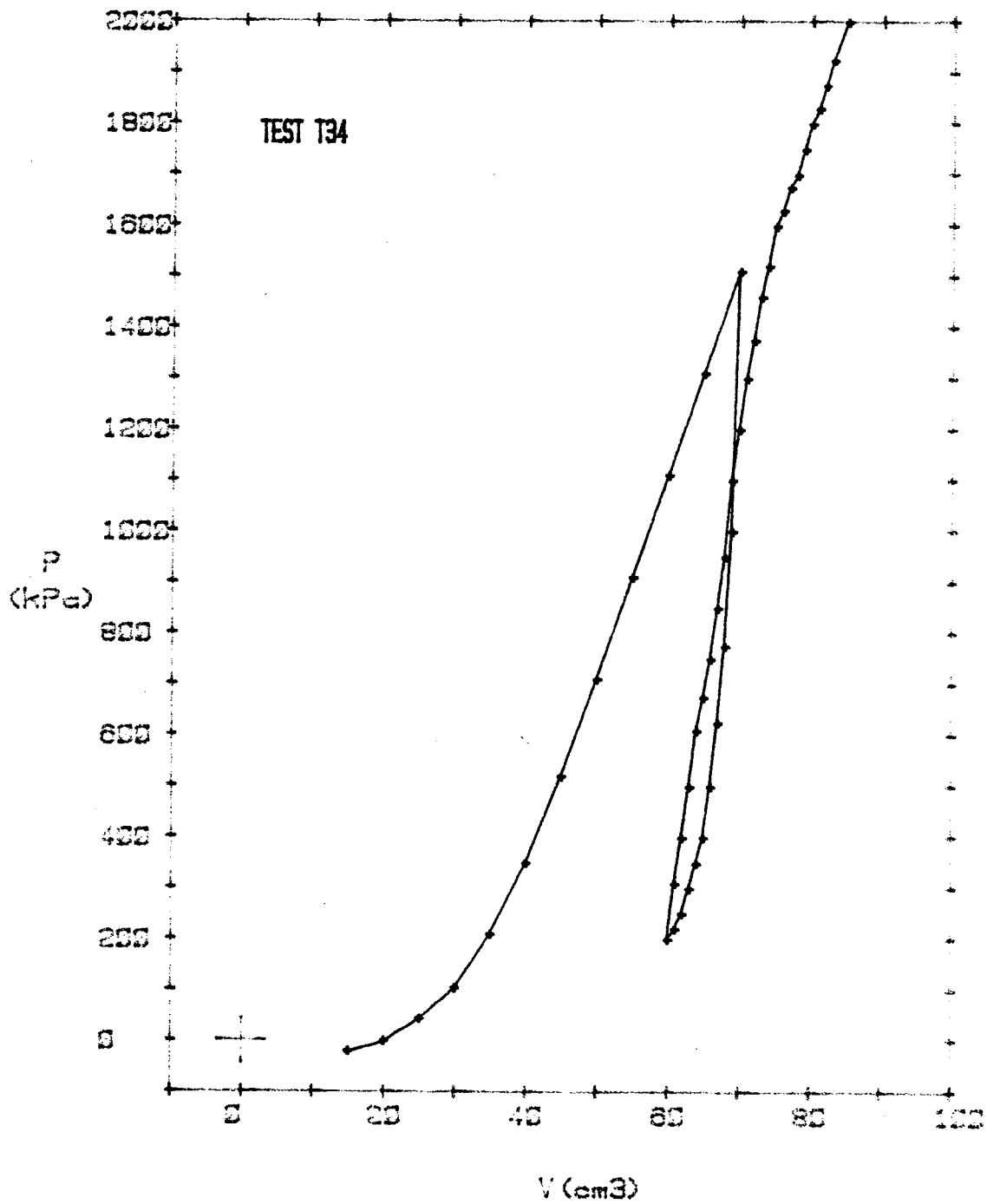


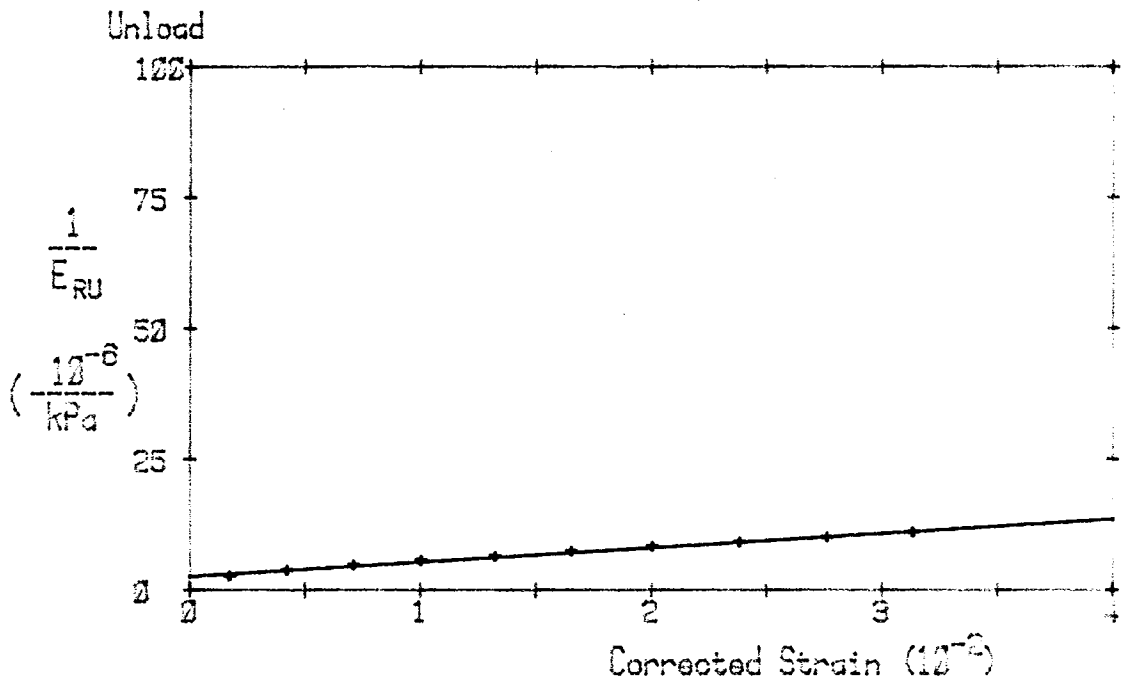




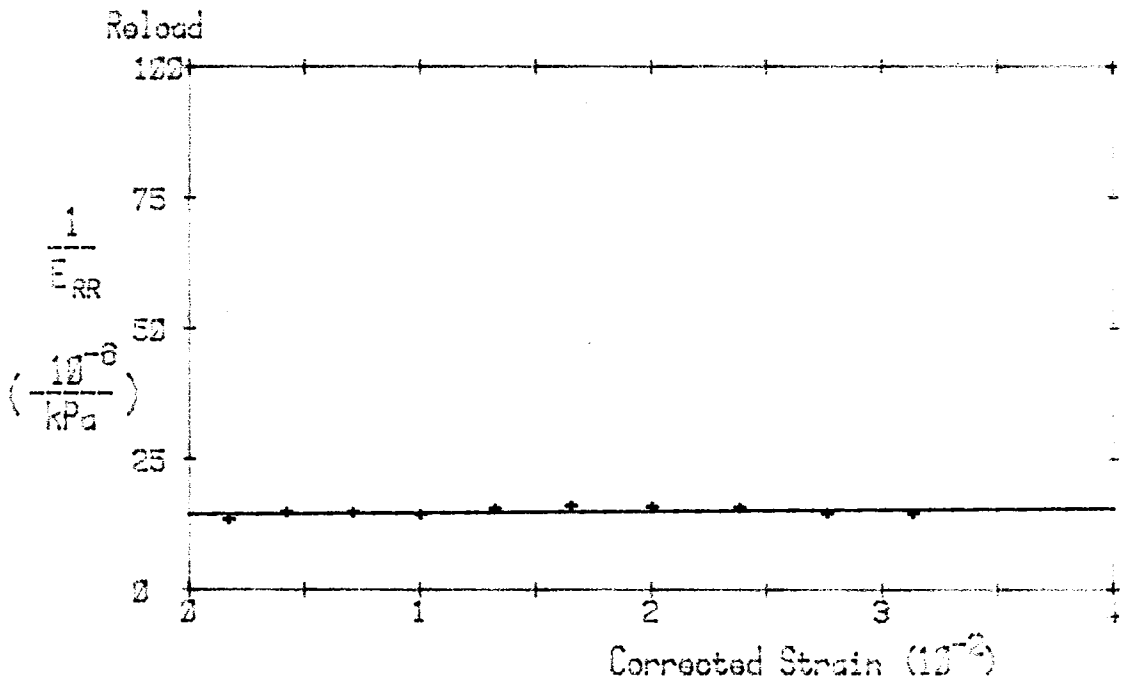
TEST T33

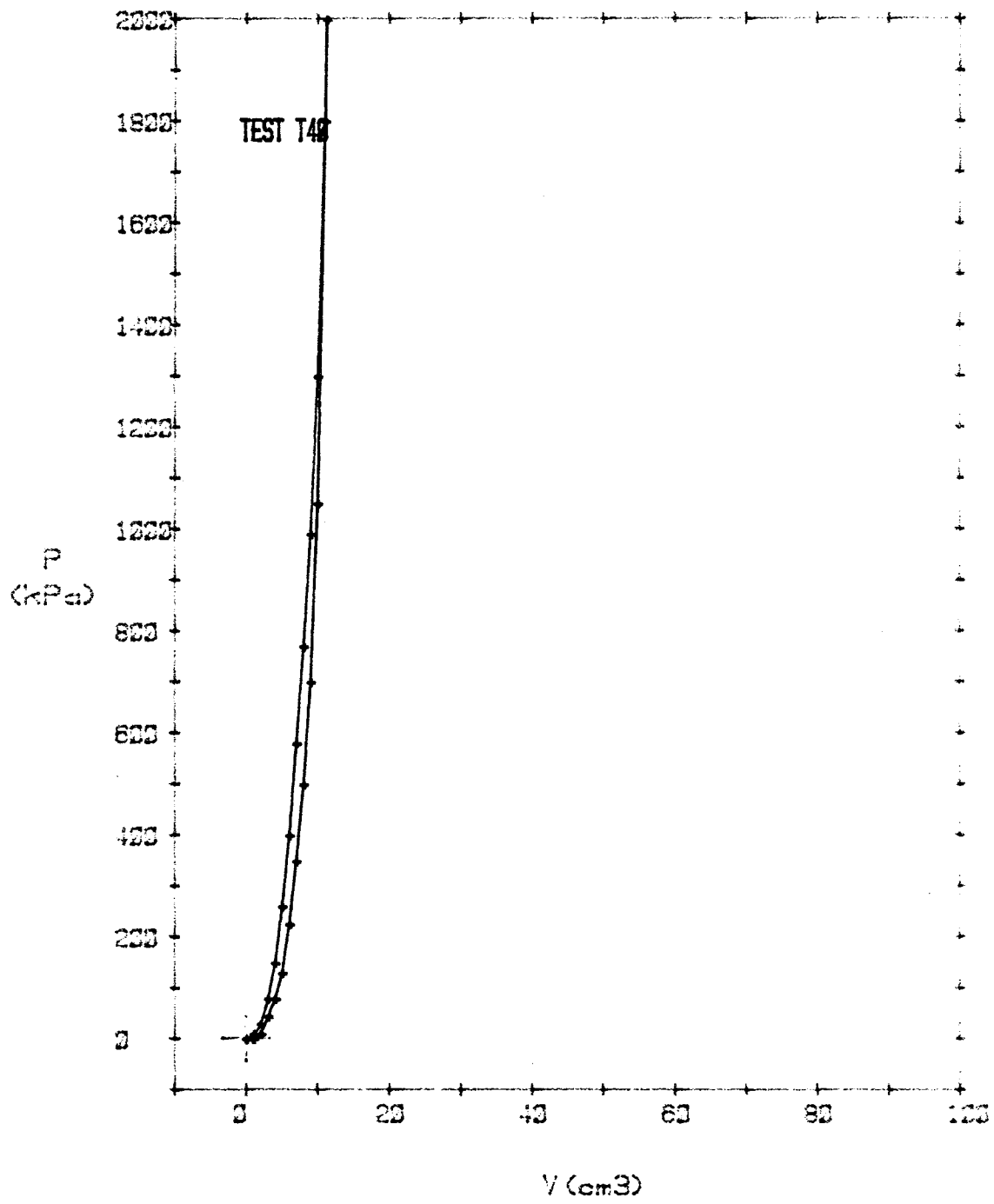


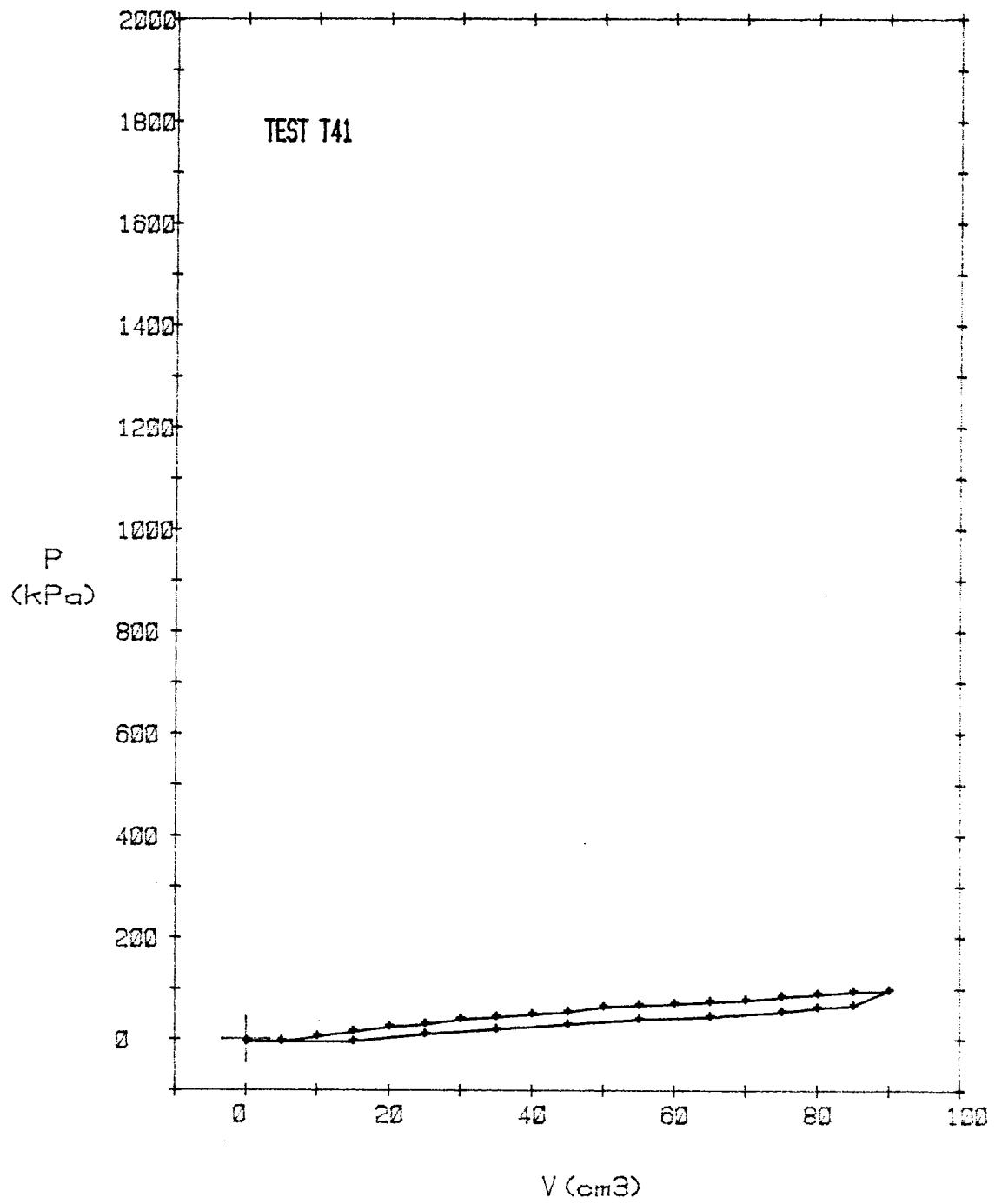


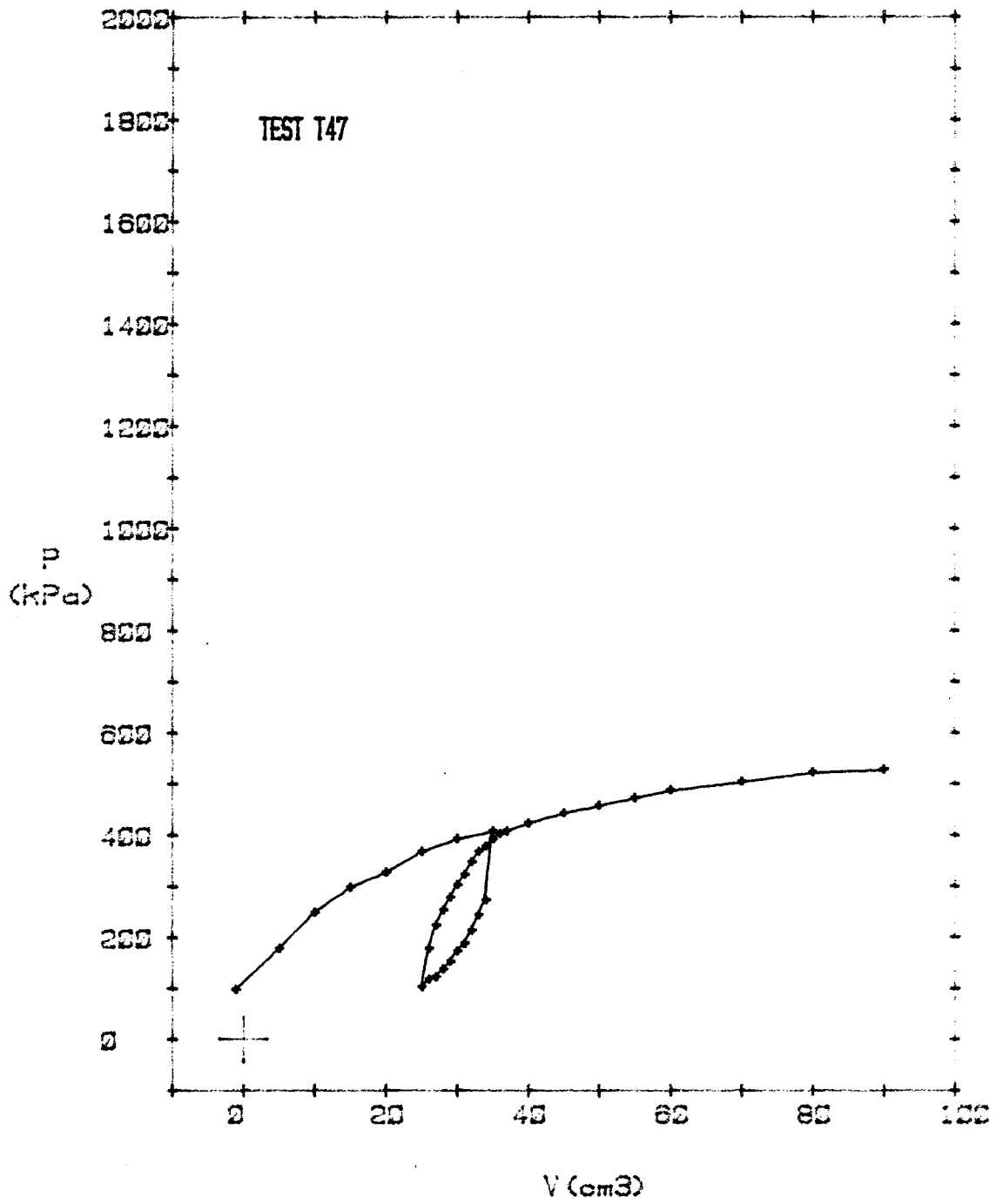


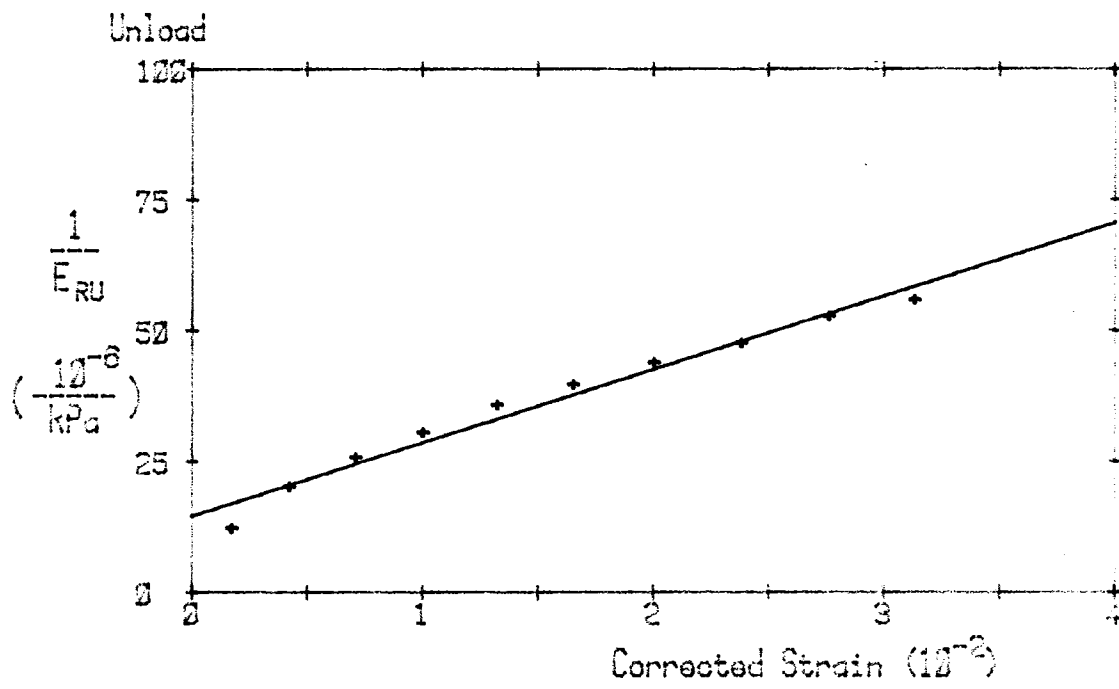
TEST T34



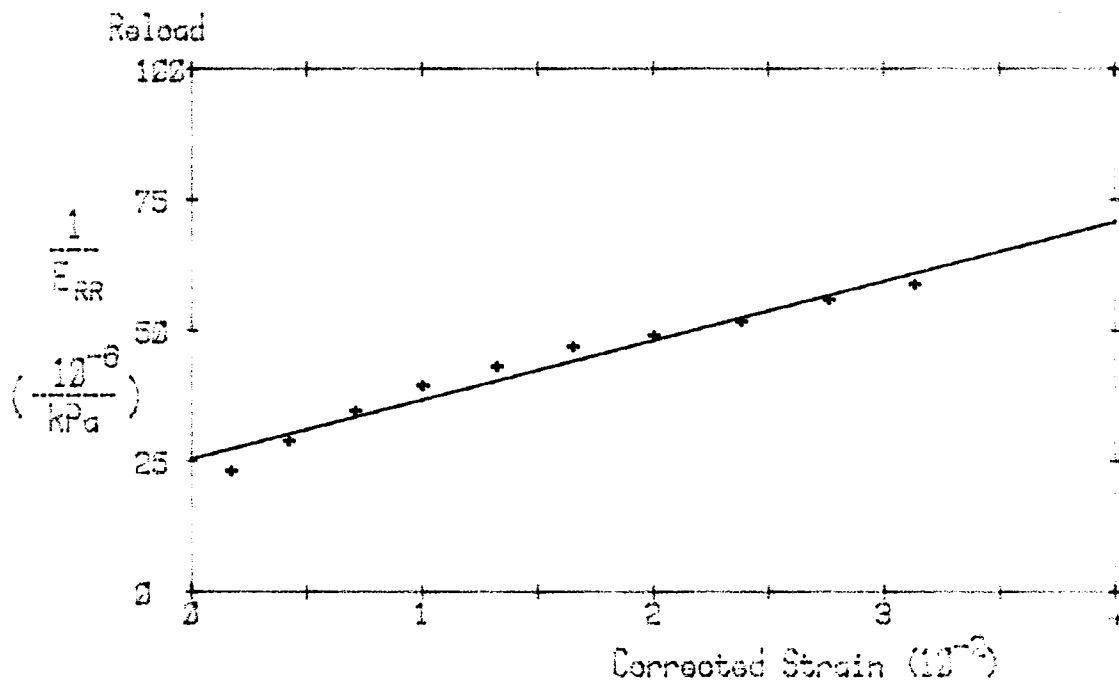


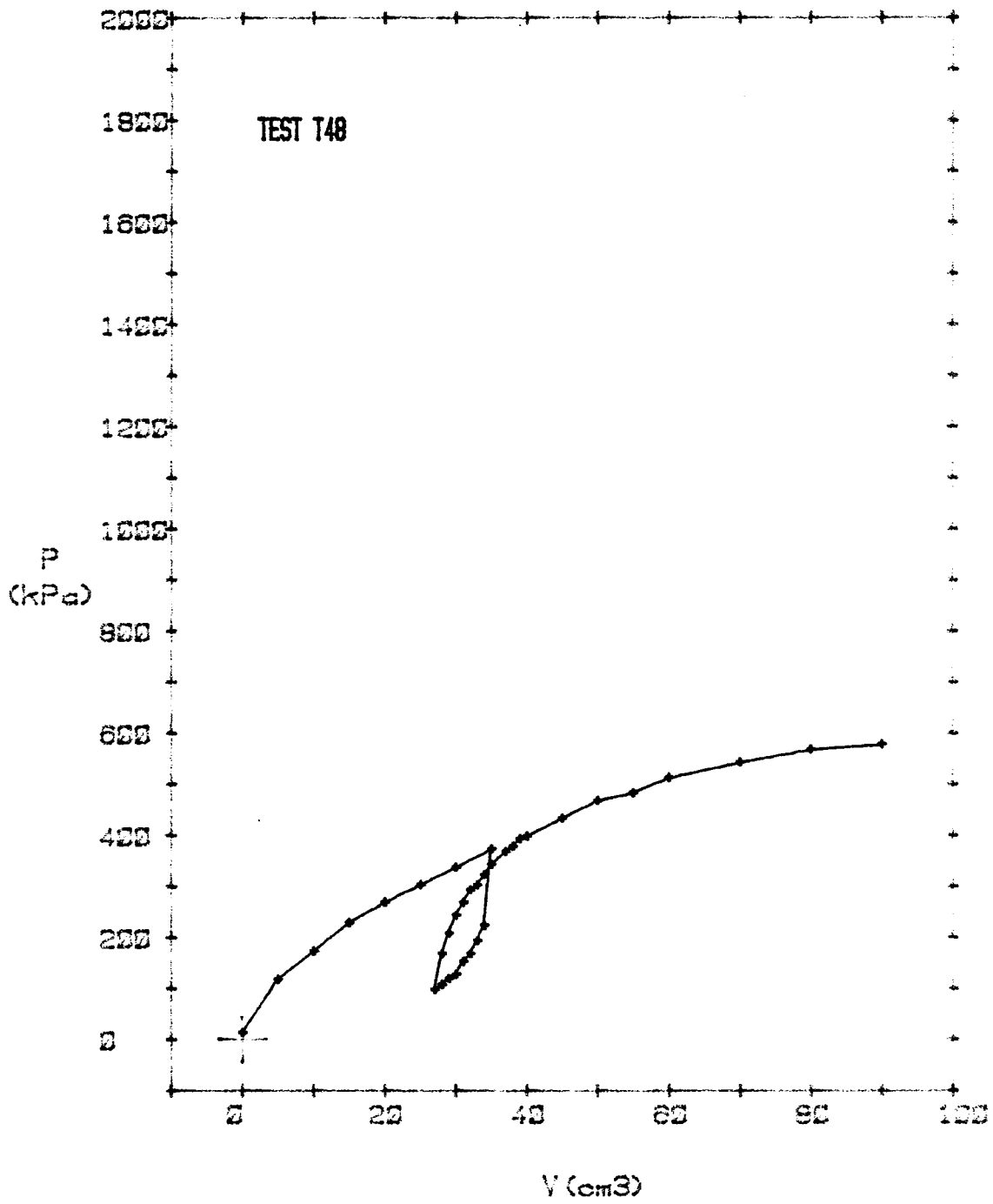


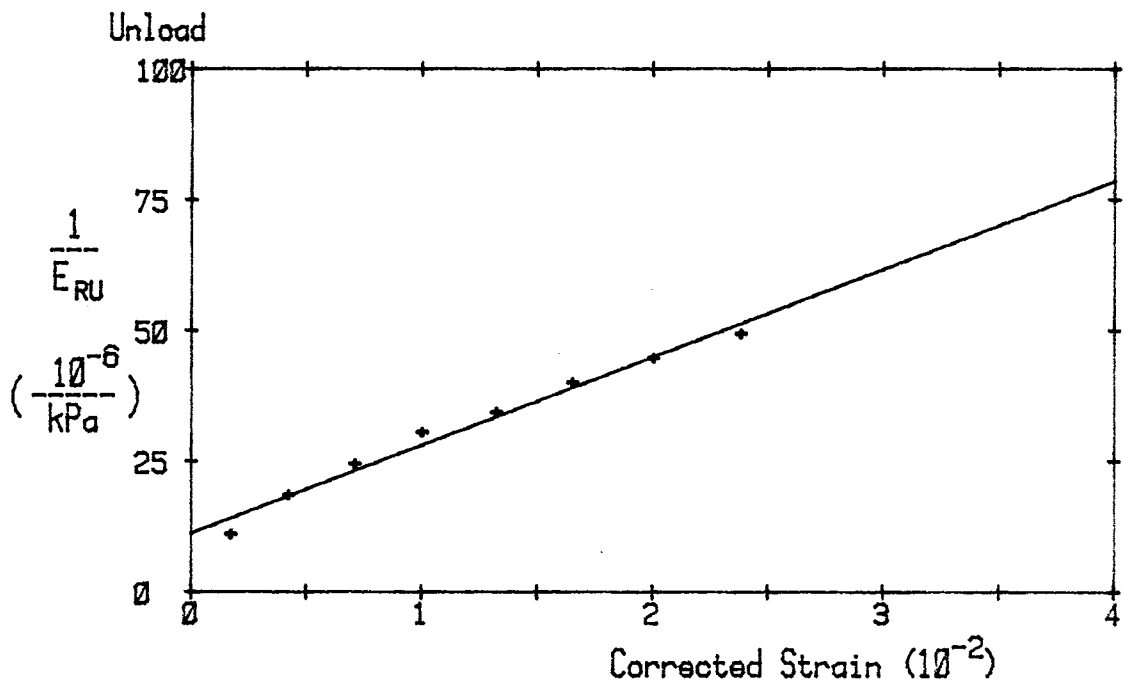




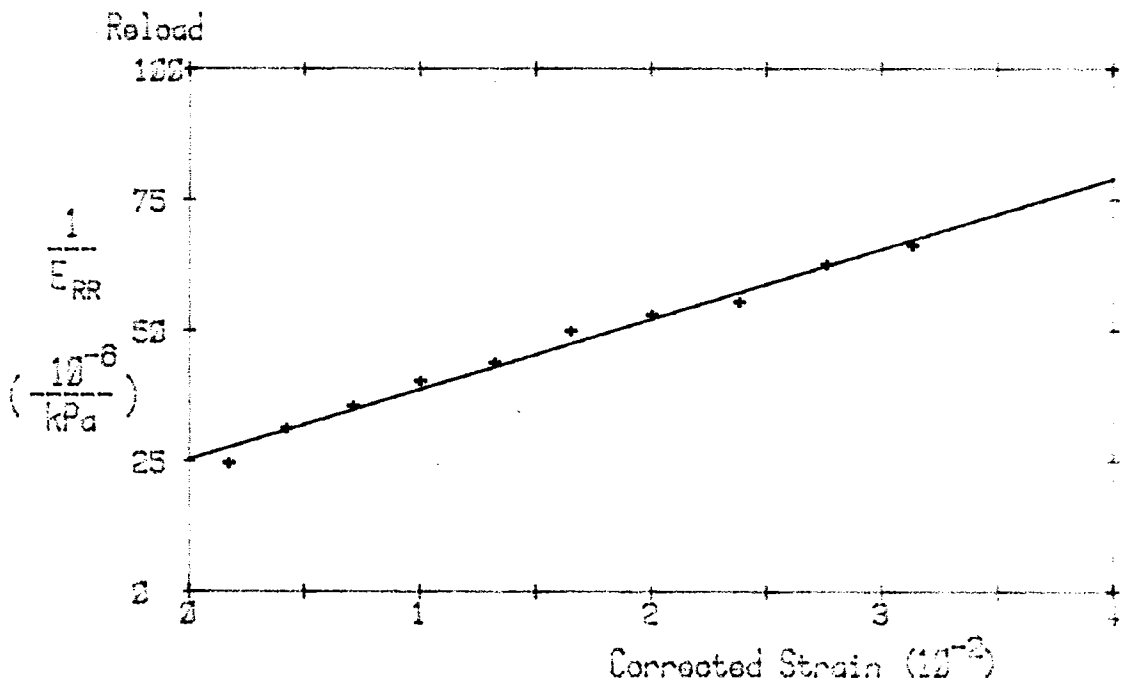
TEST T47

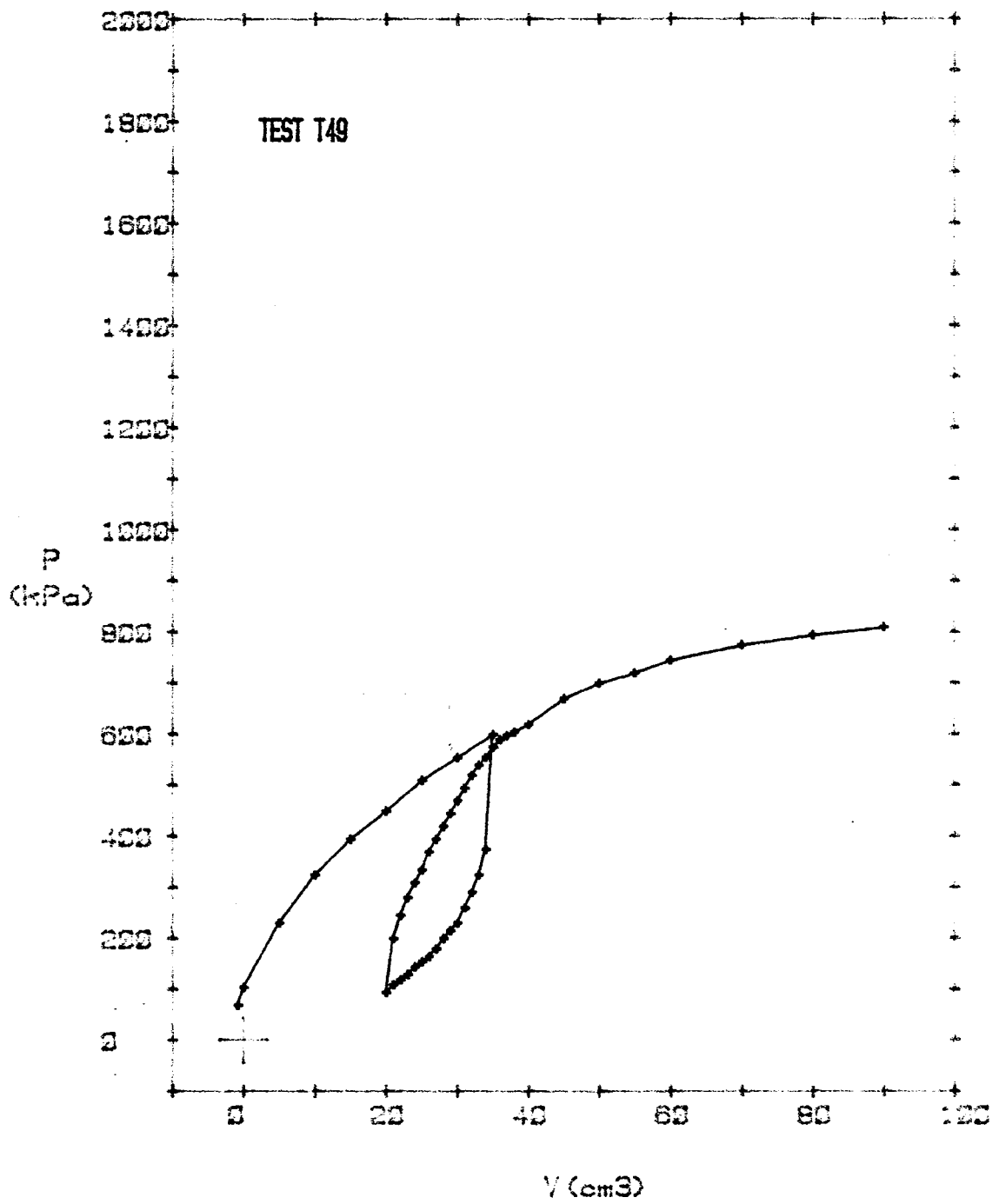


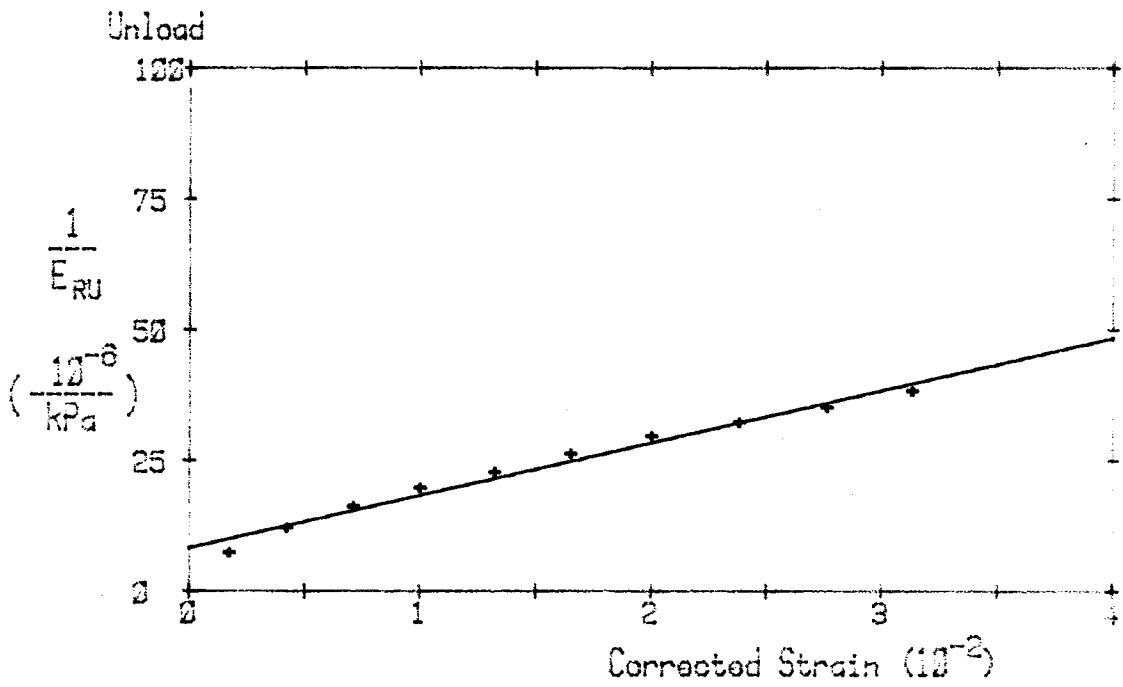




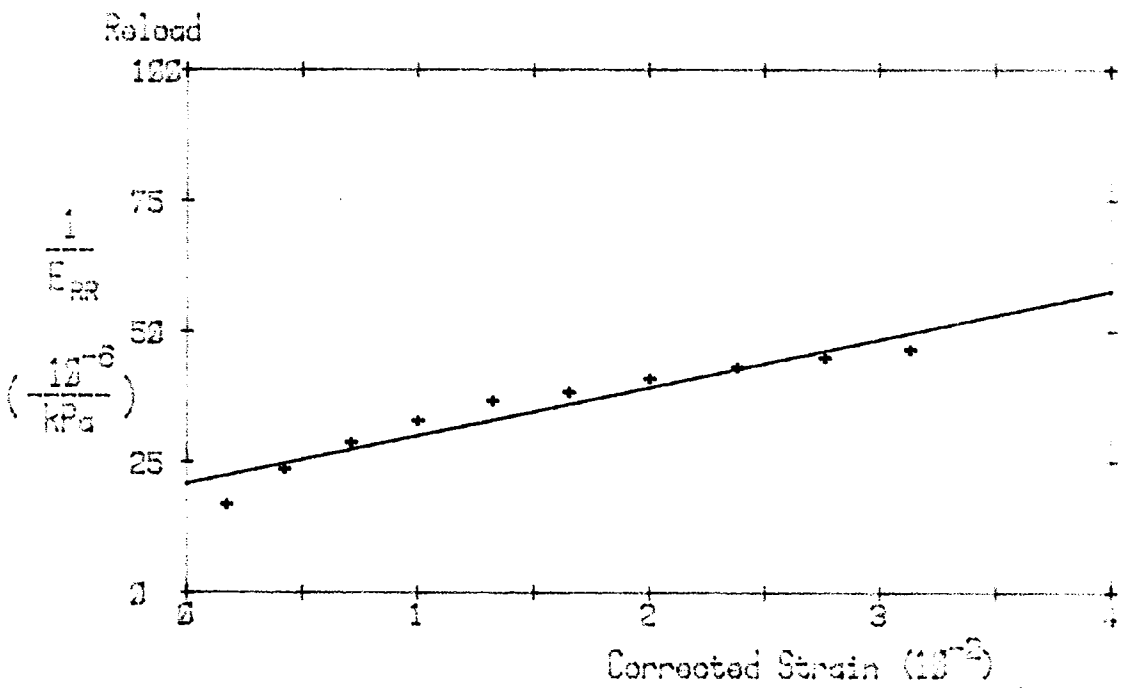
TEST T48

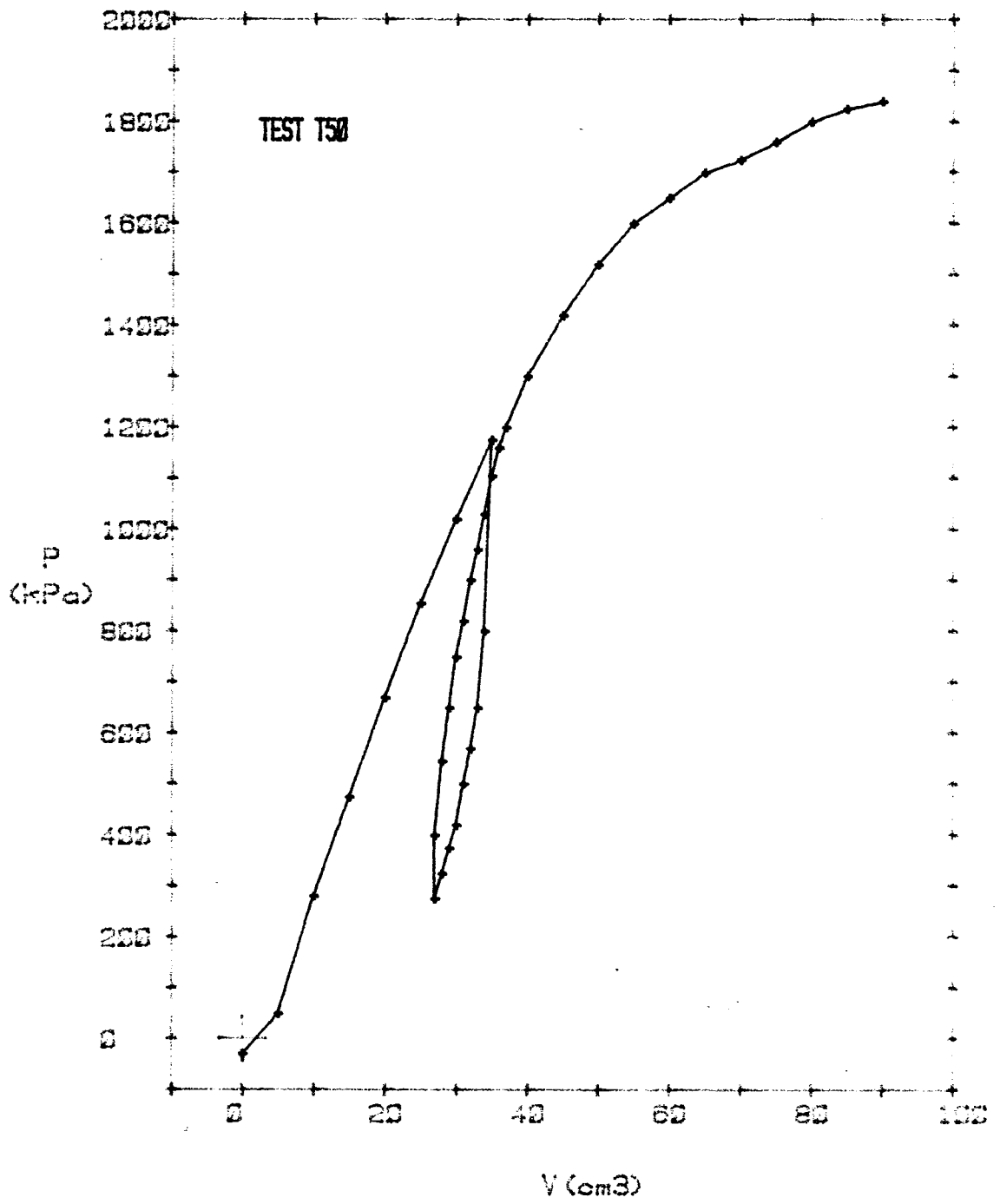


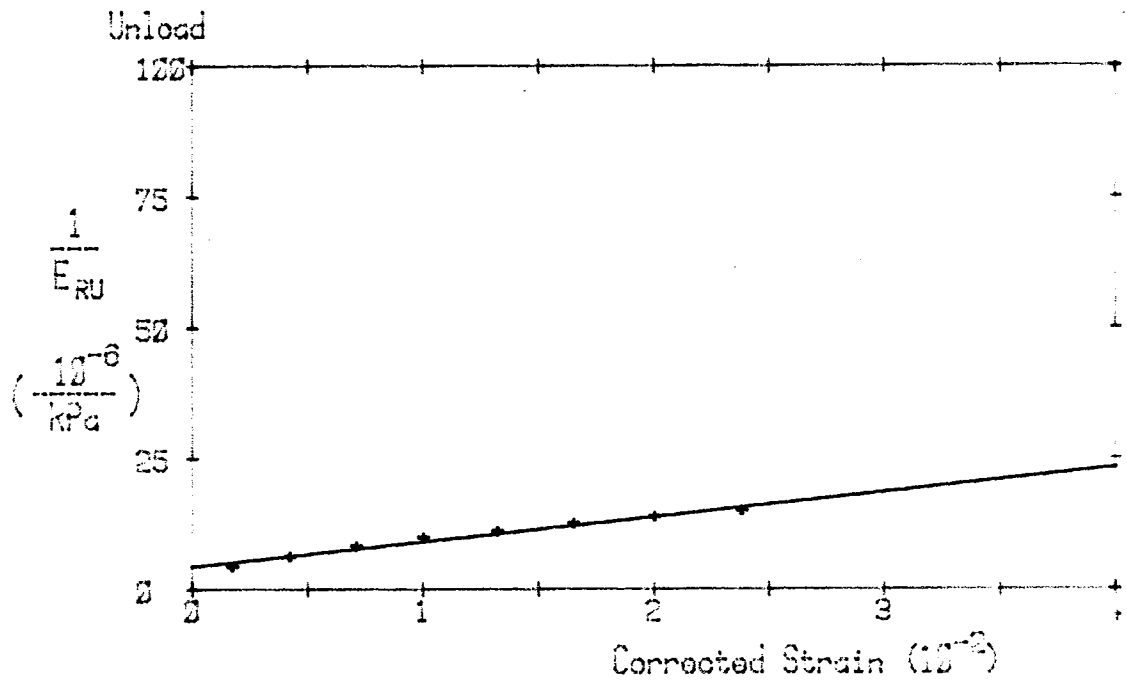




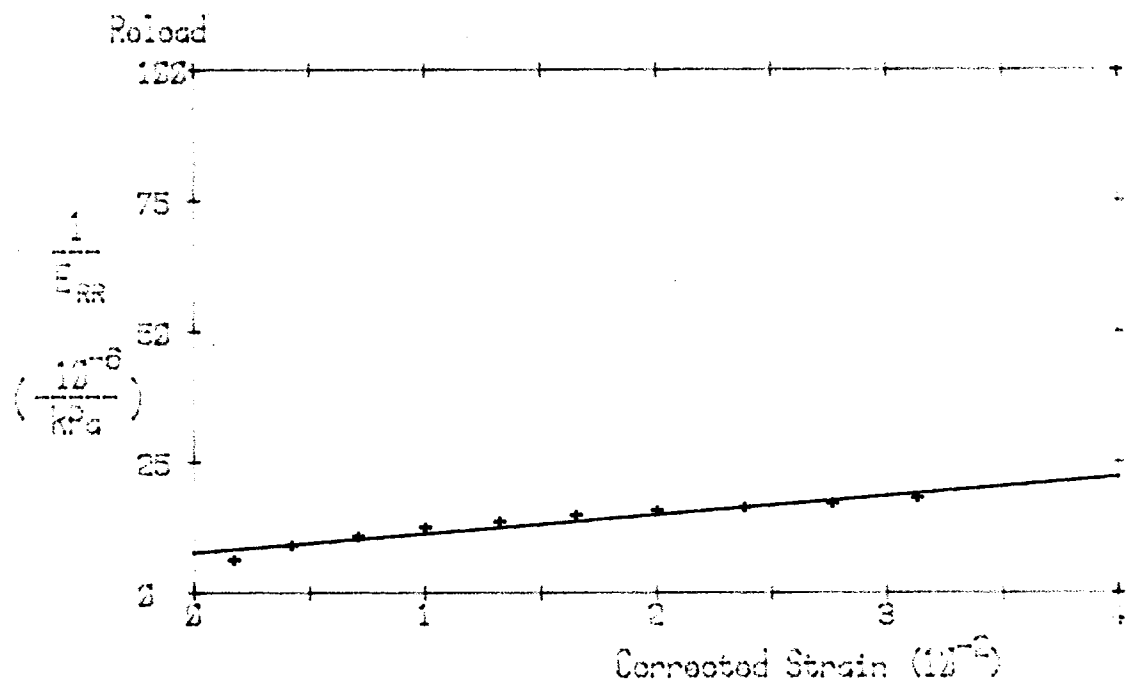
TEST T49

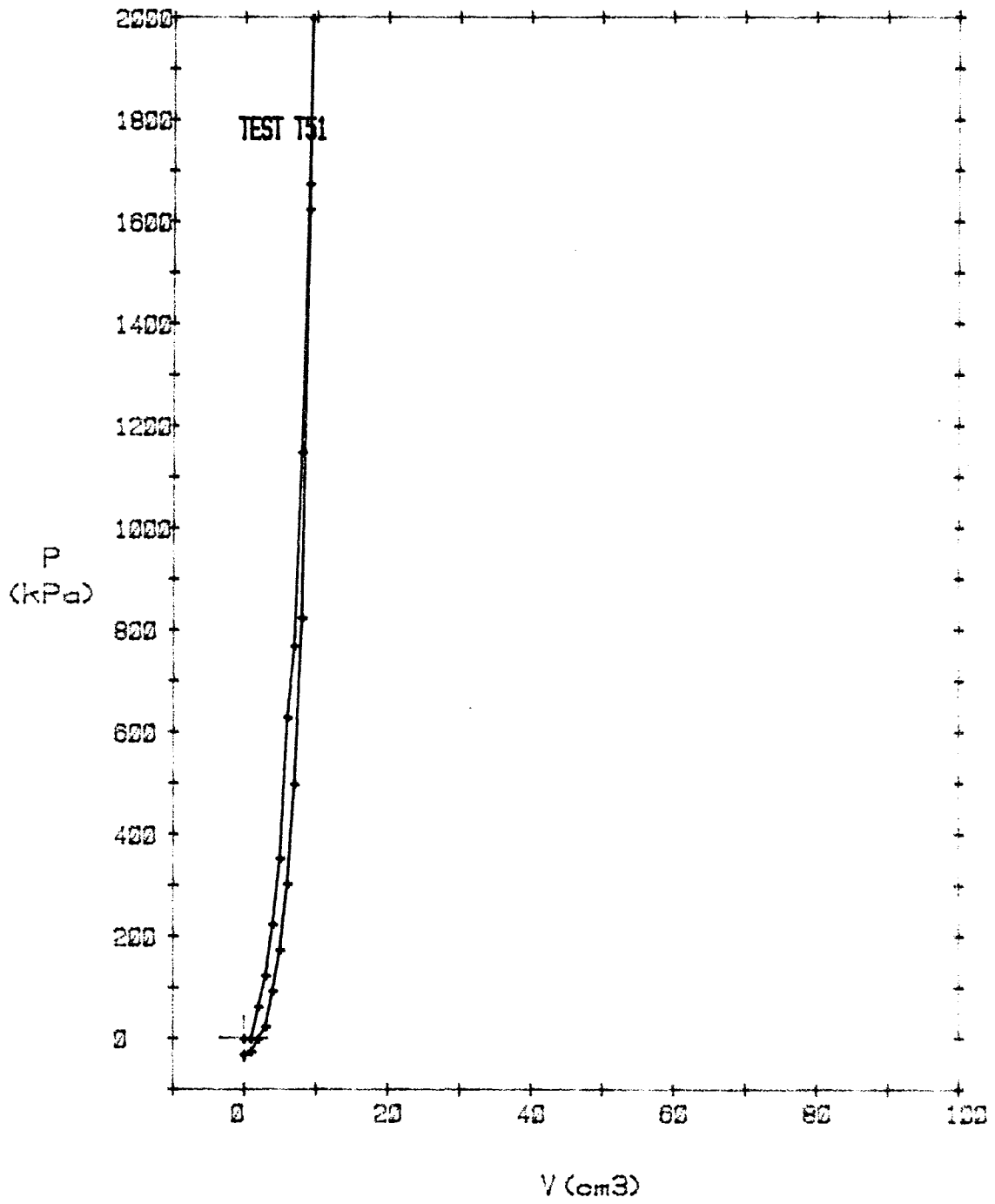


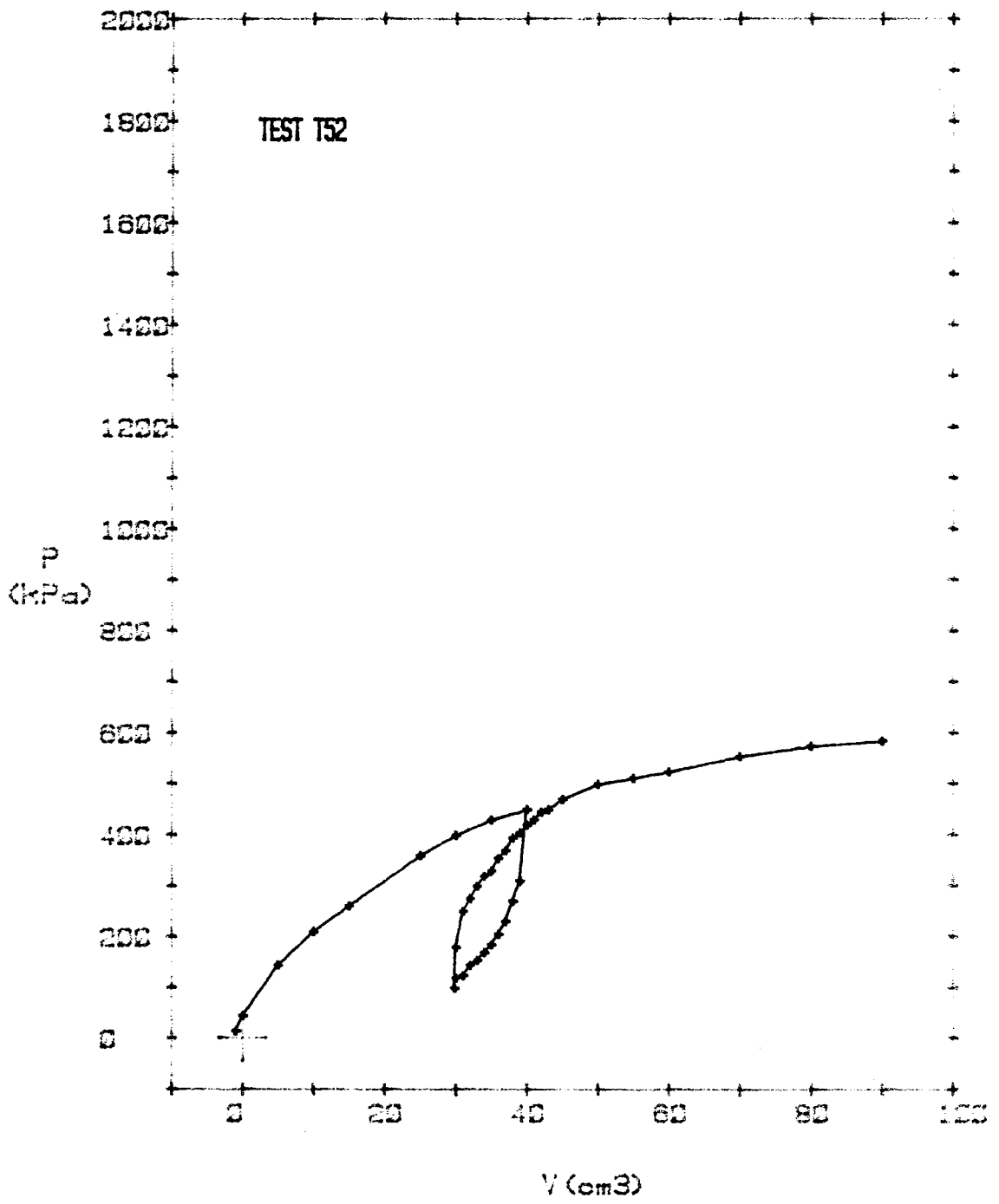


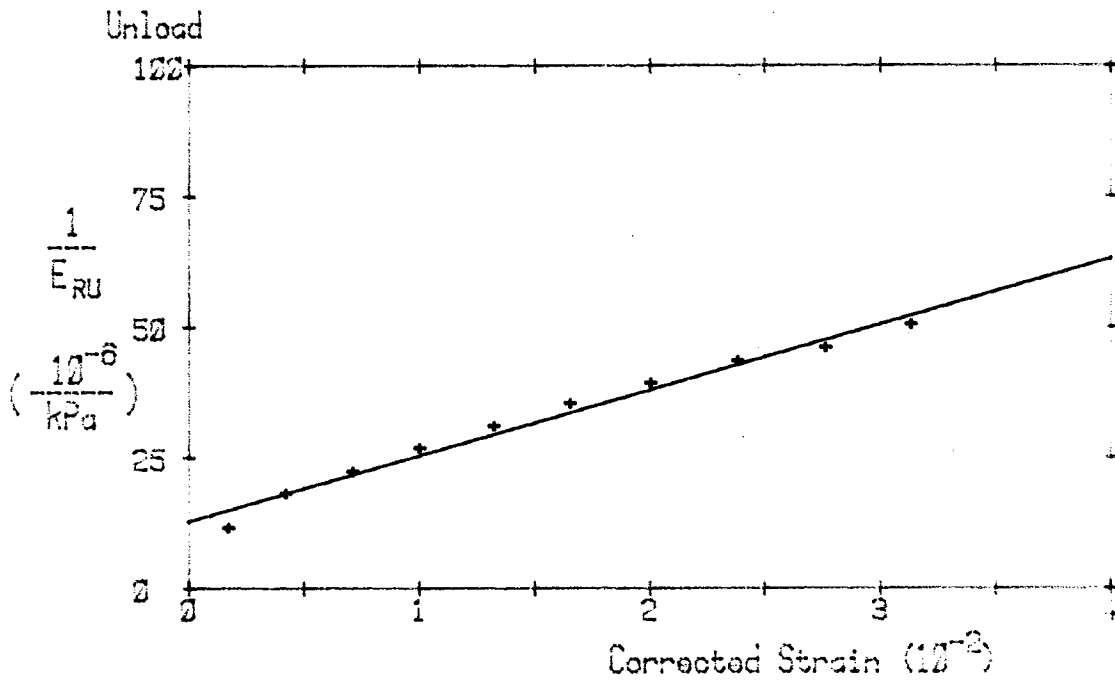


TEST T50

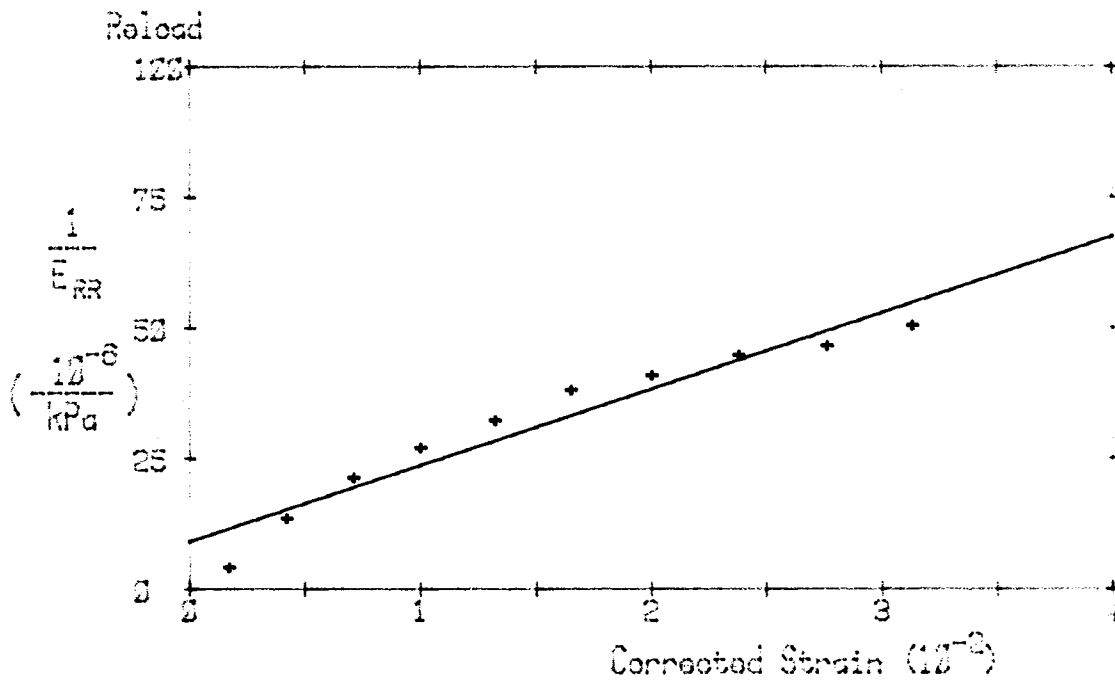


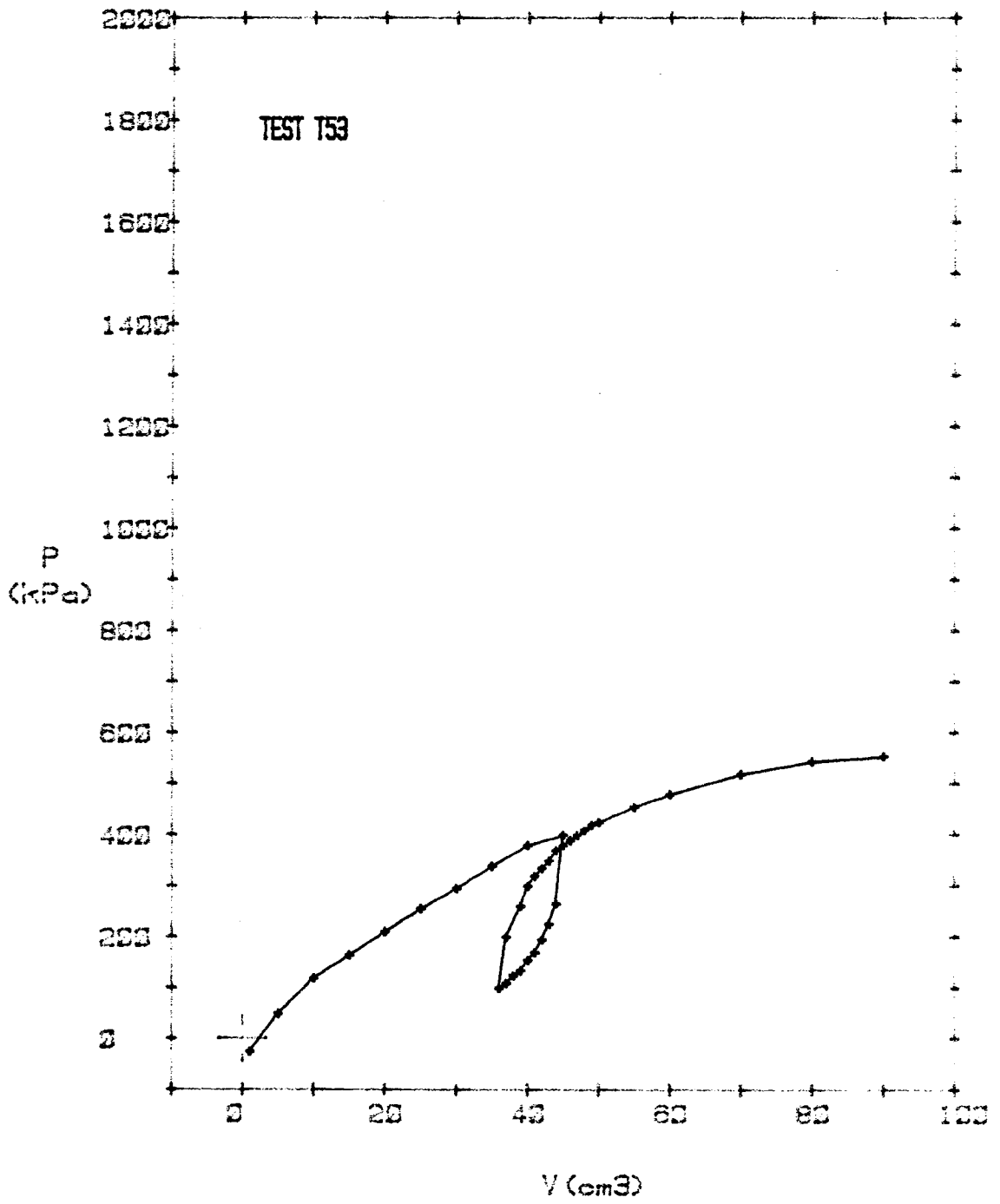


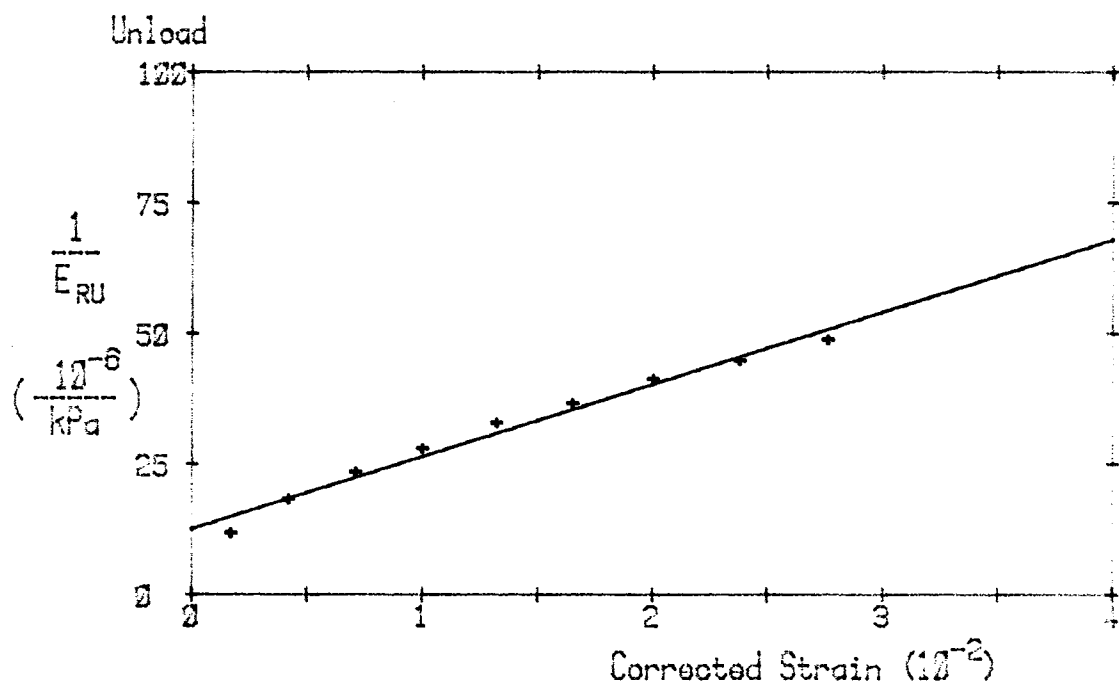




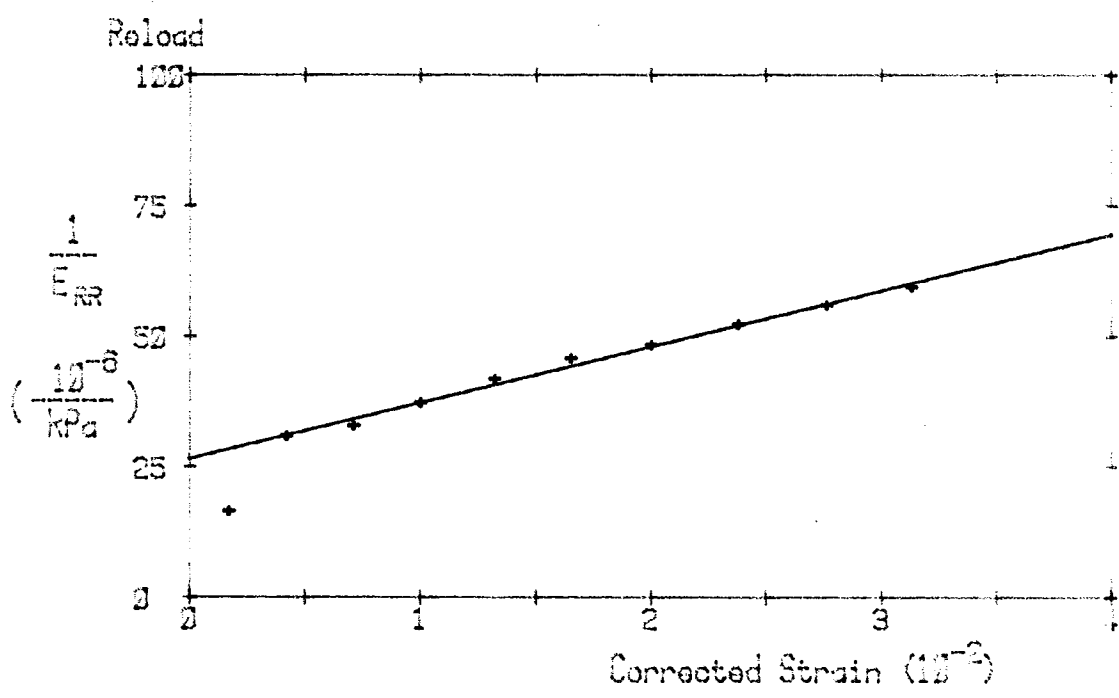
TEST T52

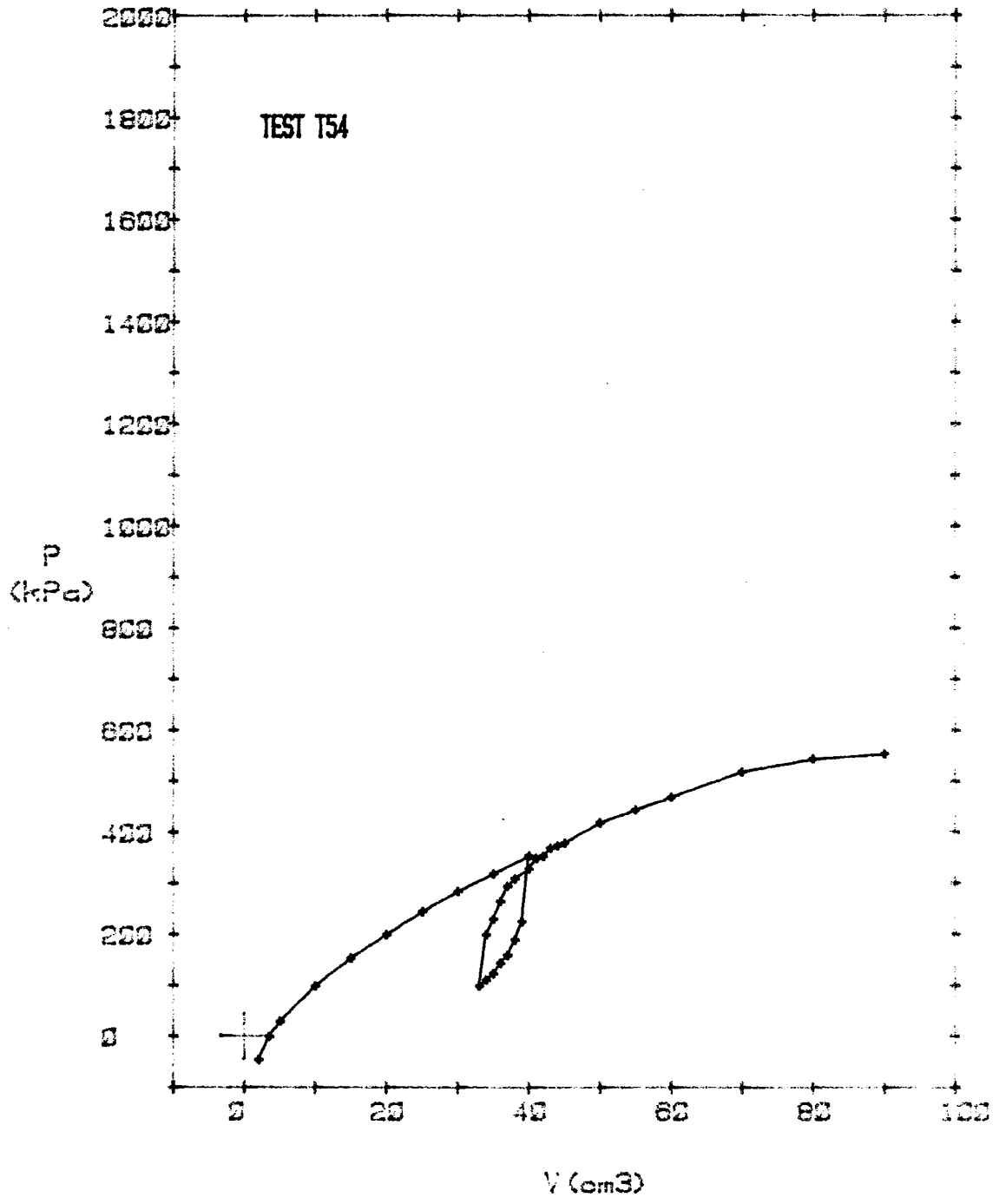


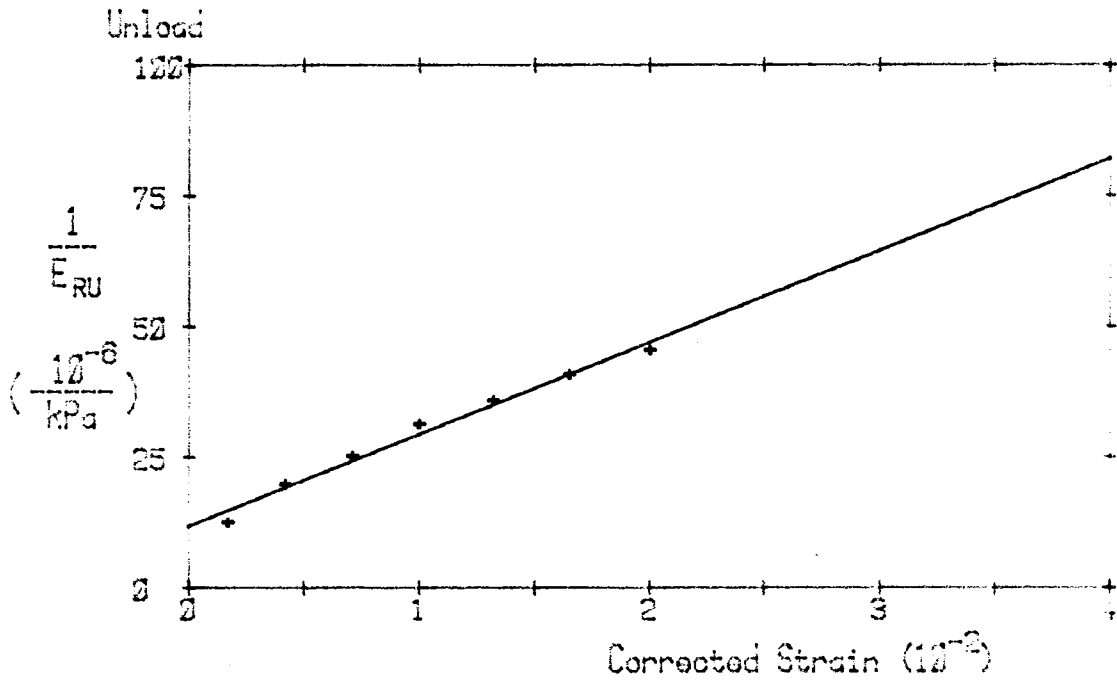




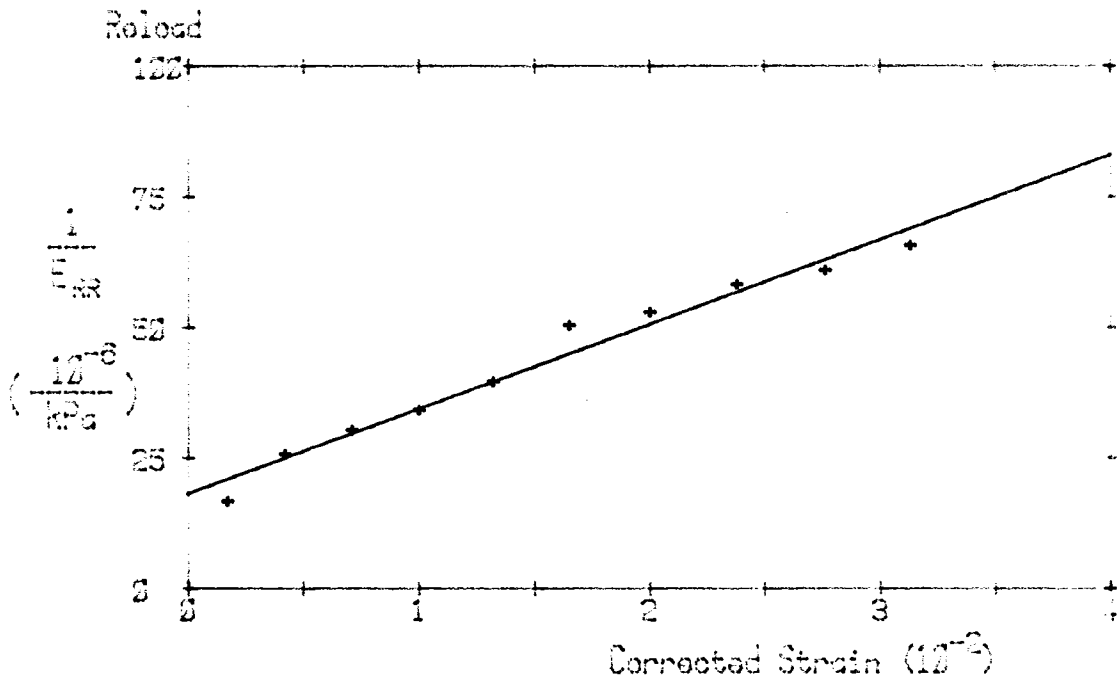
TEST T53

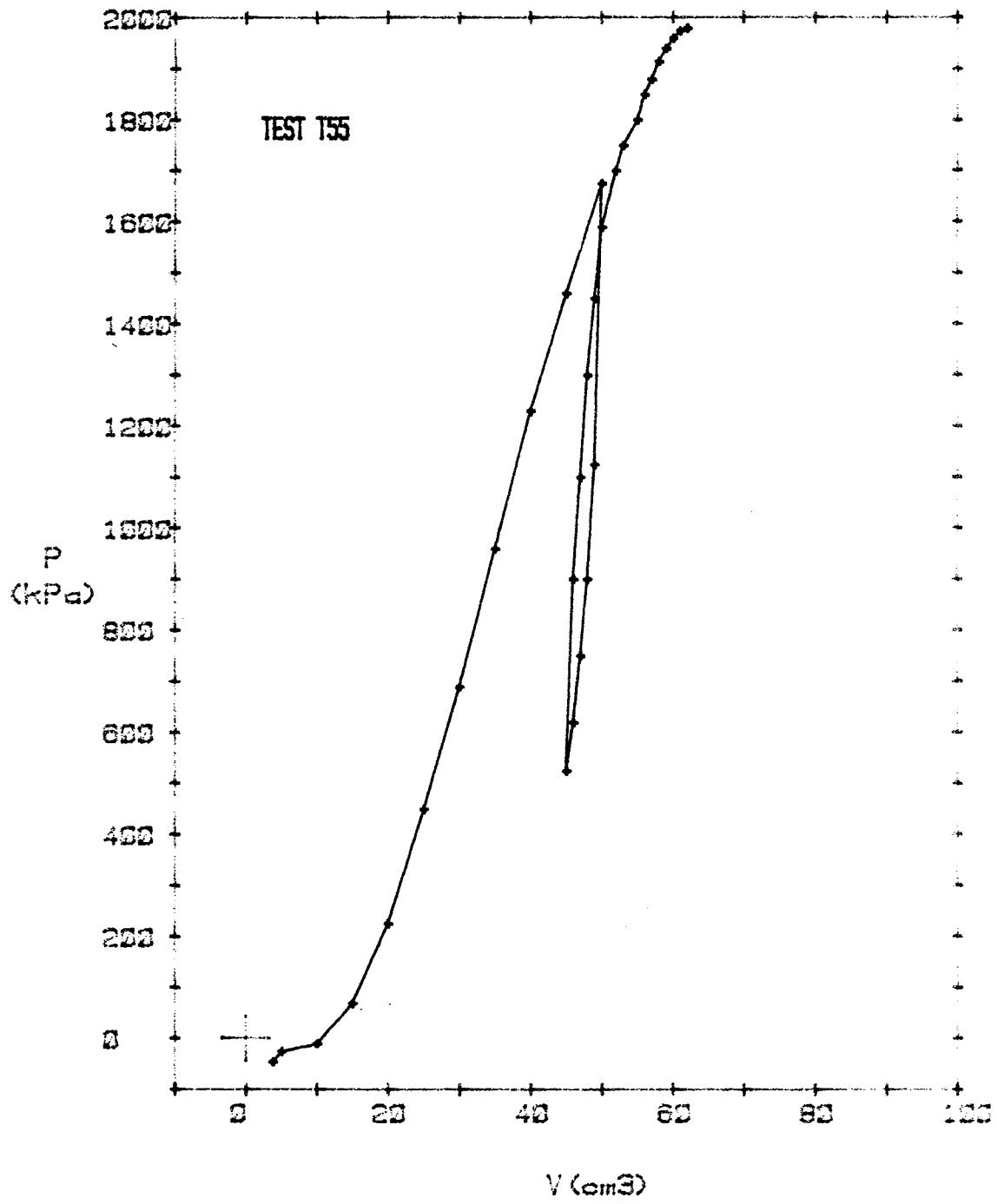


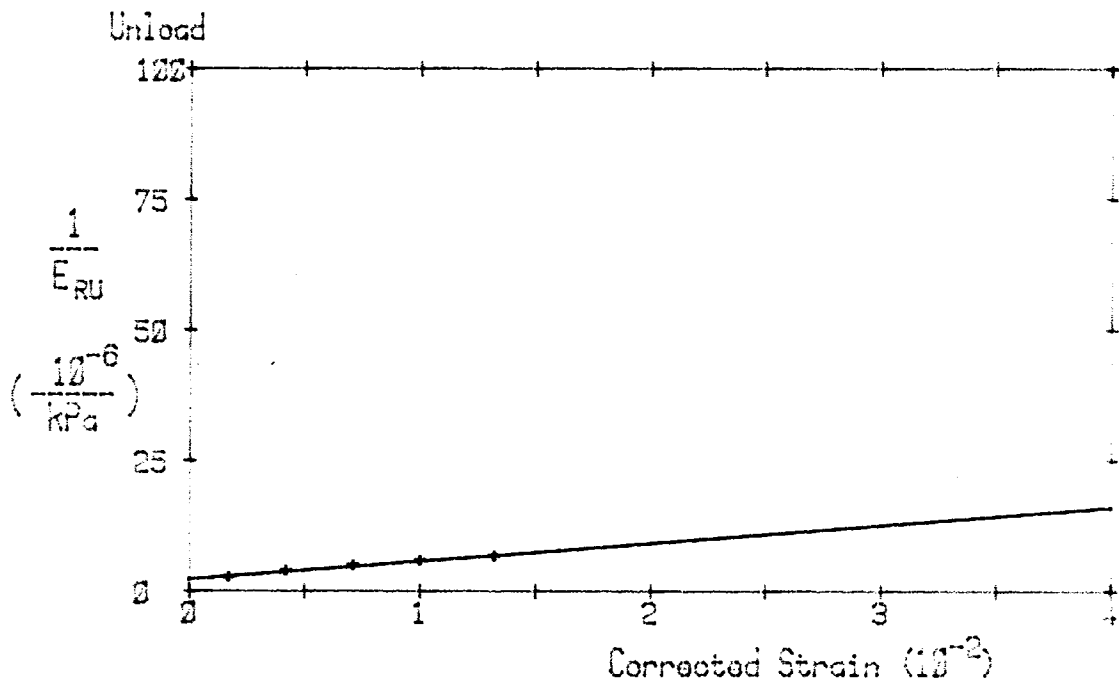




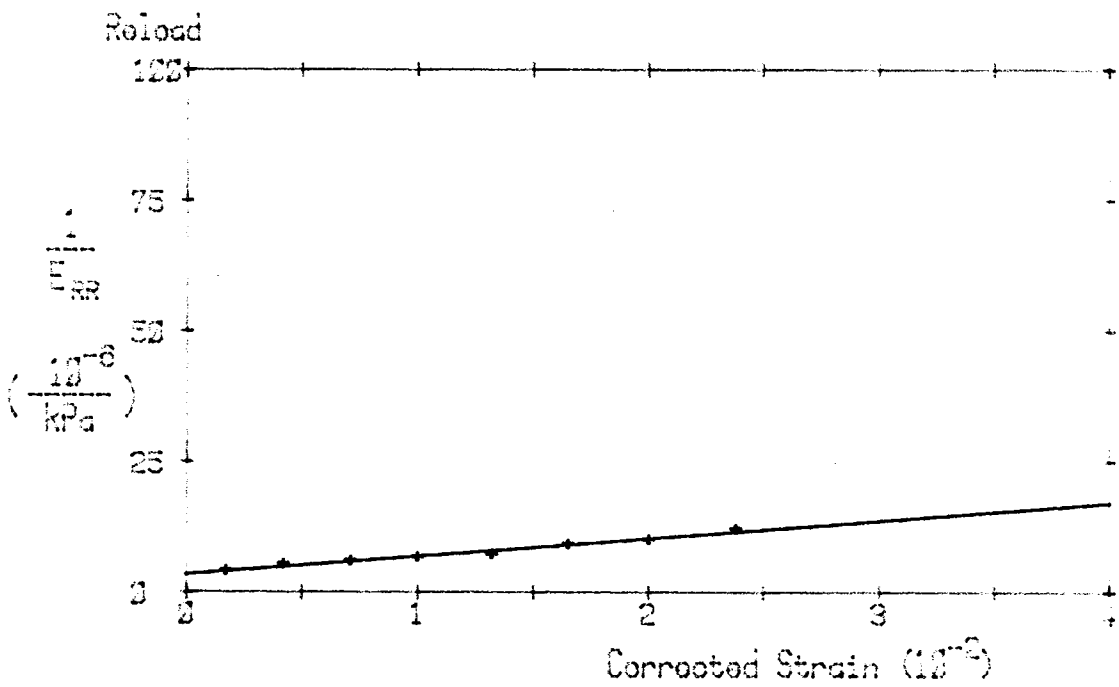
TEST T54

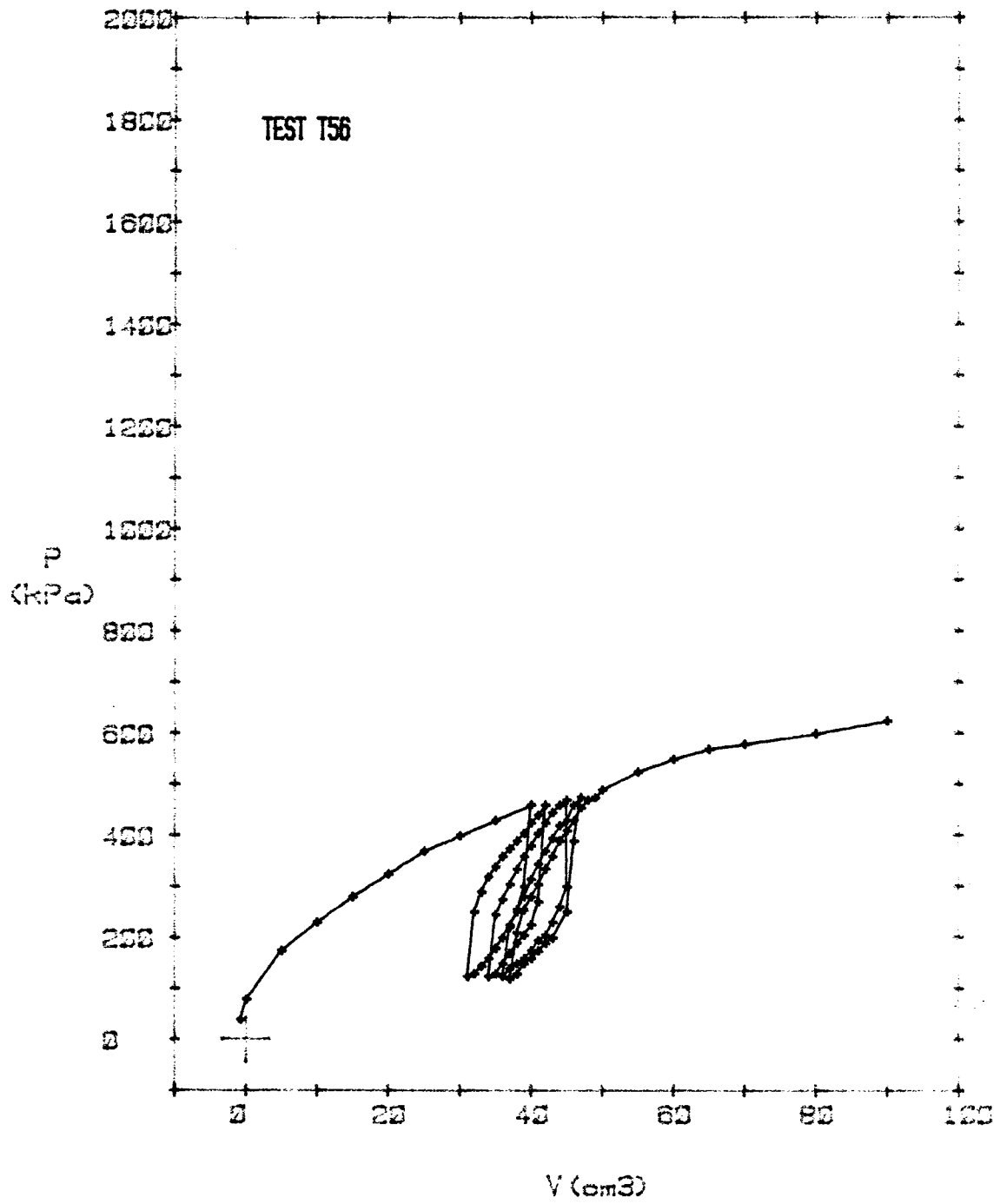


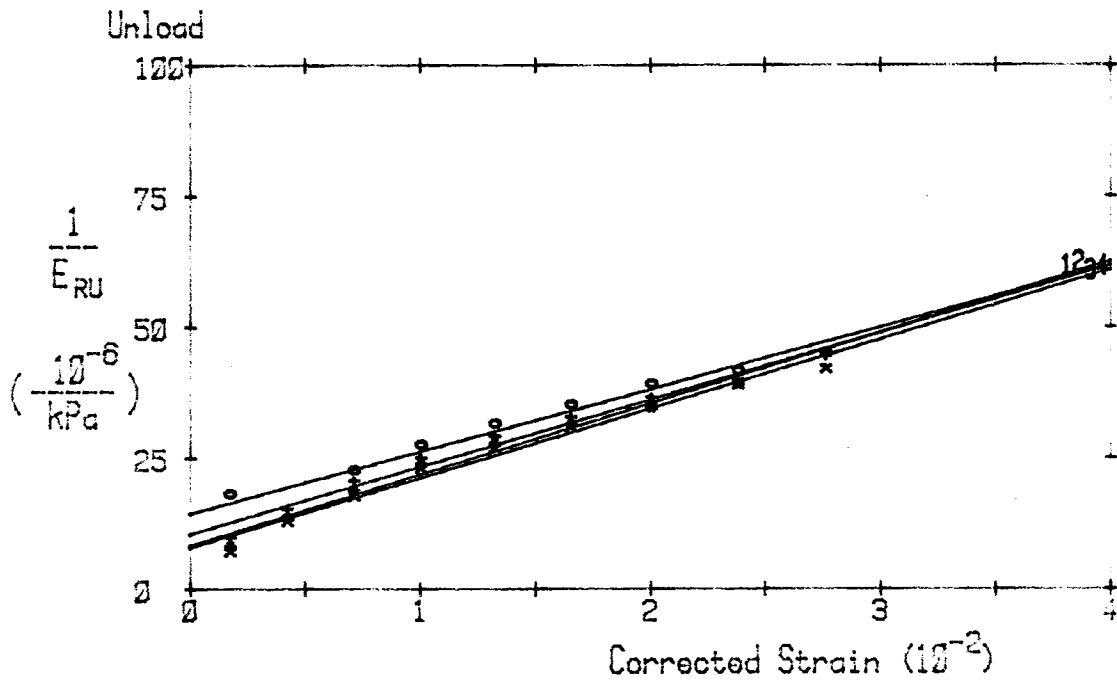




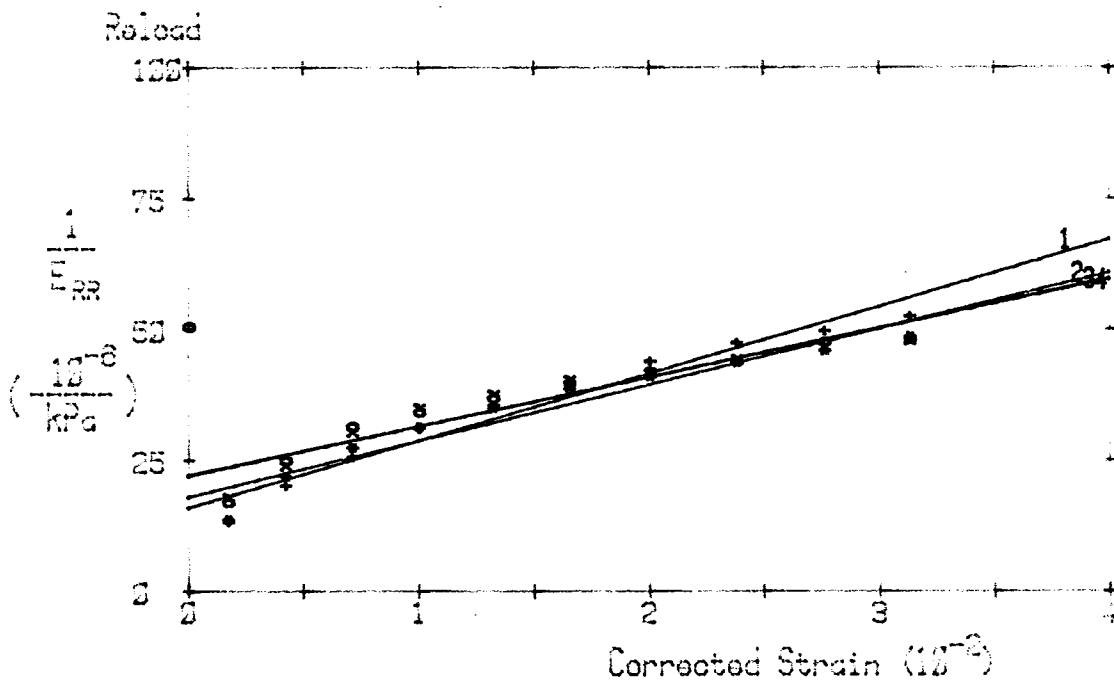
TEST T55

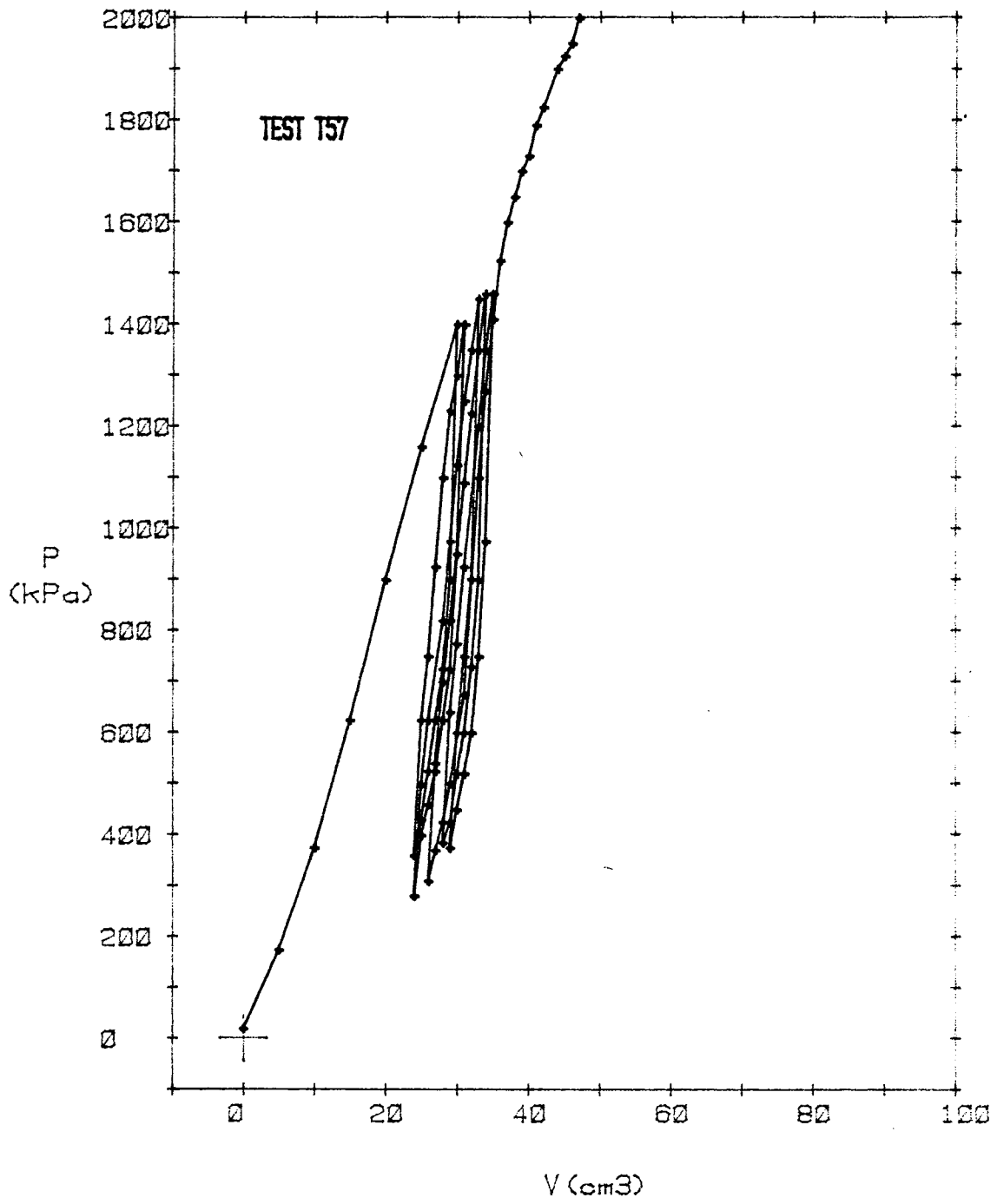


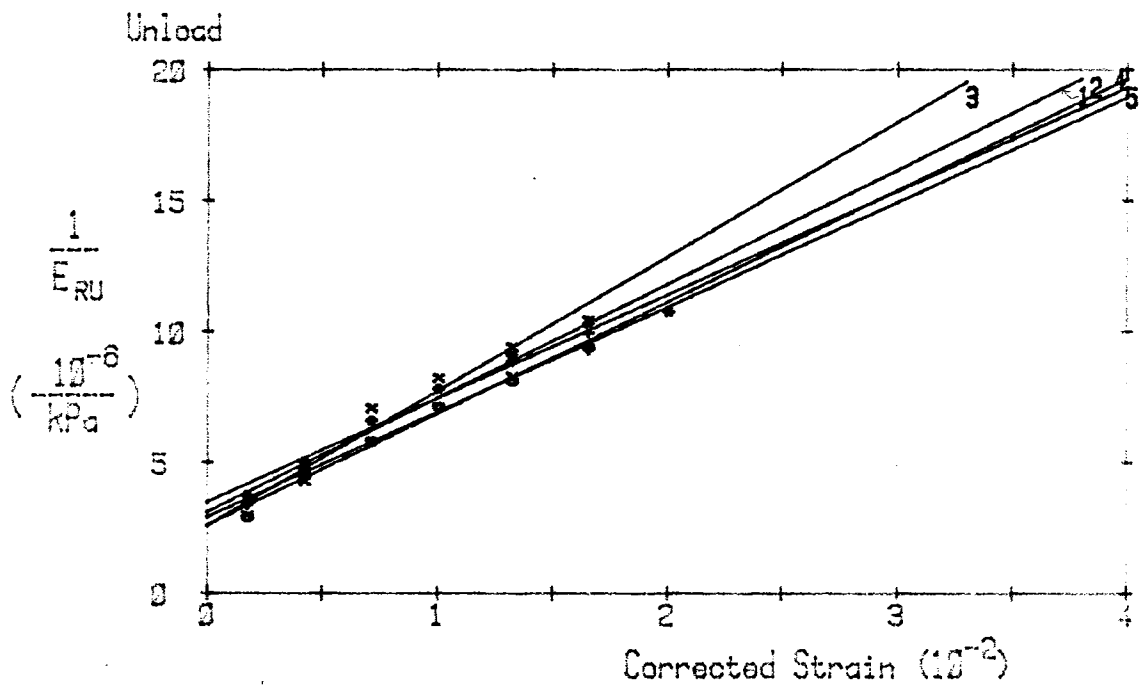




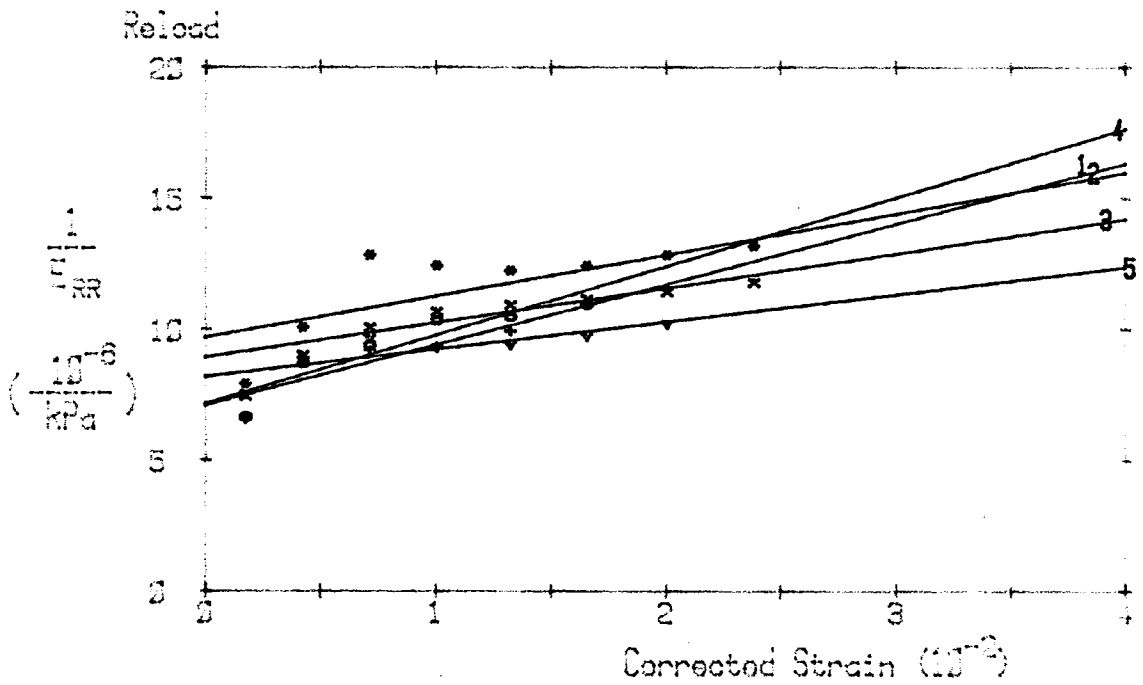
TEST T56

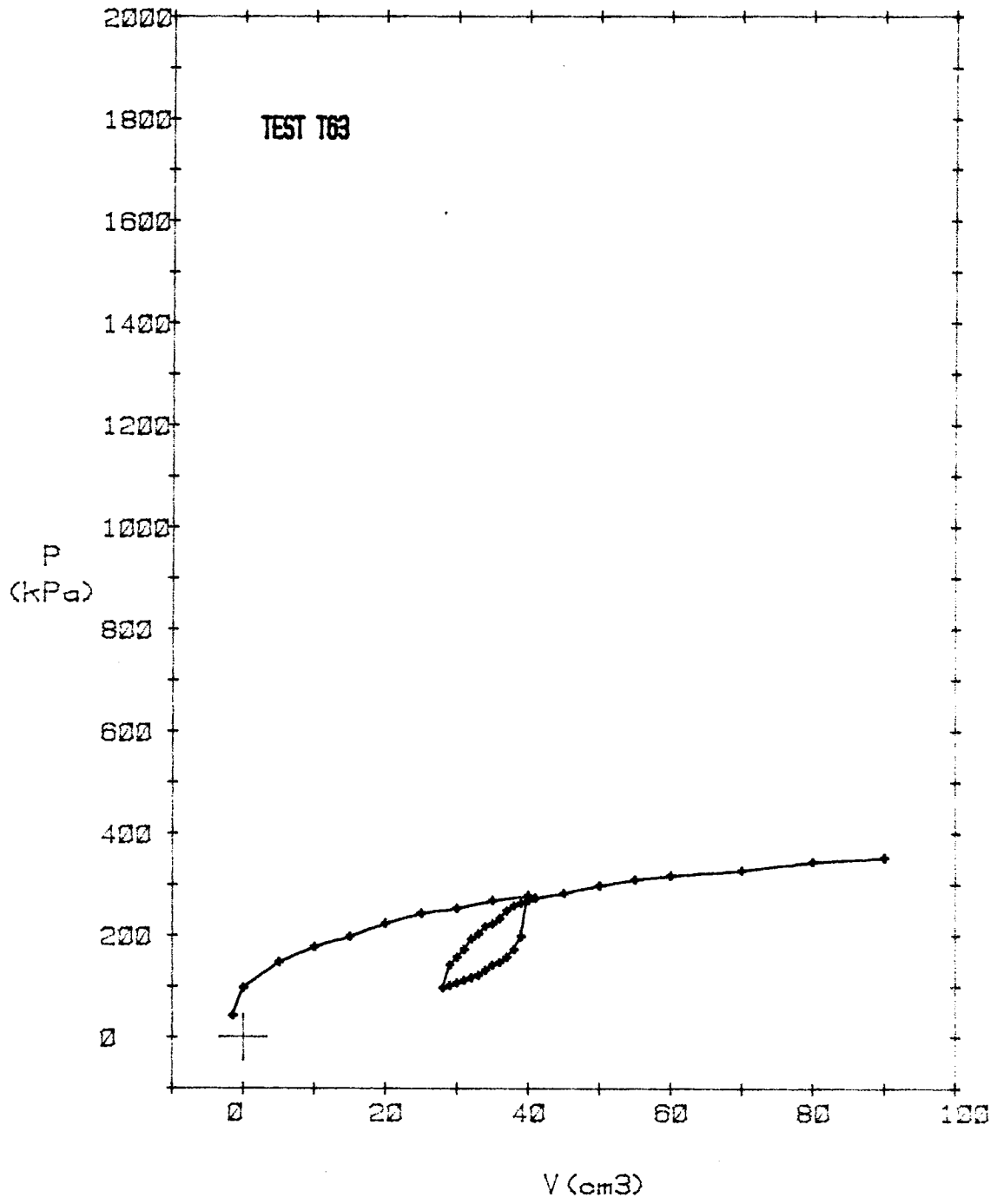


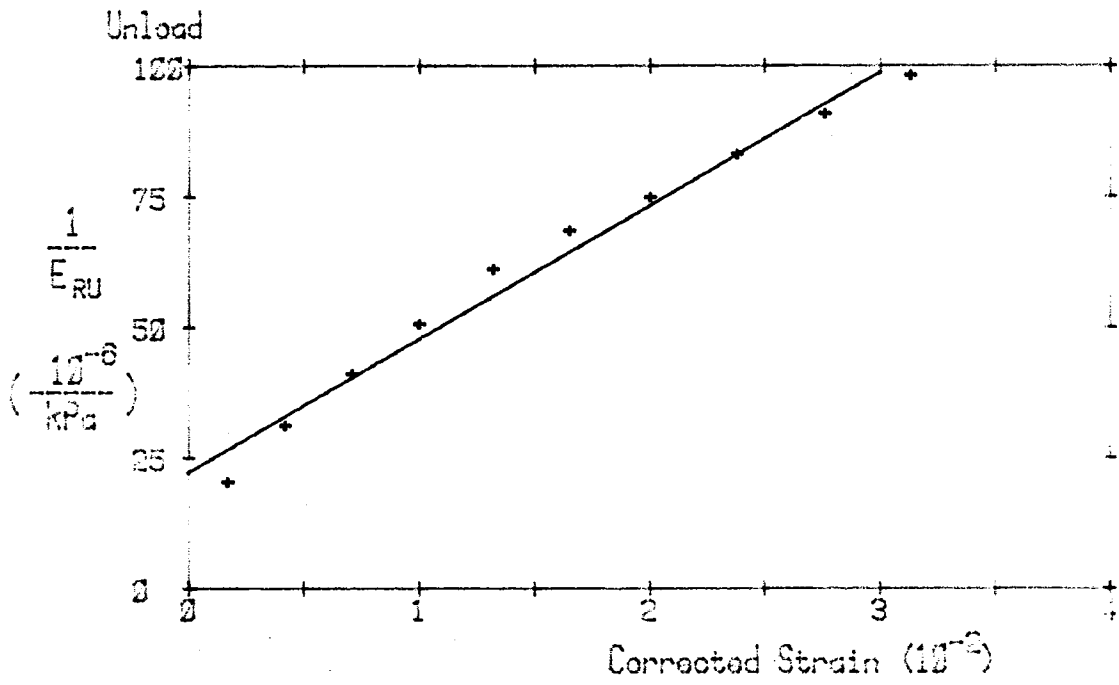




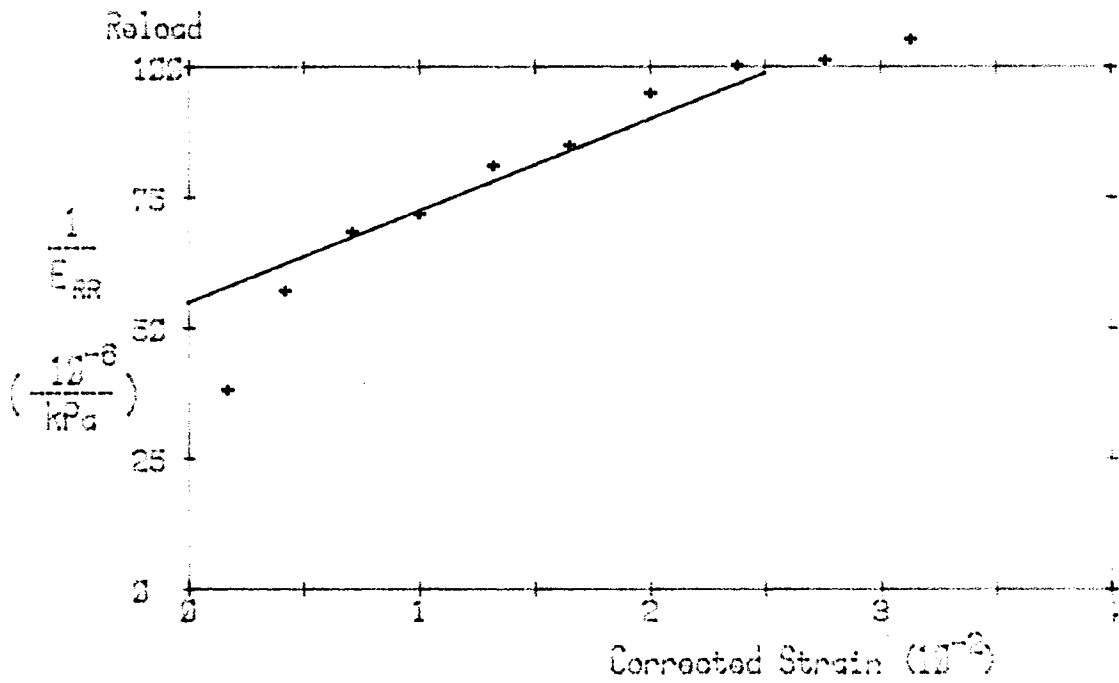
TEST T57

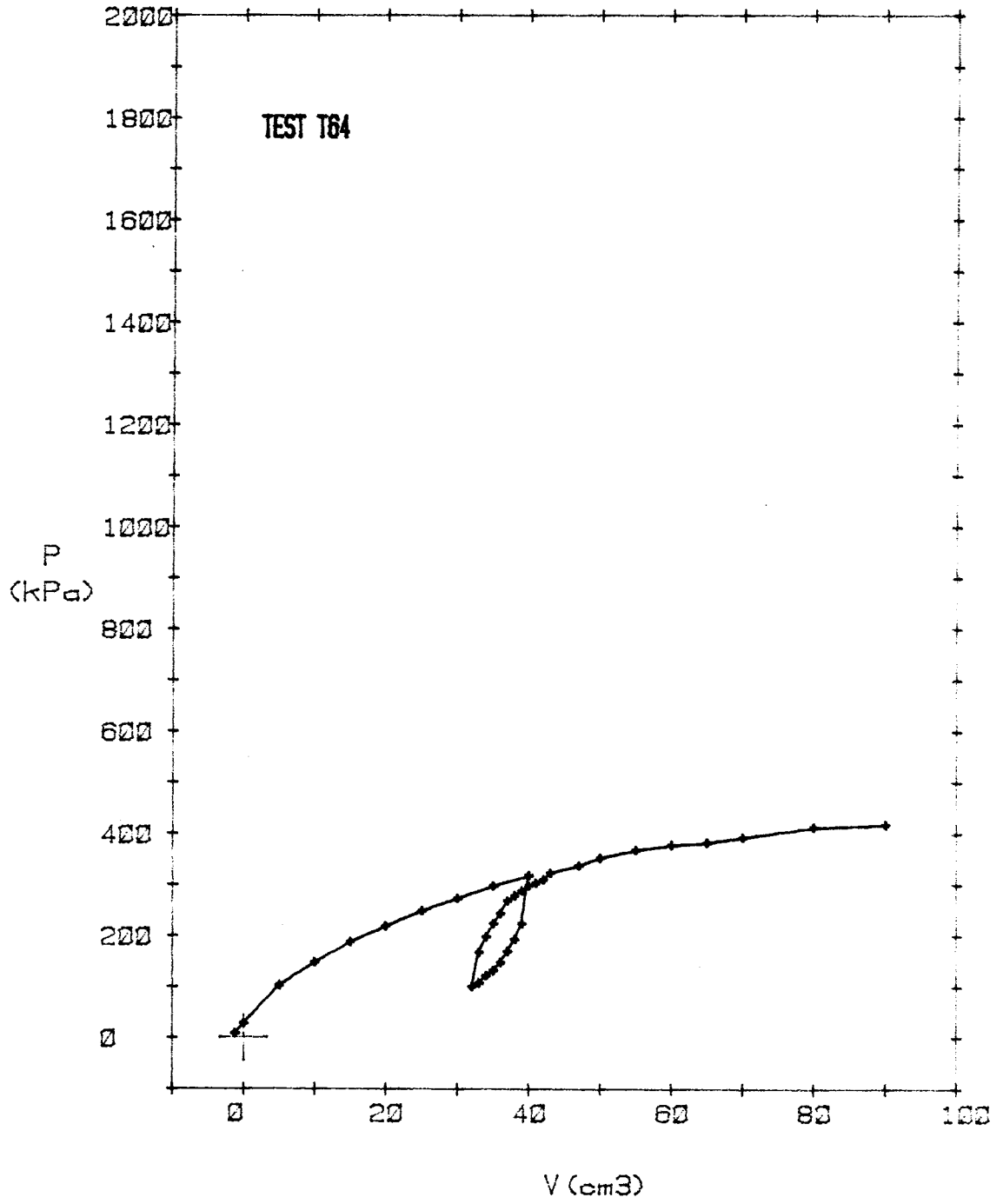


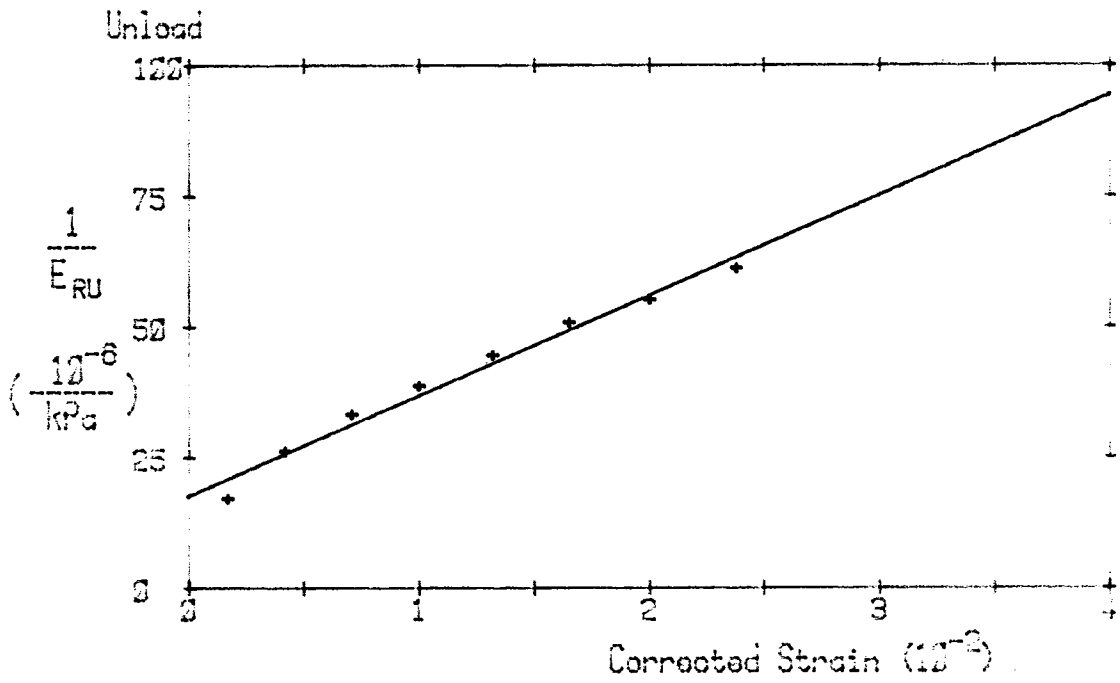




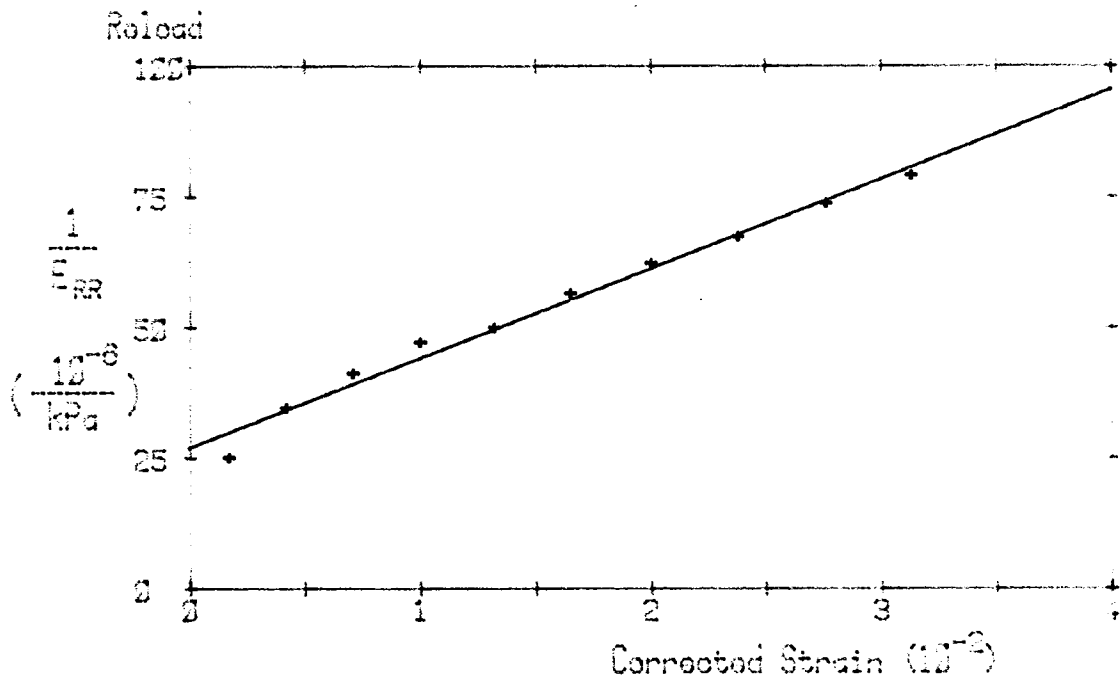
TEST T63

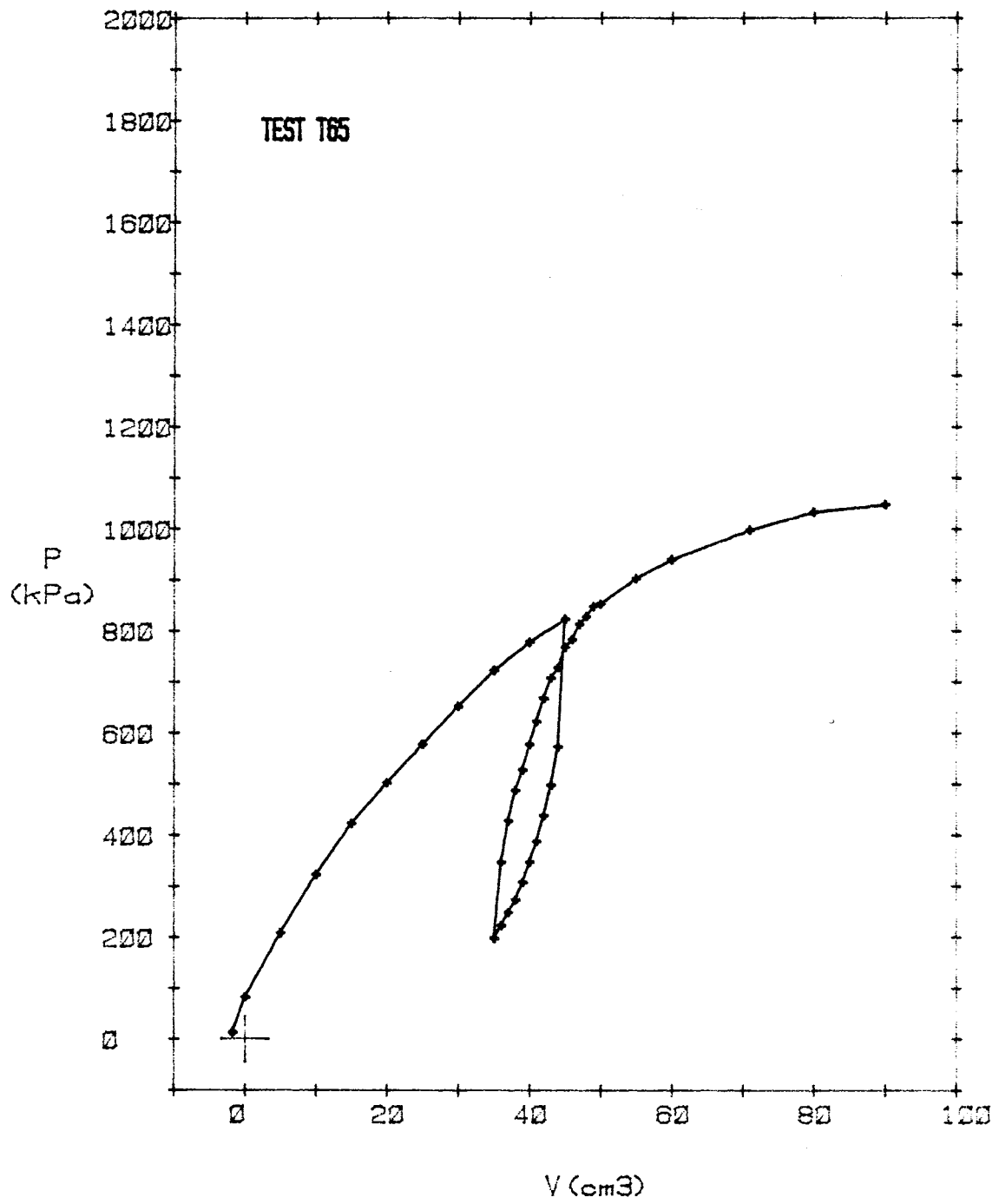


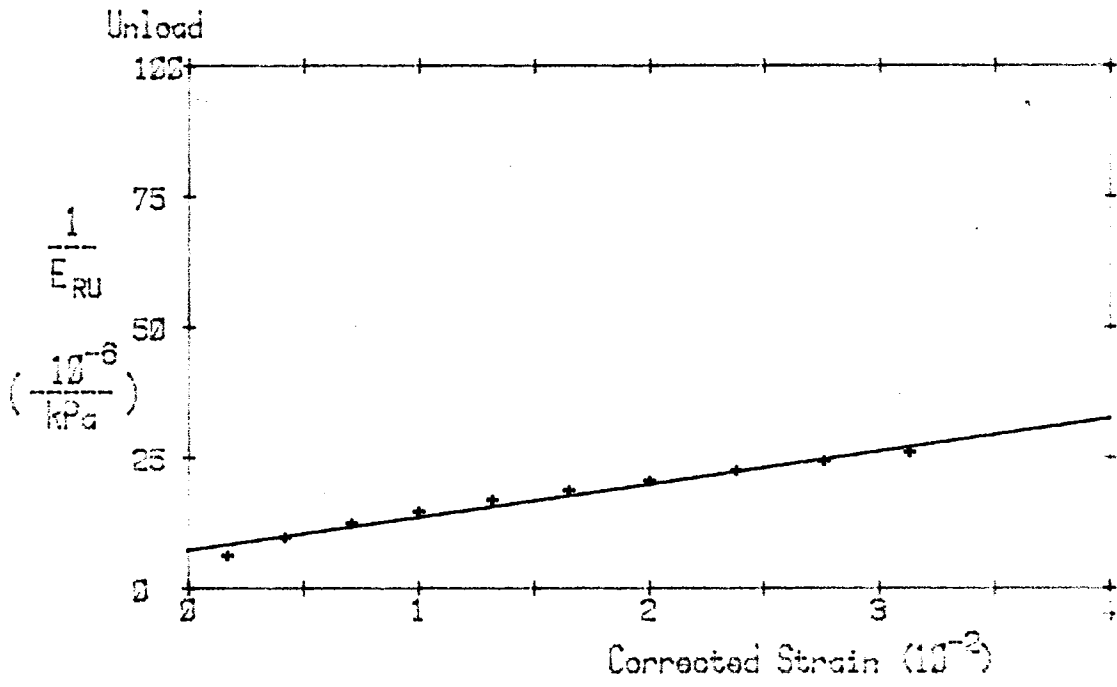




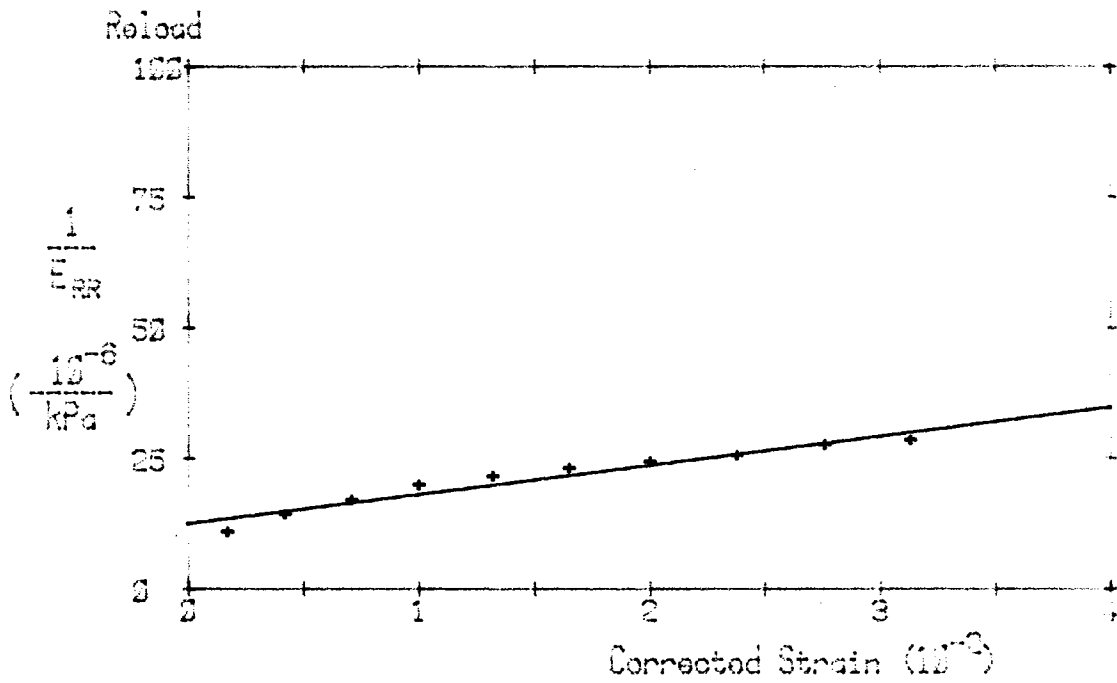
TEST T64

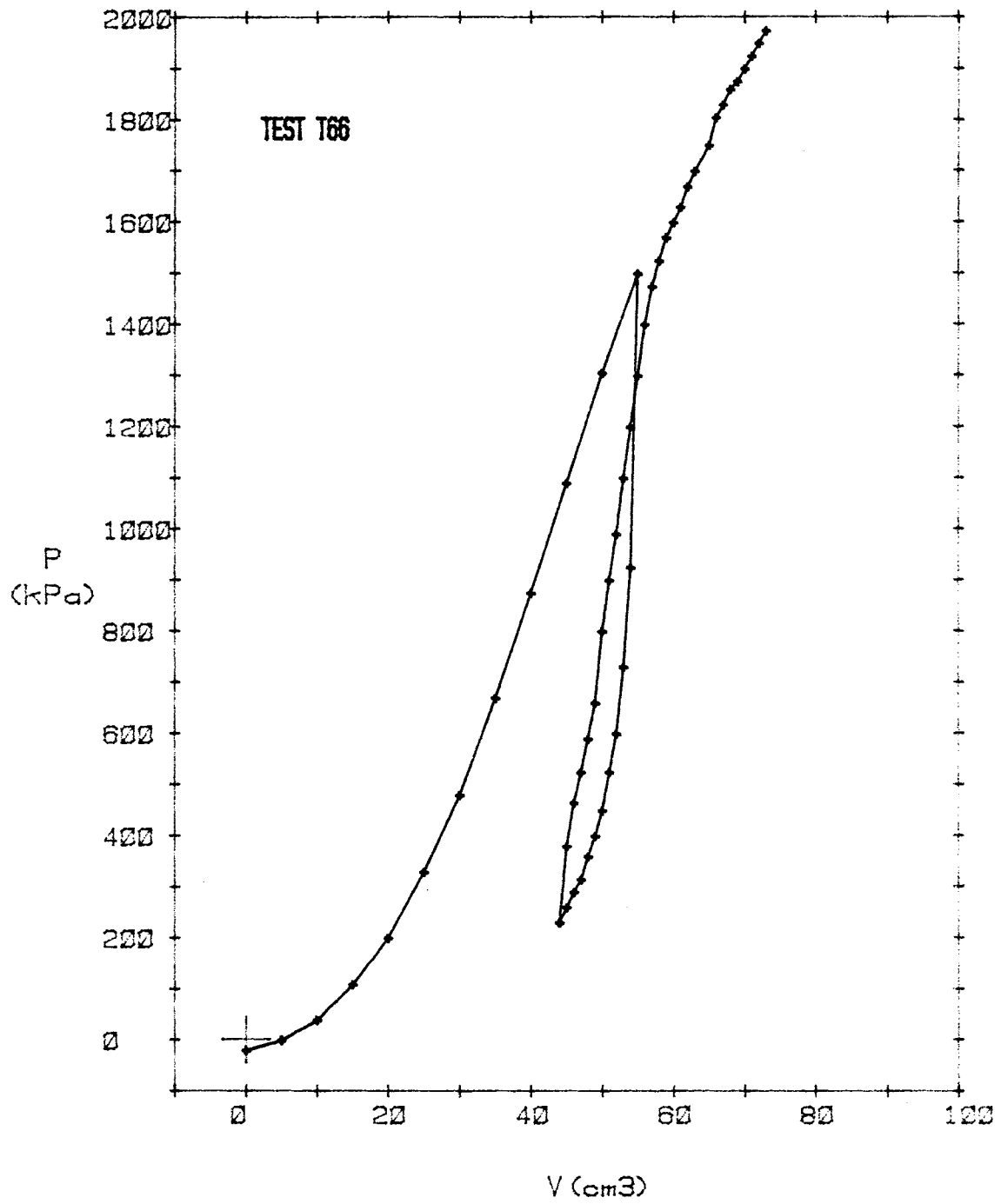


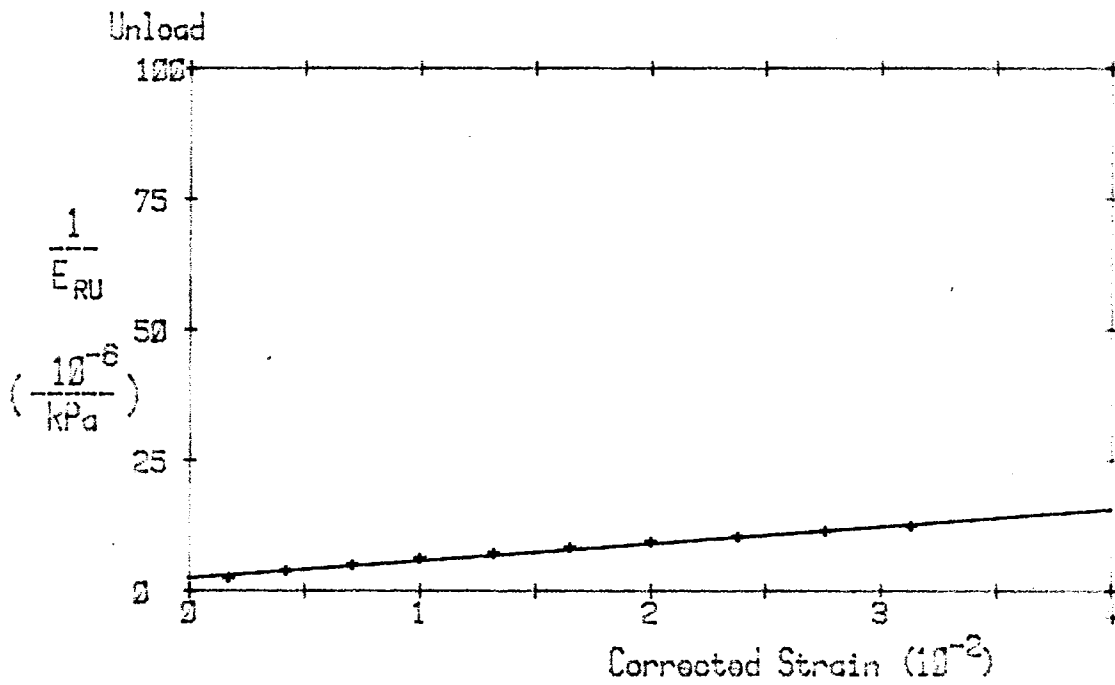




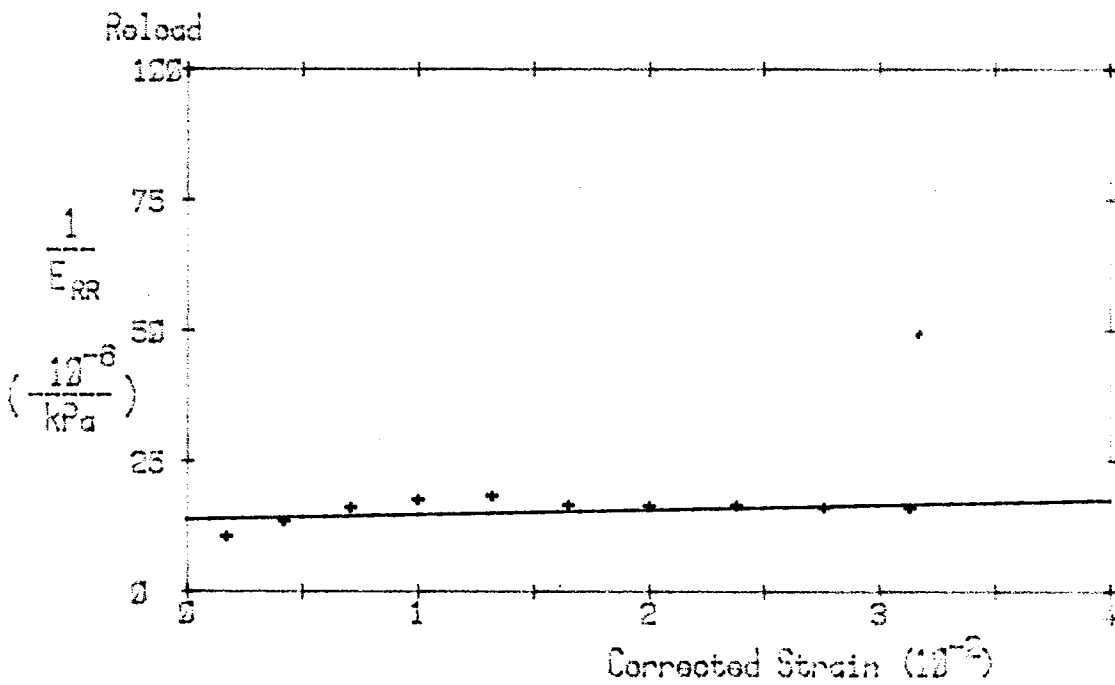
TEST T65

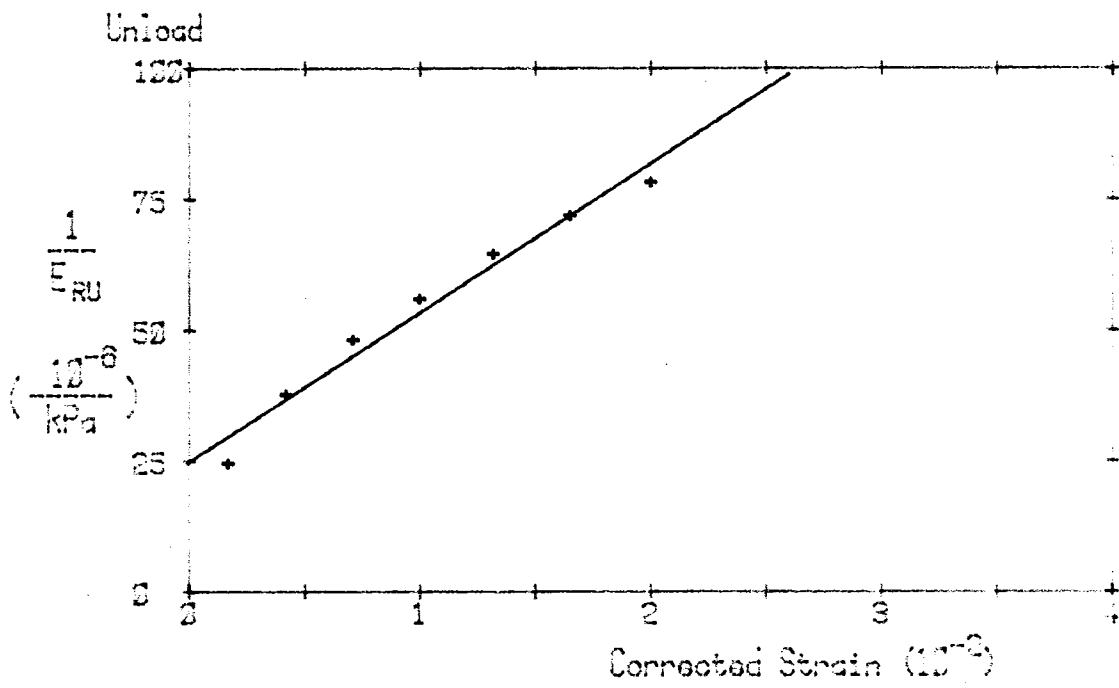




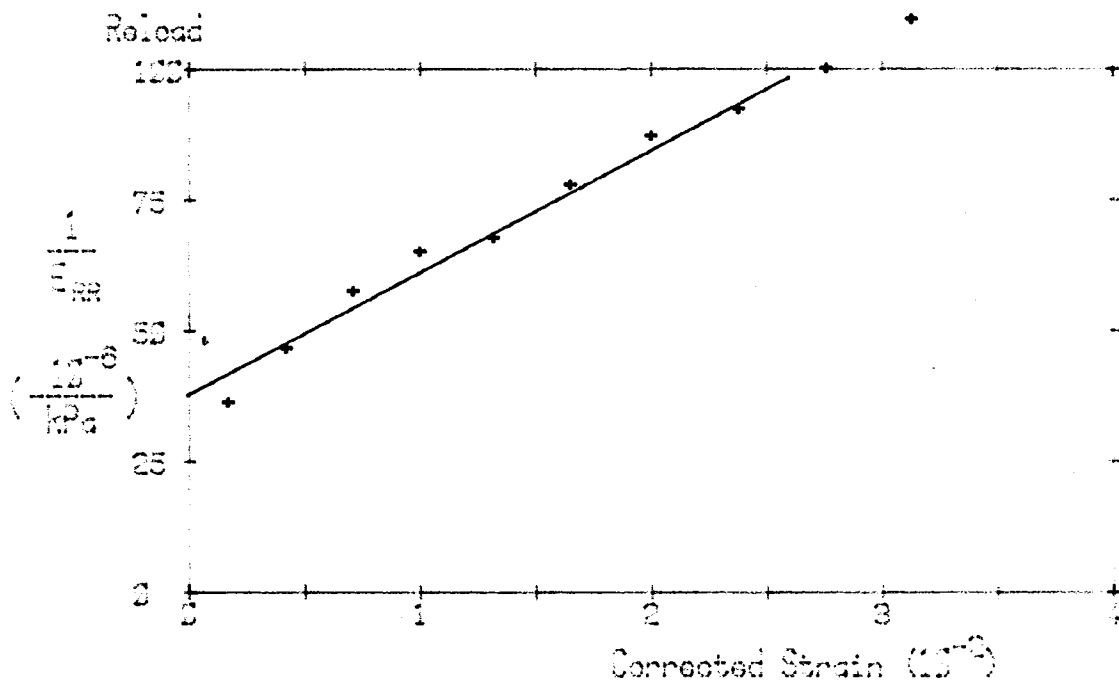


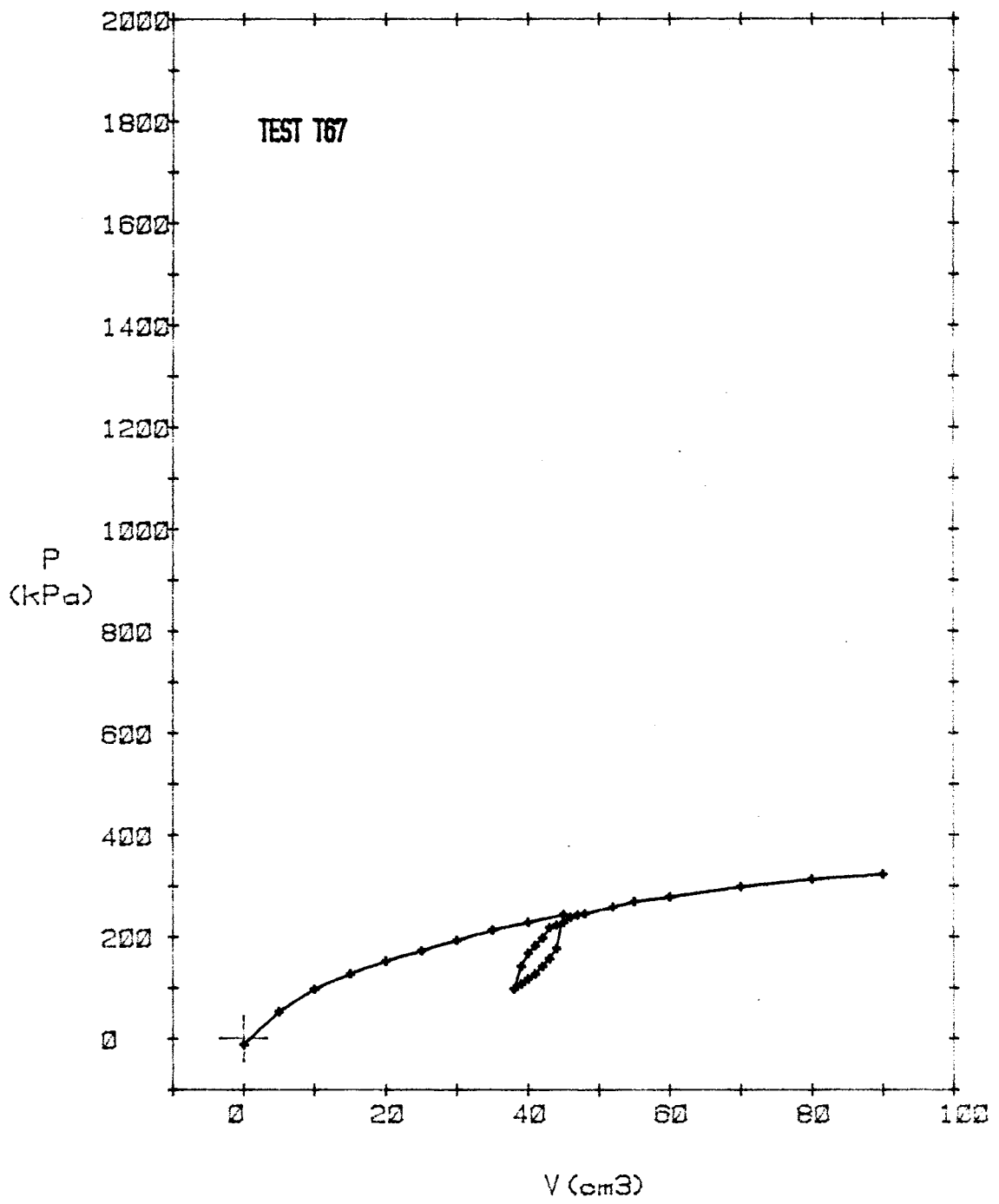
TEST T66

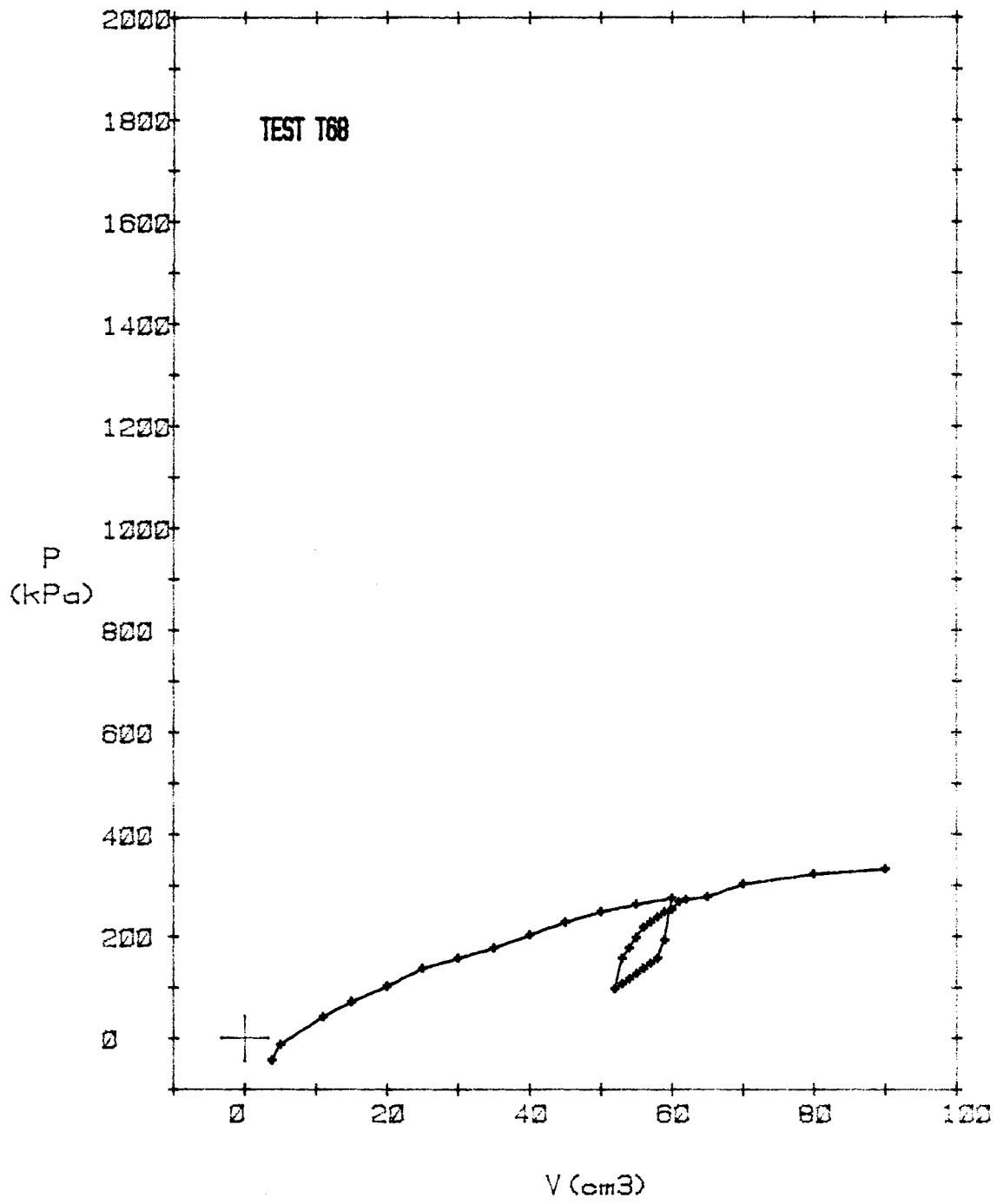


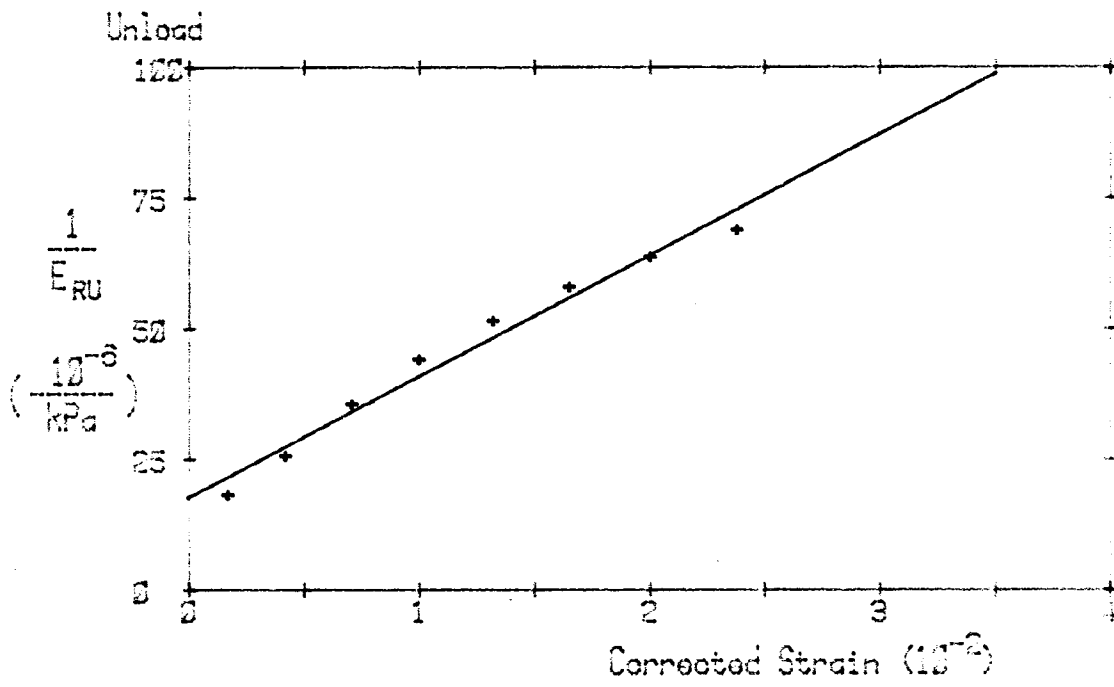


TEST T67

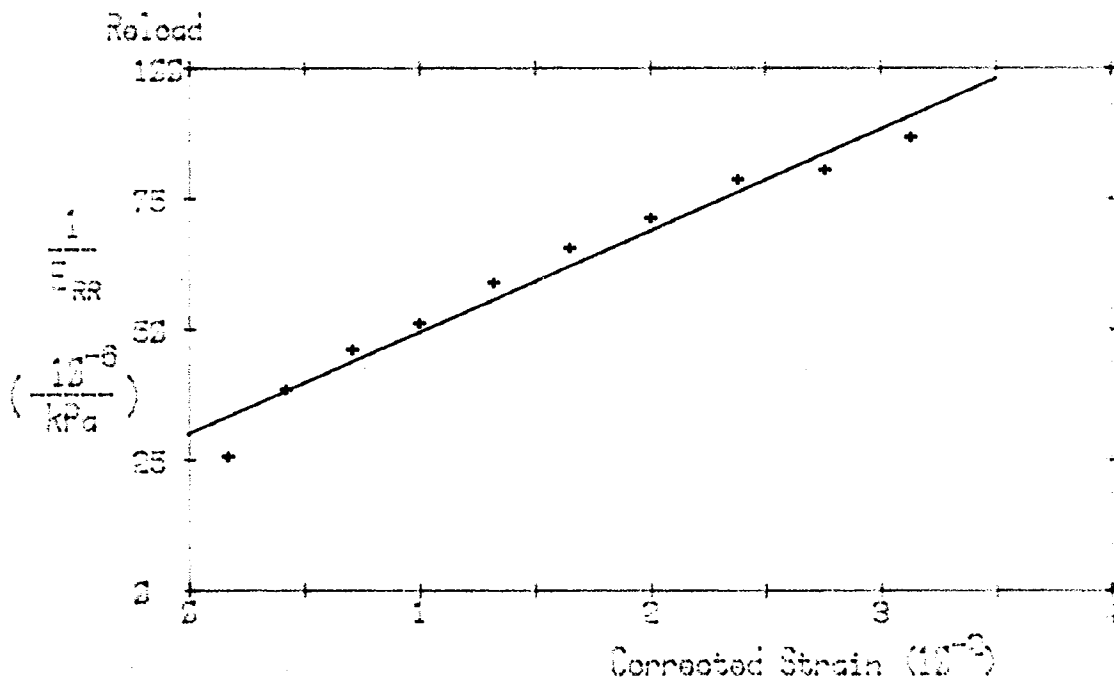


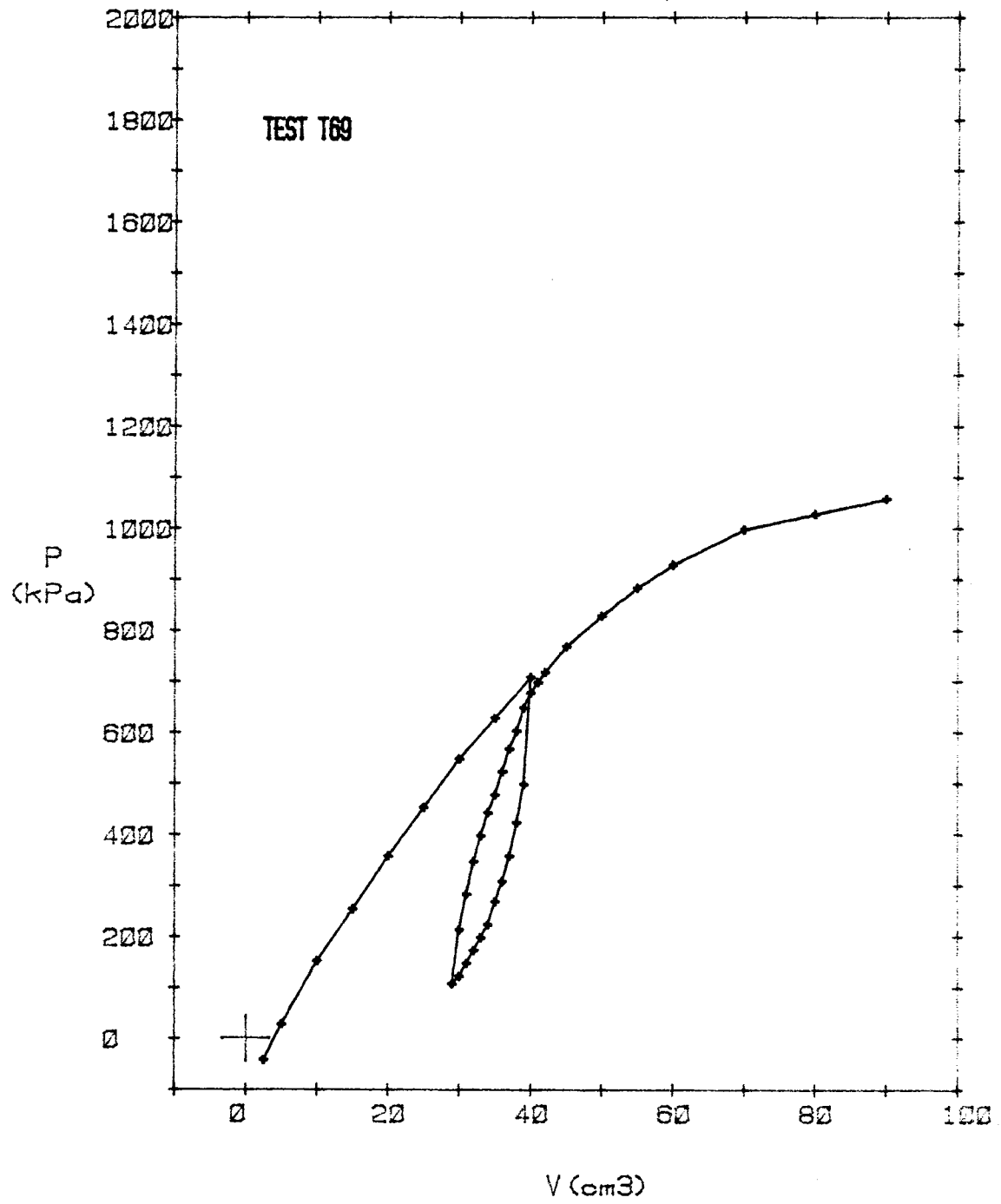


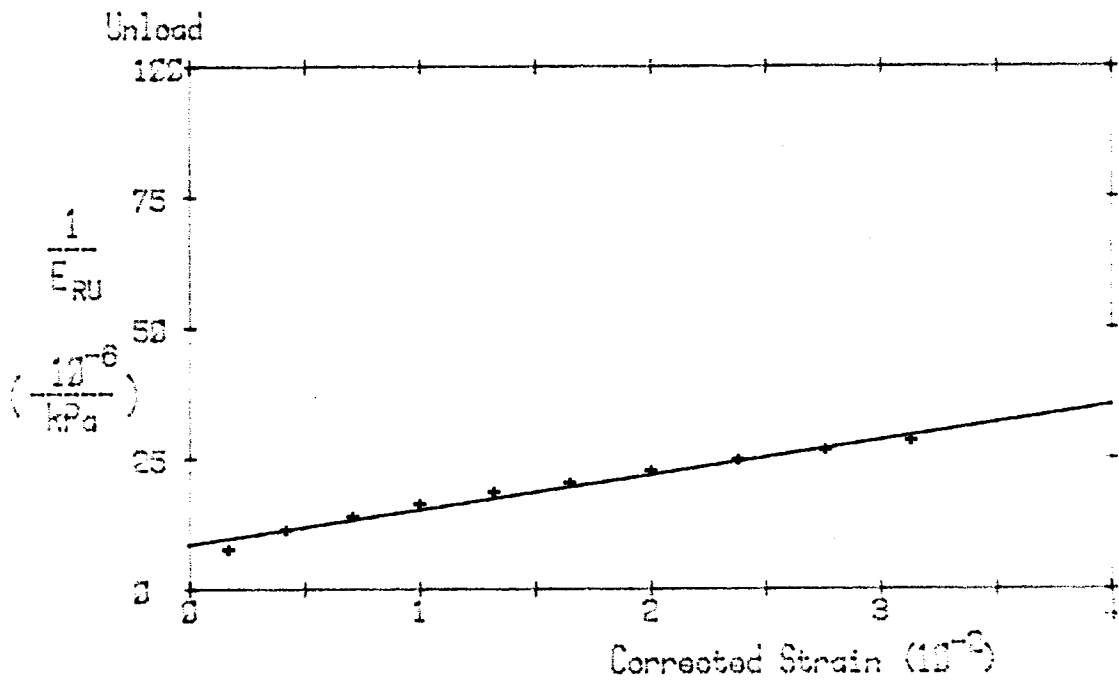




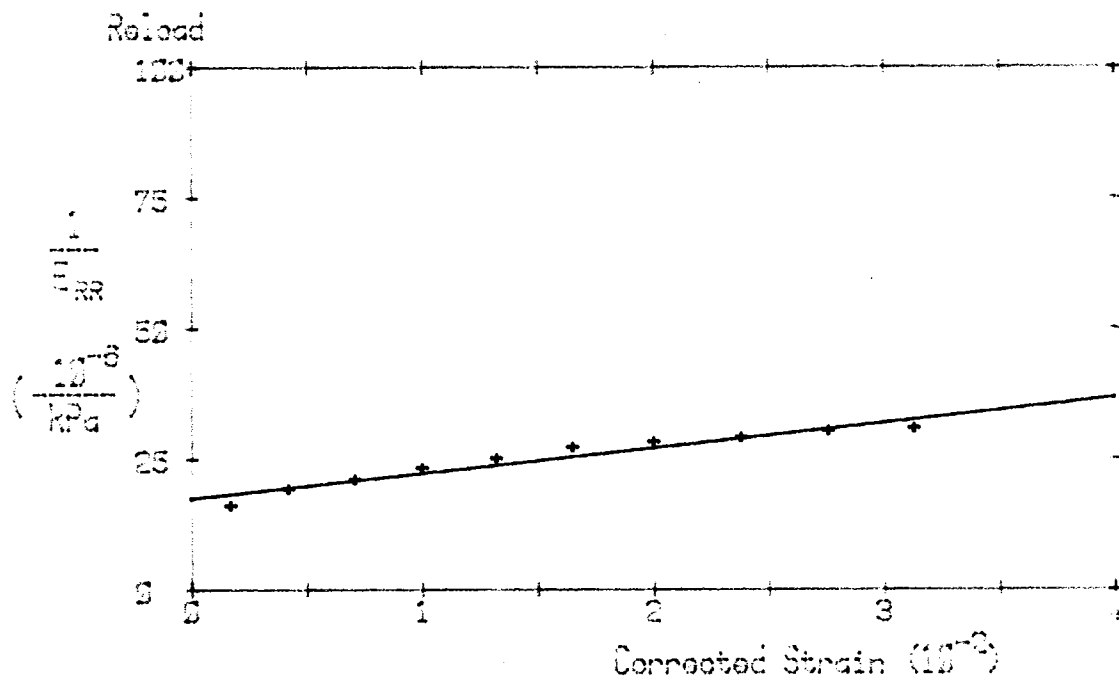
TEST T68

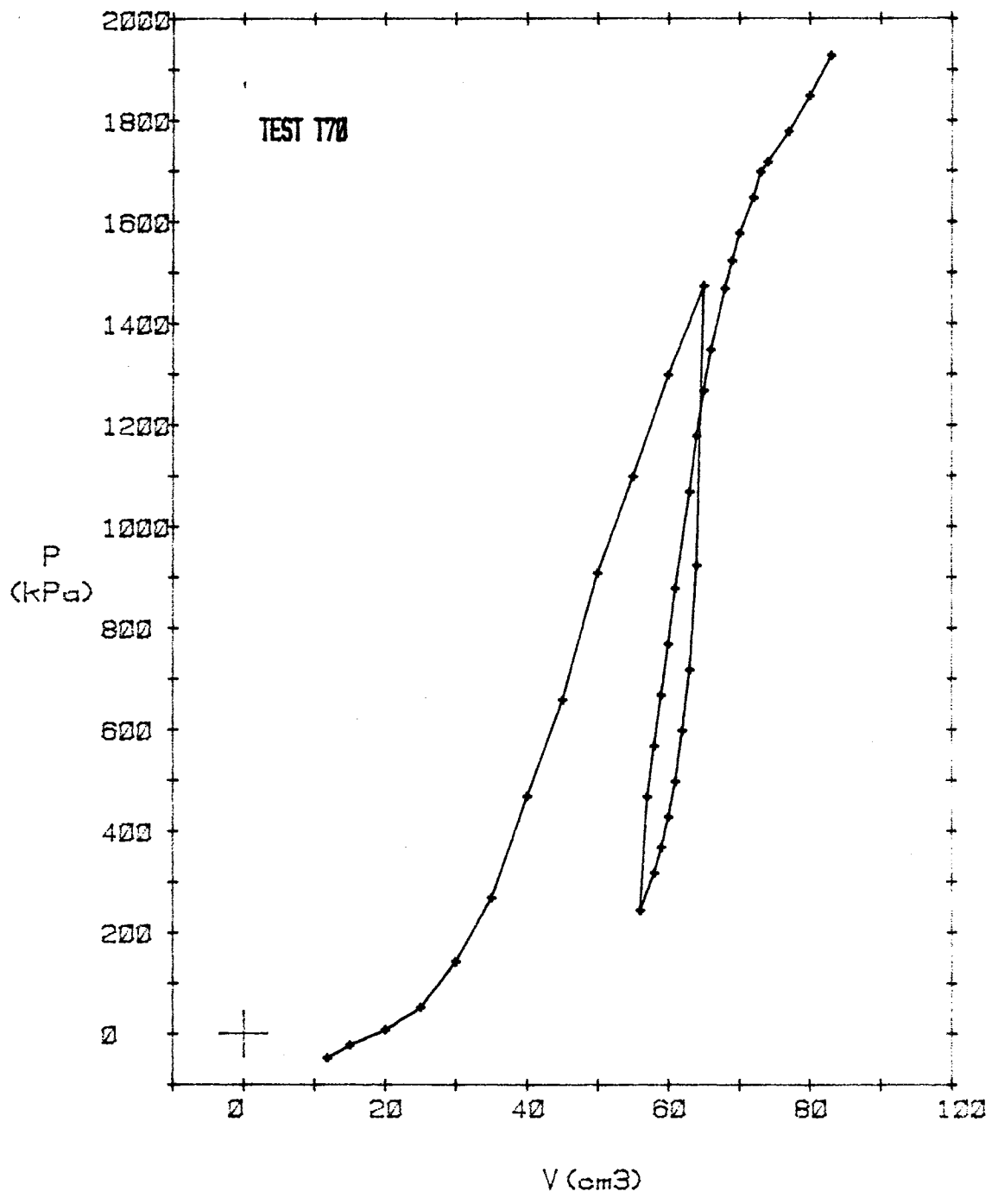


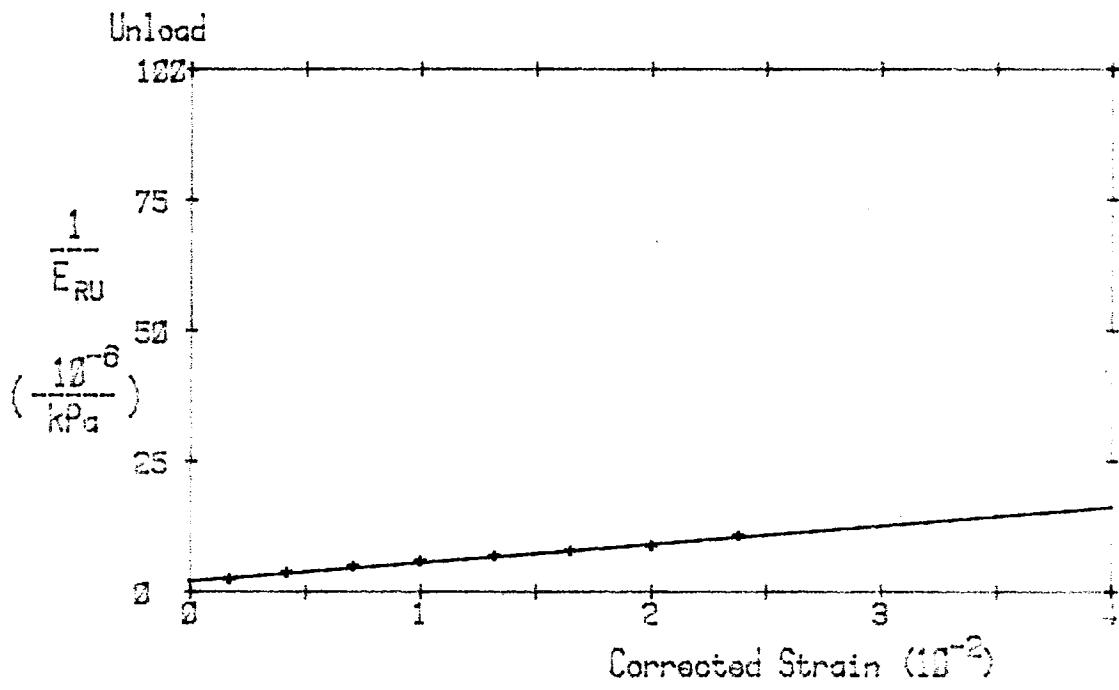




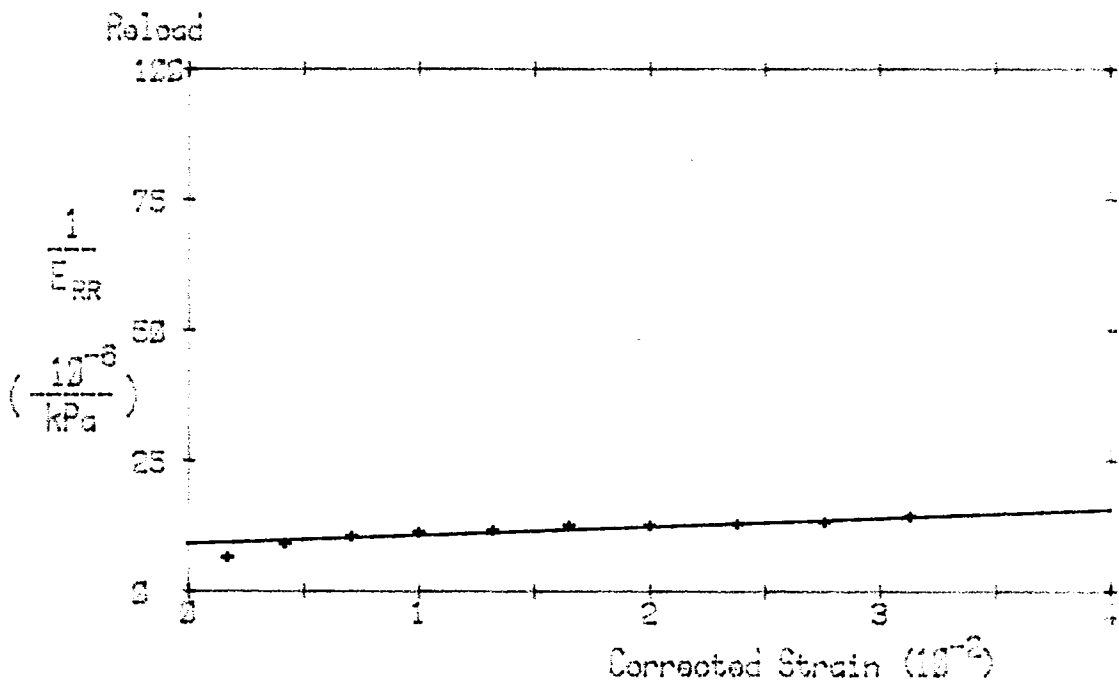
TEST T69

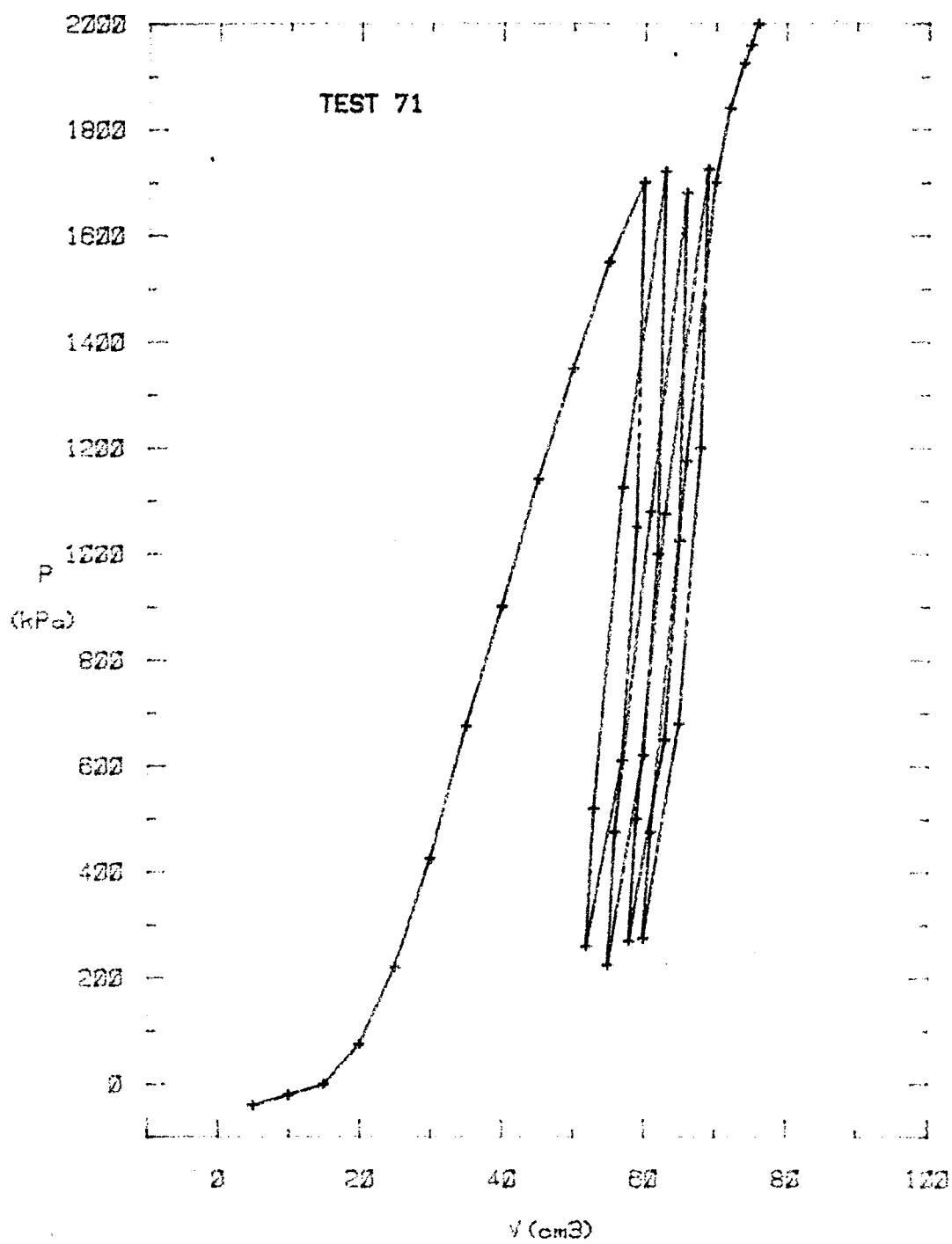


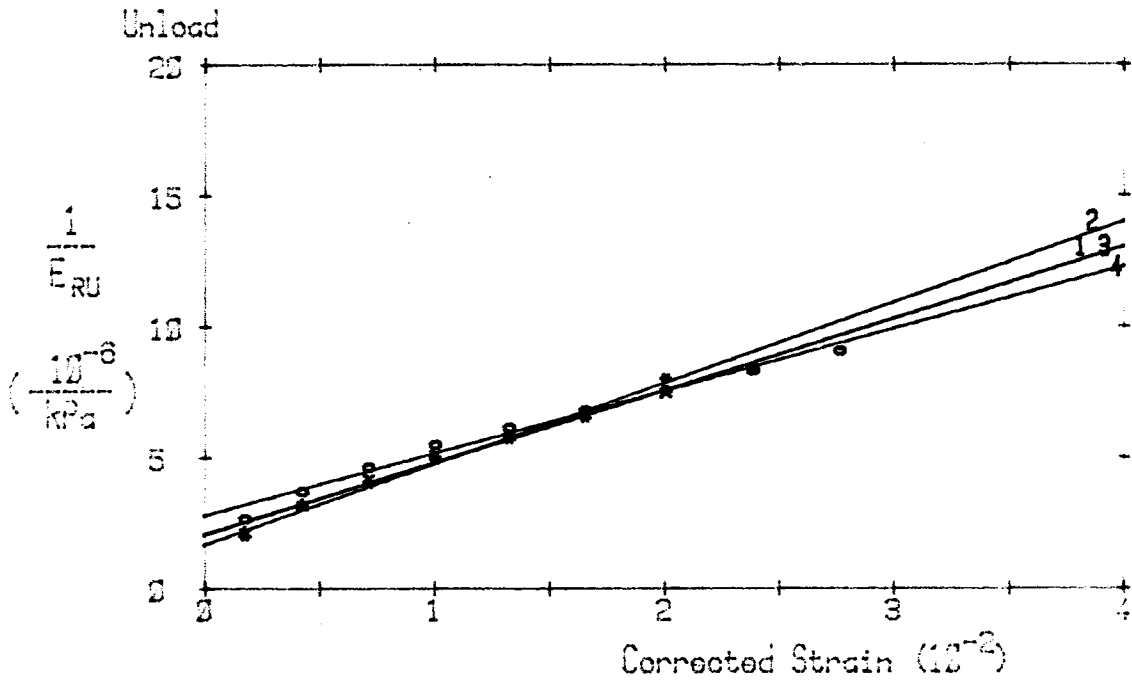




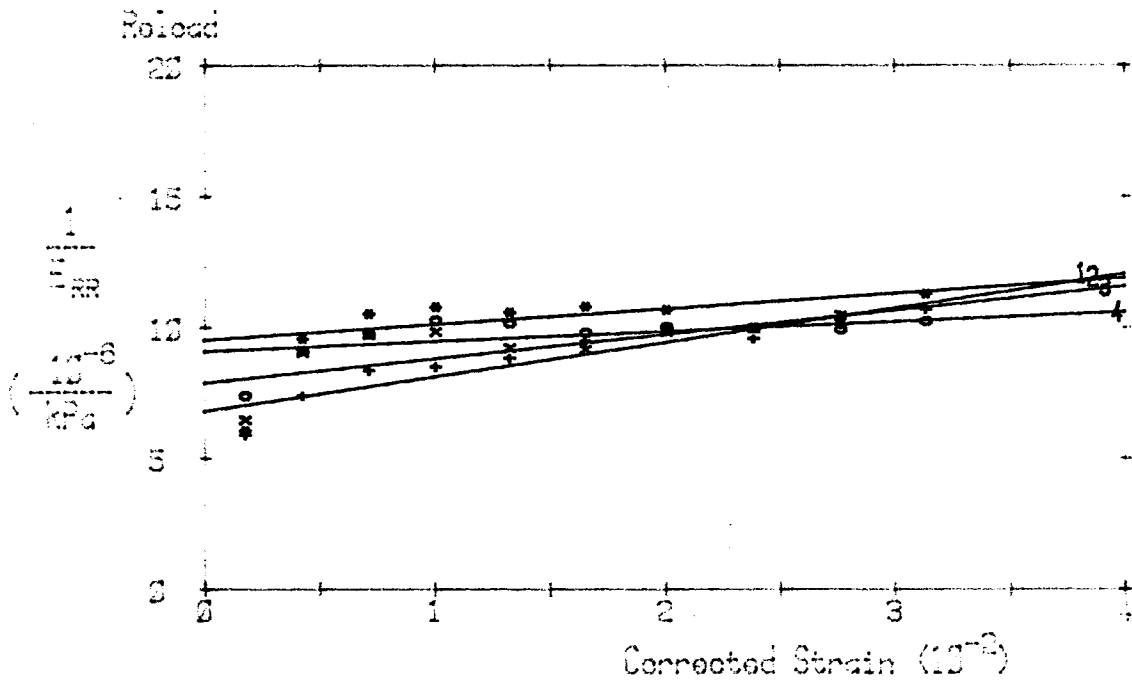
TEST T70

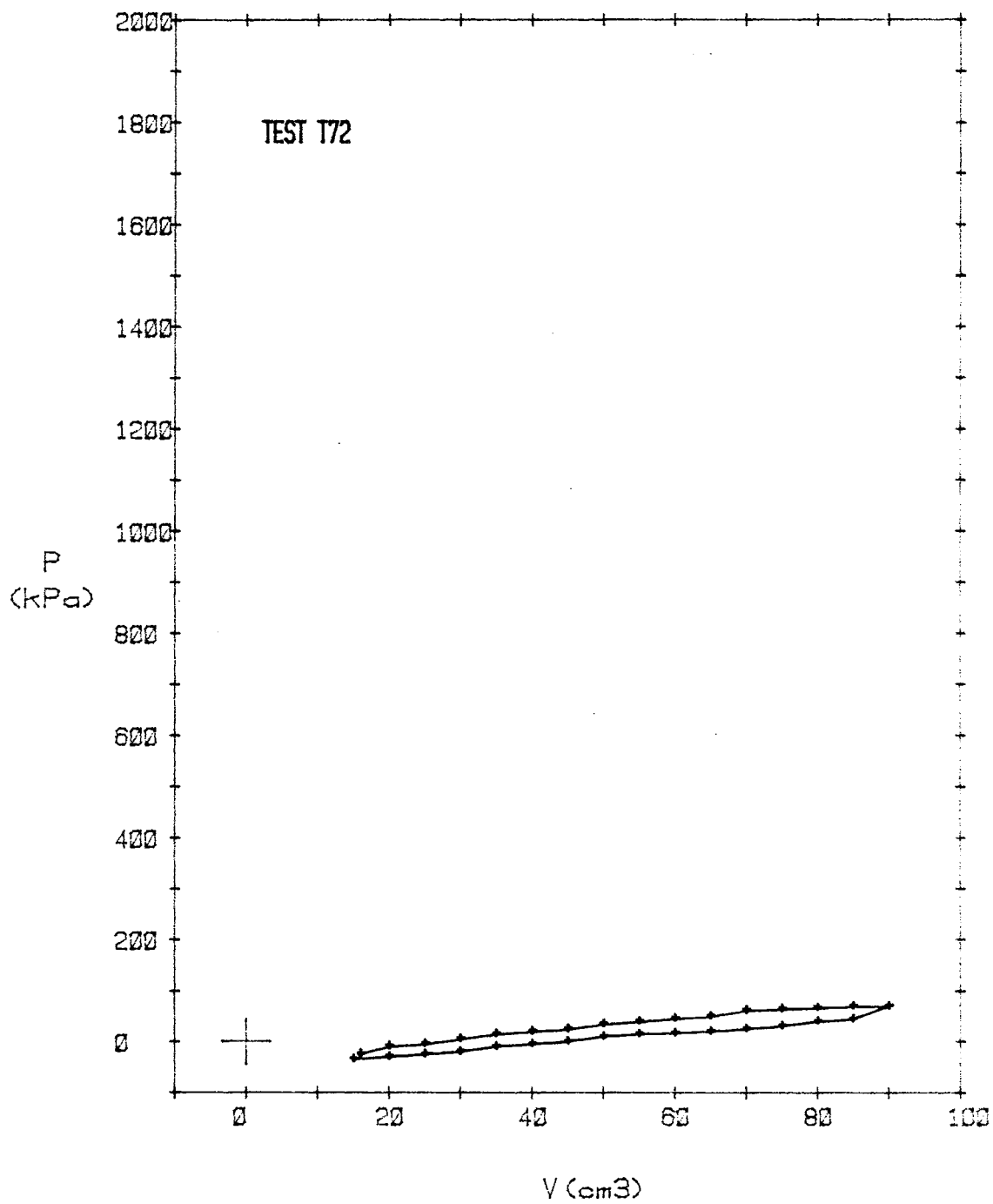


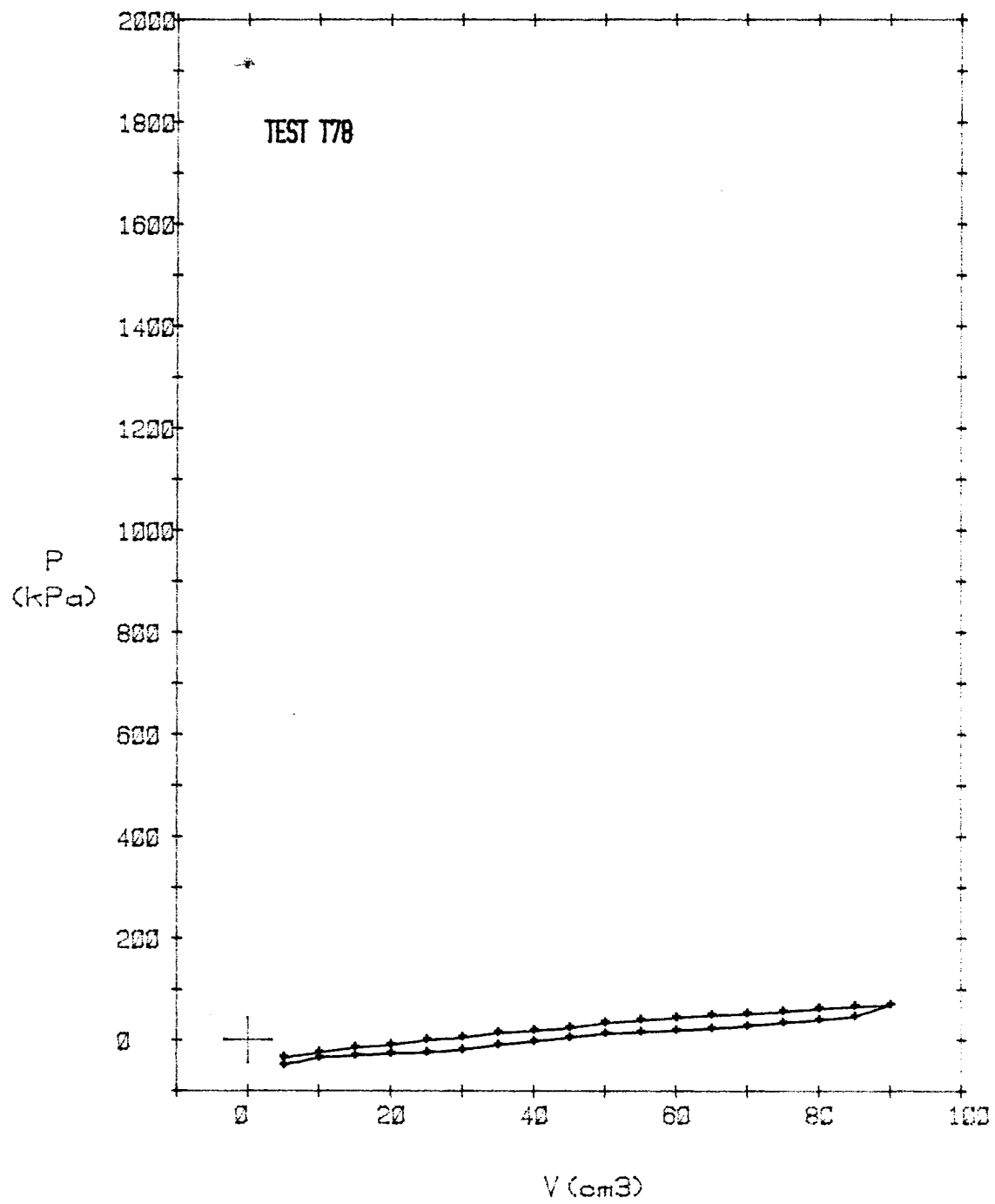


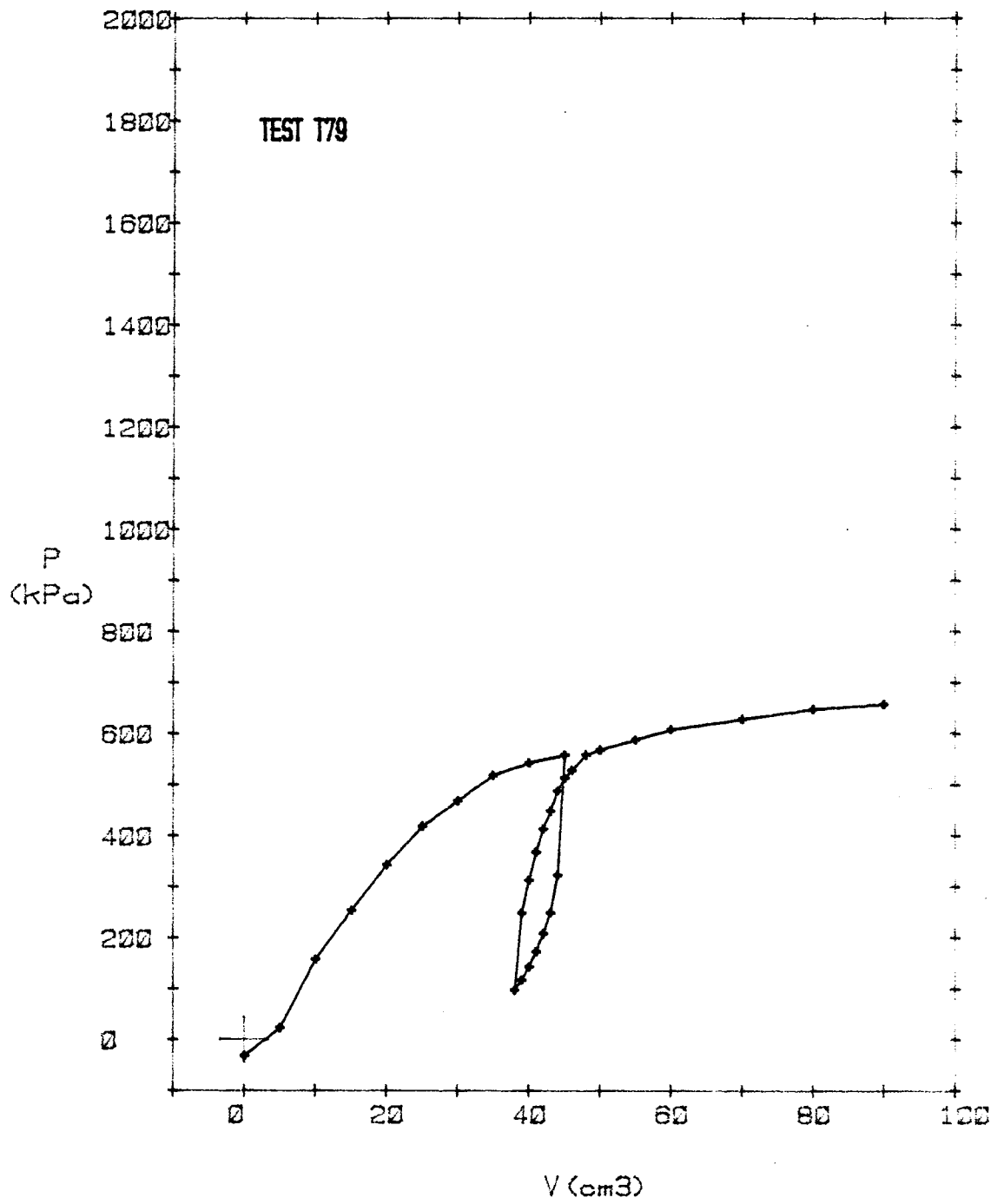


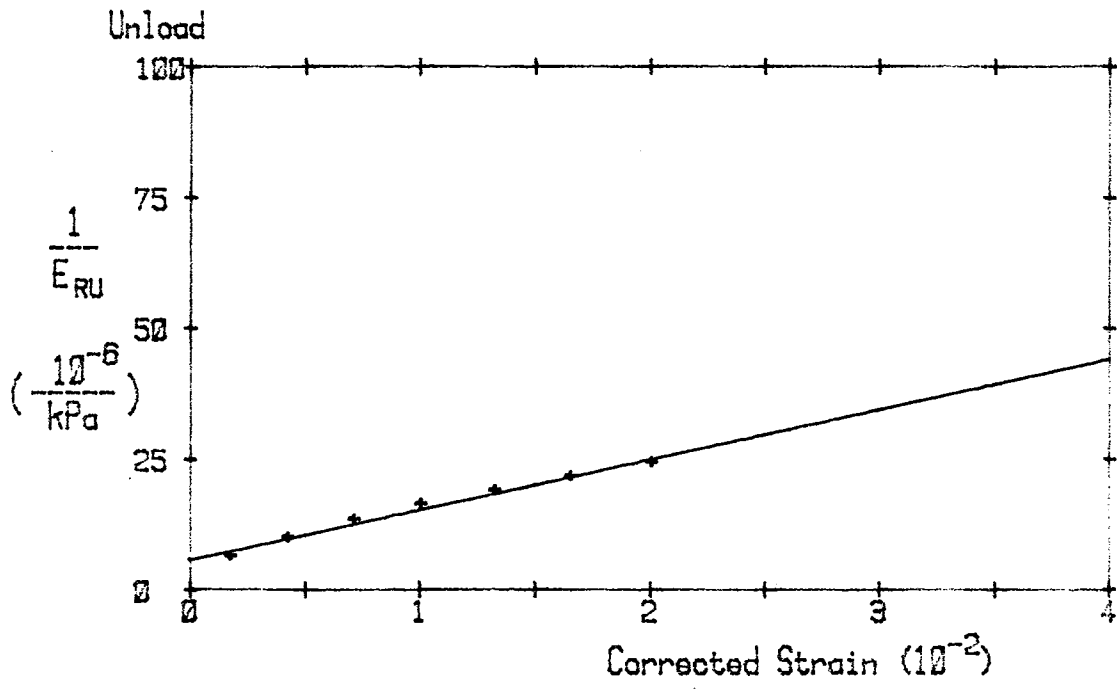
TEST T71



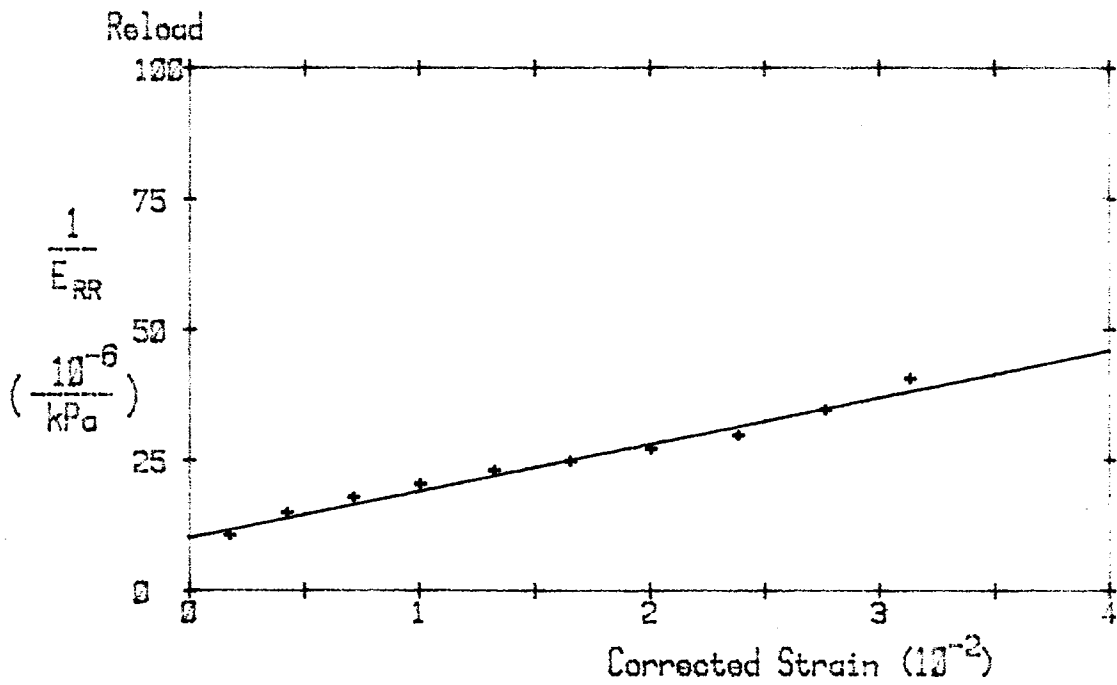


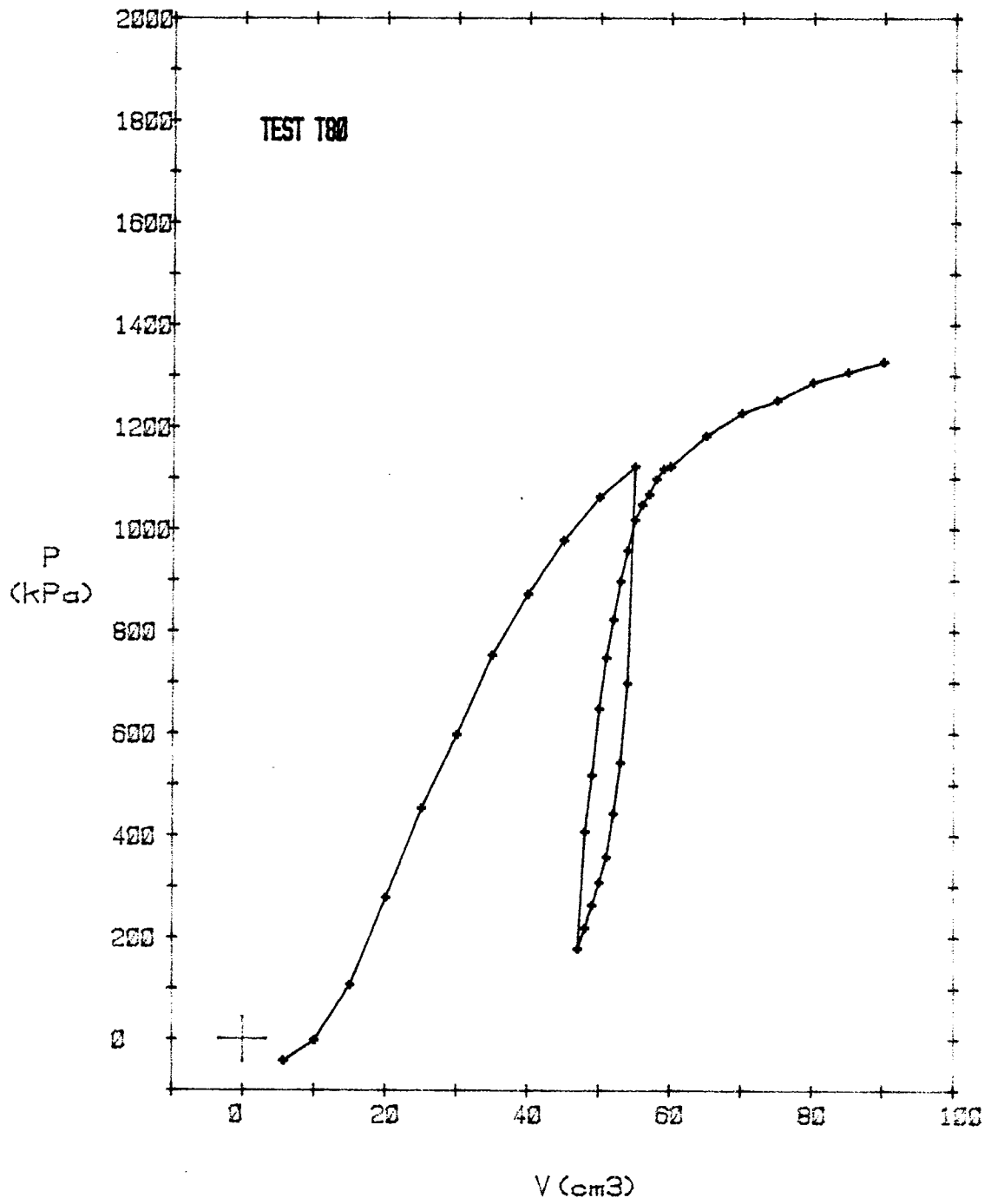


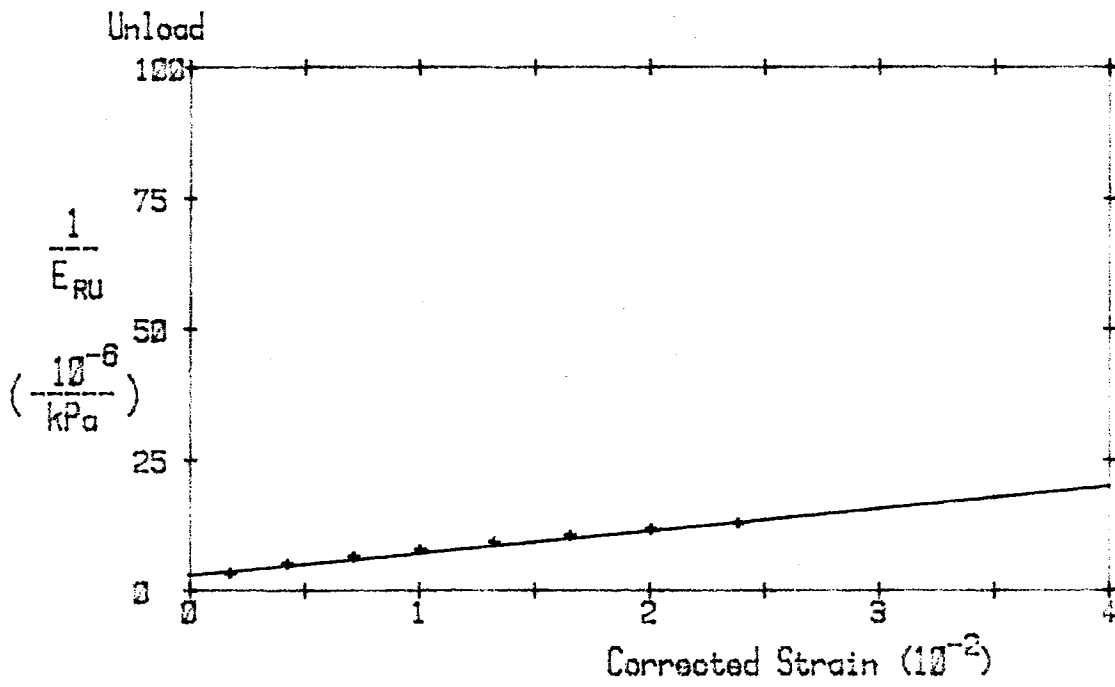




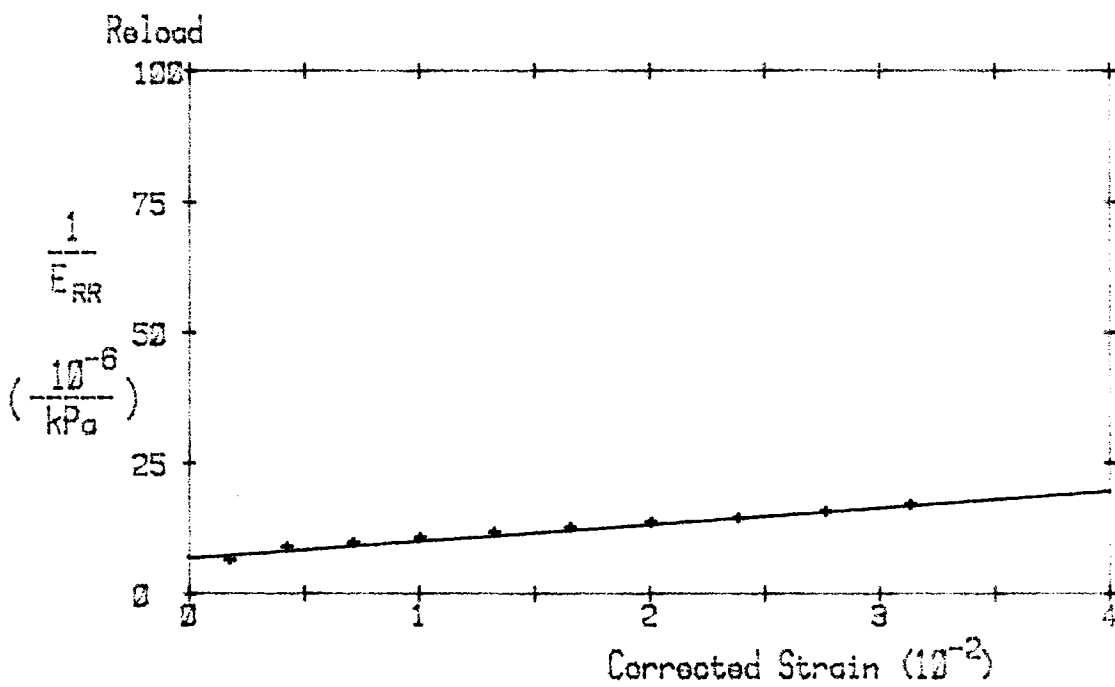
TEST T79

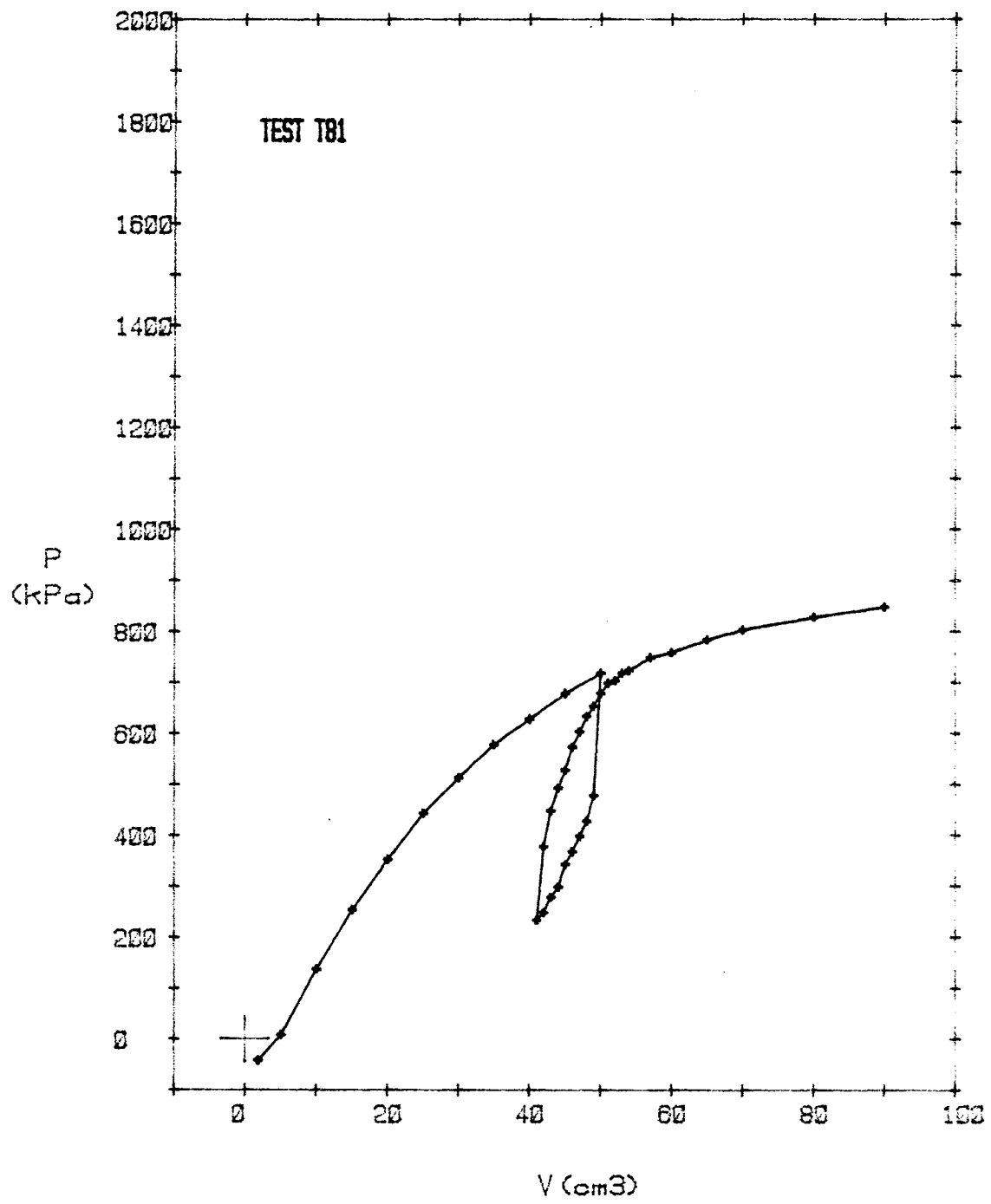


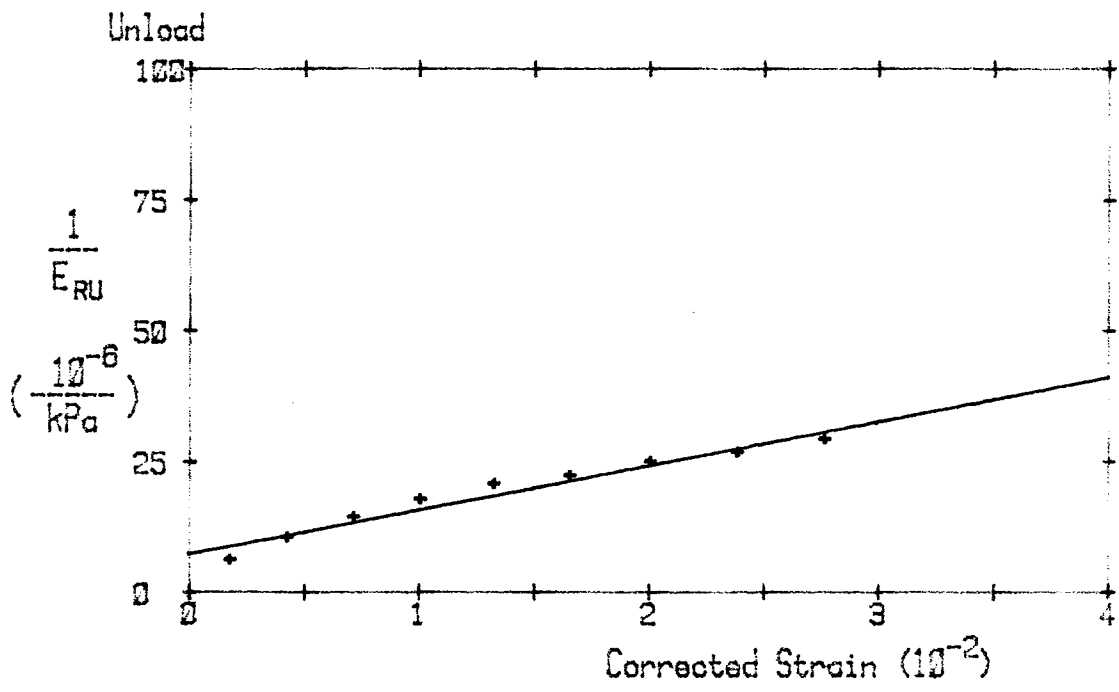




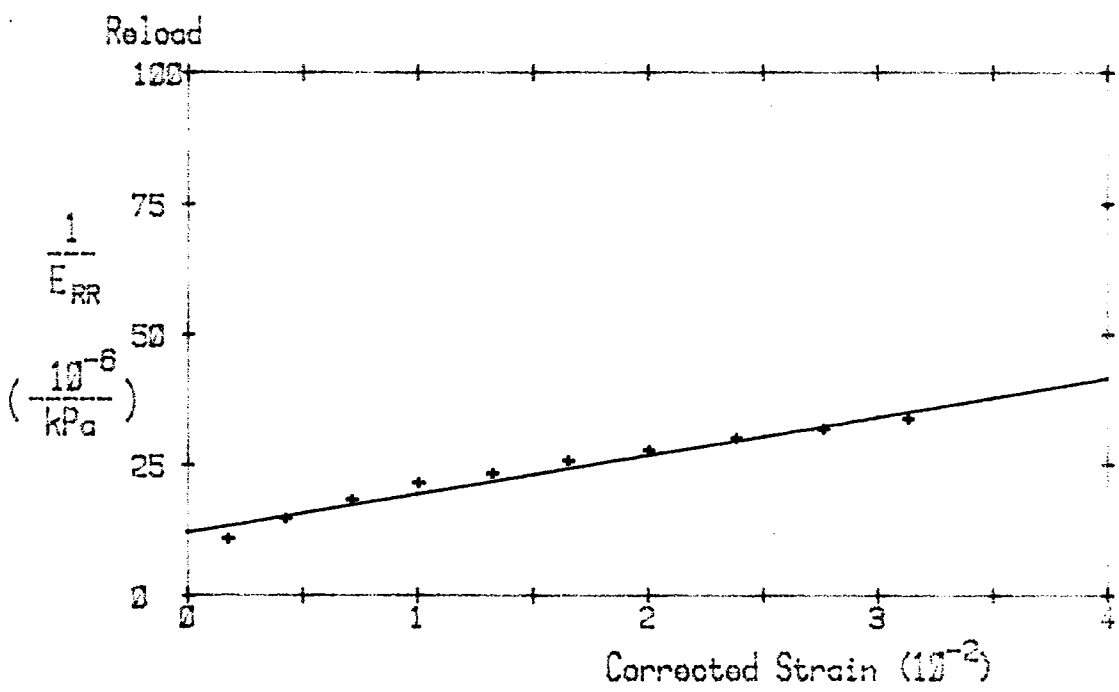
TEST T80

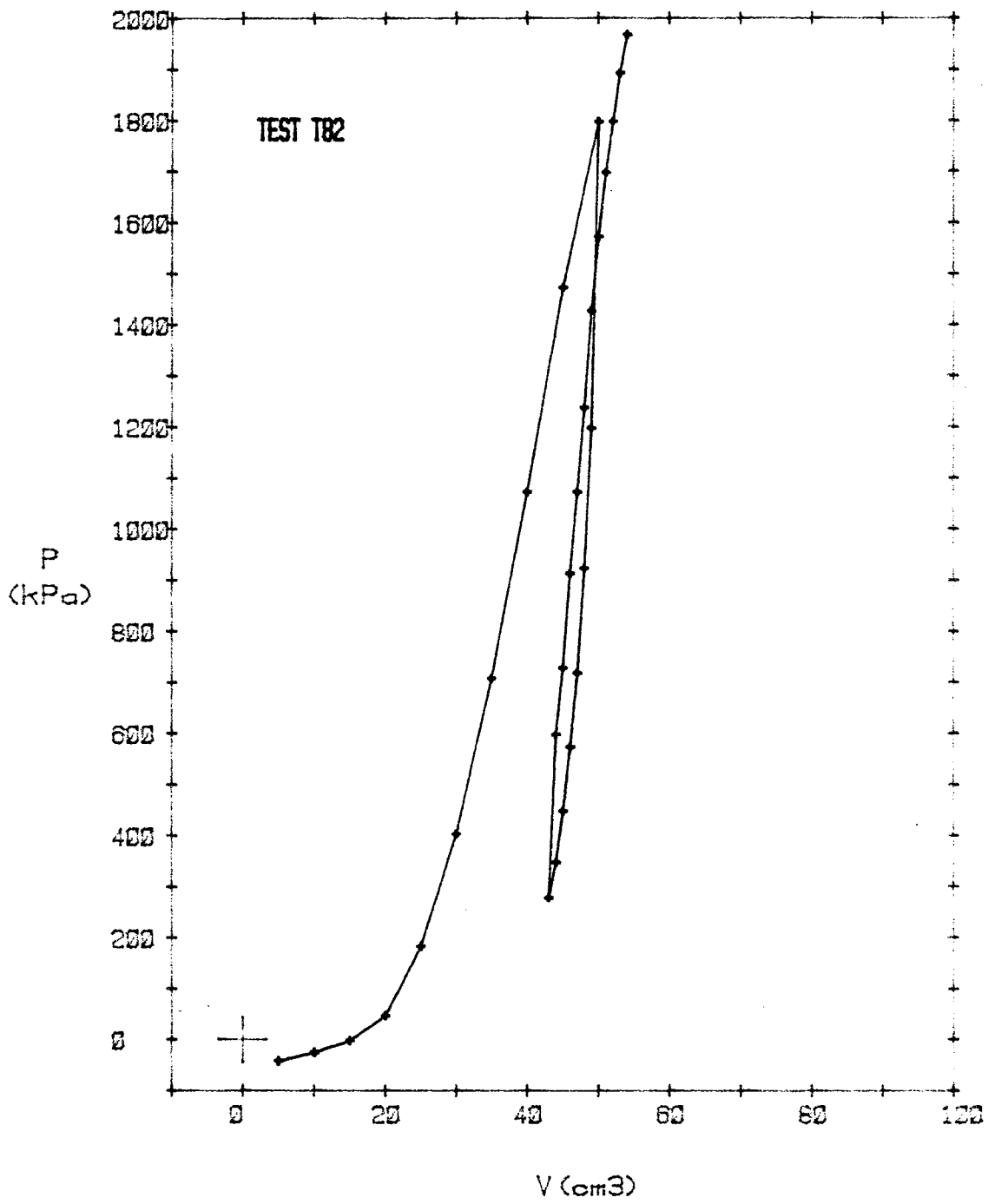


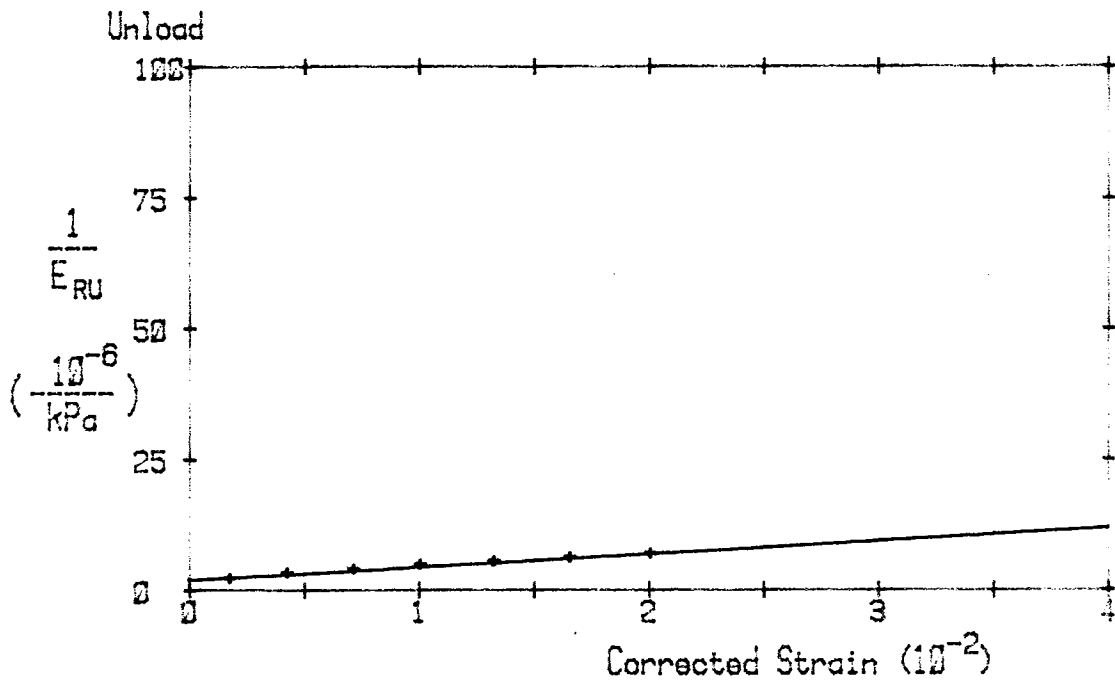




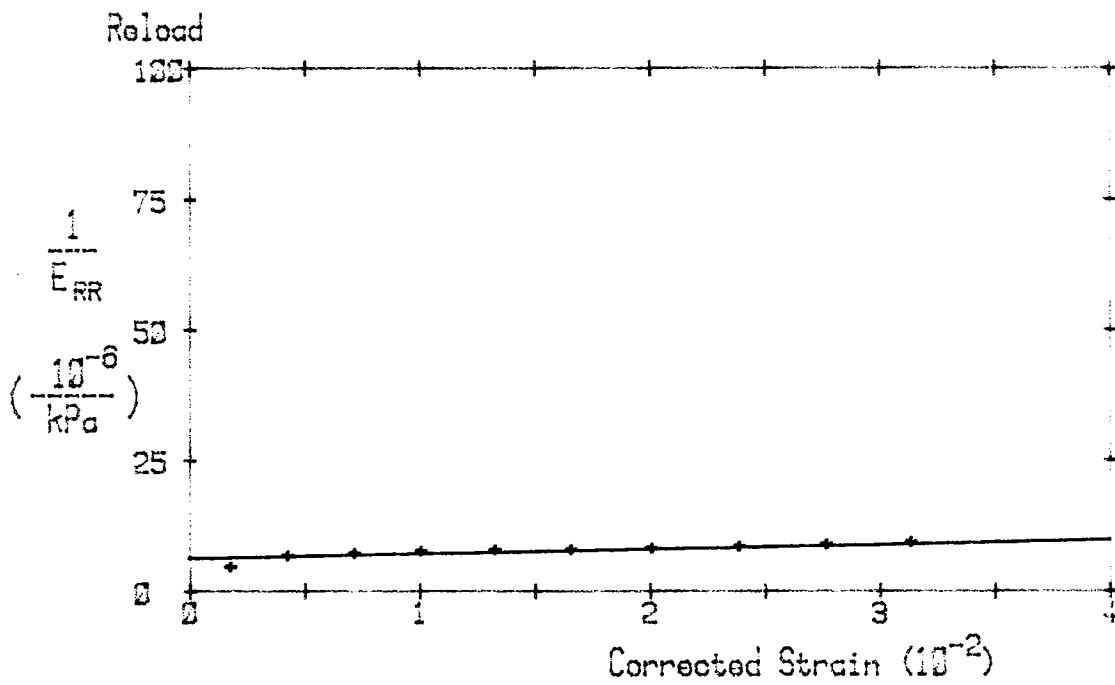
TEST T81

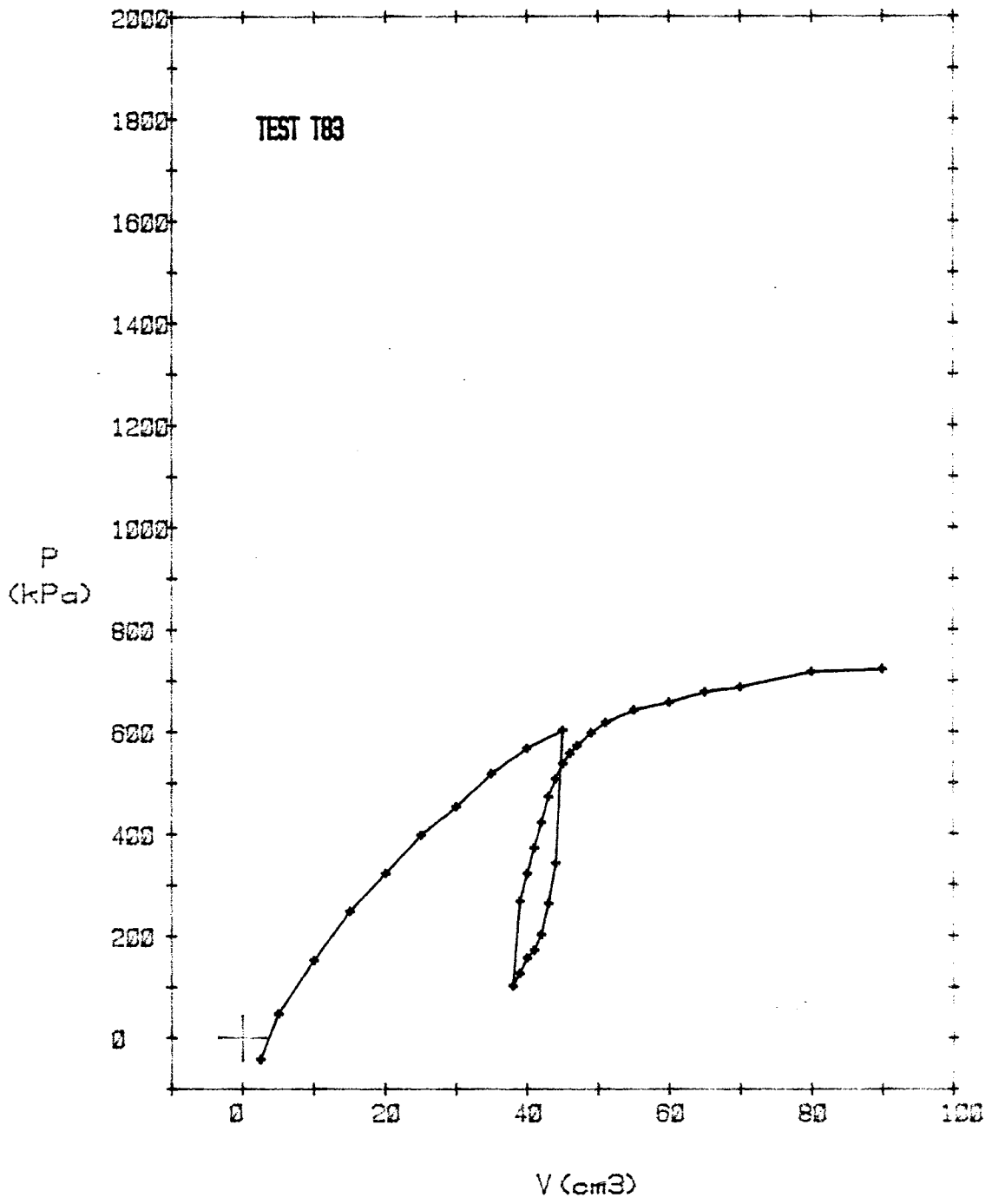


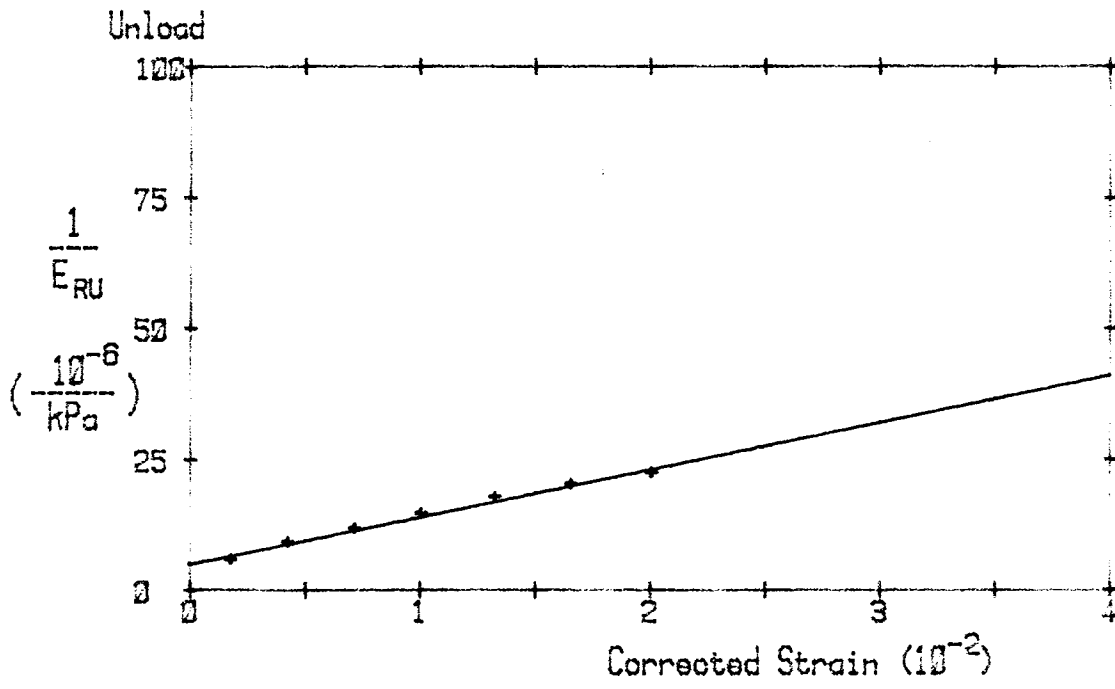




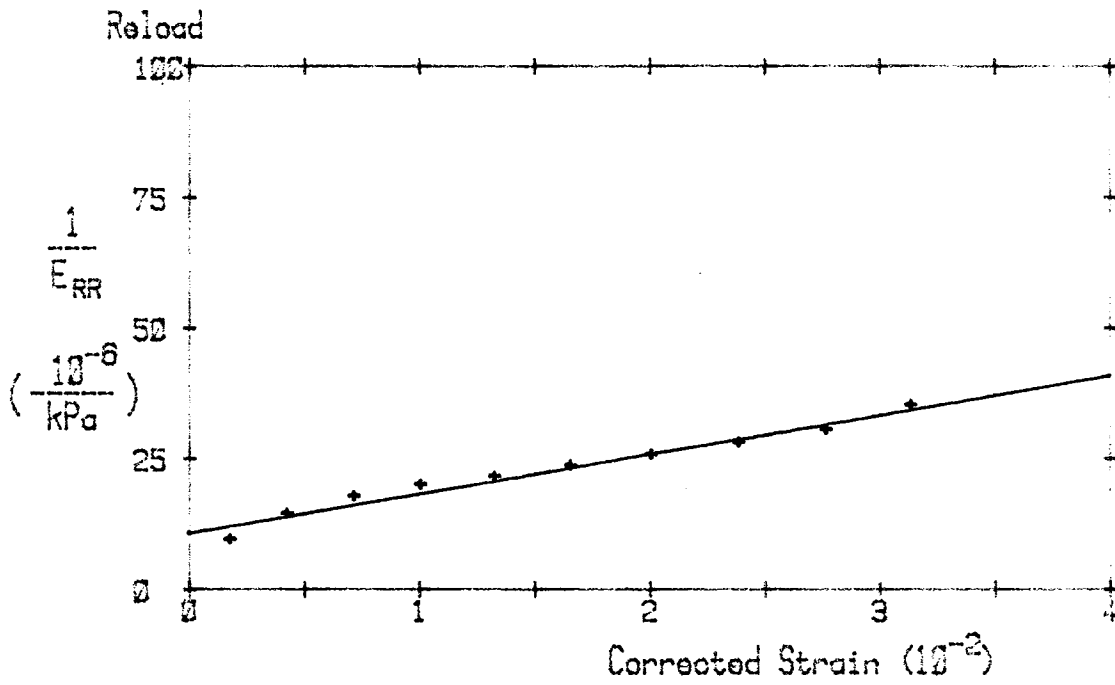
TEST T82

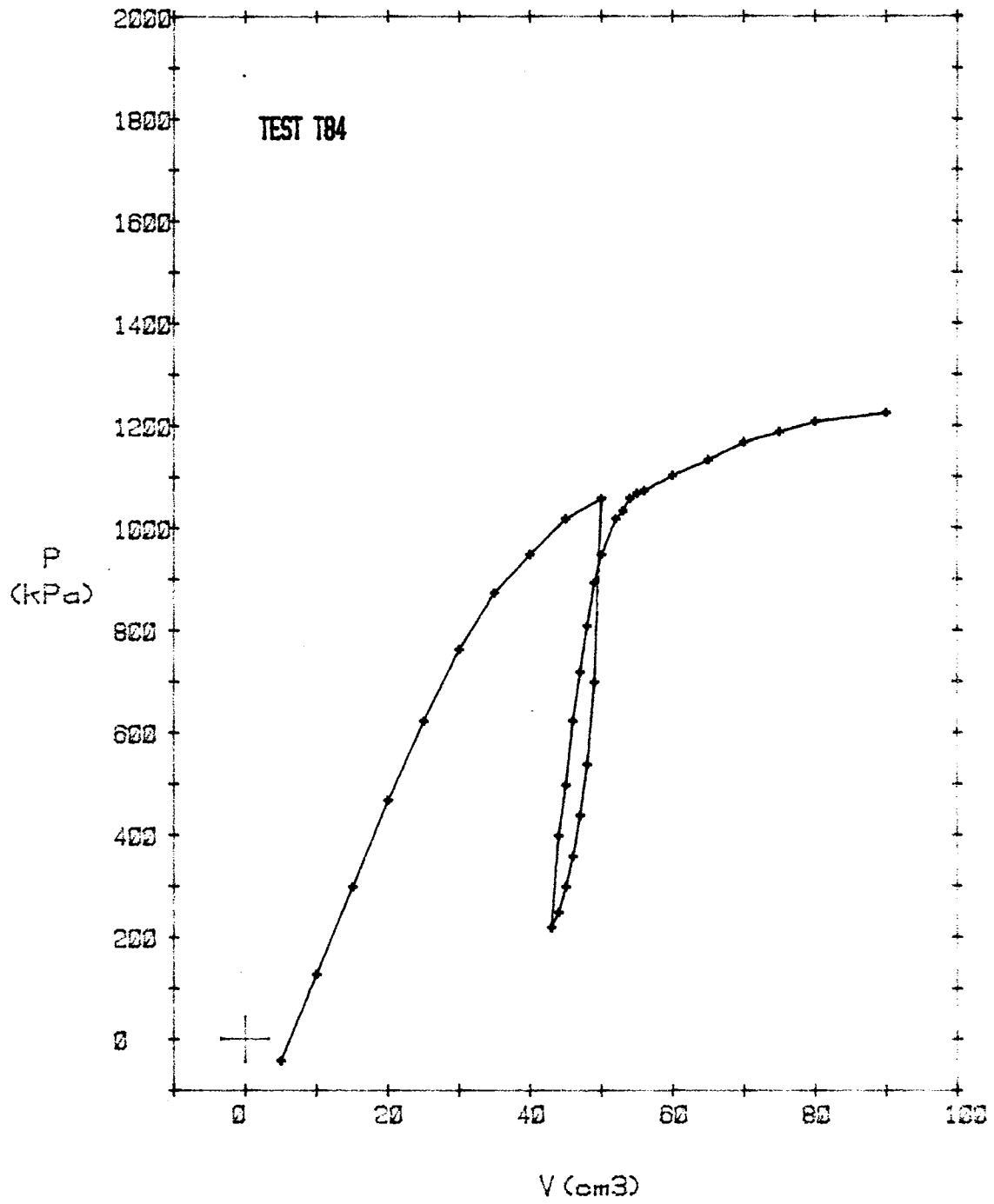


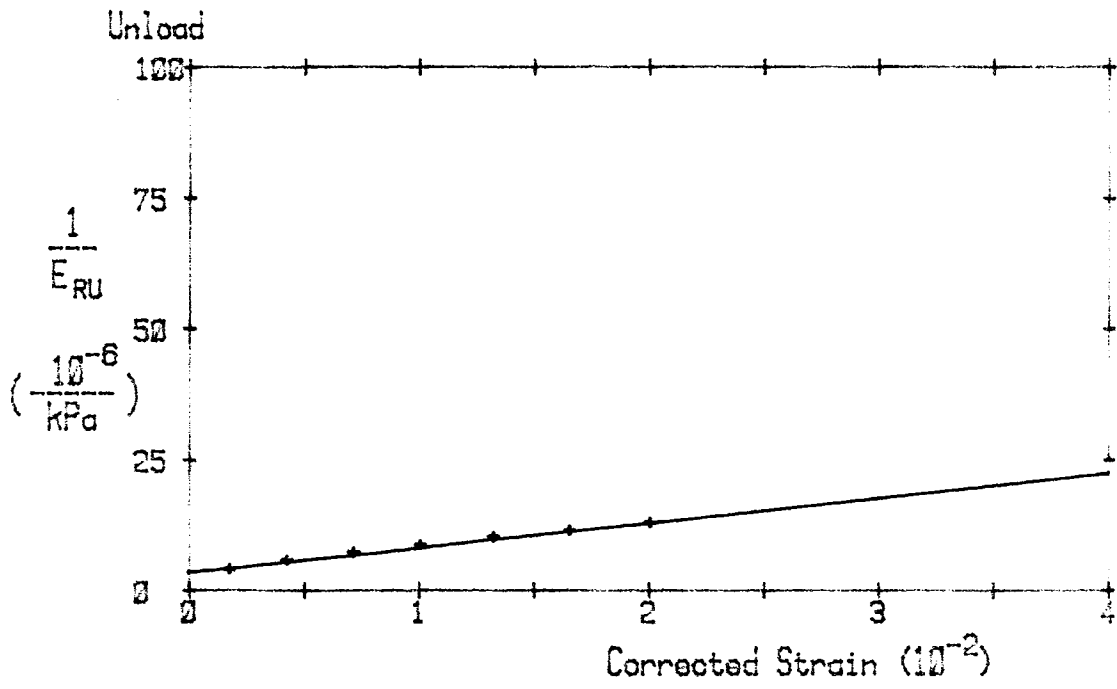




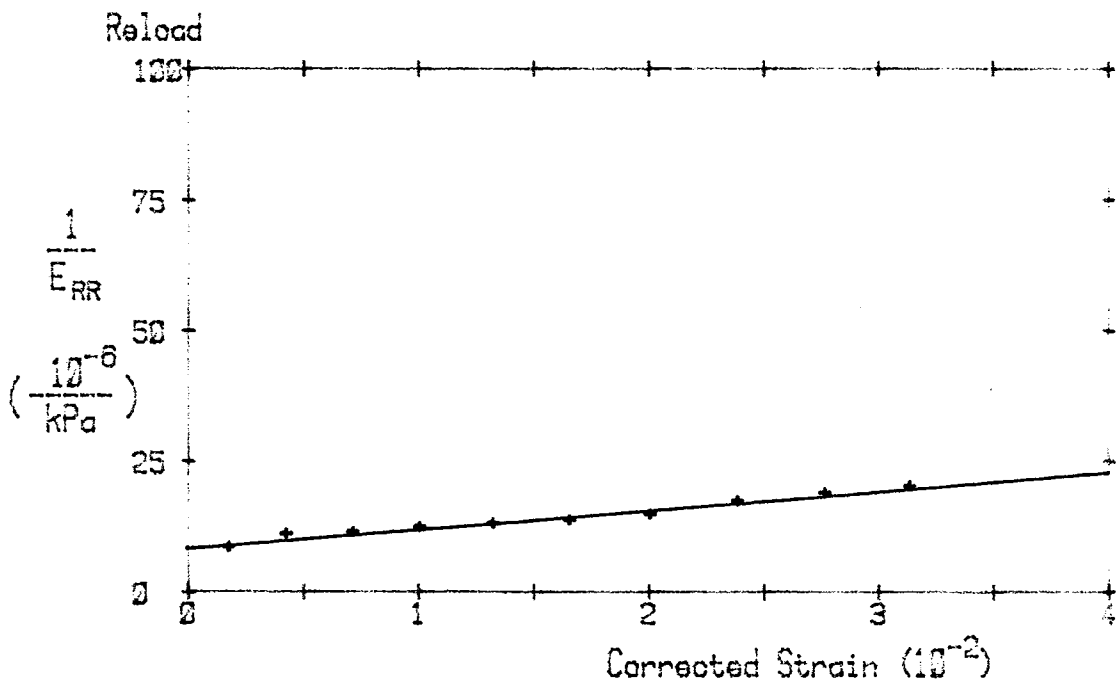
TEST T83

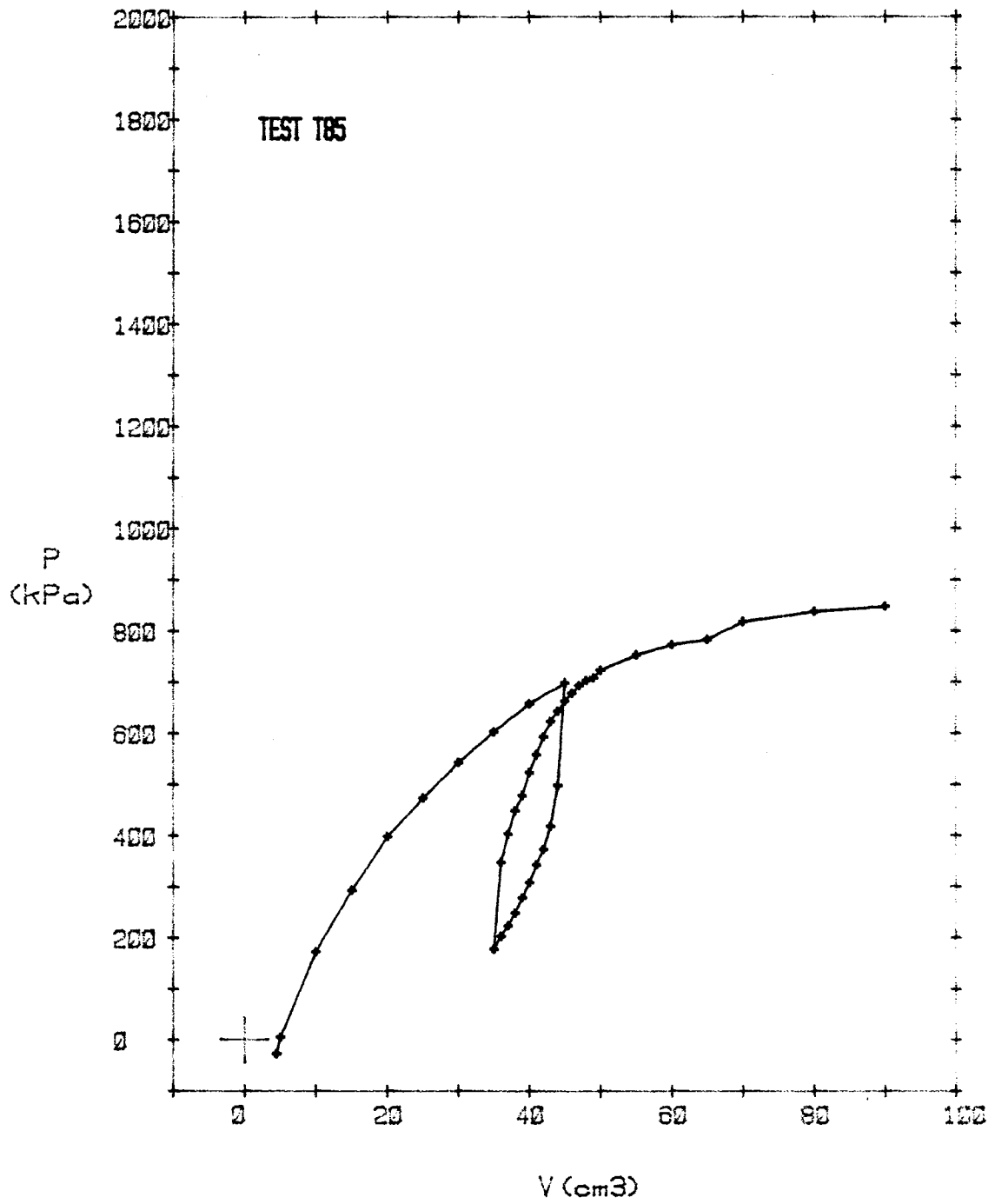


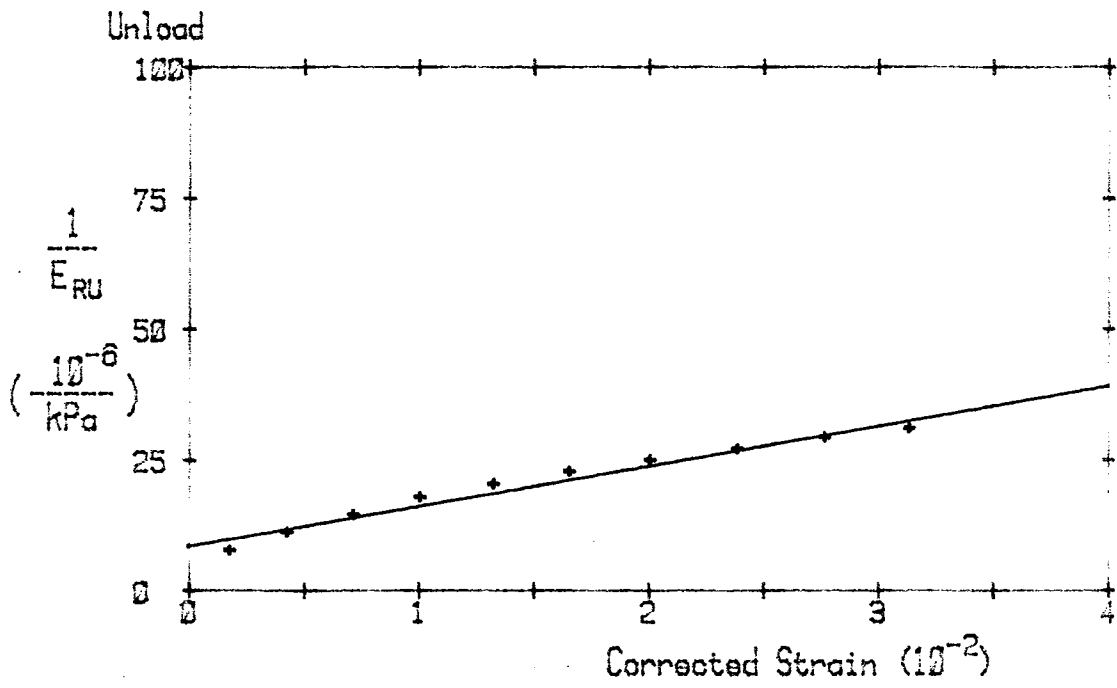




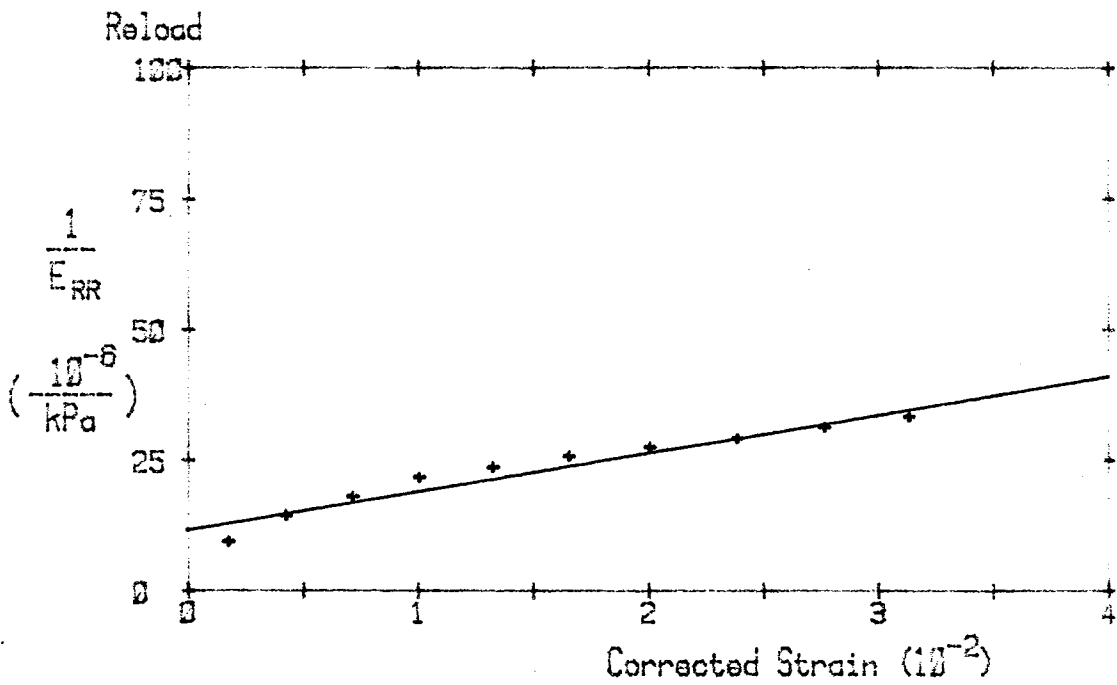
TEST T84

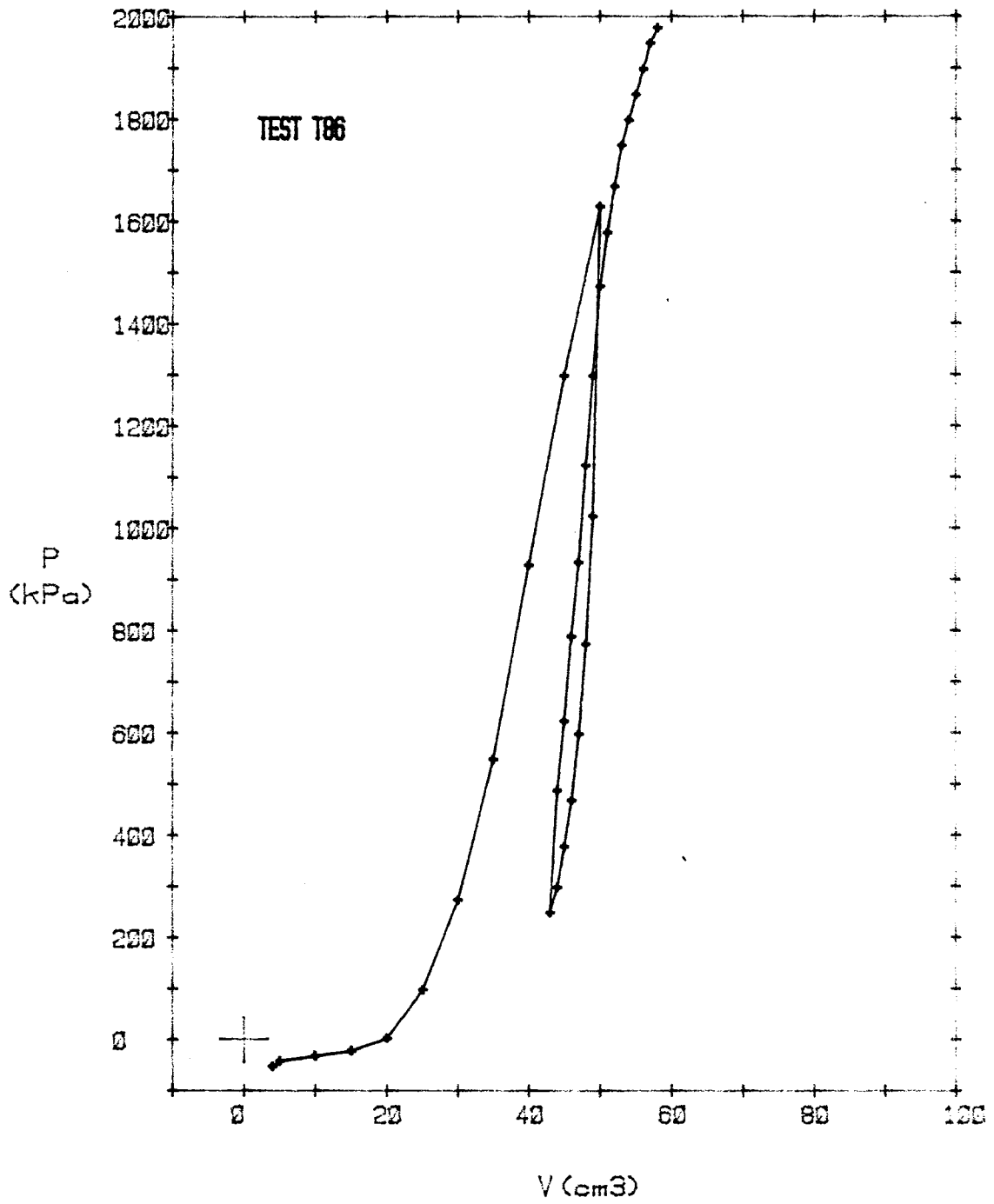


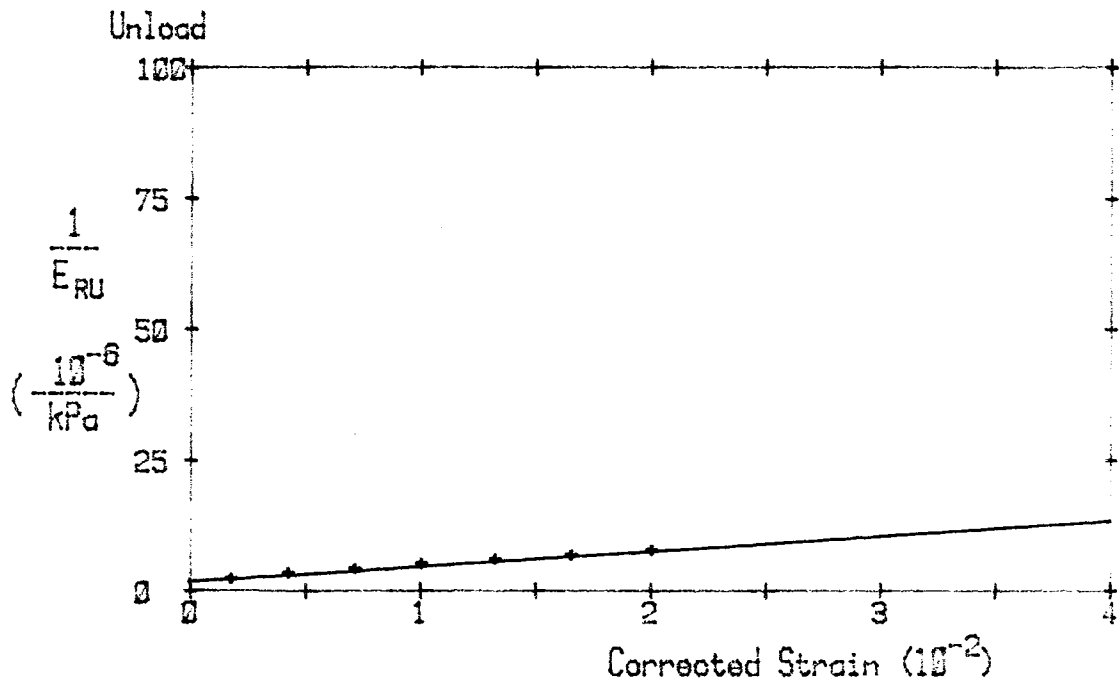




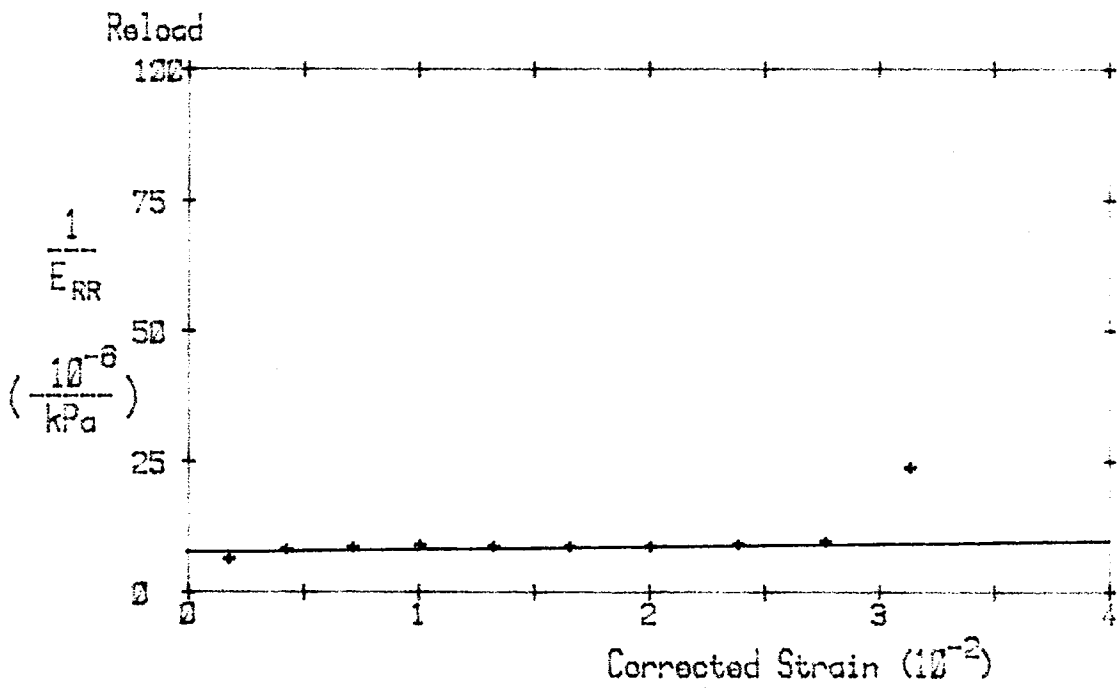
TEST T85

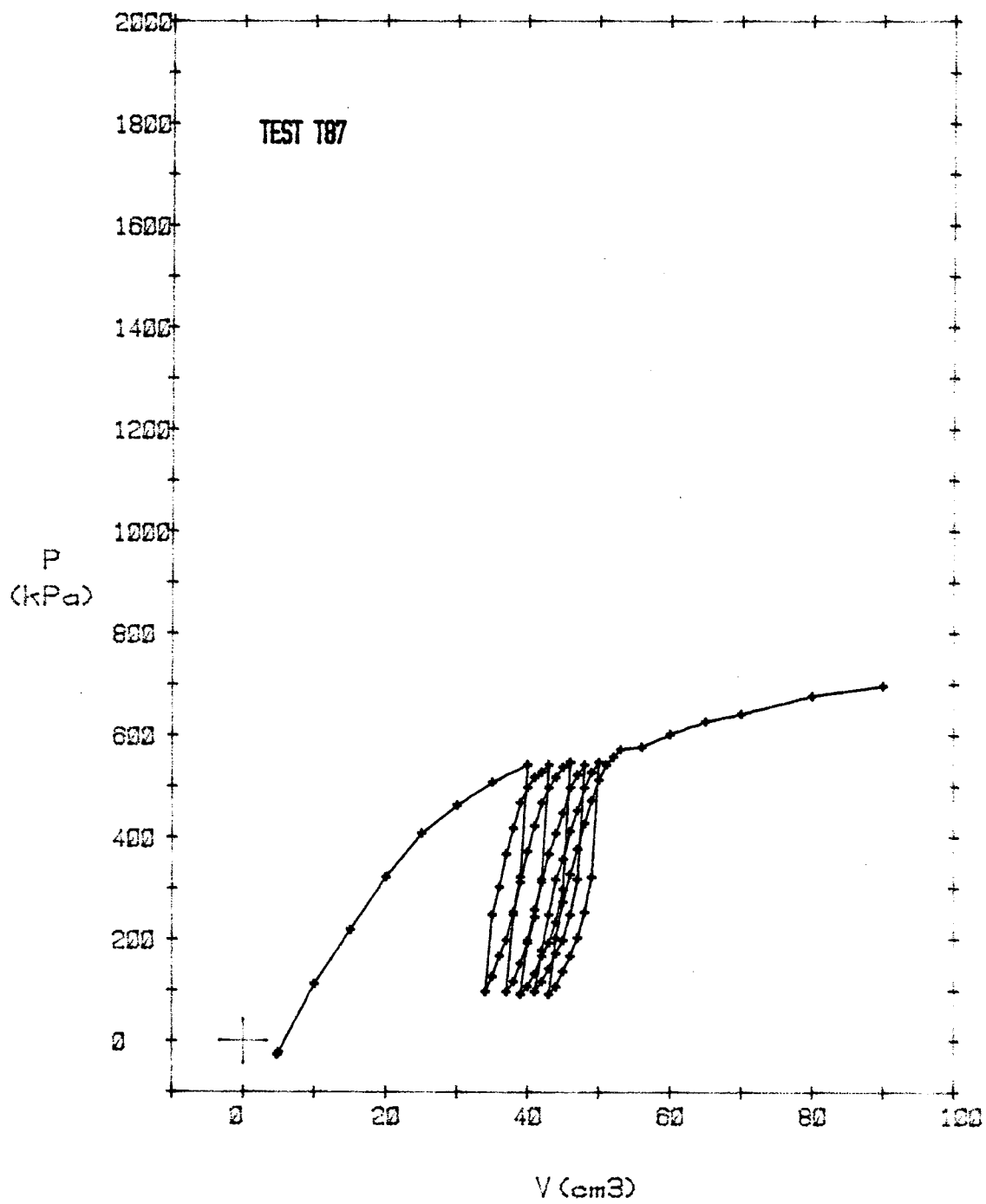


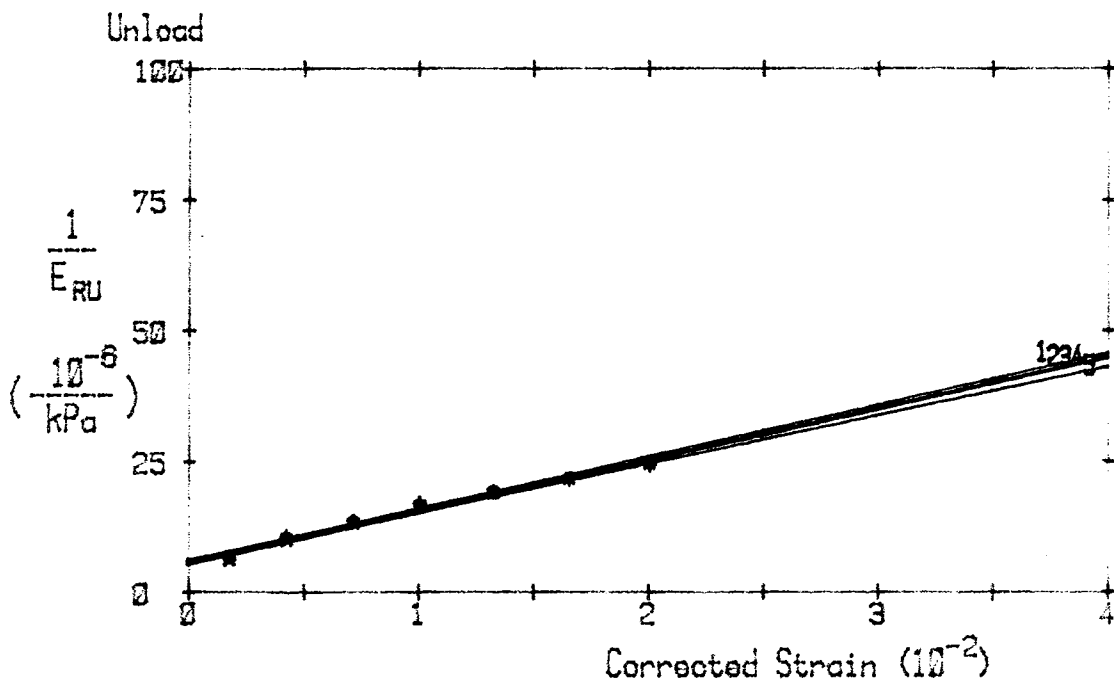




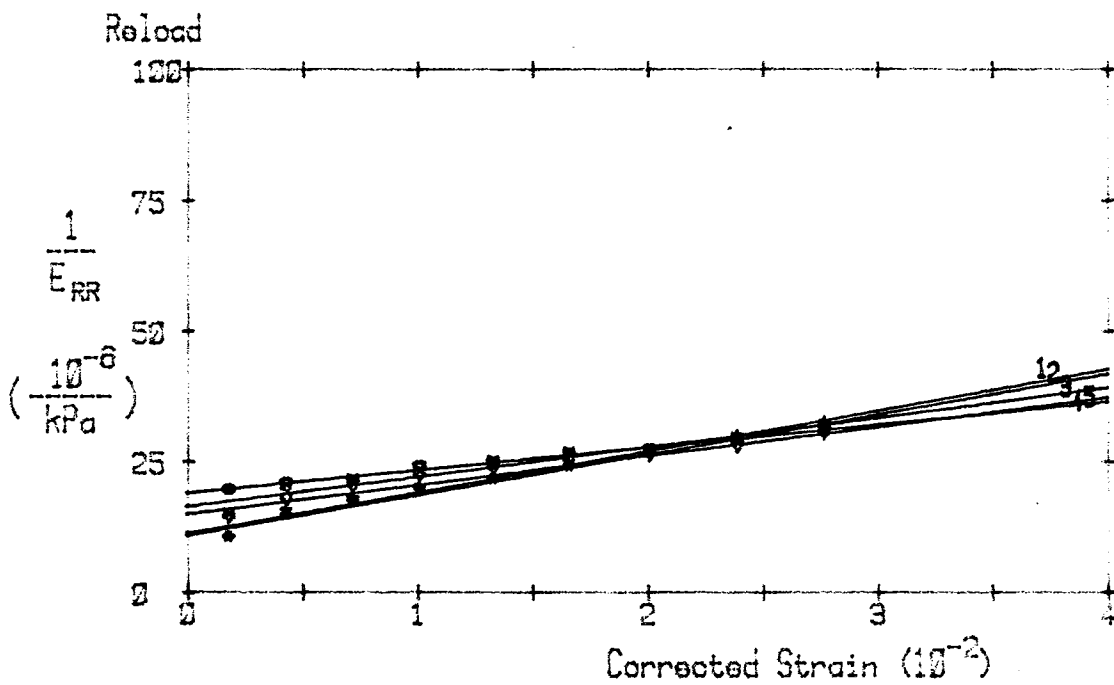
TEST T86

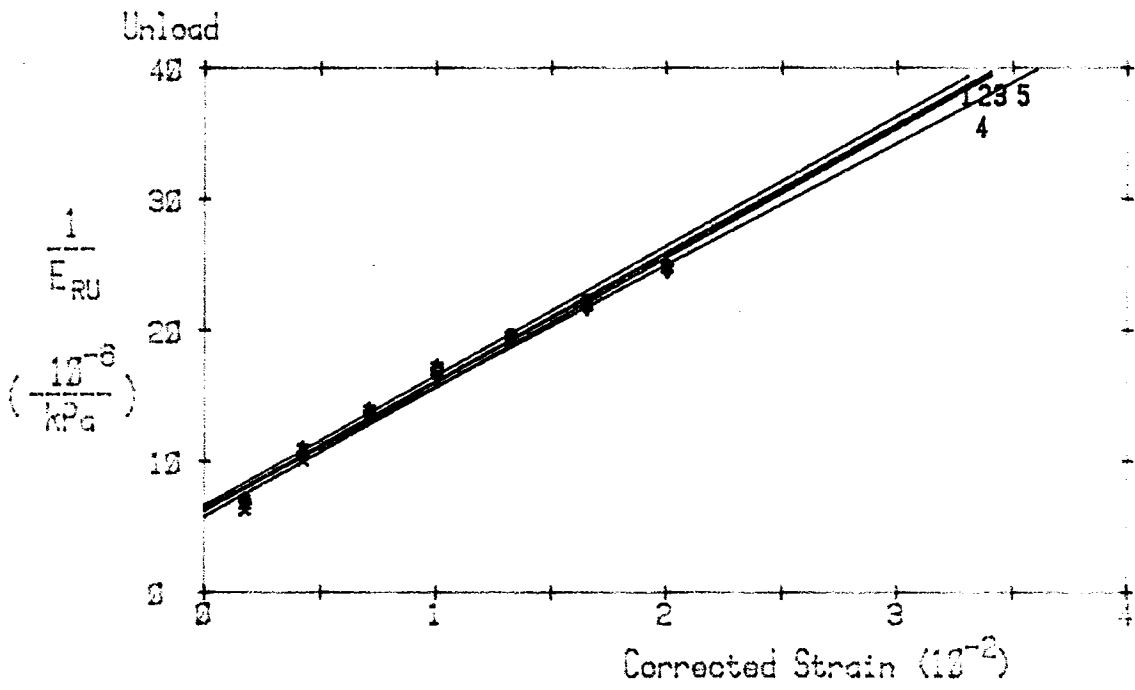




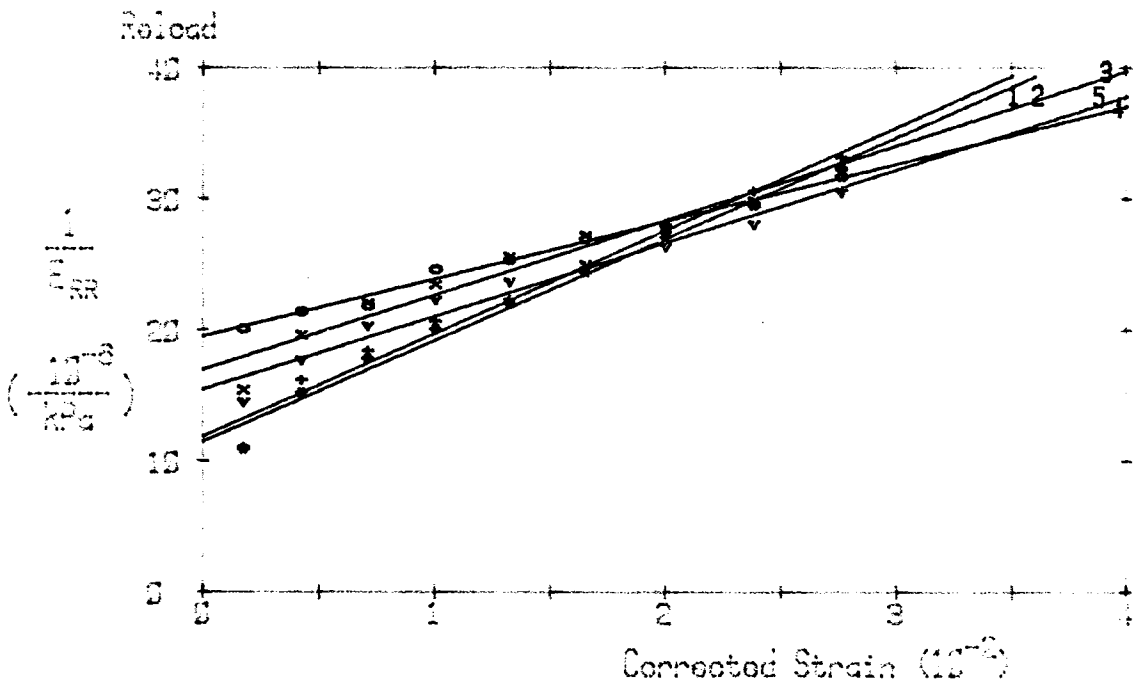


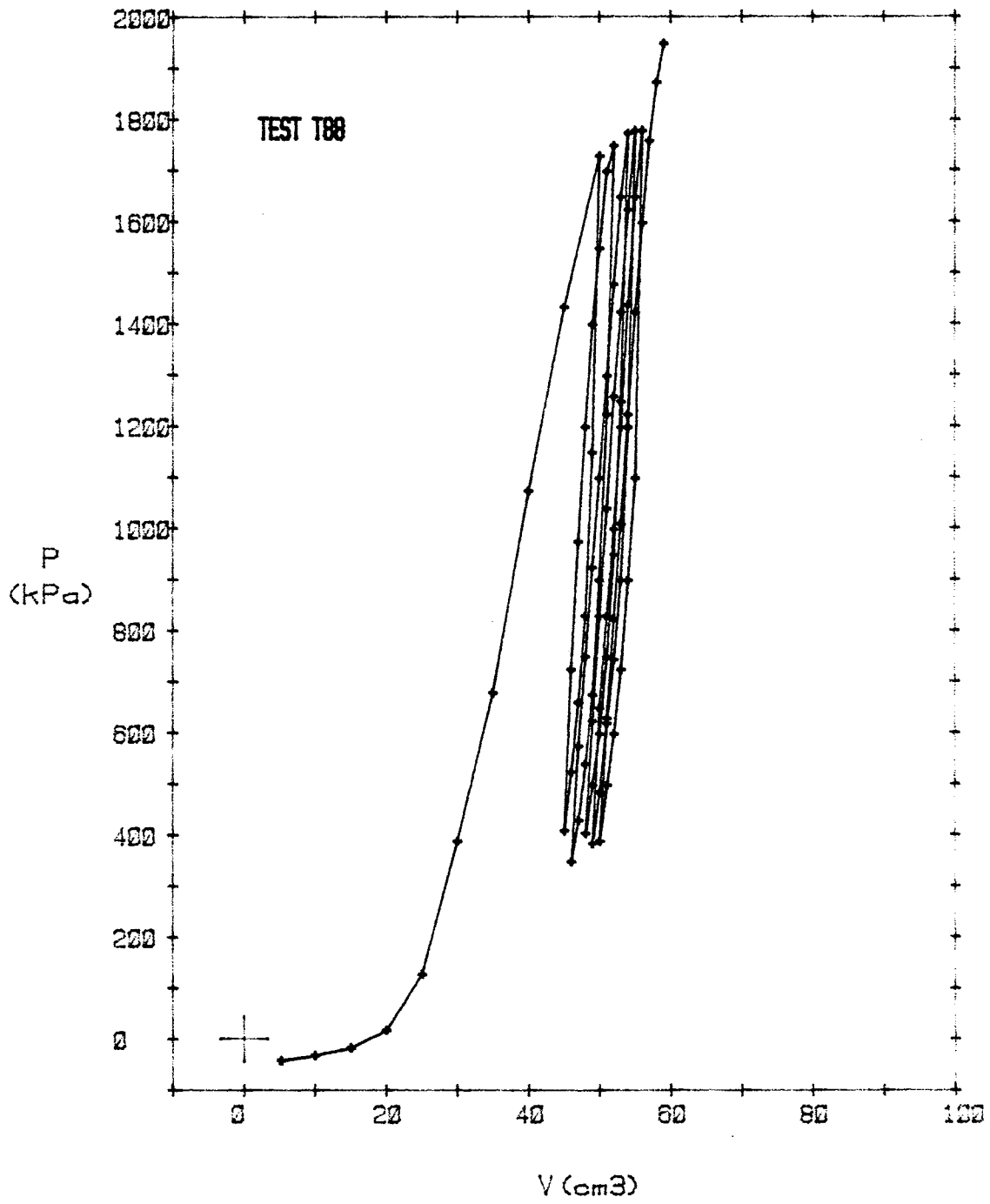
TEST T87

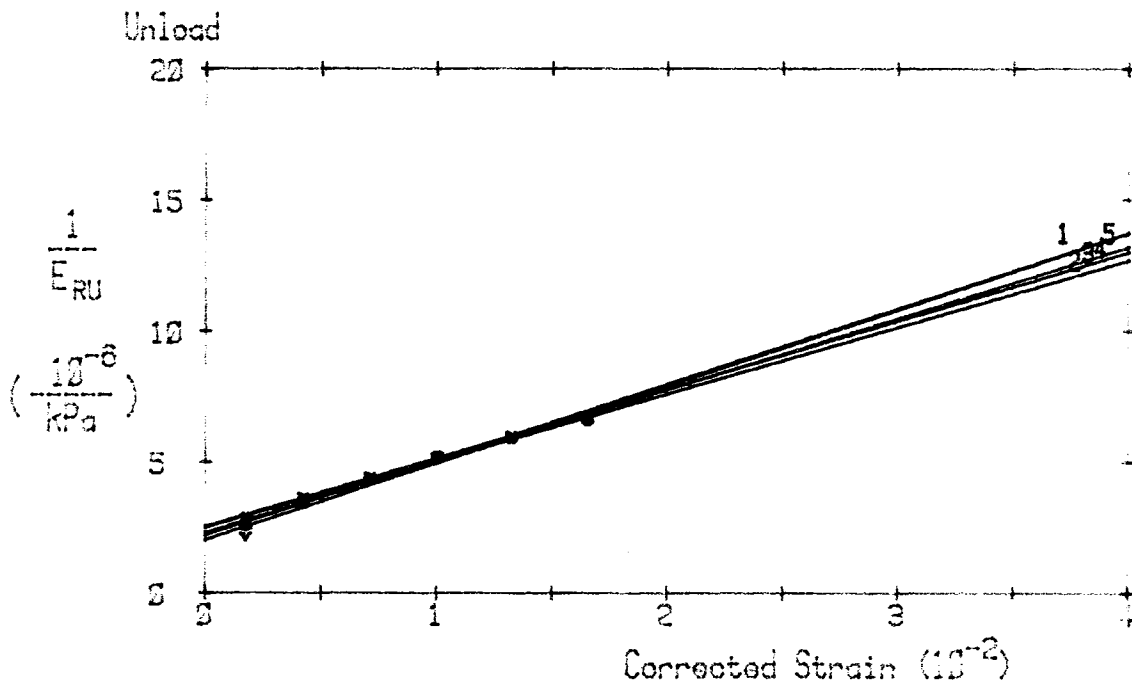




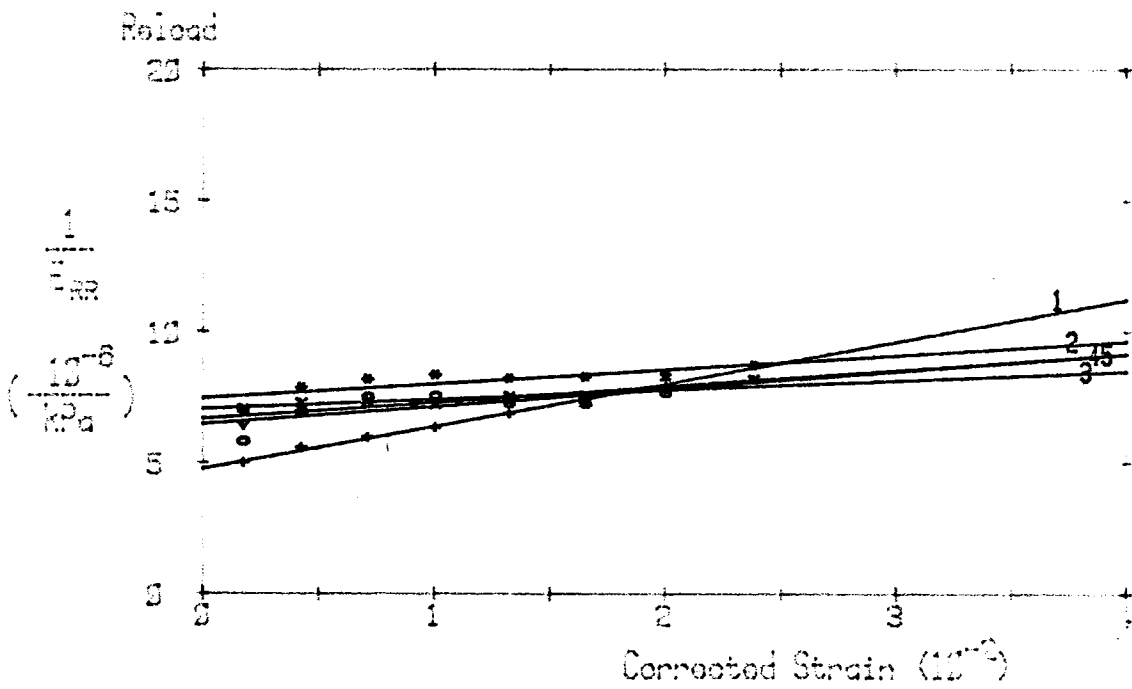
TEST T87

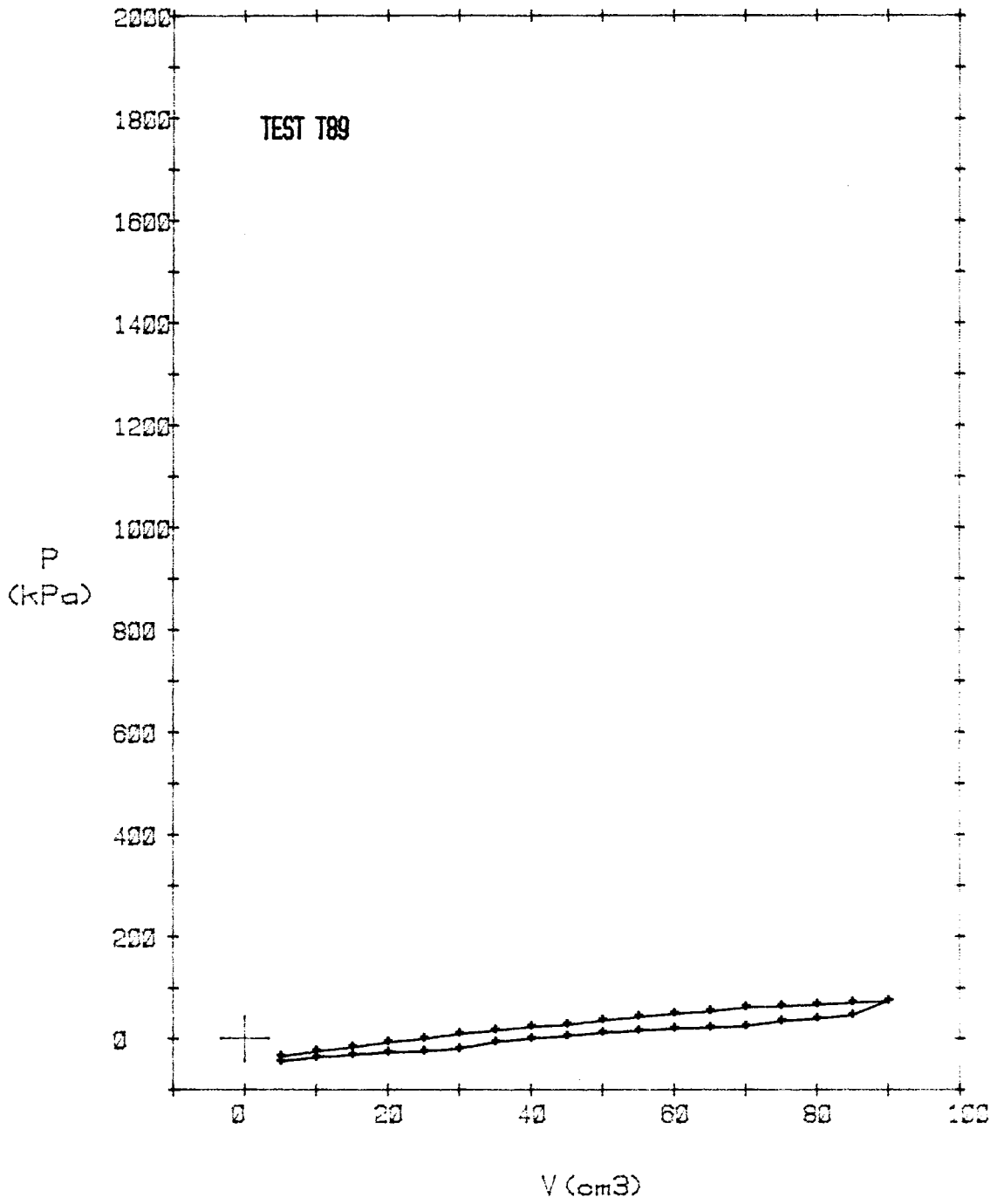


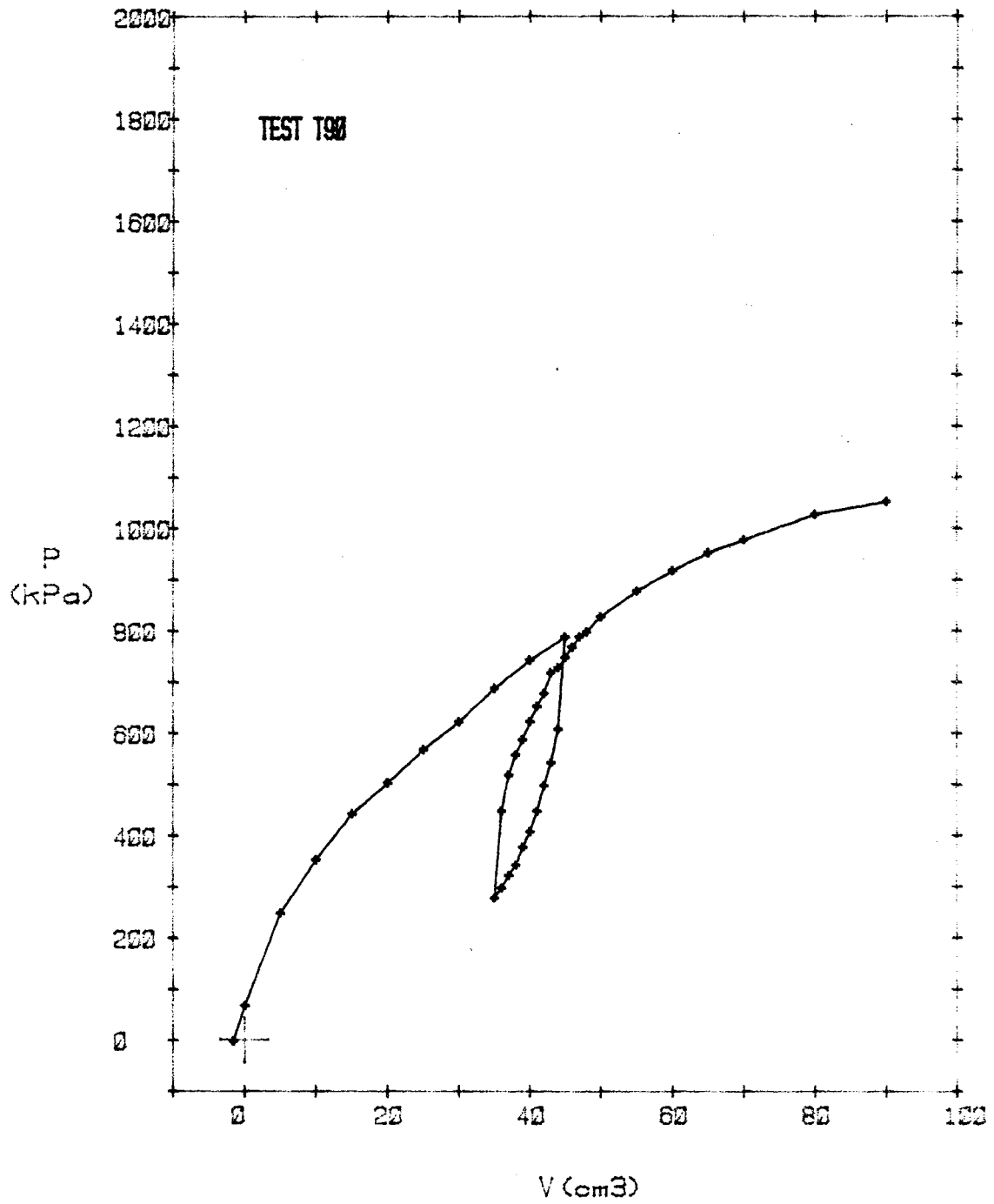


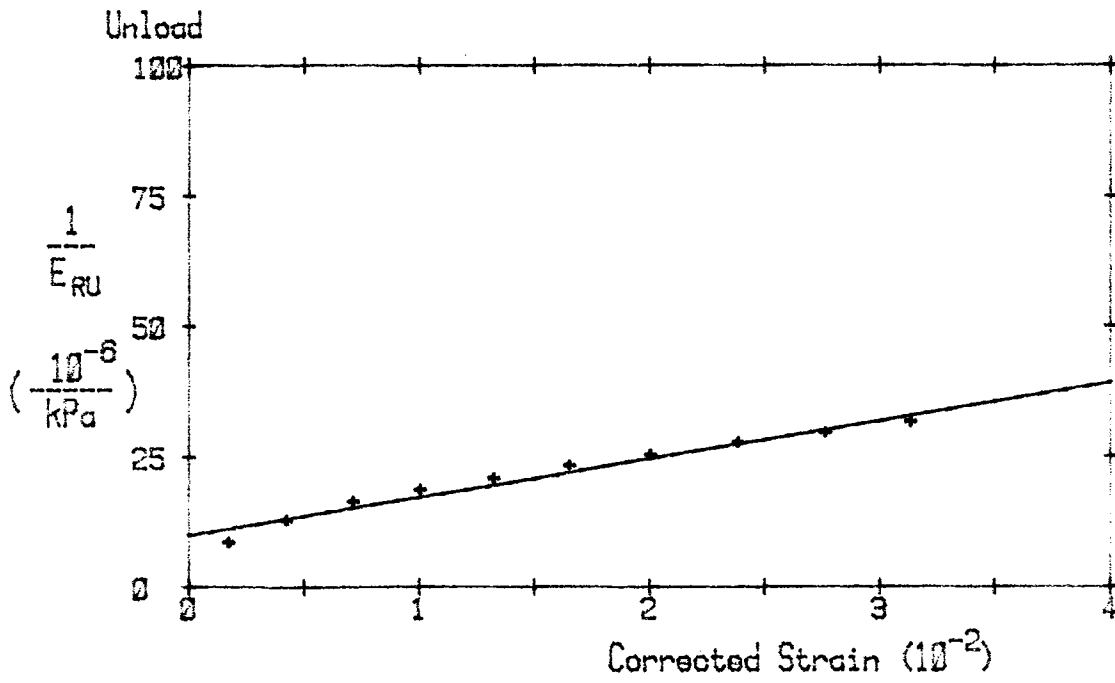


TEST T88

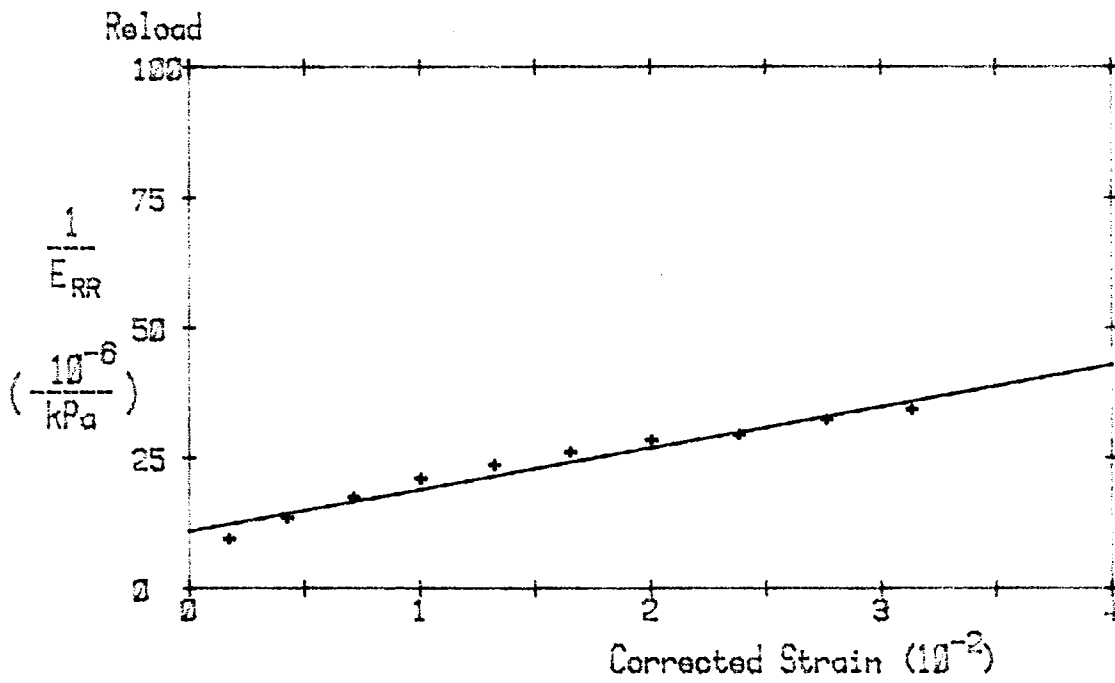


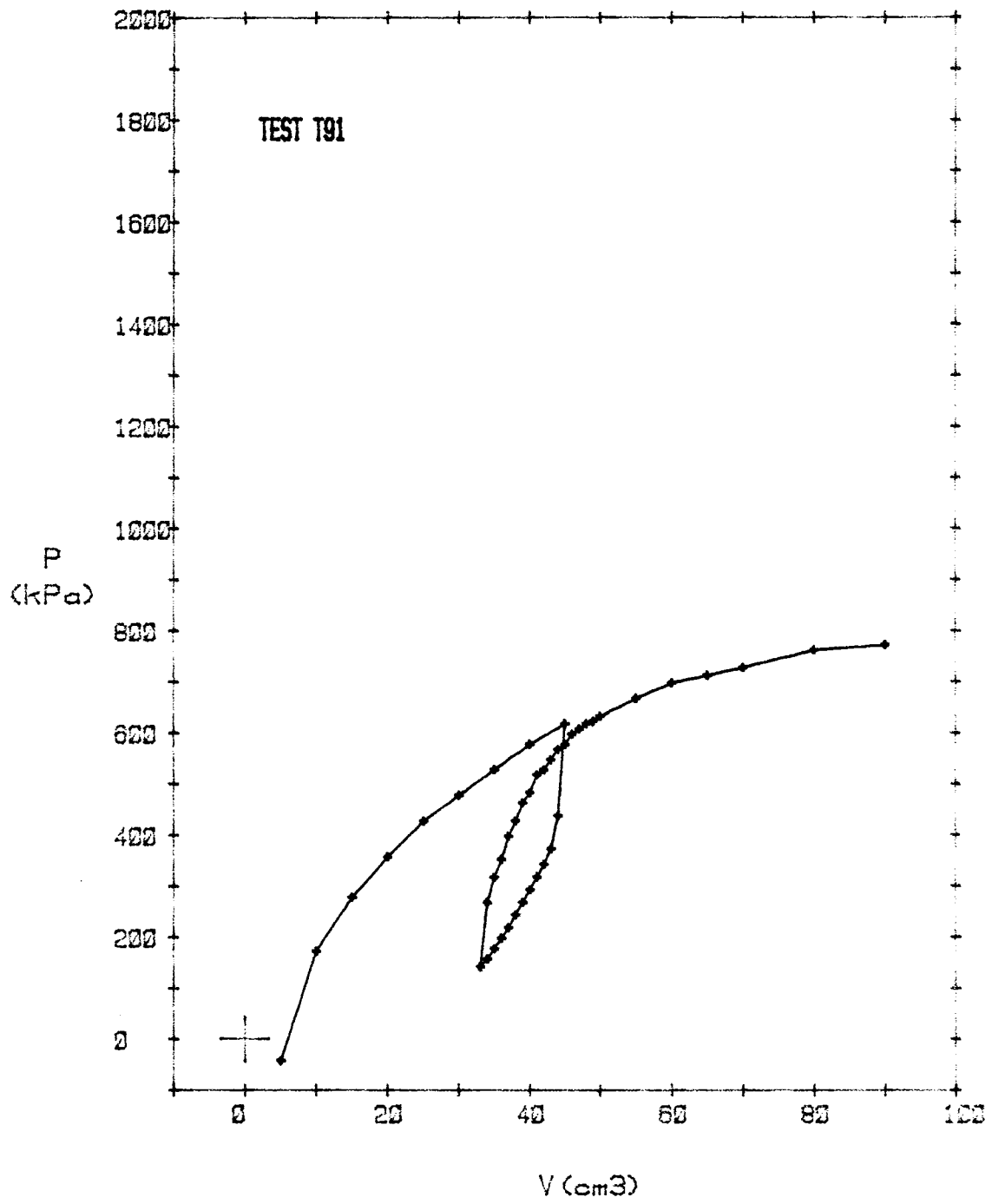


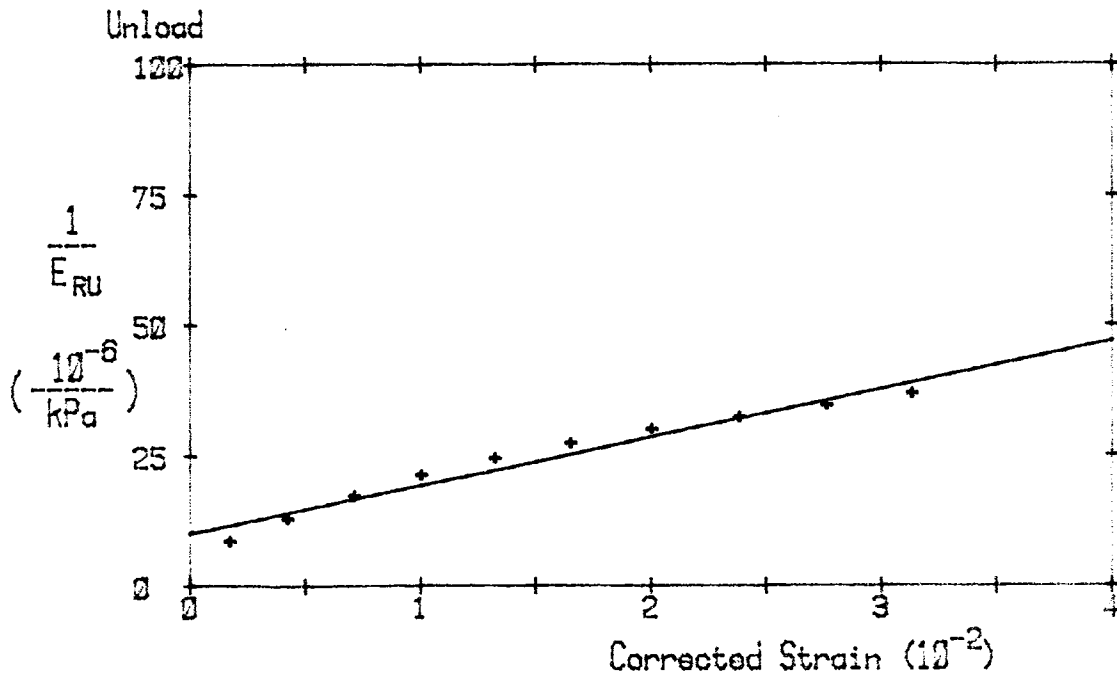




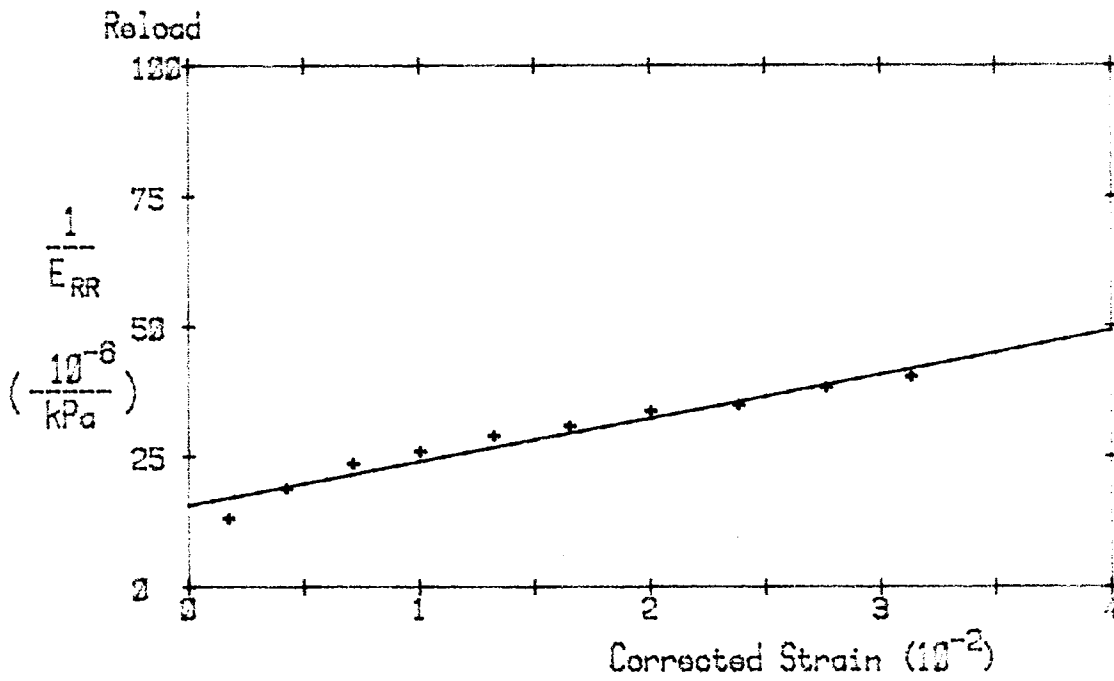
TEST T90

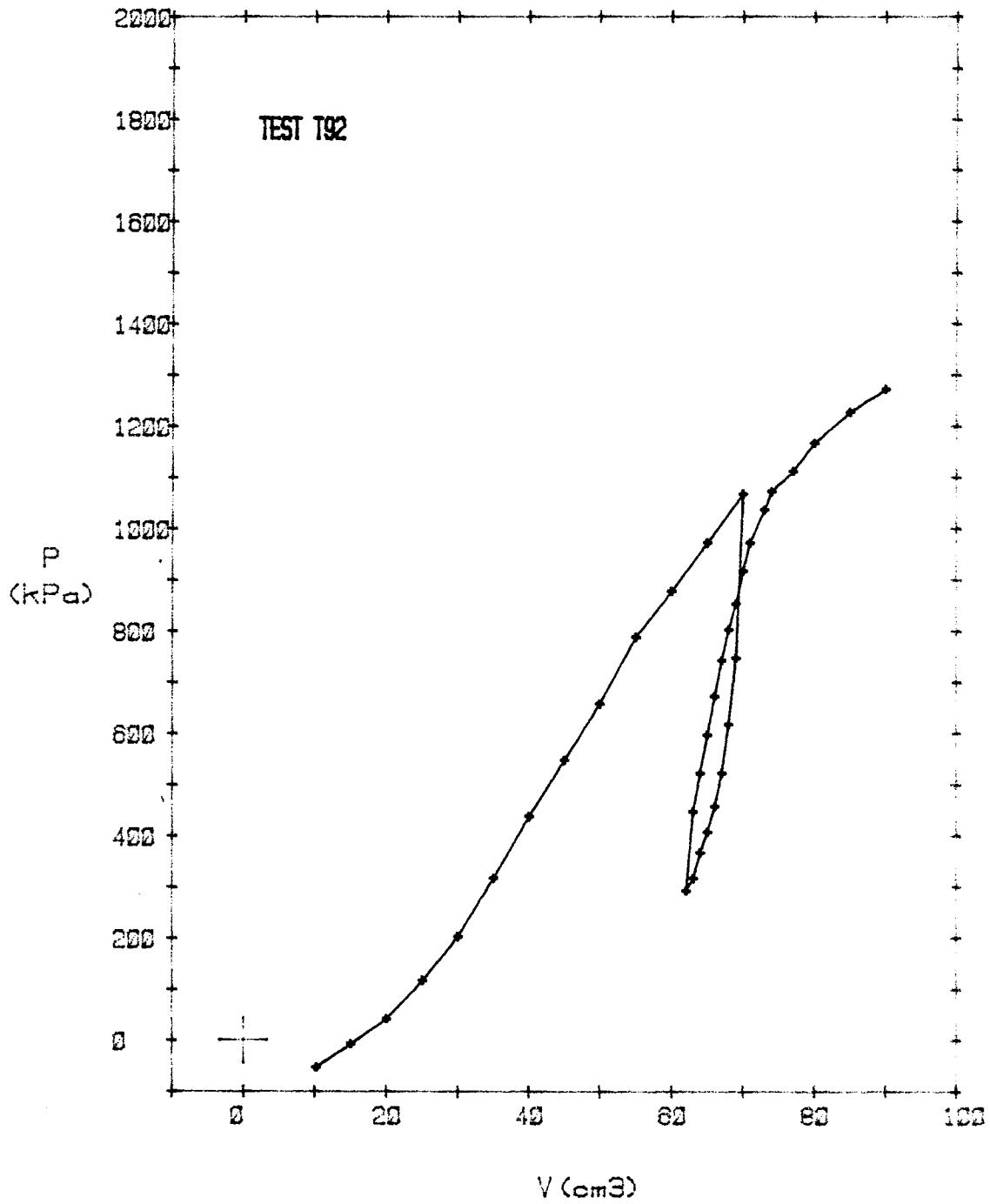


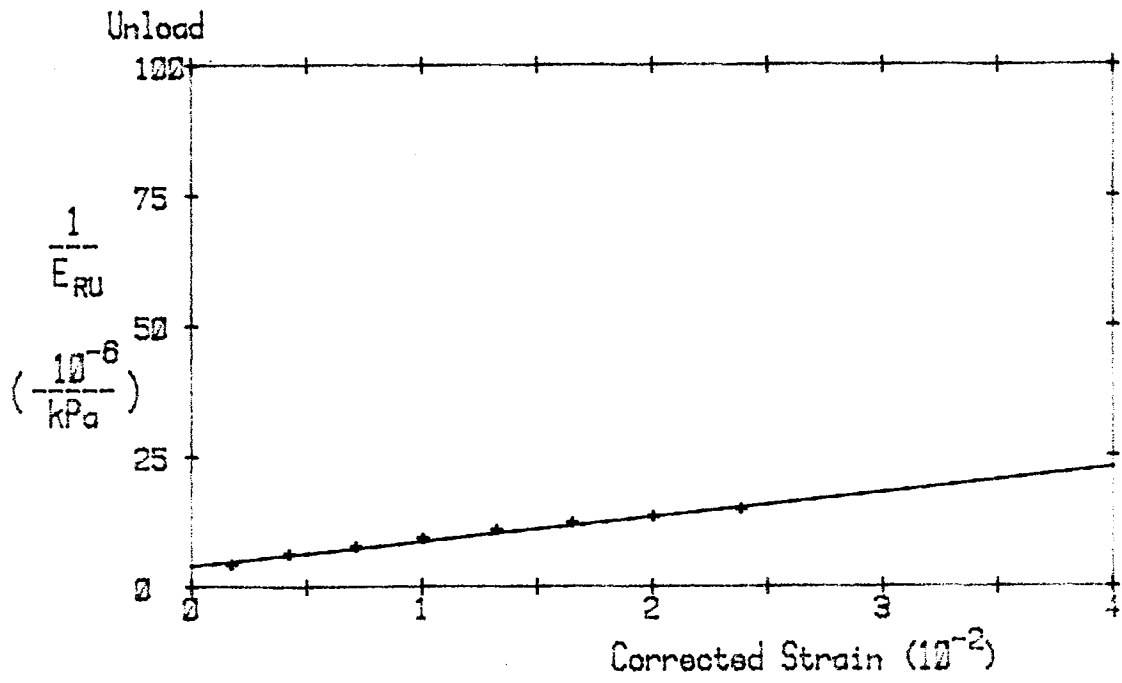




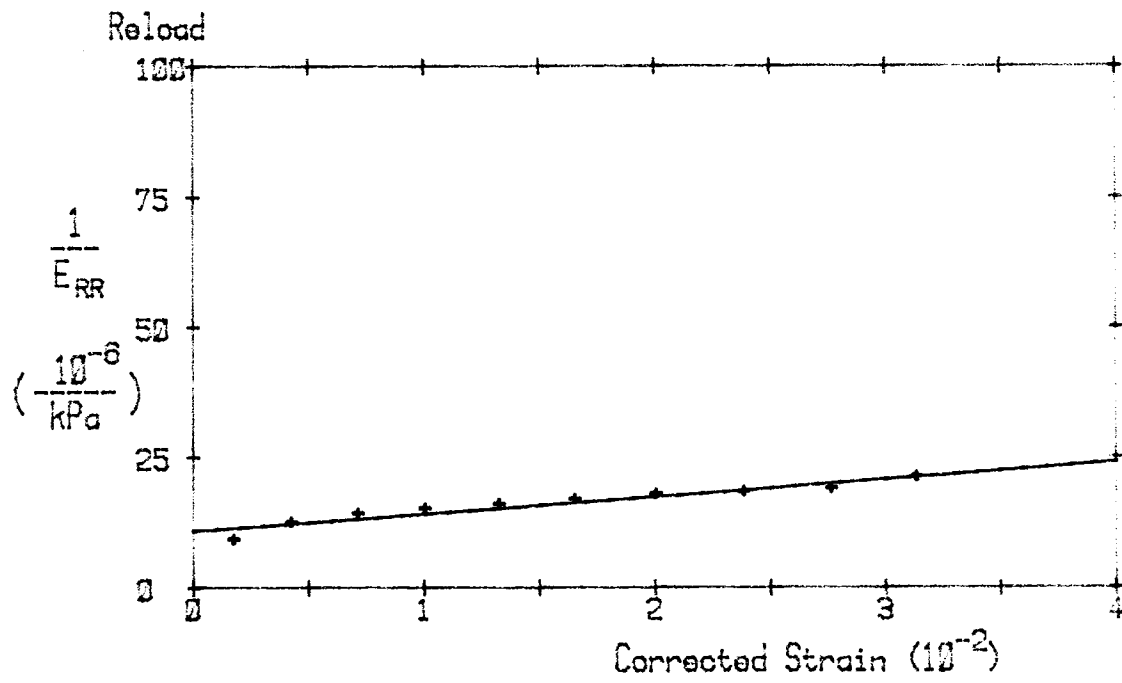
TEST T91

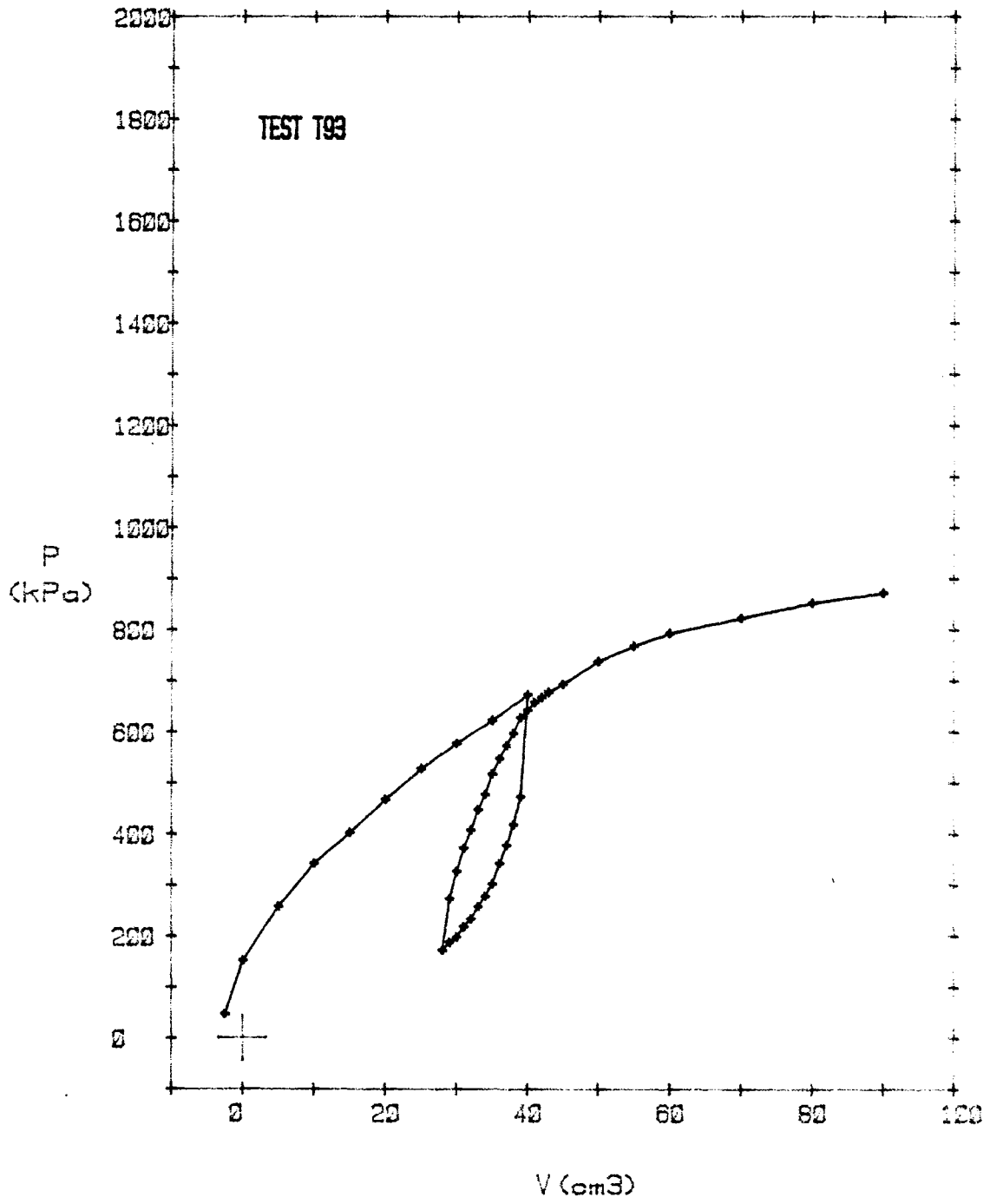


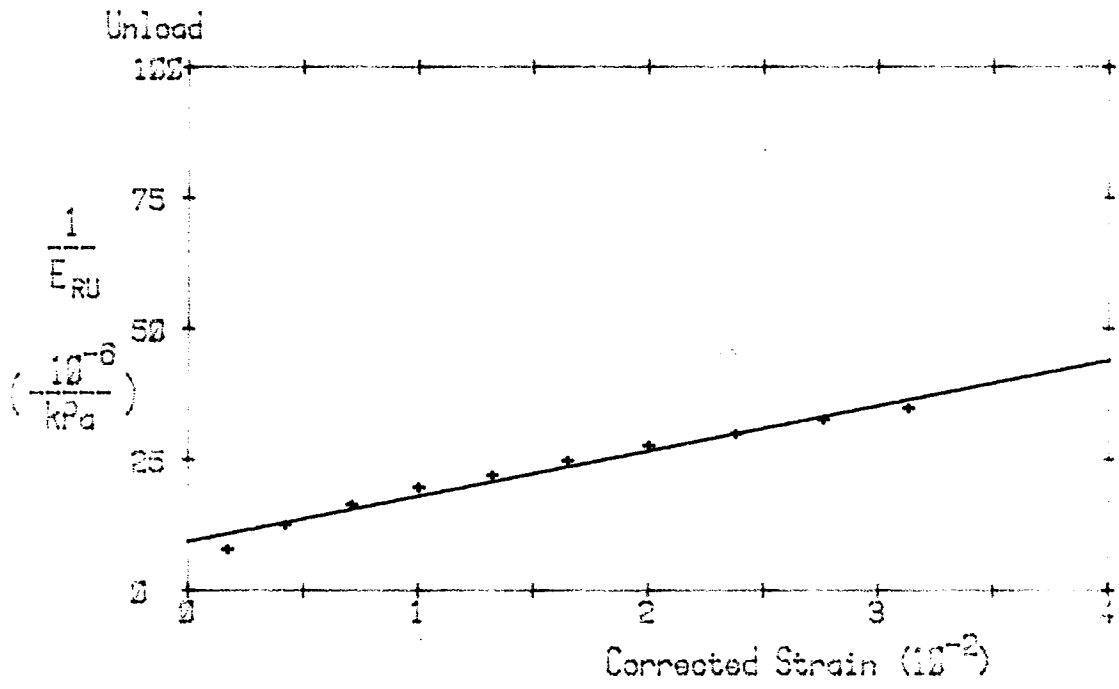




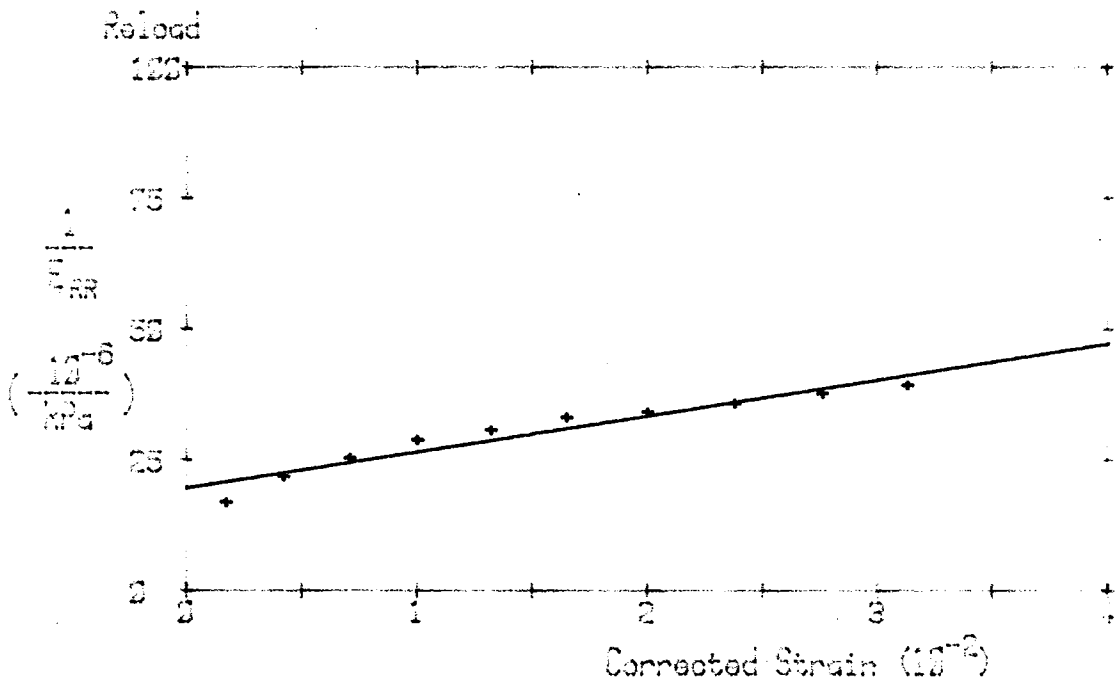
TEST T92

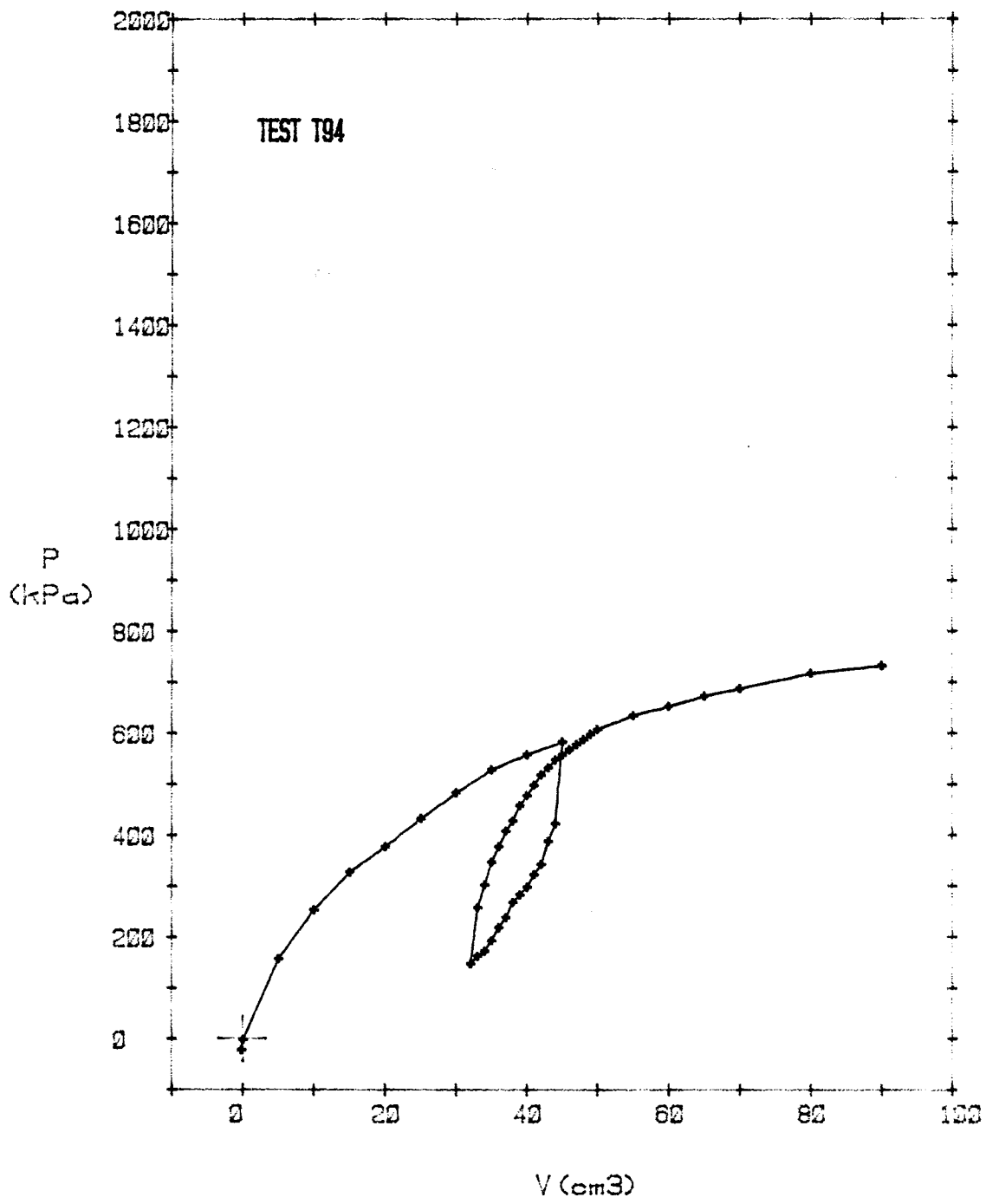


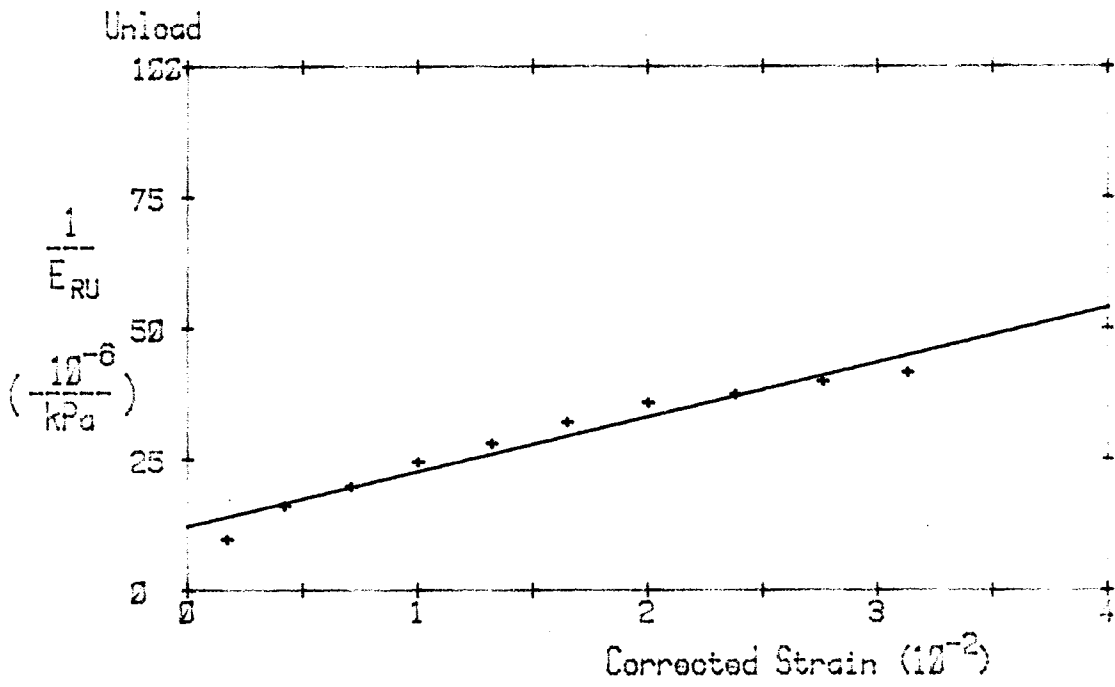




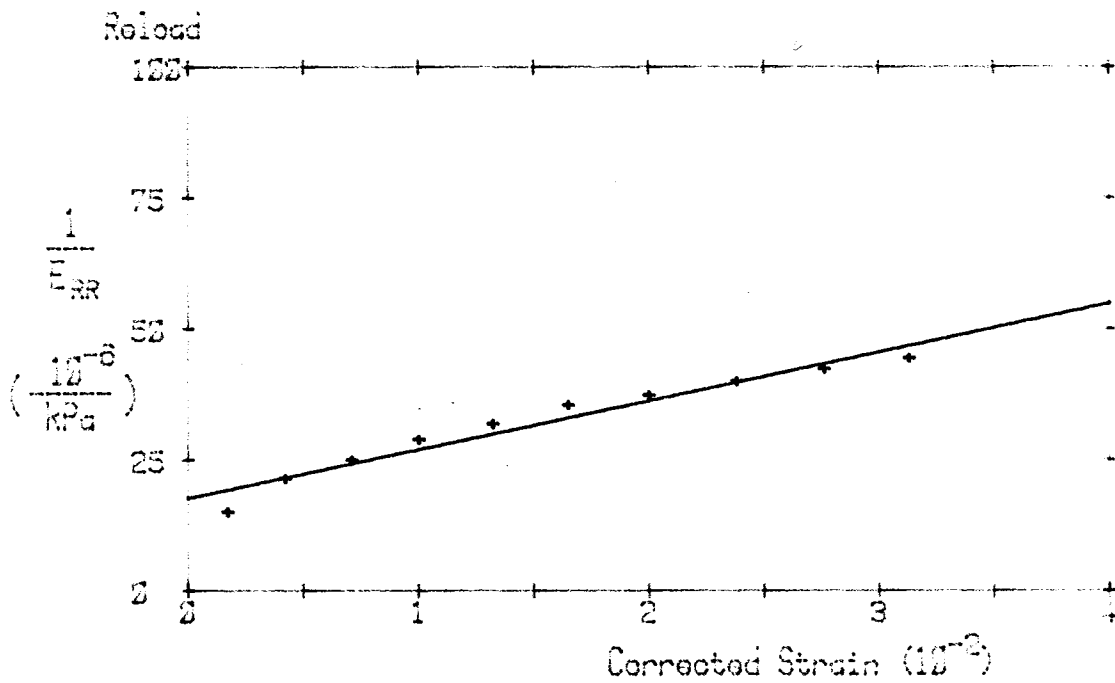
TEST T93

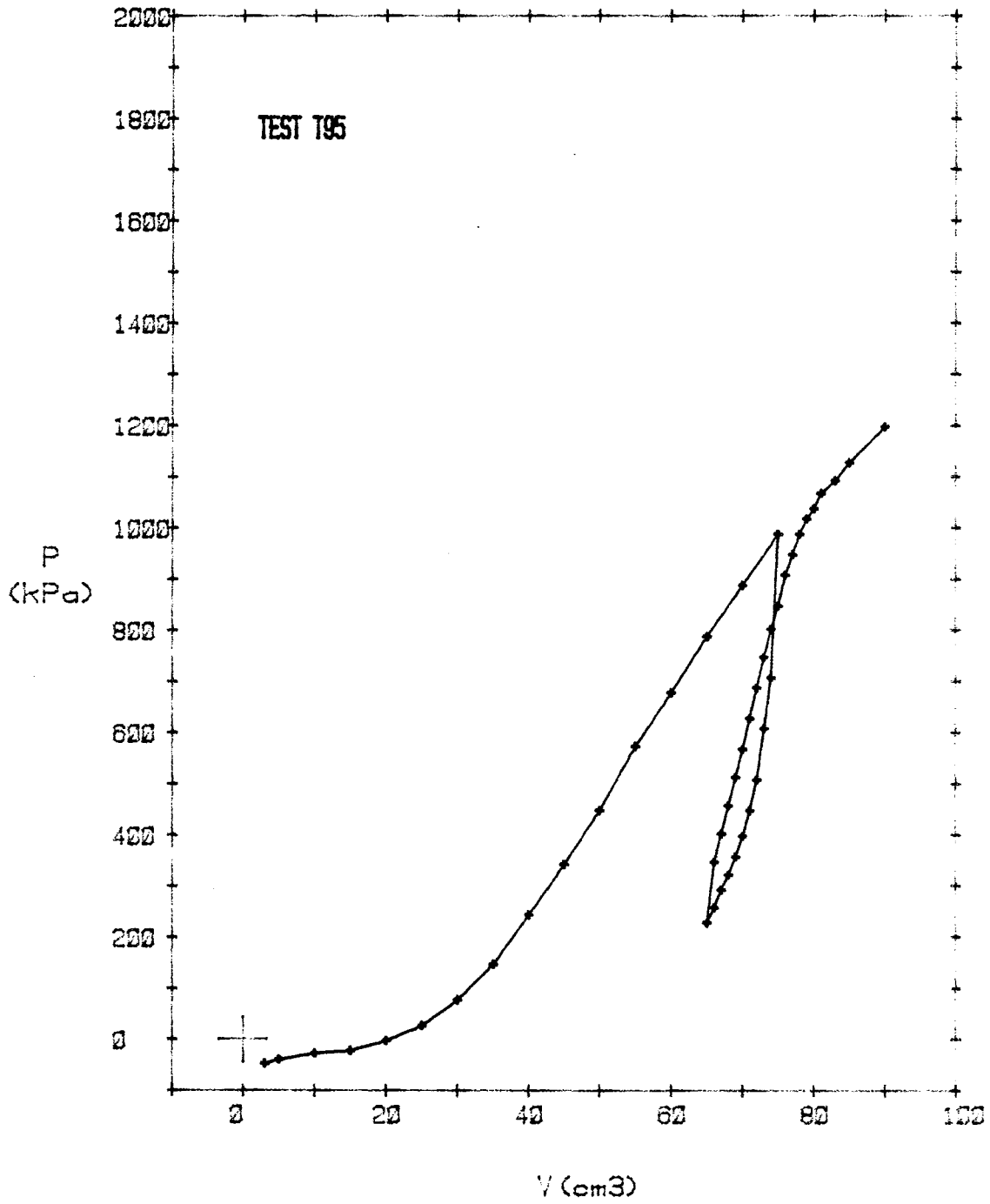


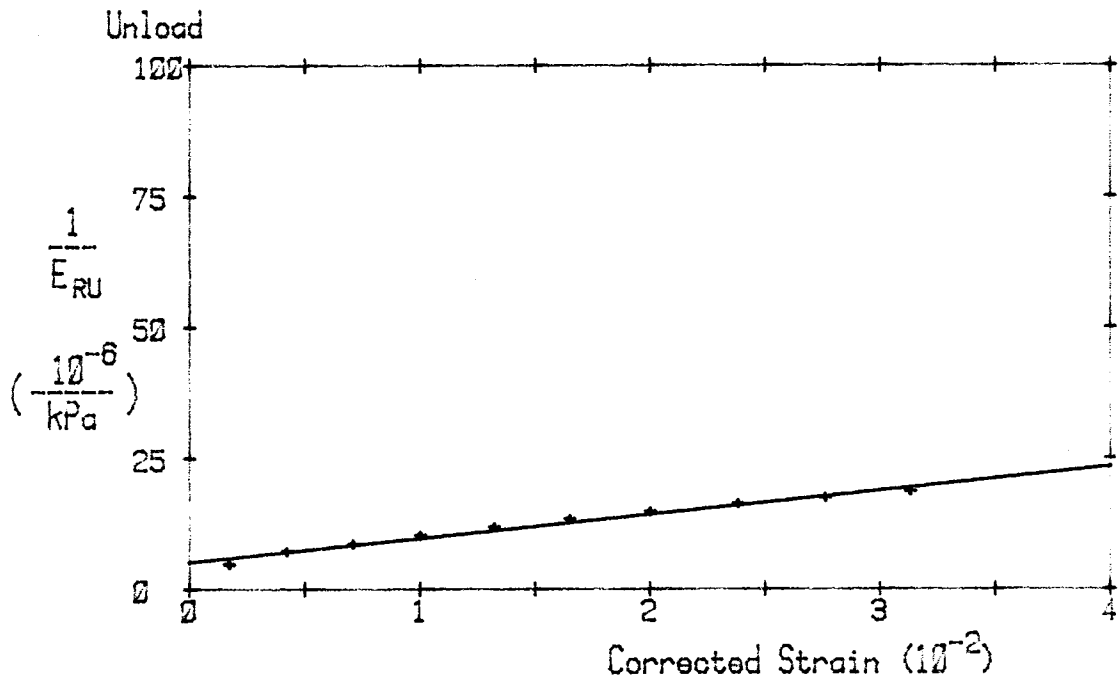




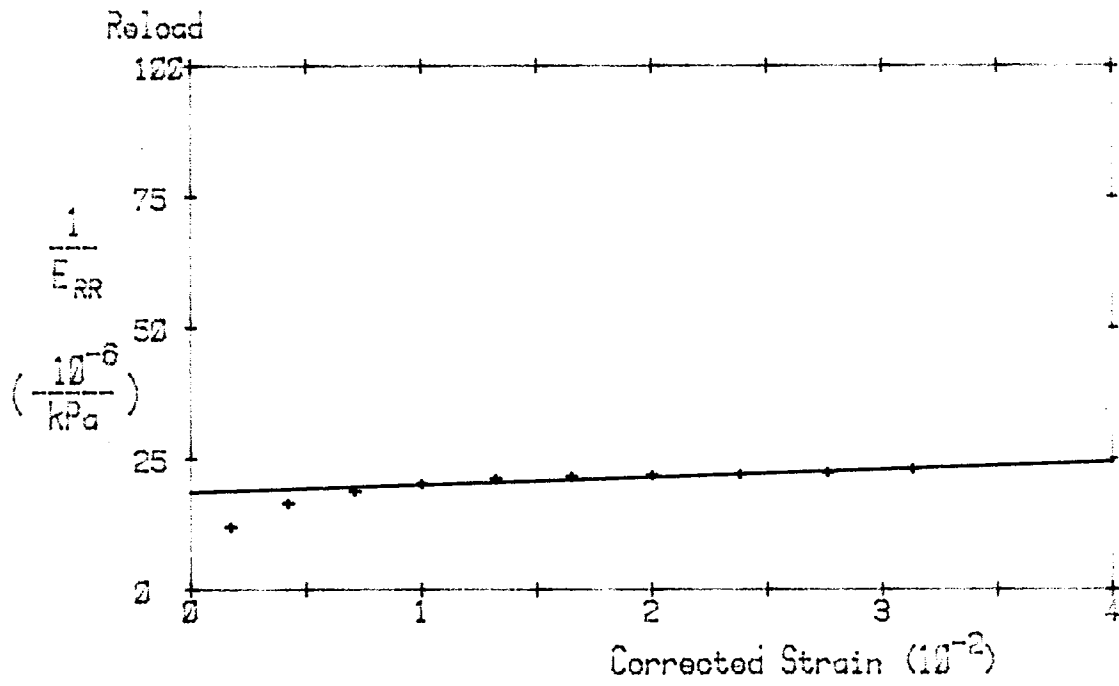
TEST T94

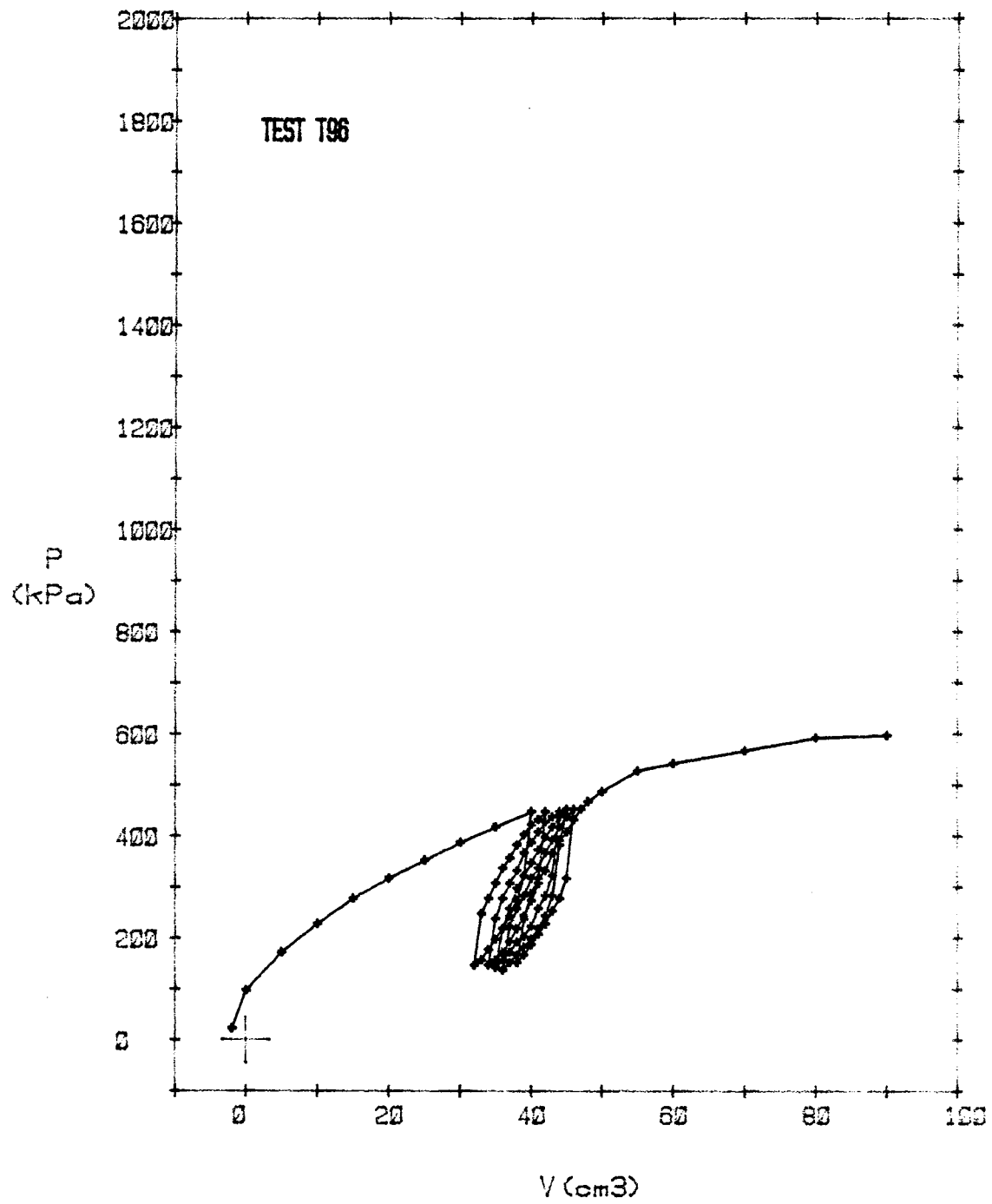


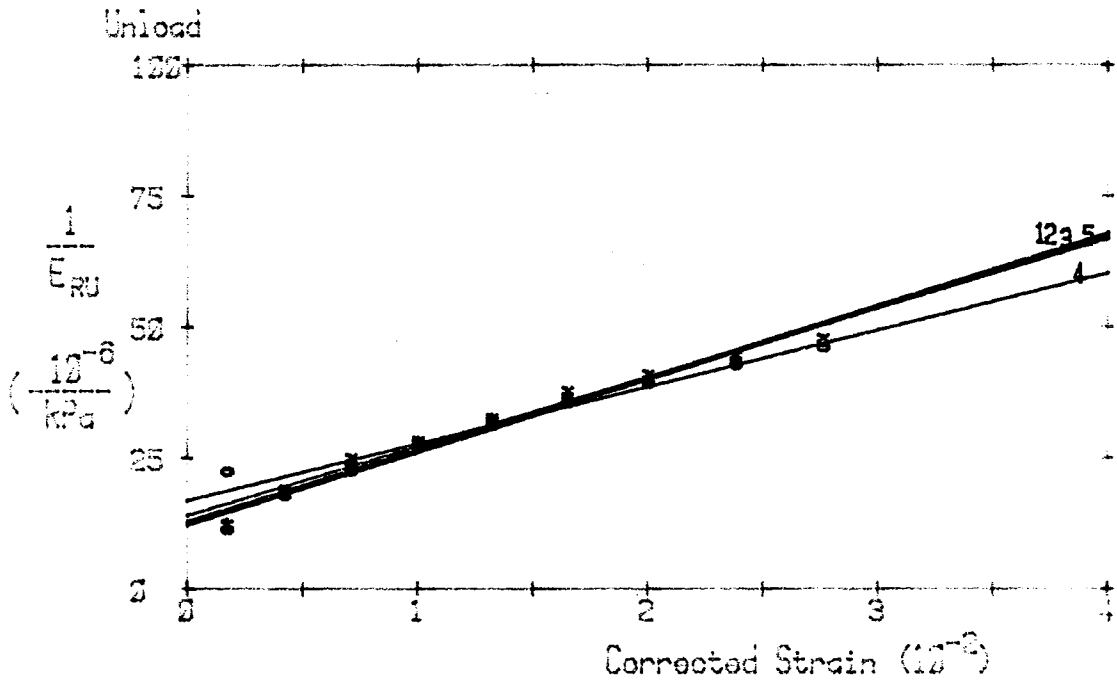




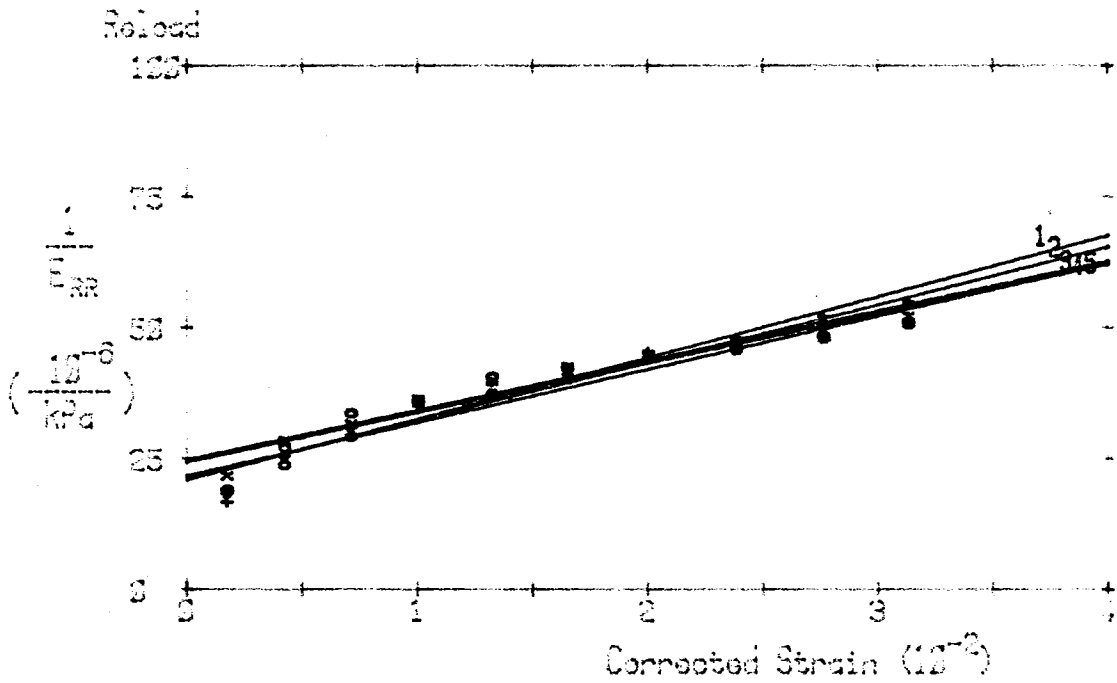
TEST T95

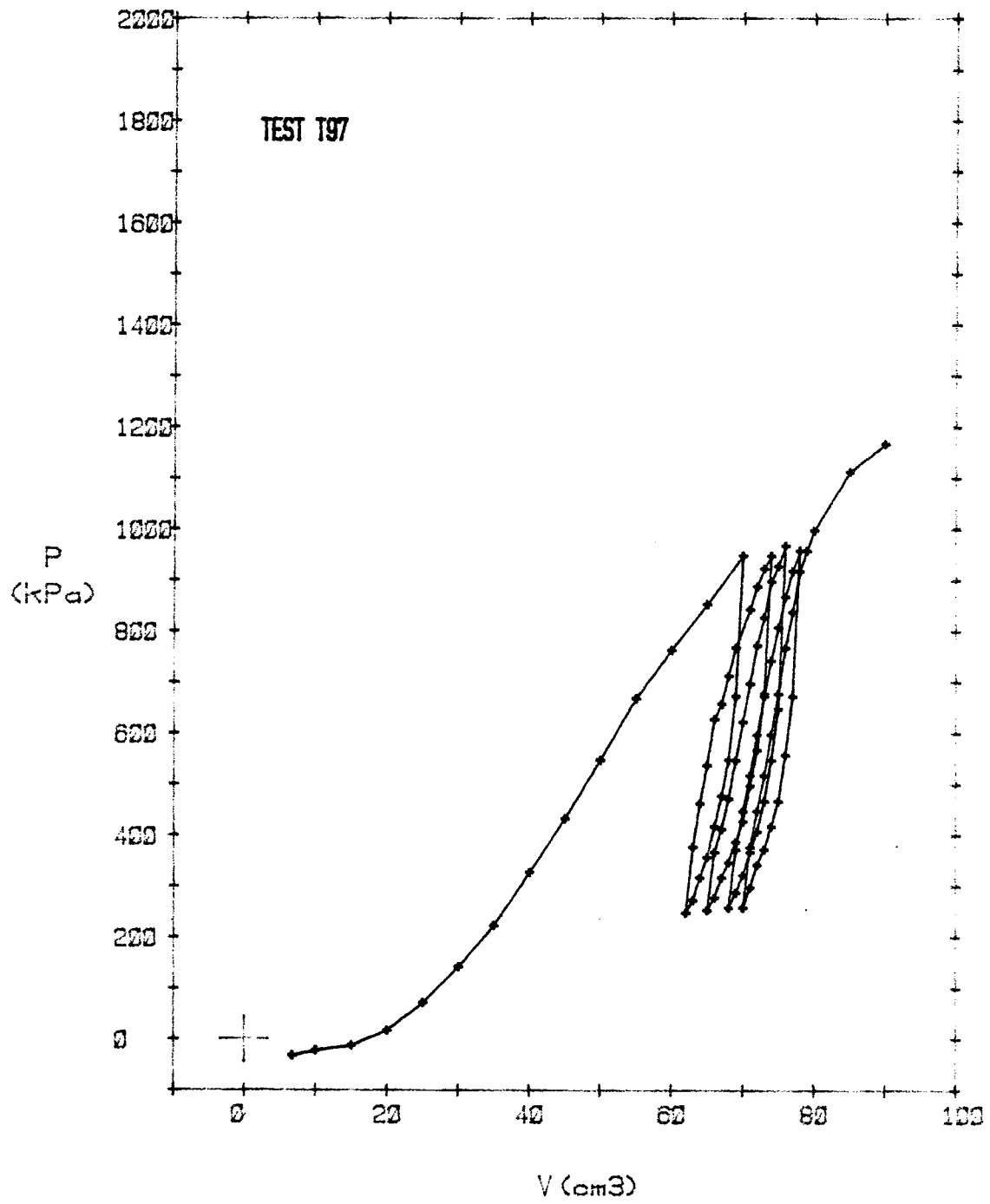


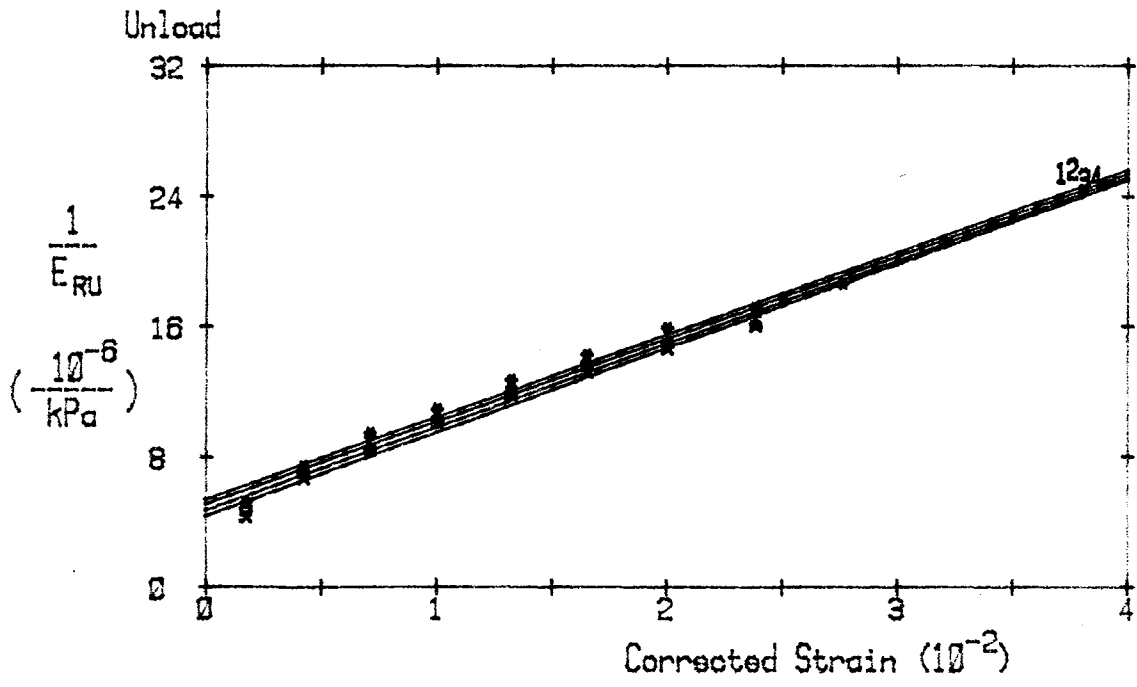




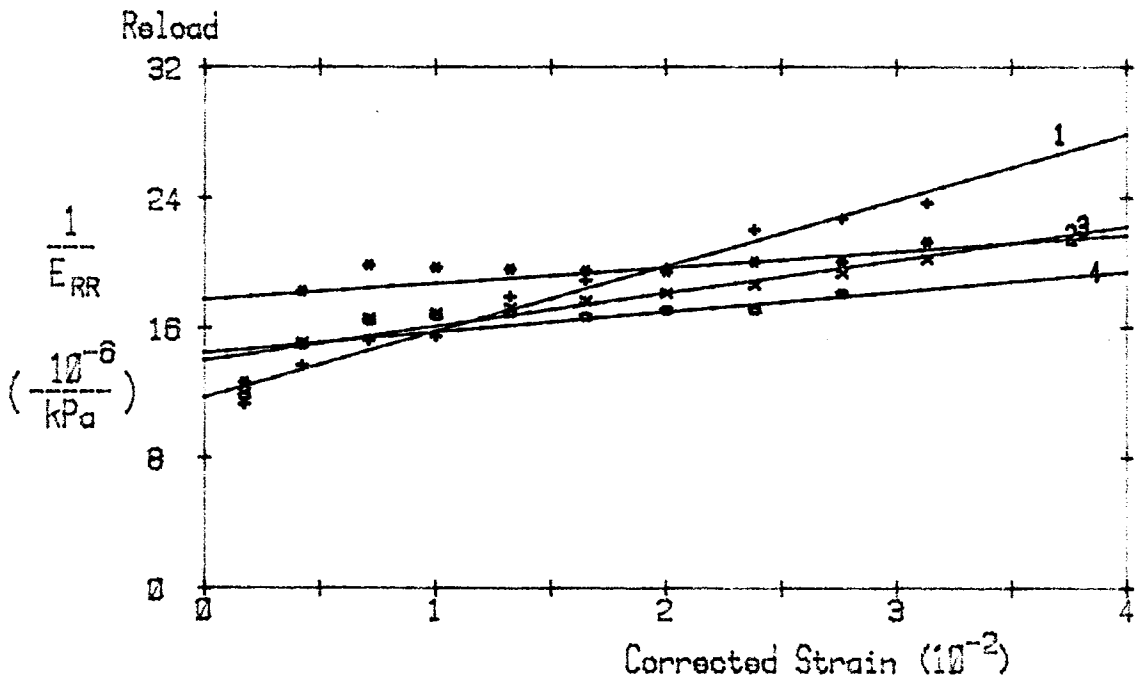
TEST T96

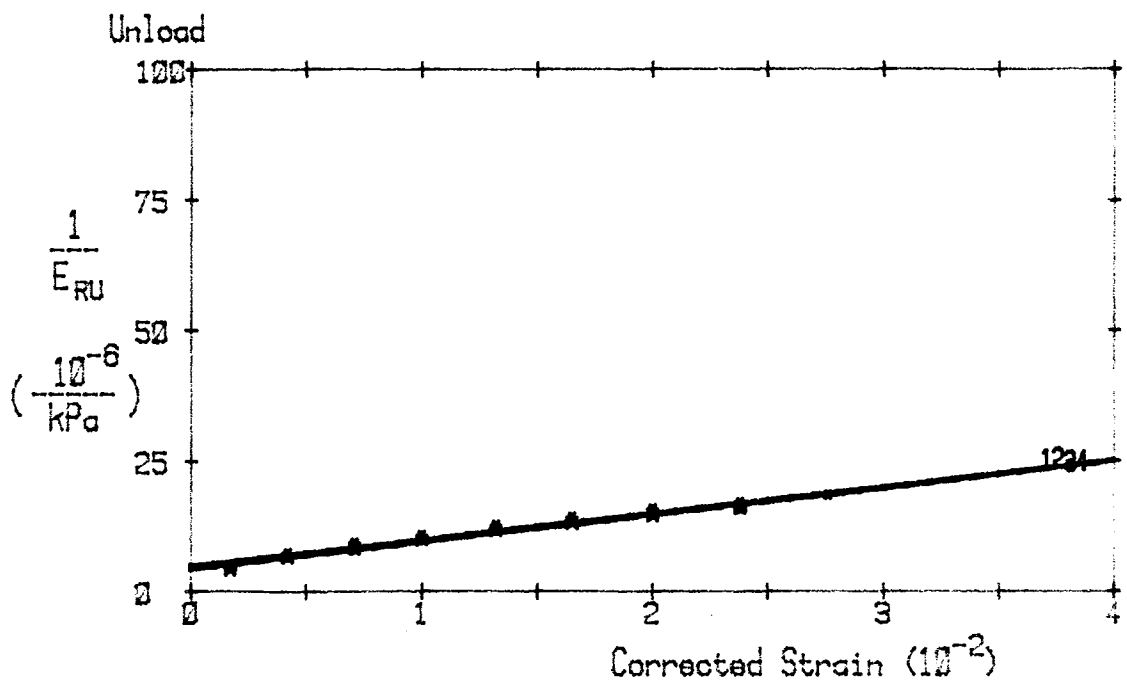




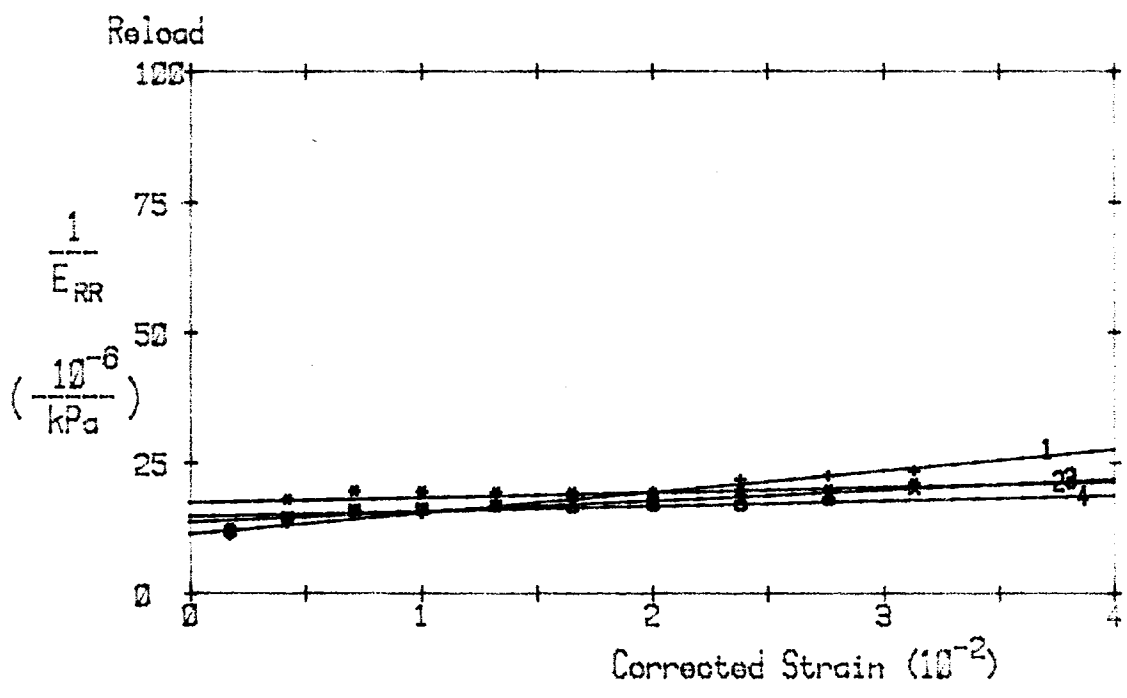


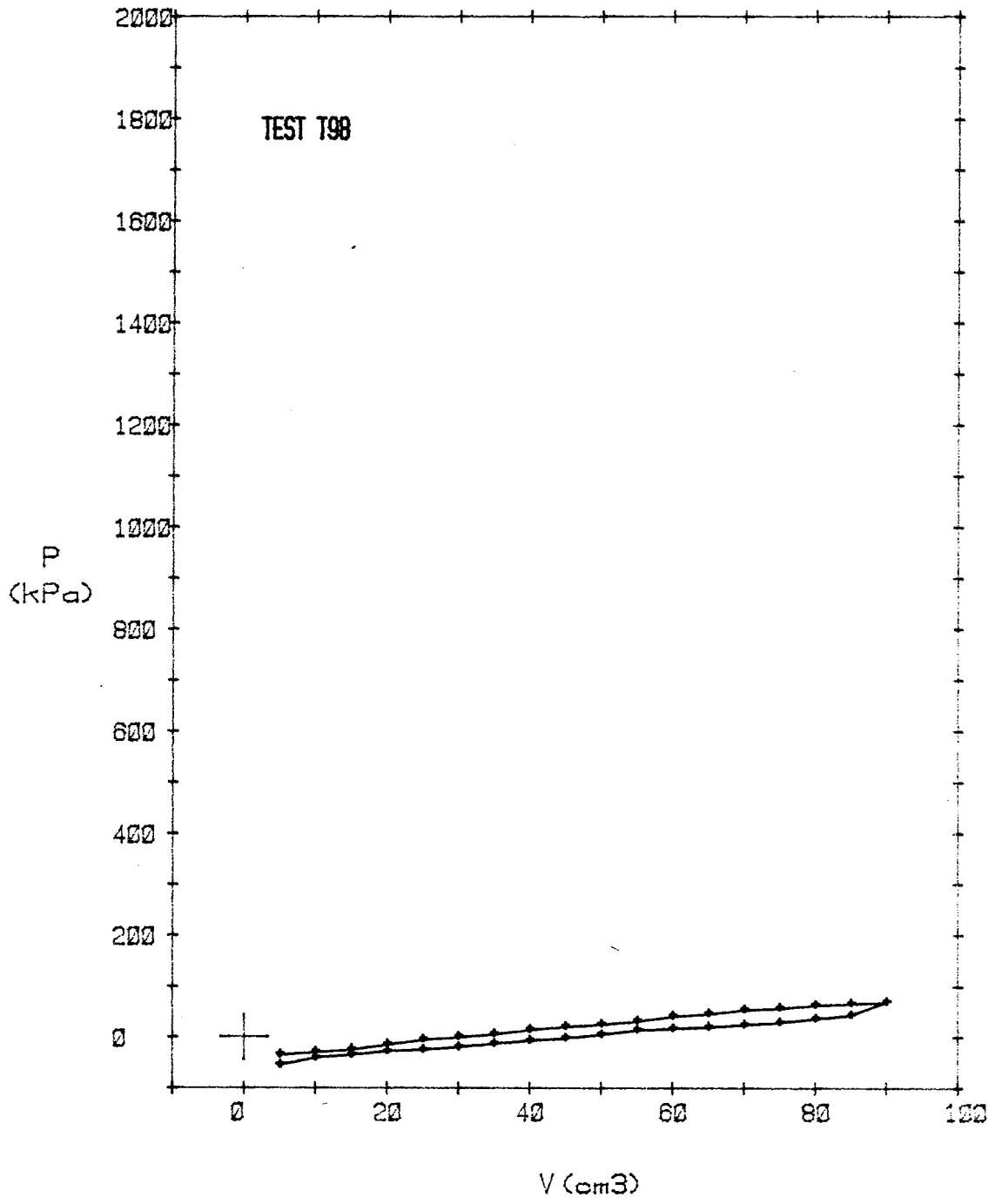
TEST T97

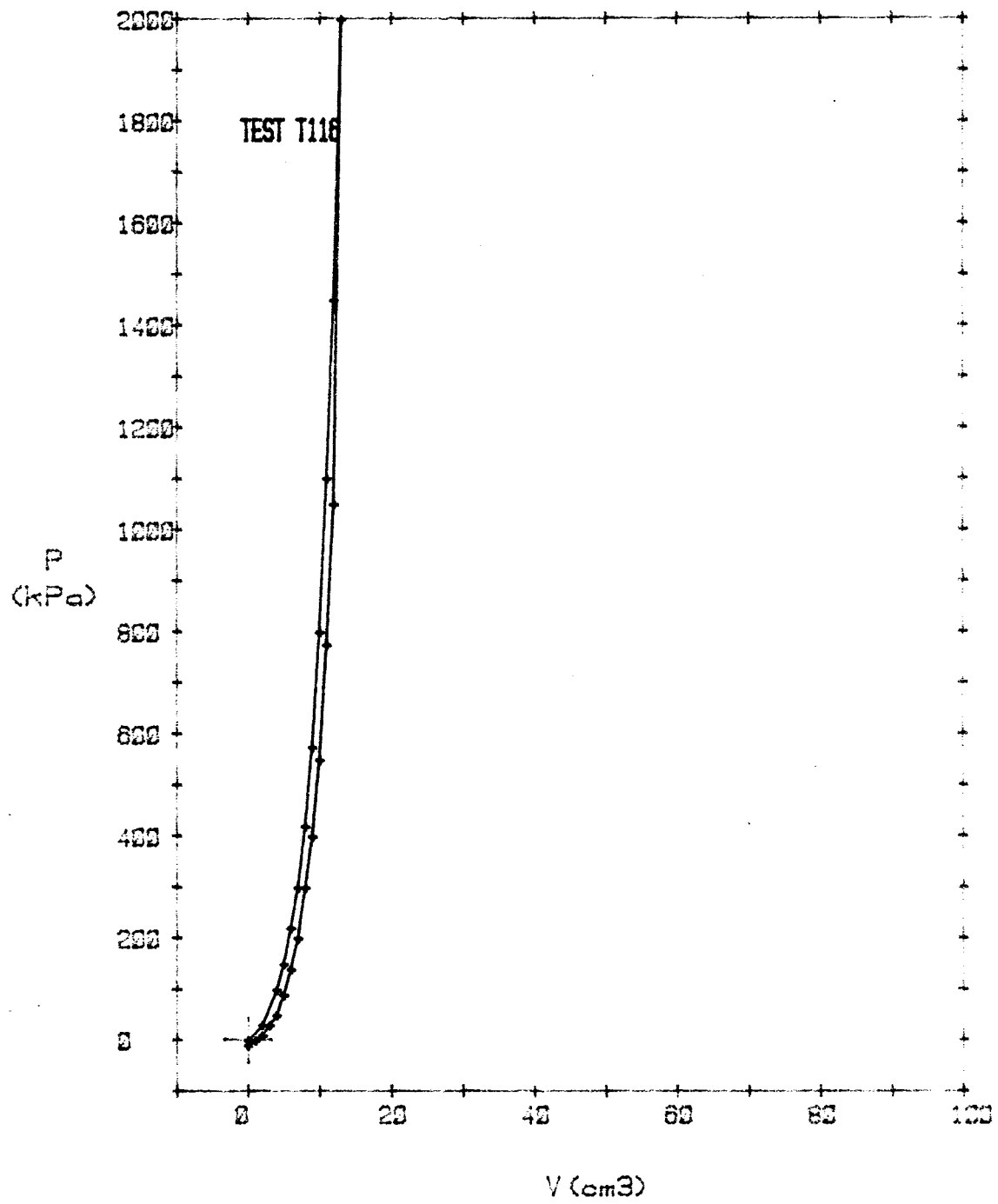


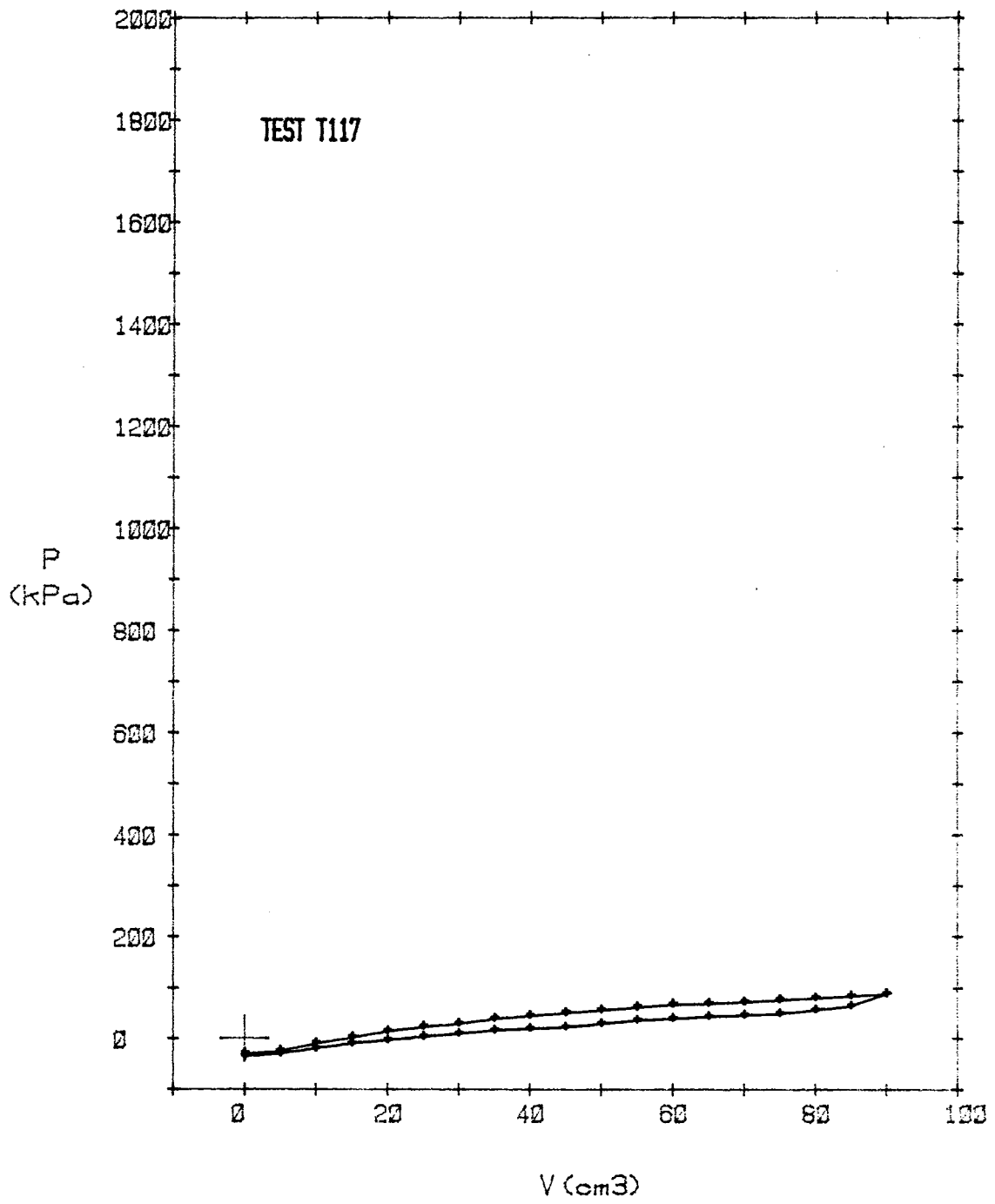


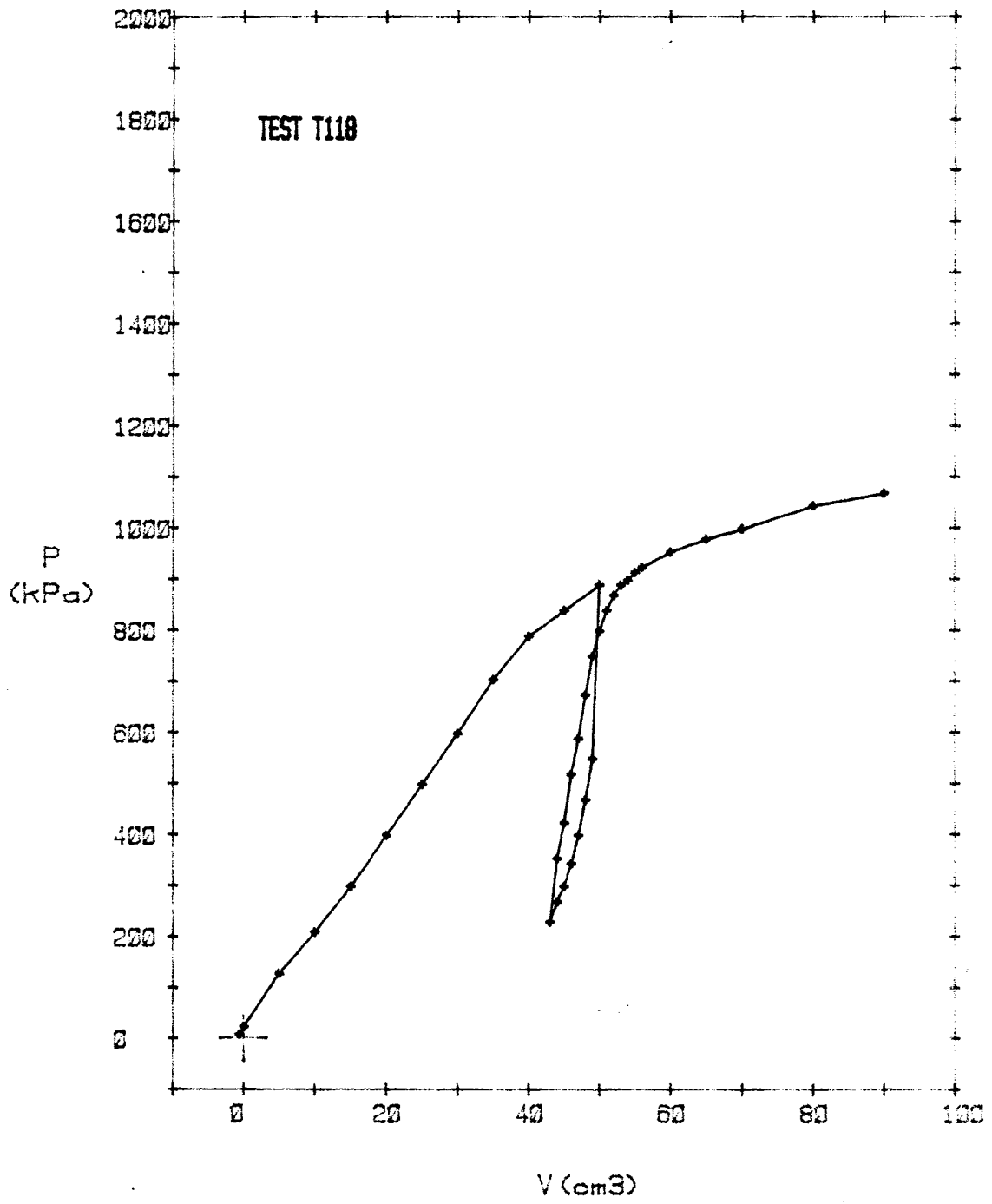
TEST T97

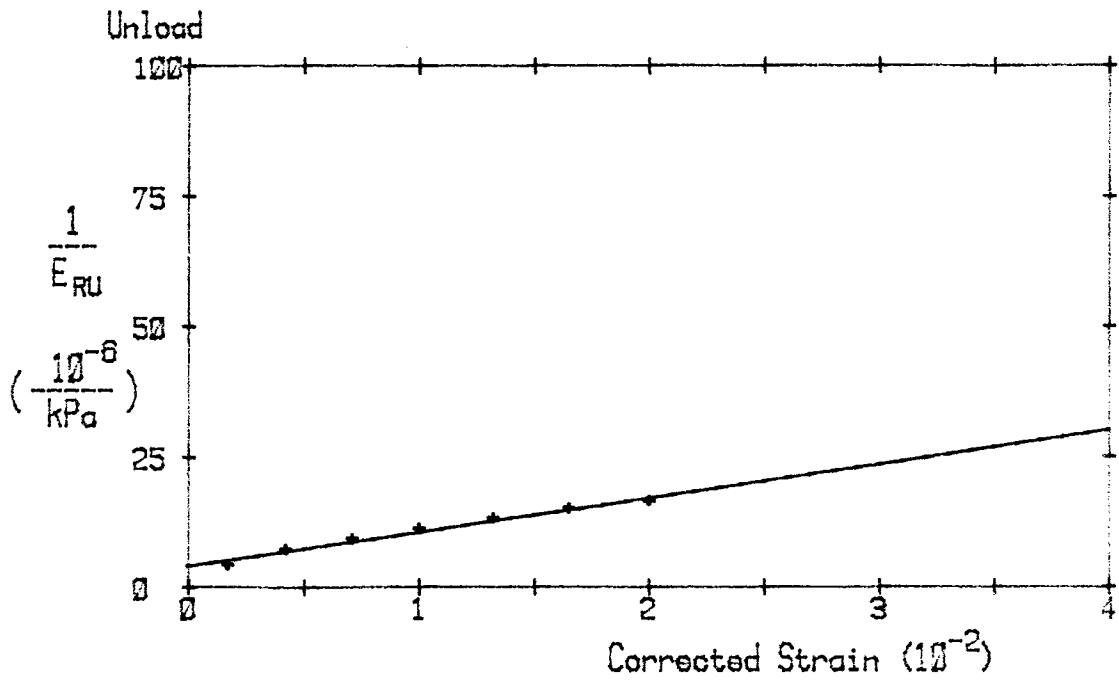




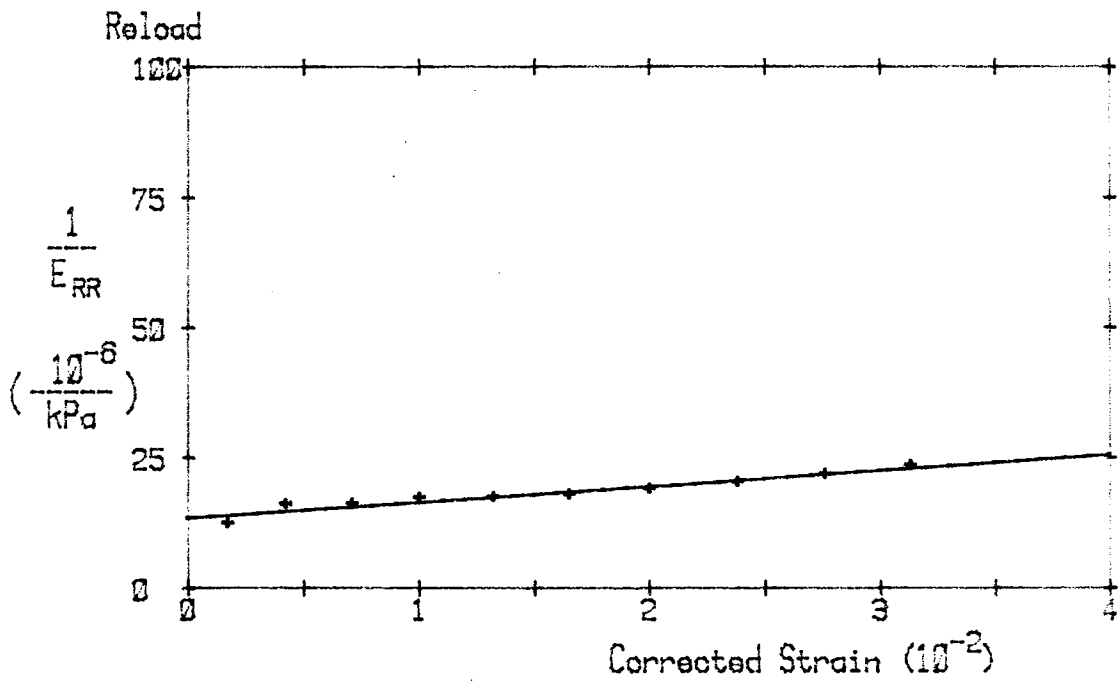


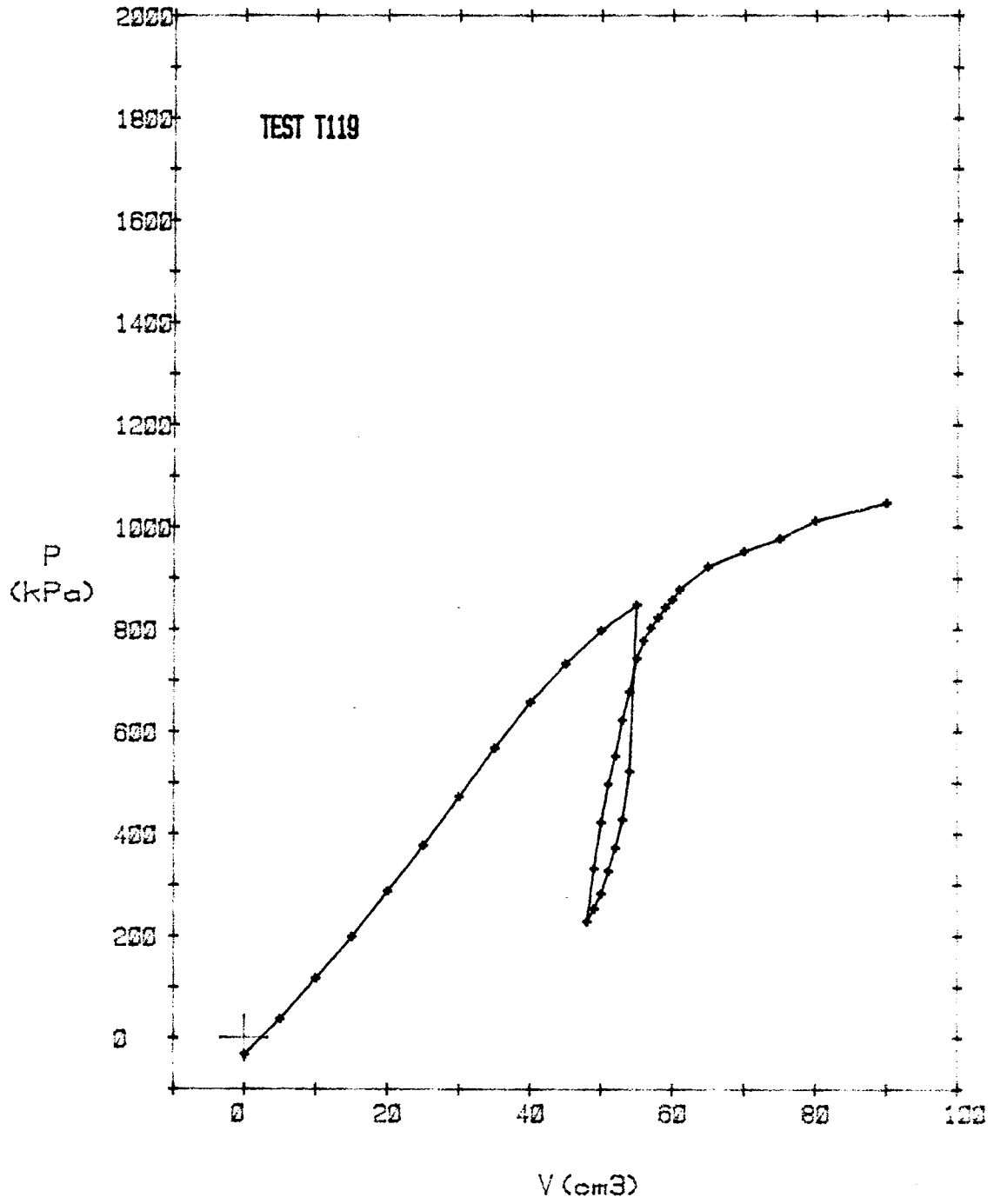


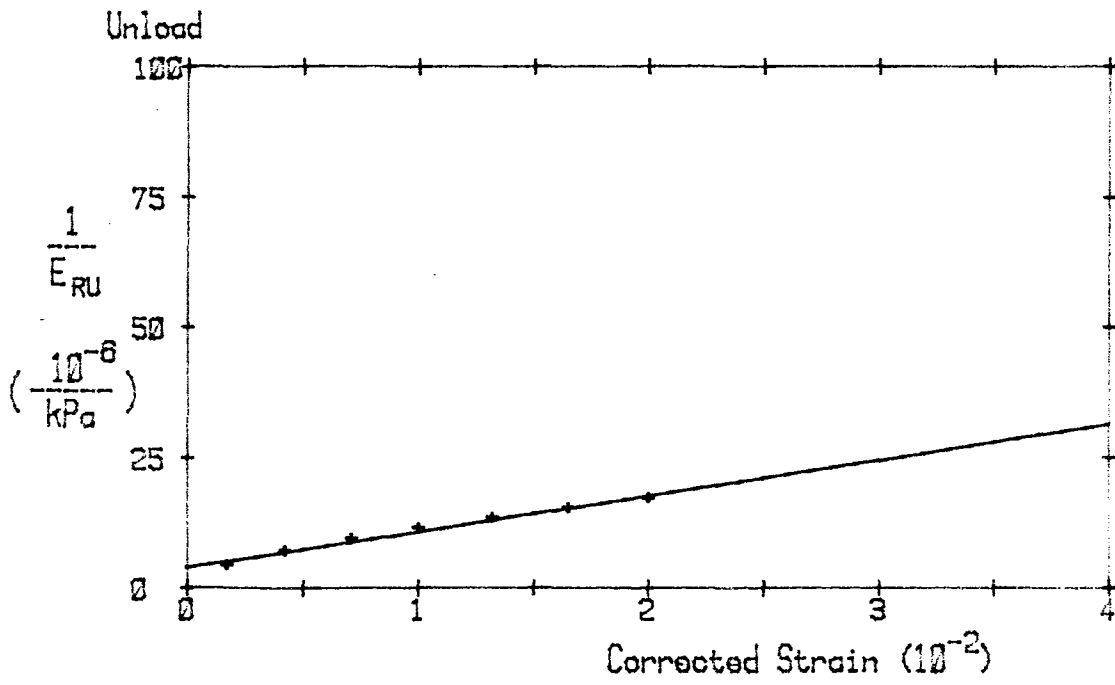




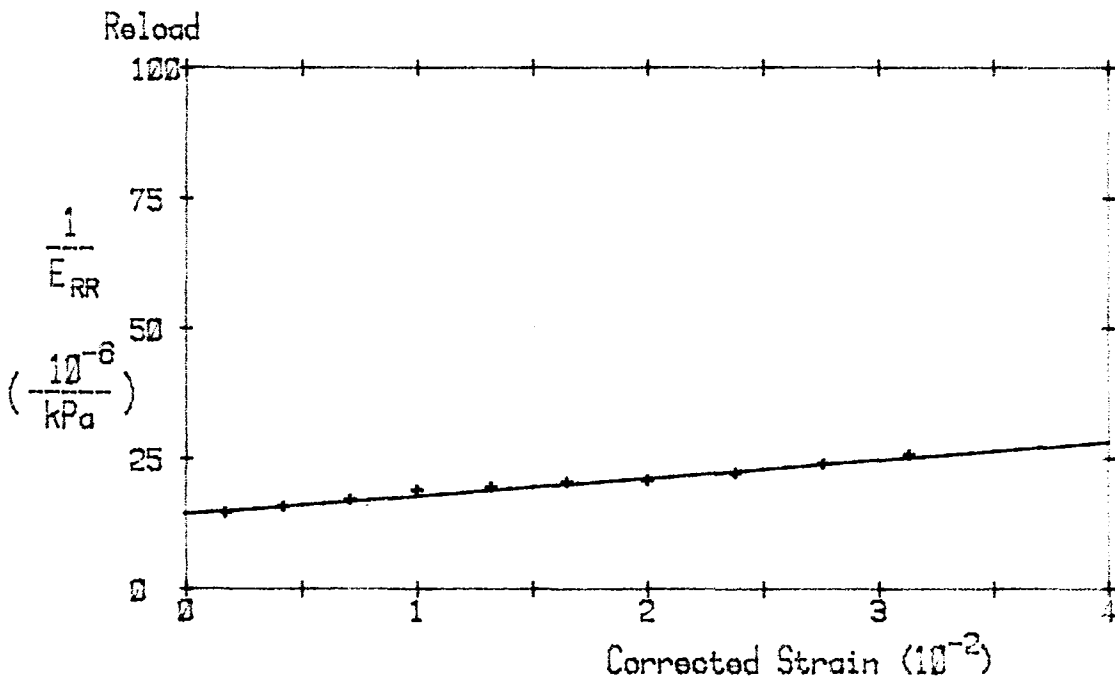
TEST T118

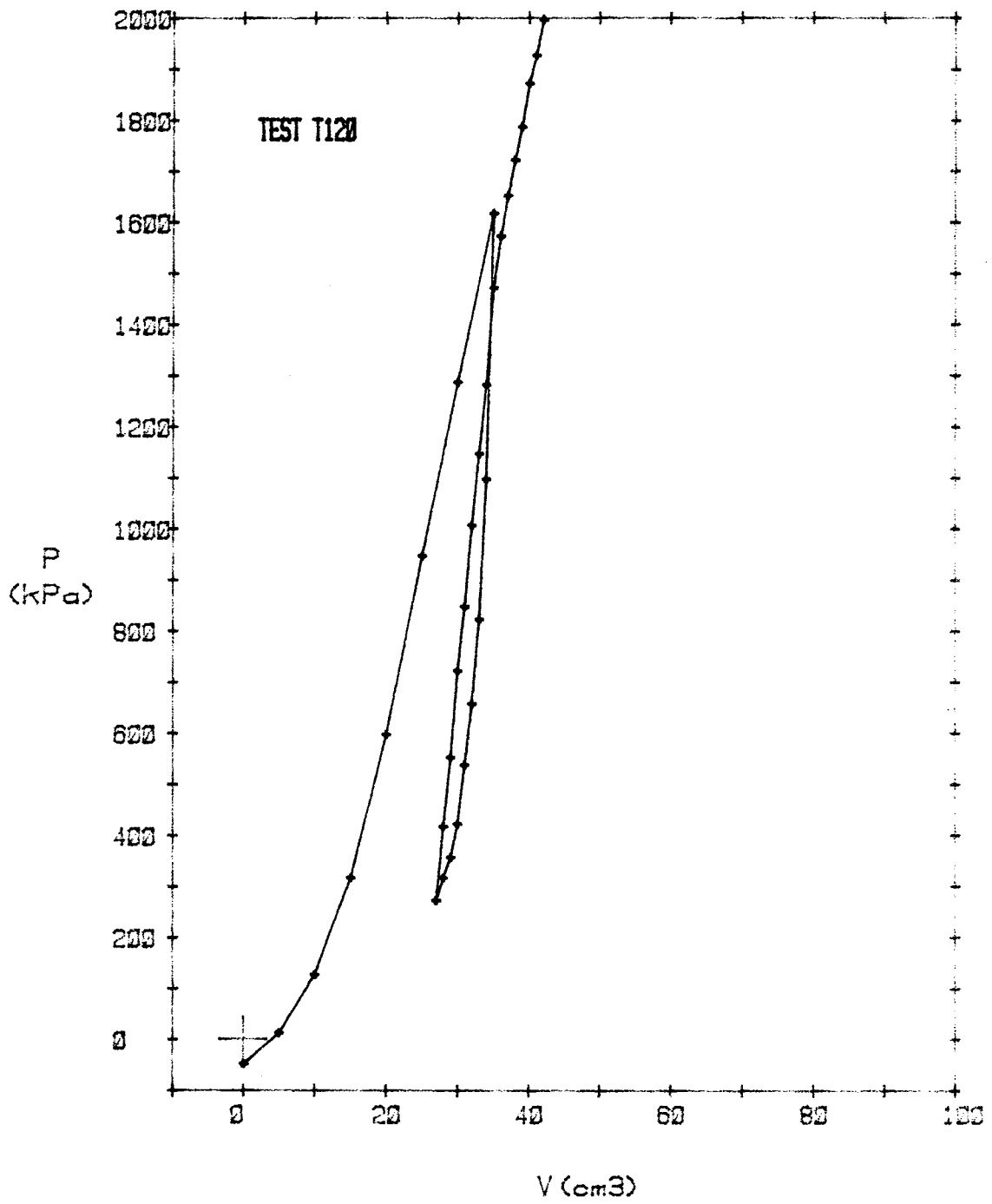


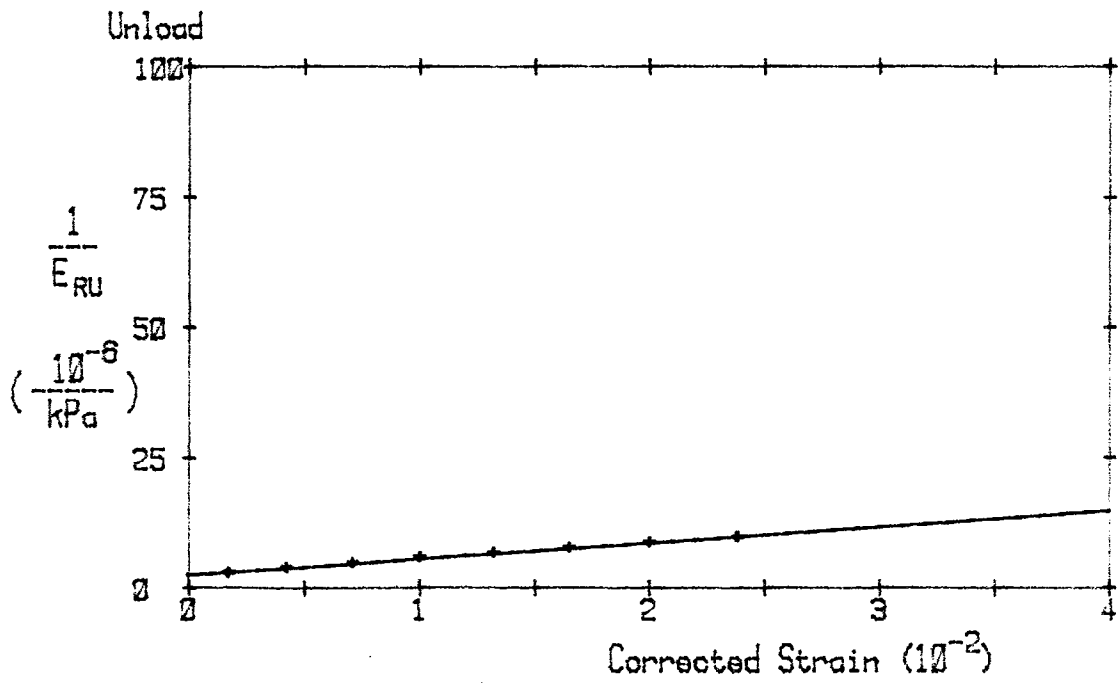




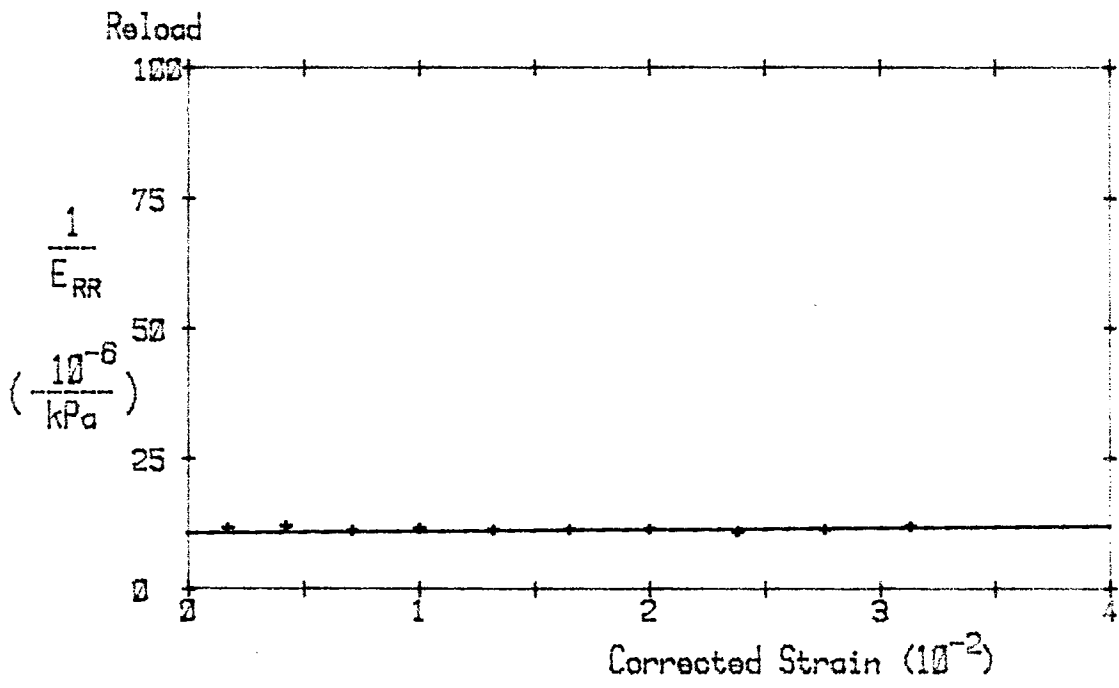
TEST T119

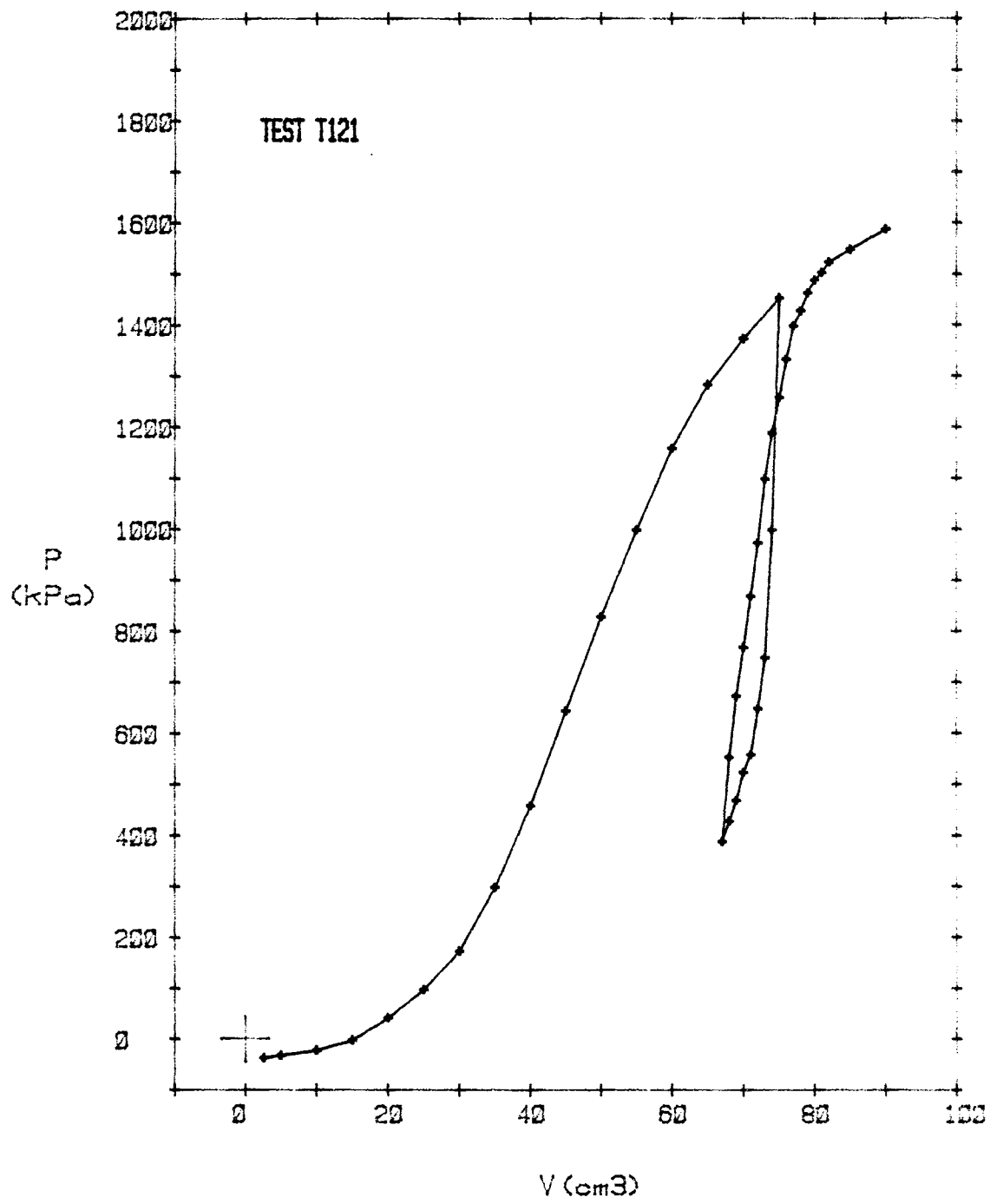


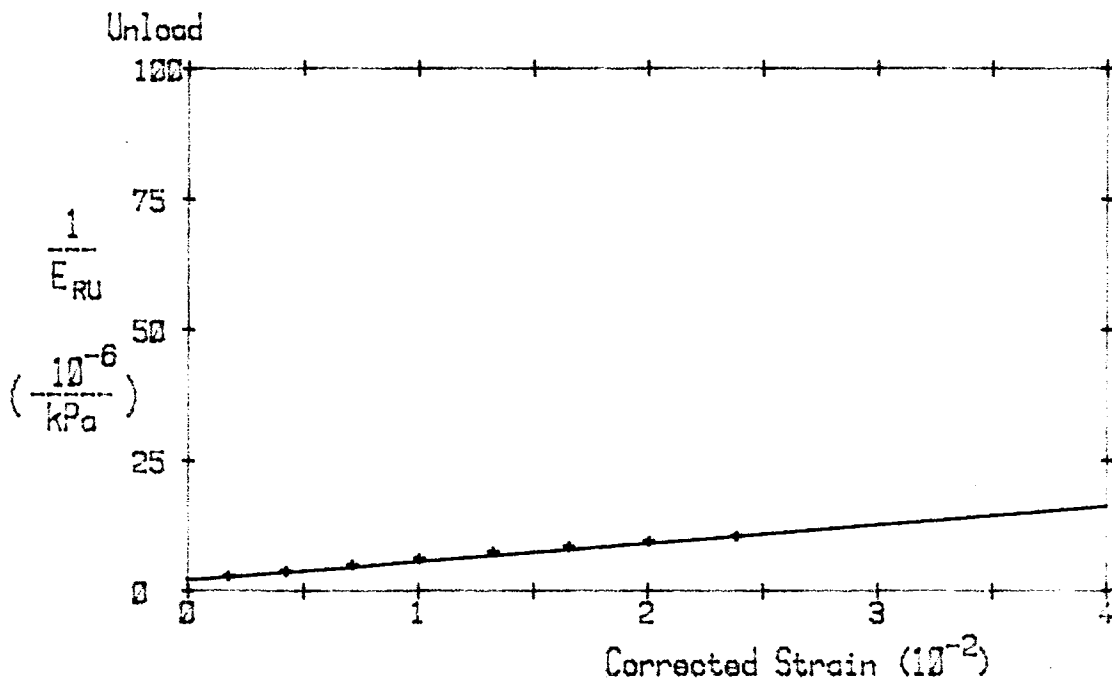




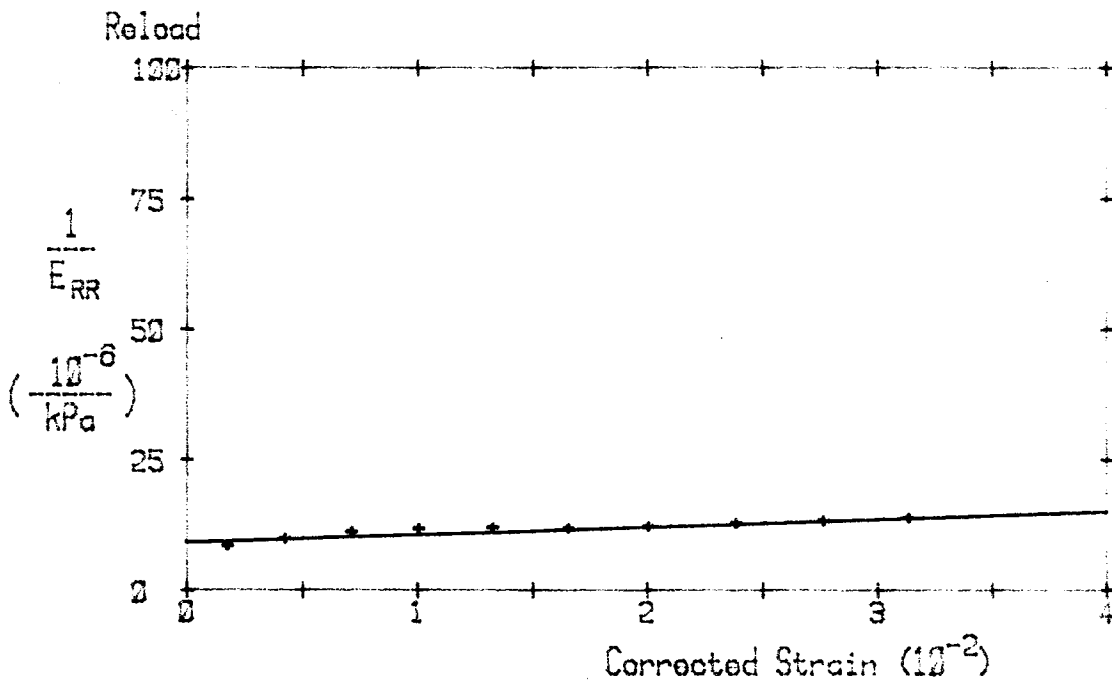
TEST T120

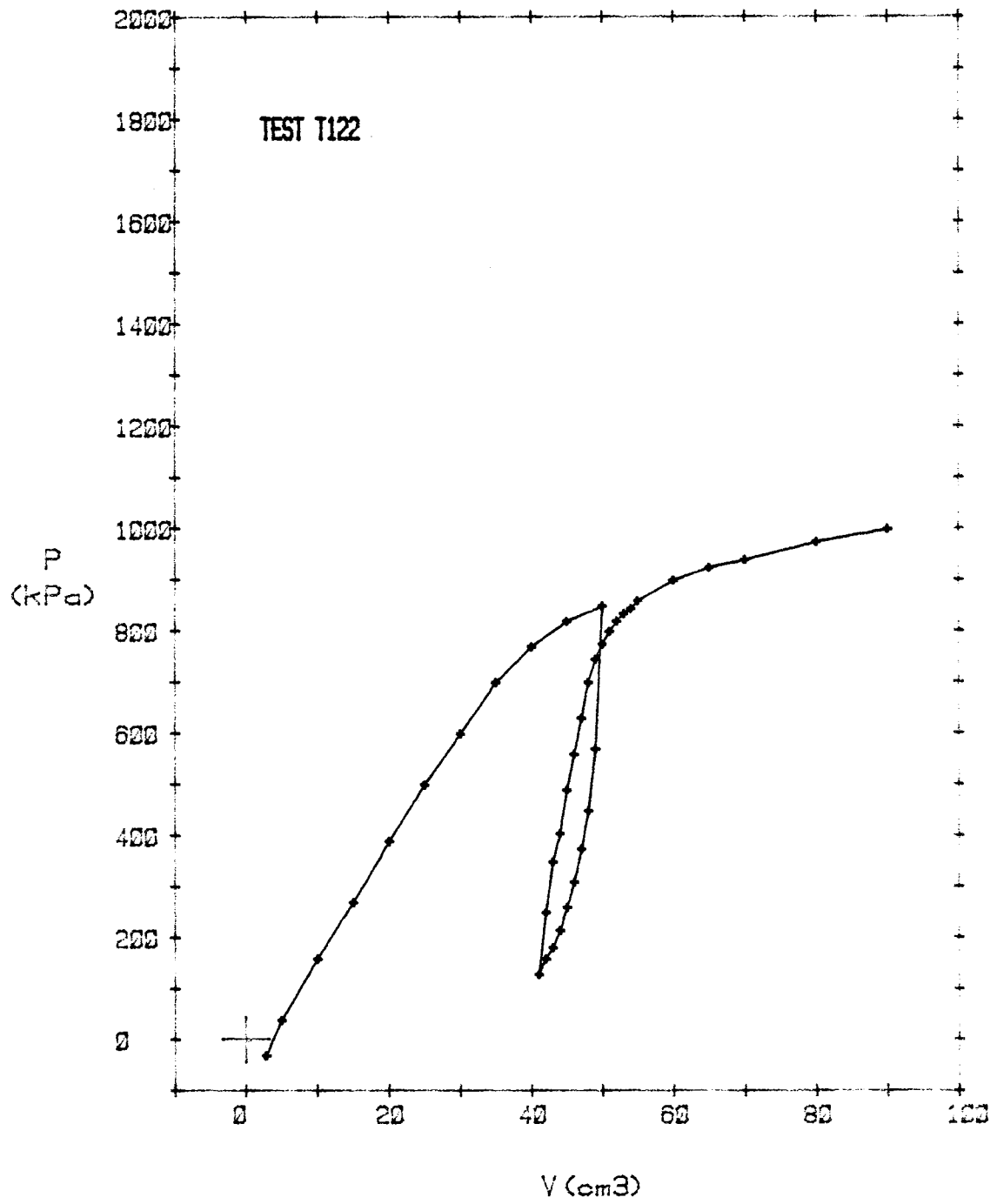


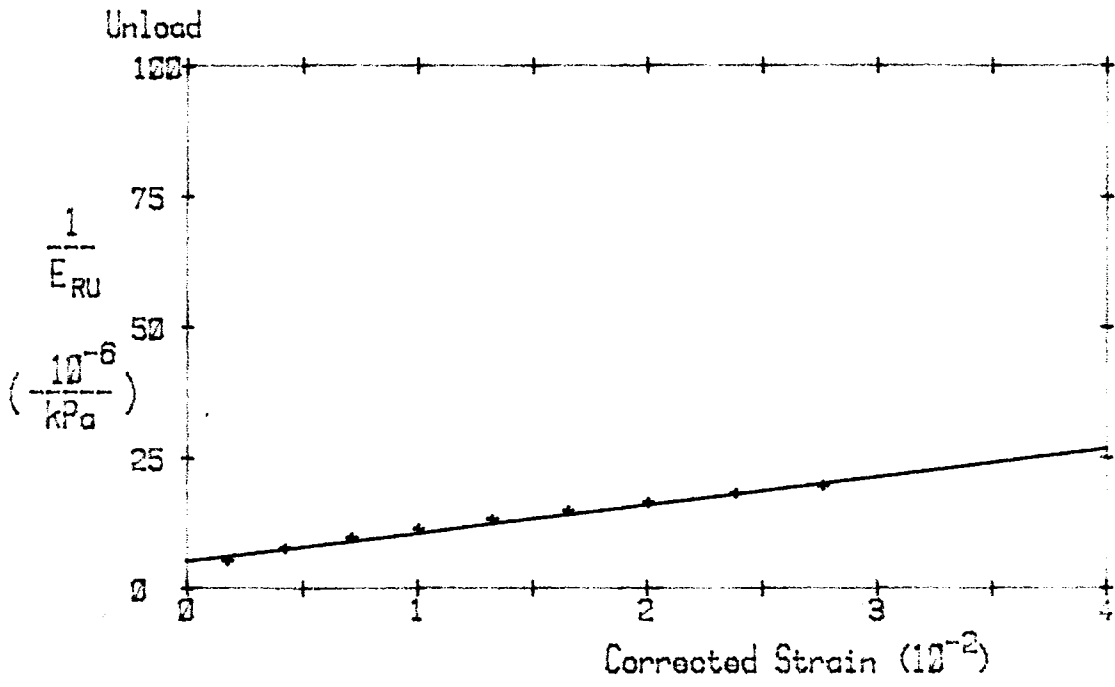




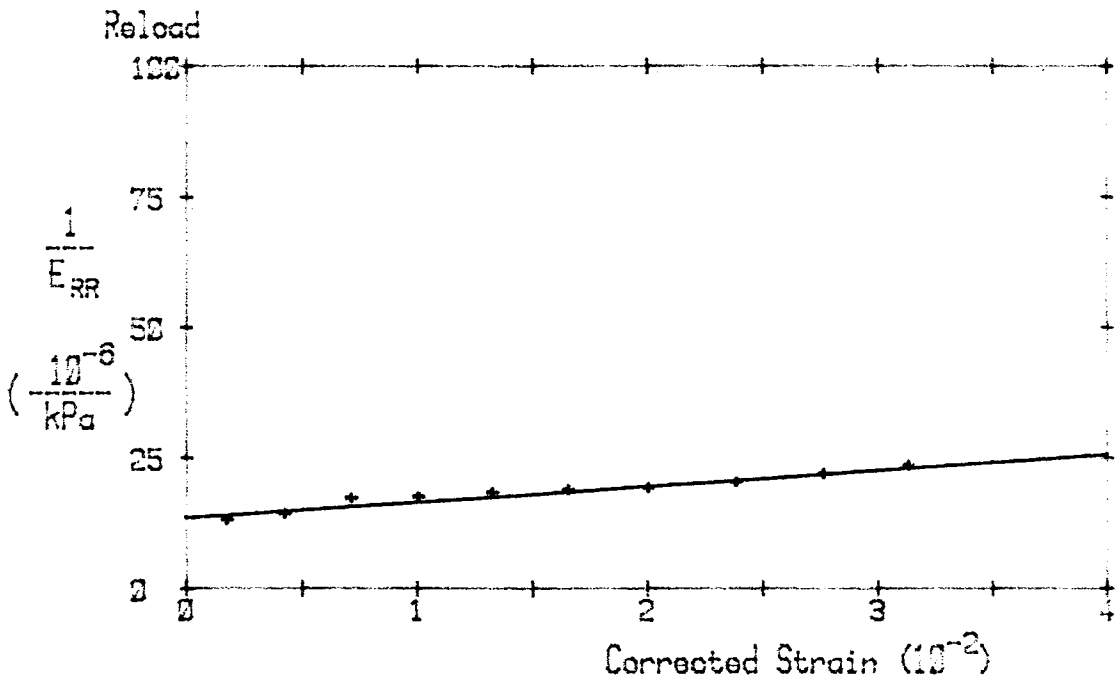
TEST T121

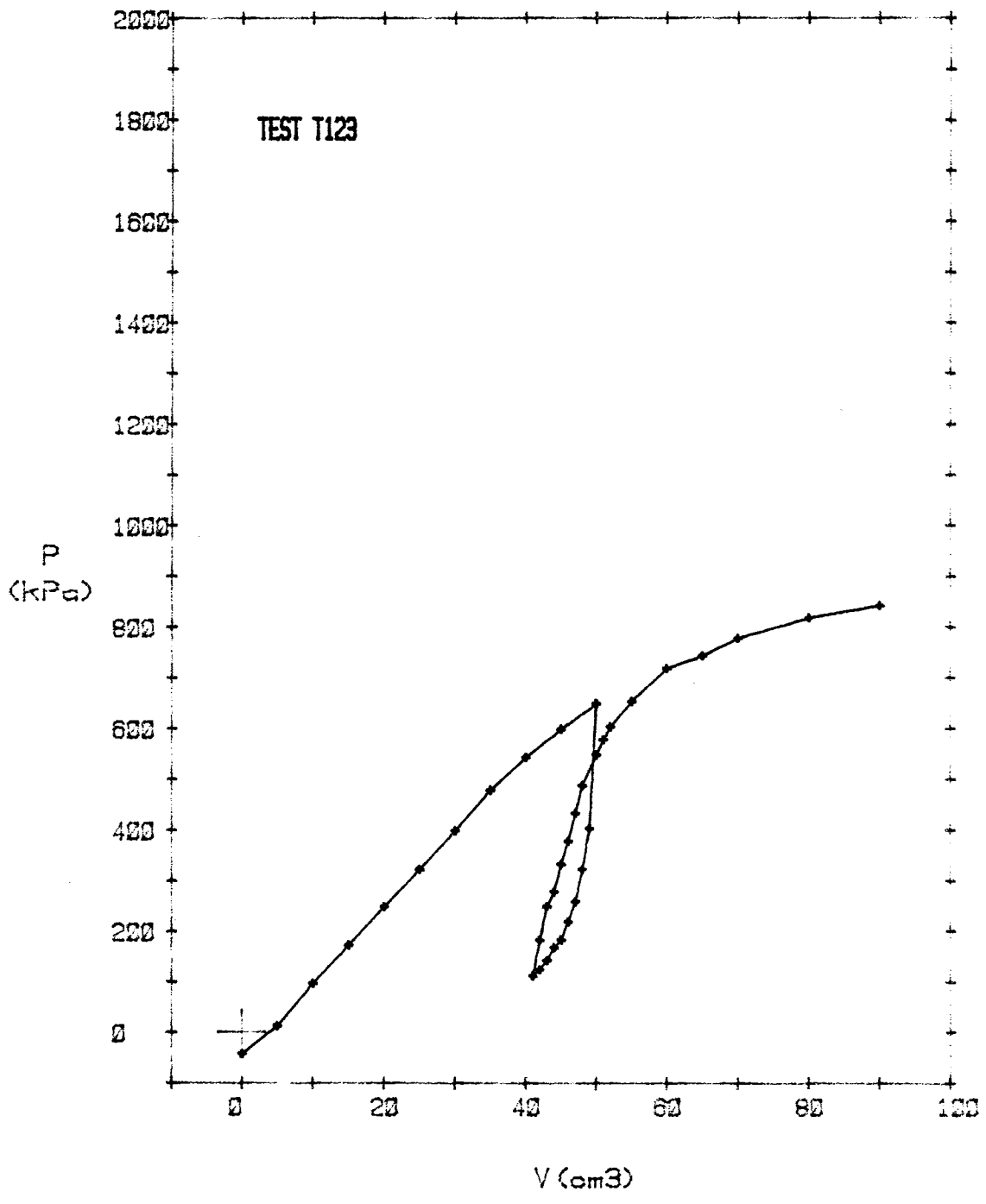


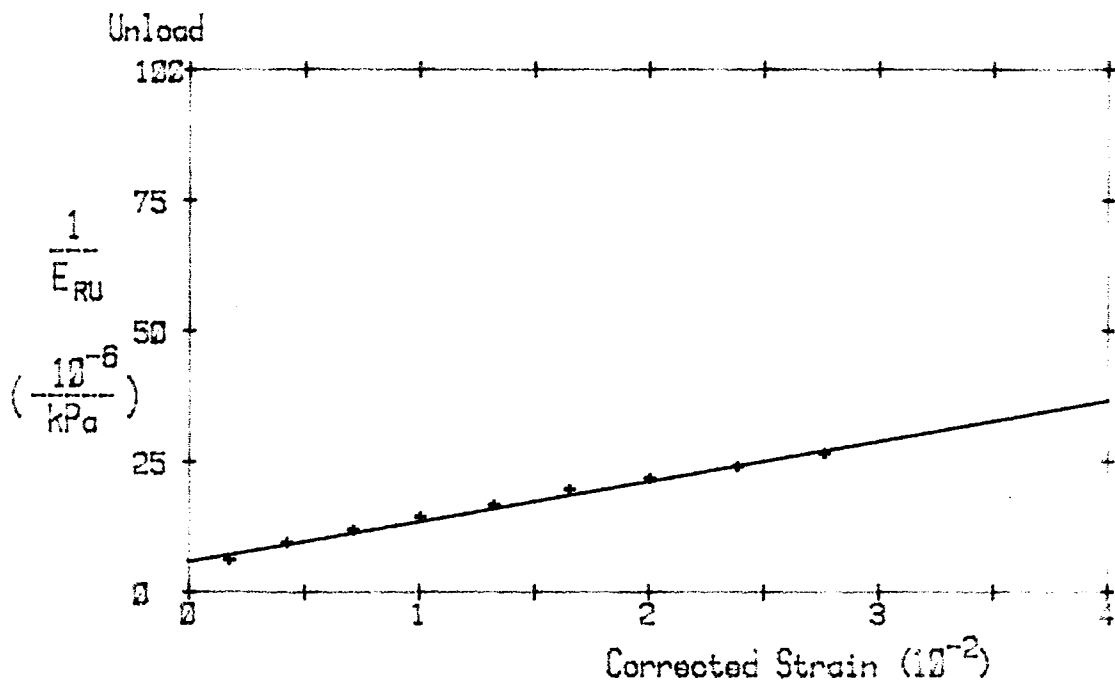




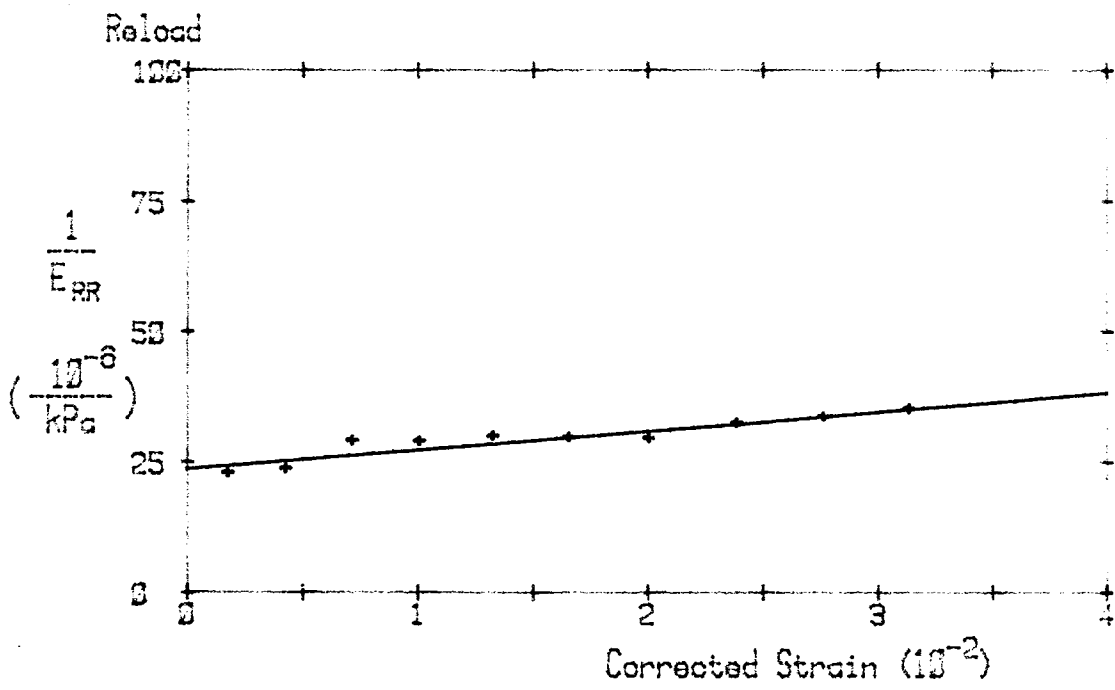
TEST T122

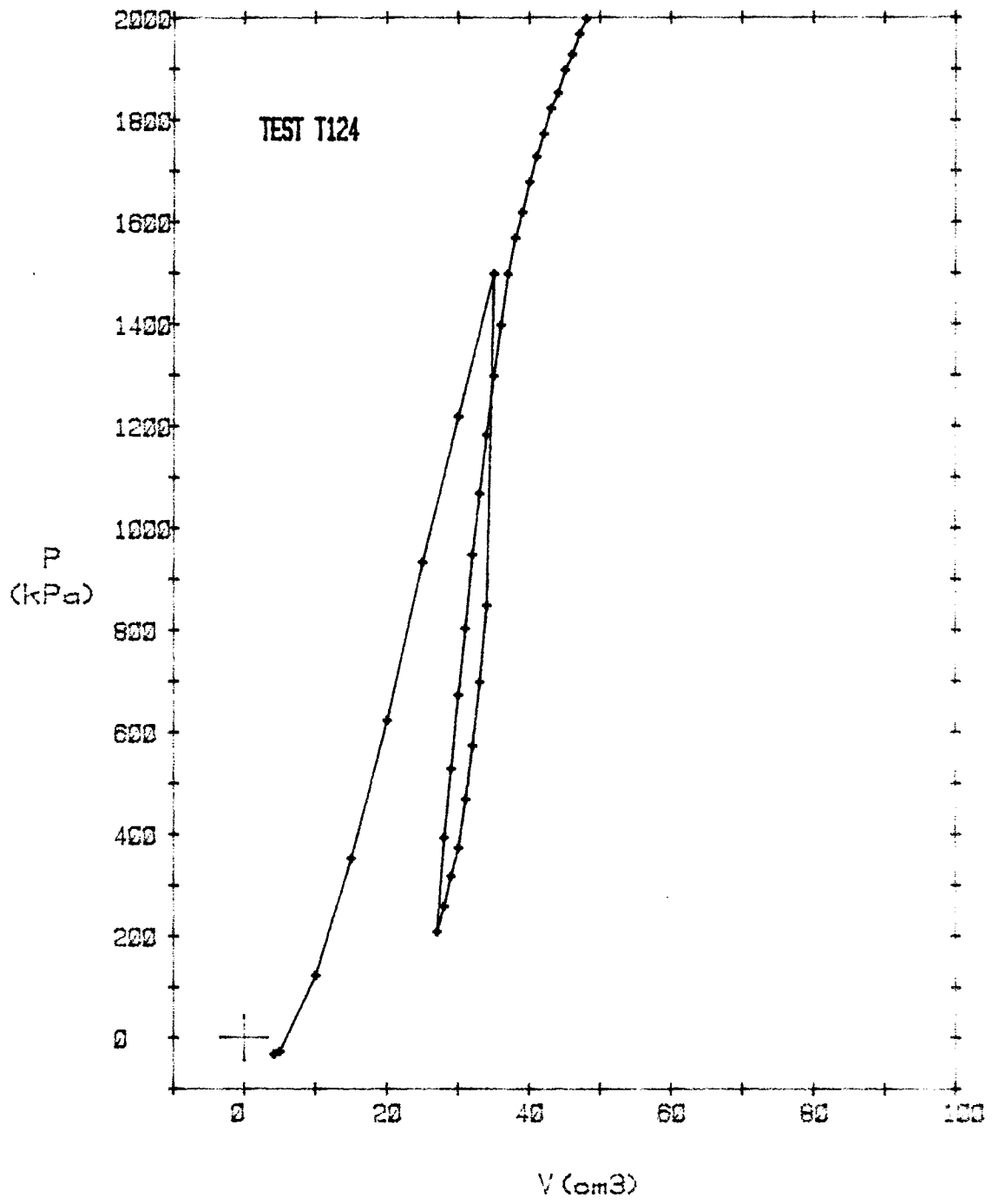


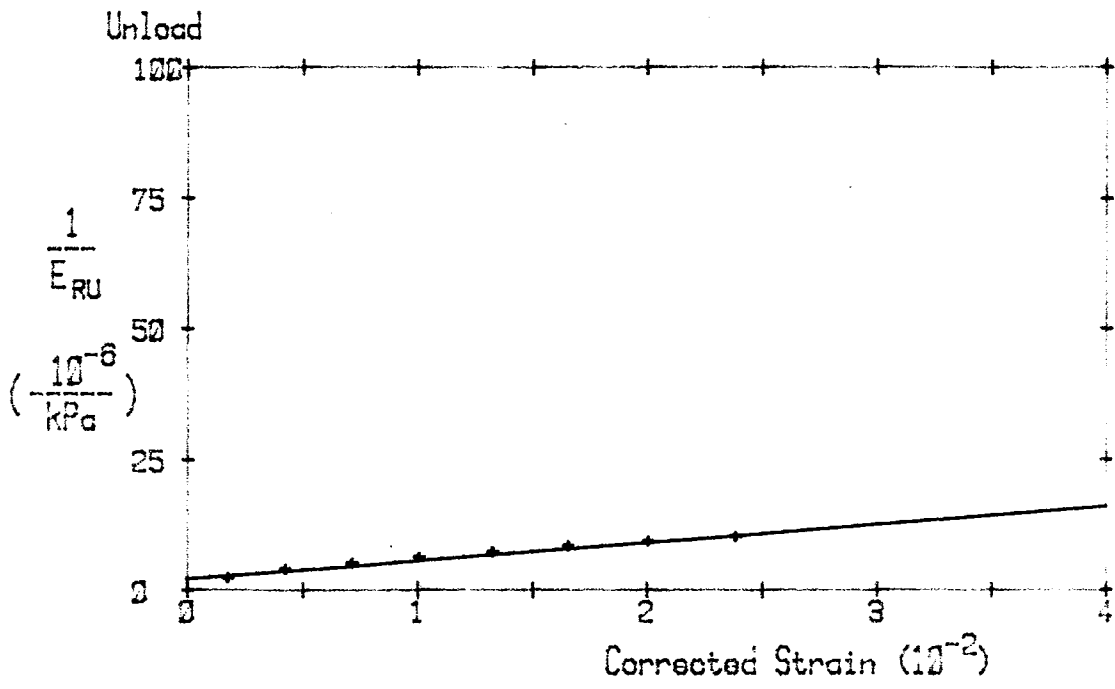




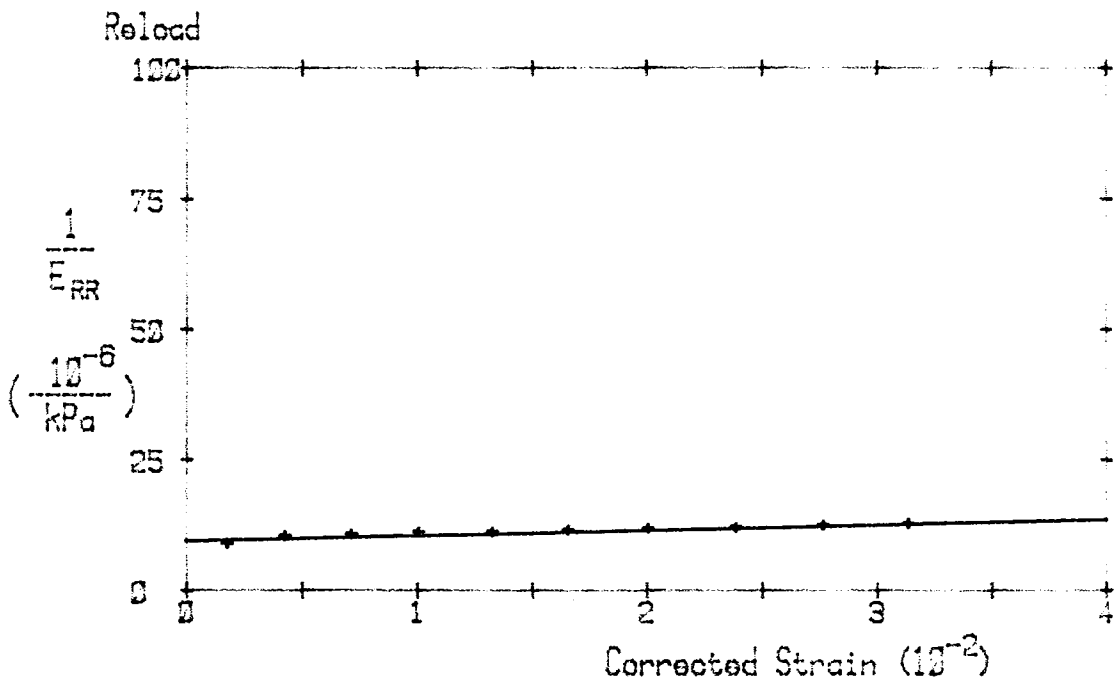
TEST T123

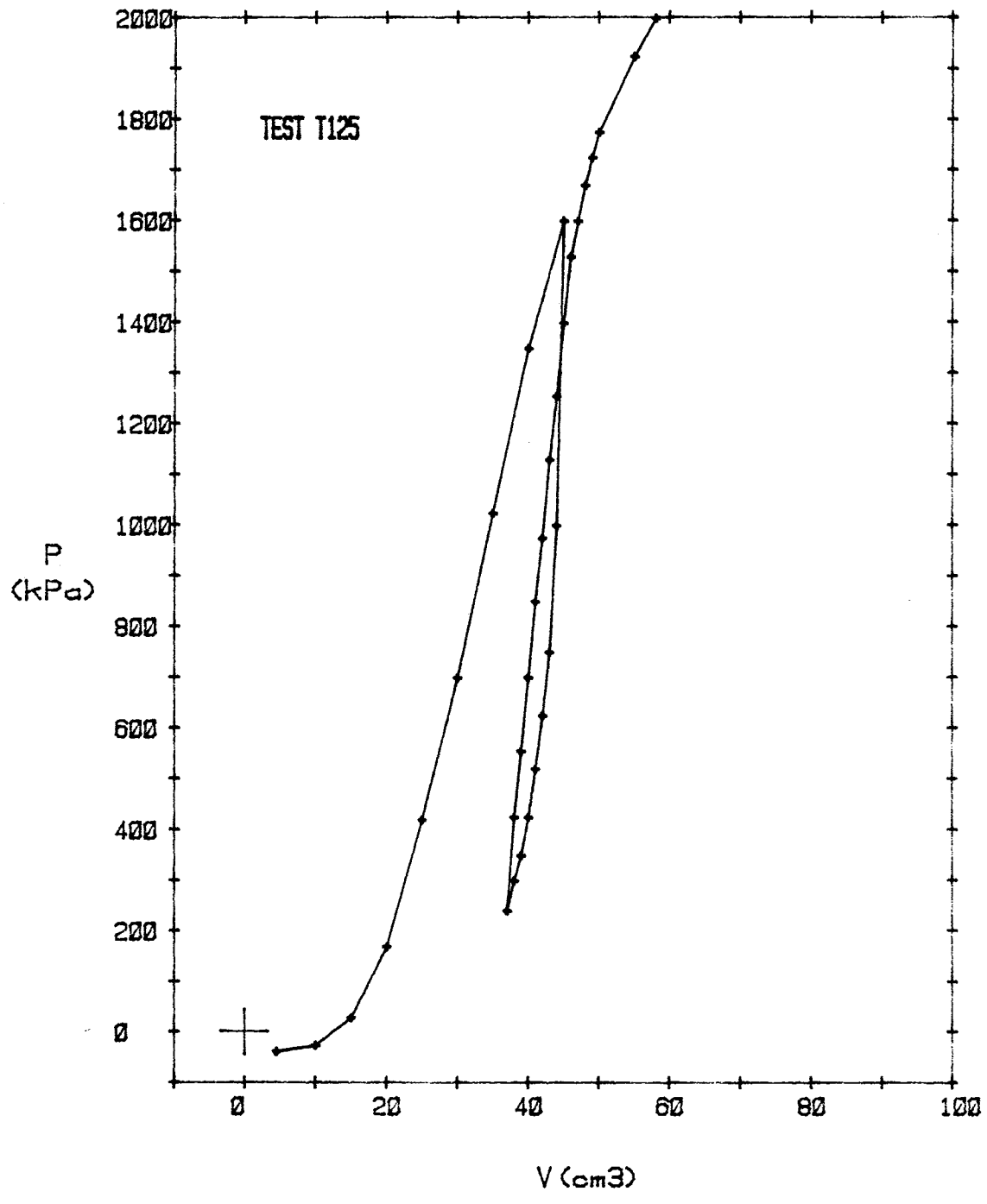


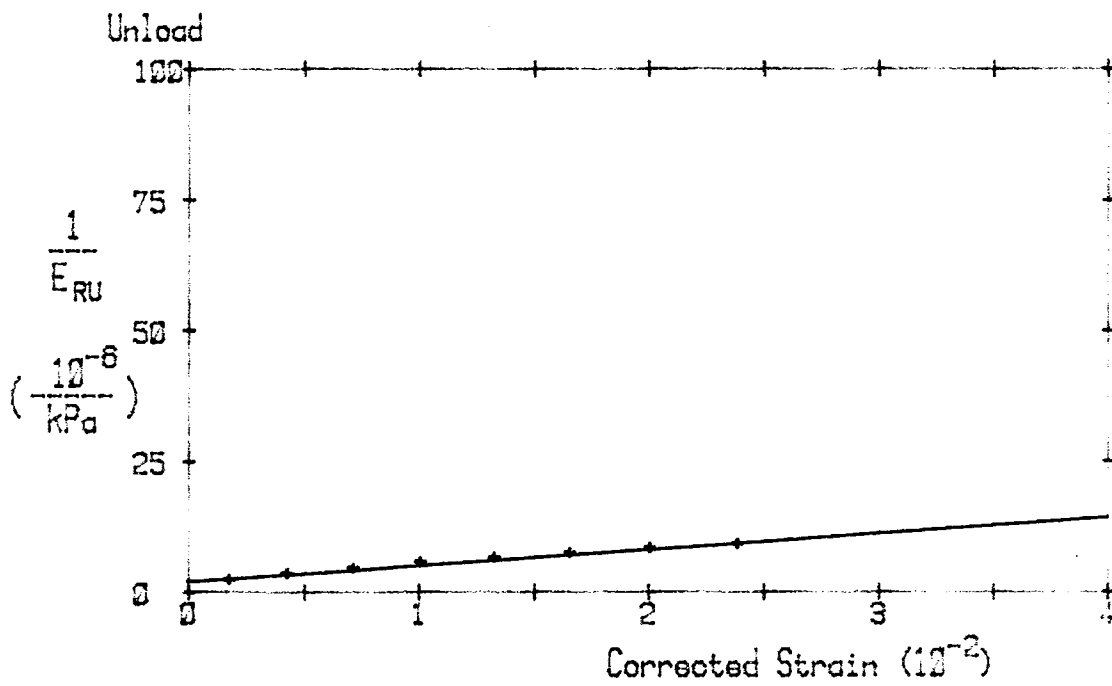




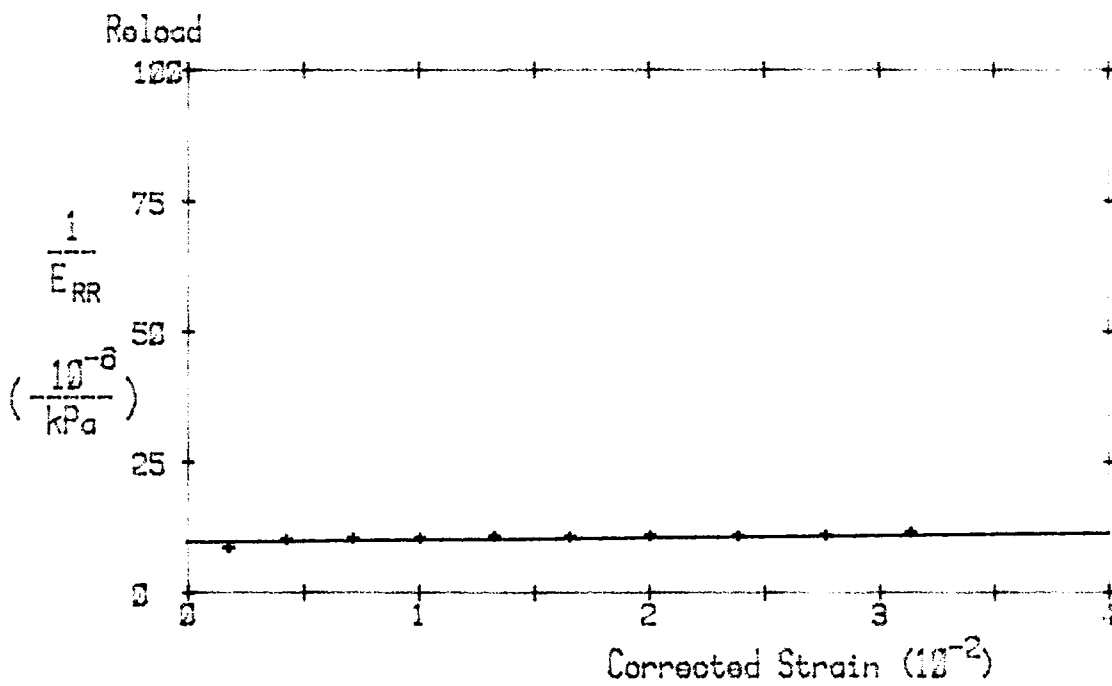
TEST T124

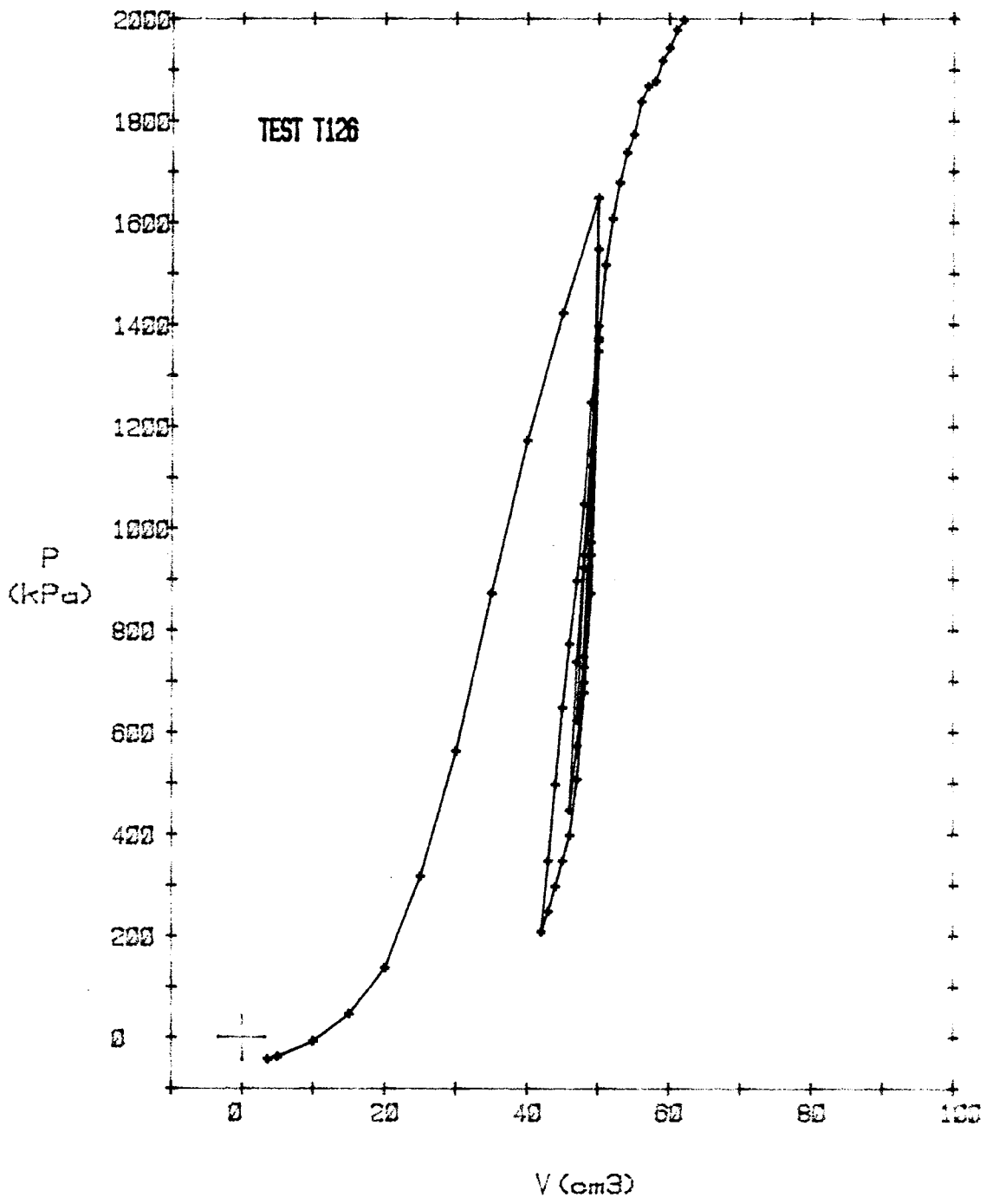


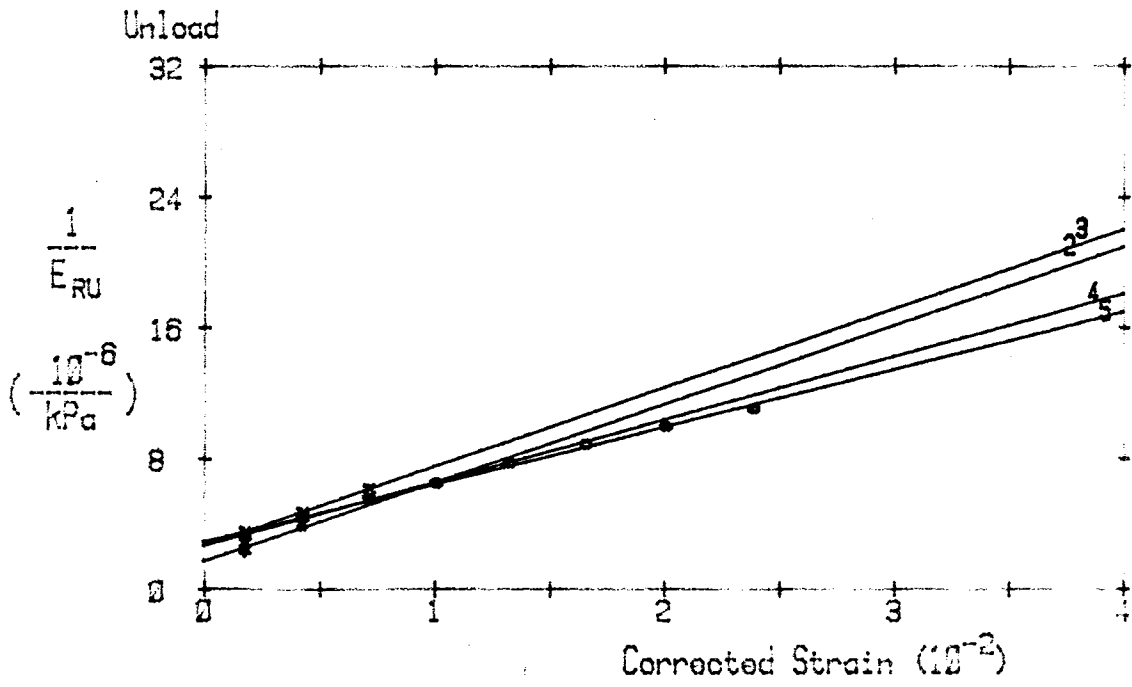




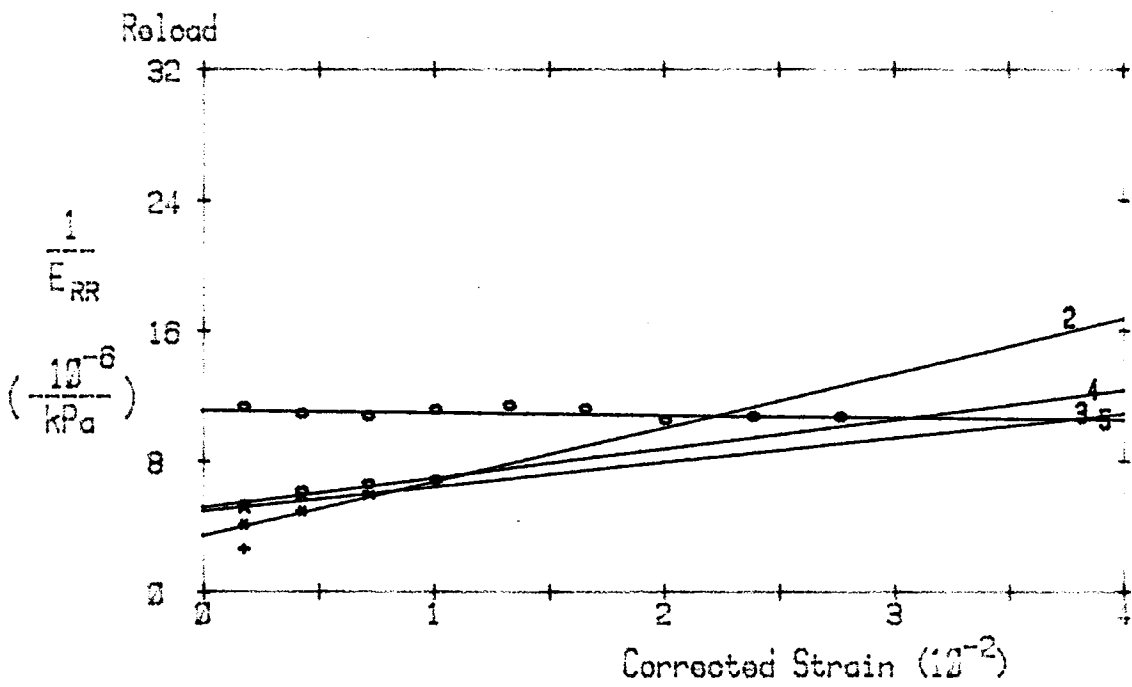
TEST T125

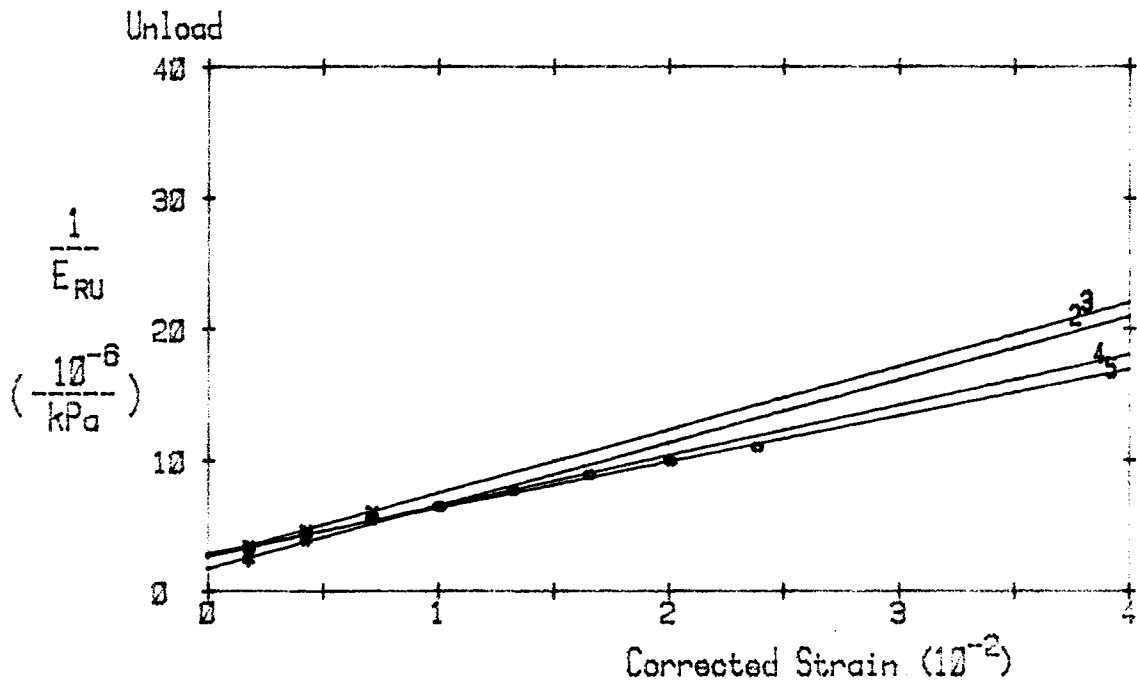




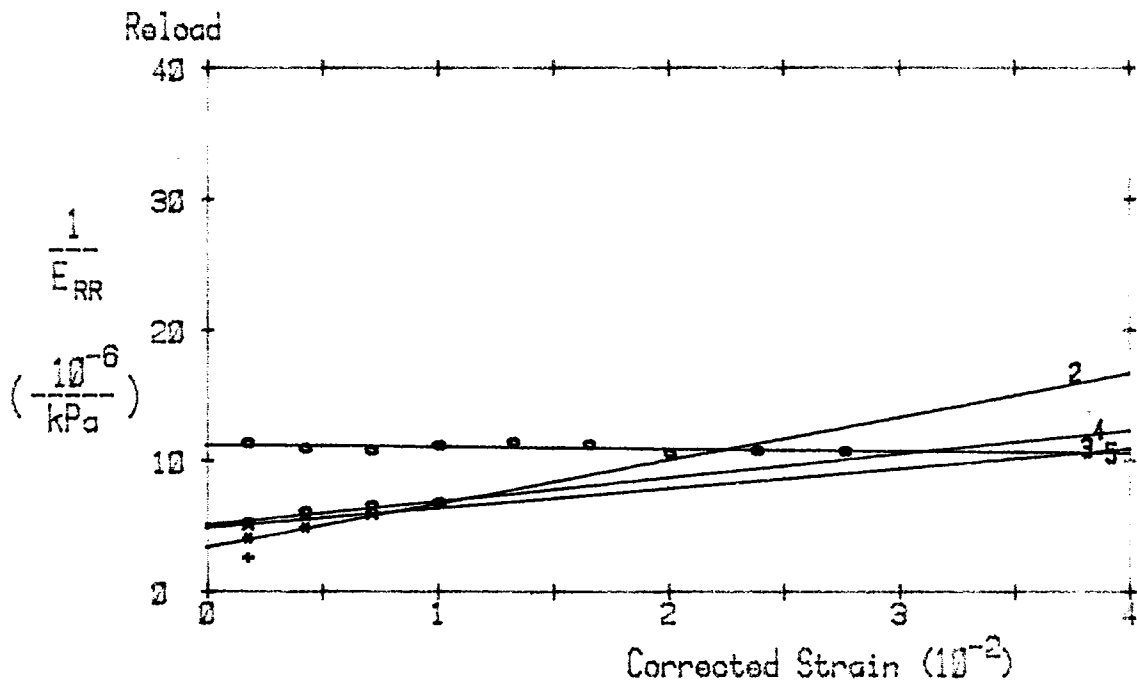


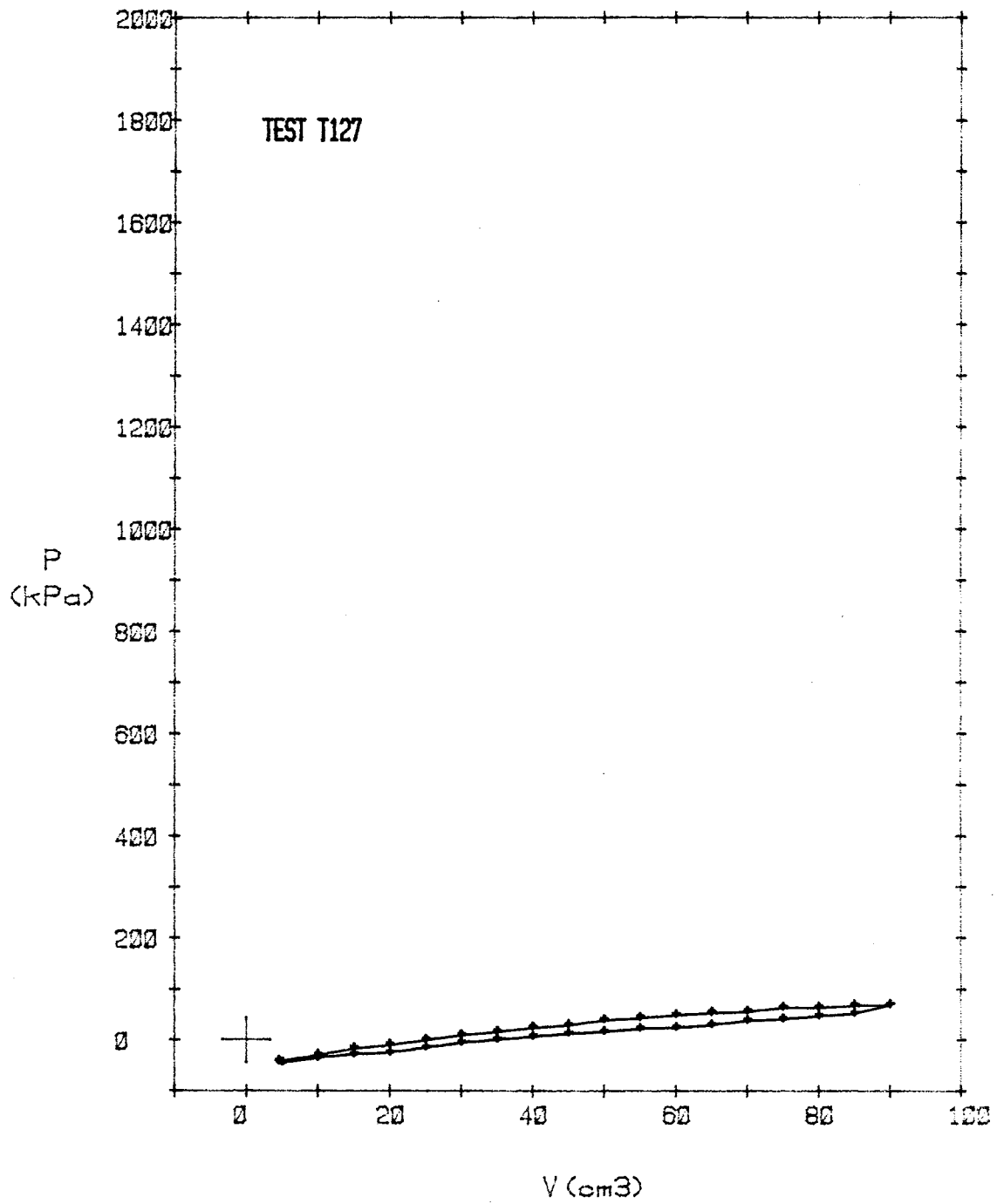
TEST T126

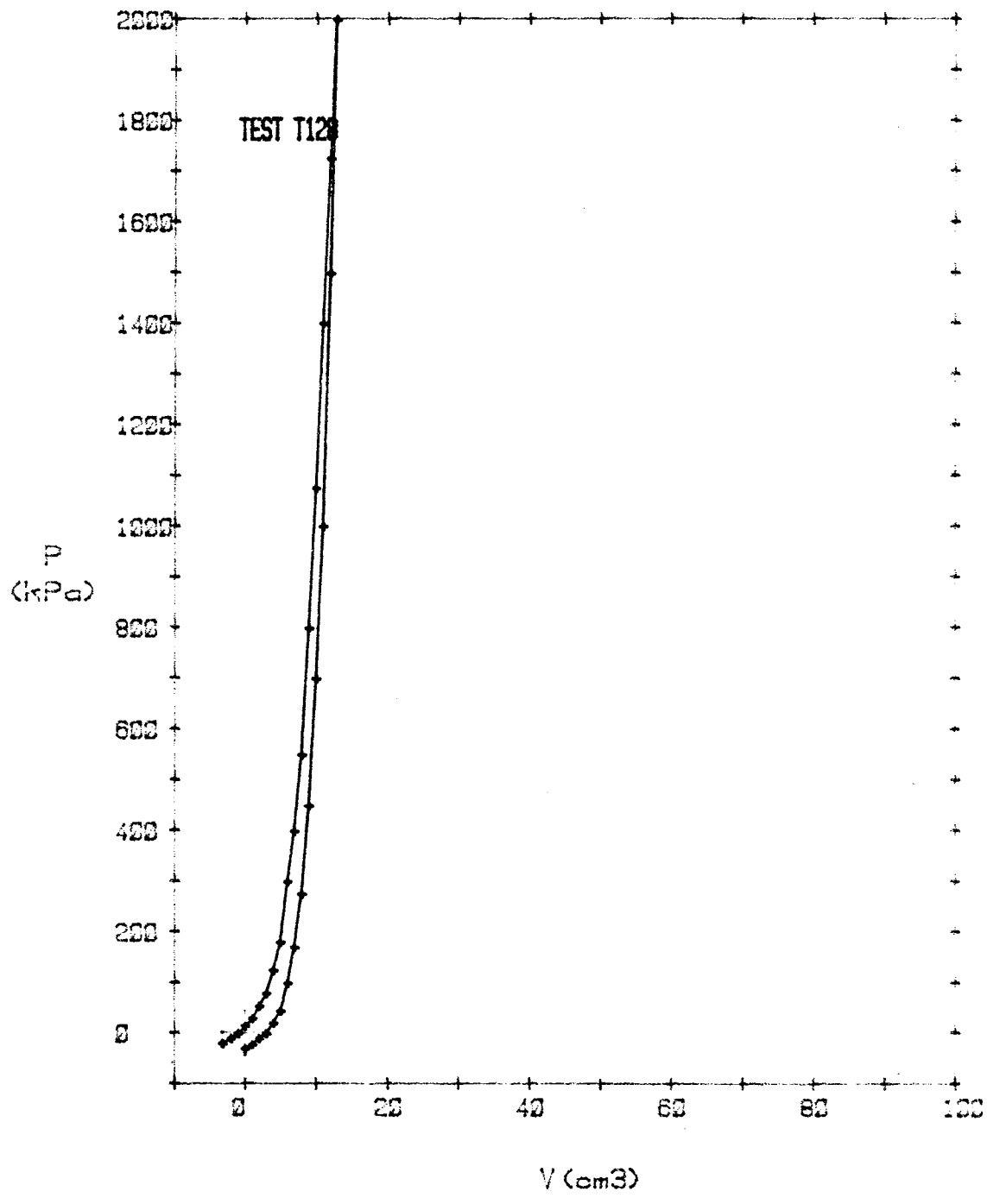


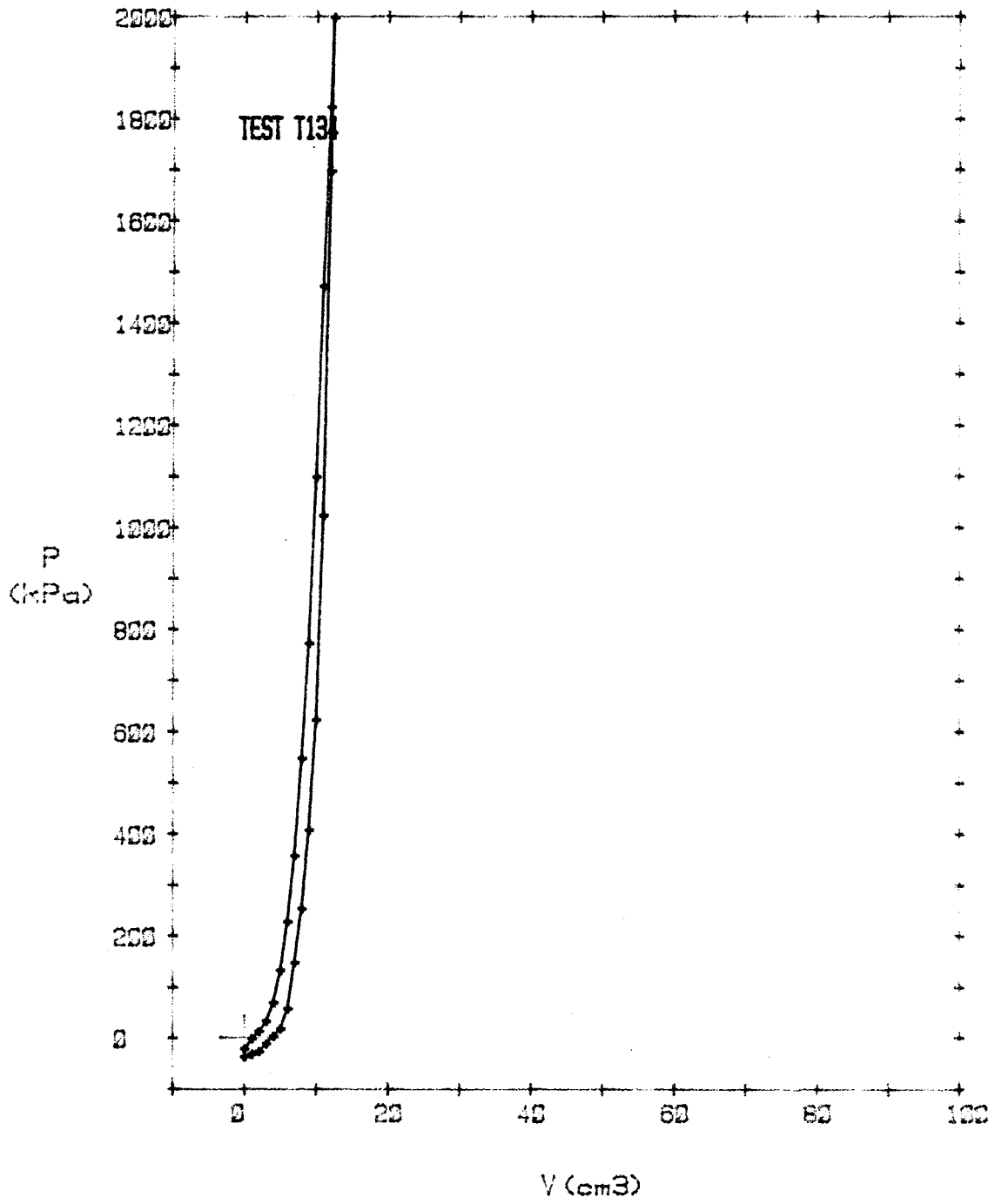


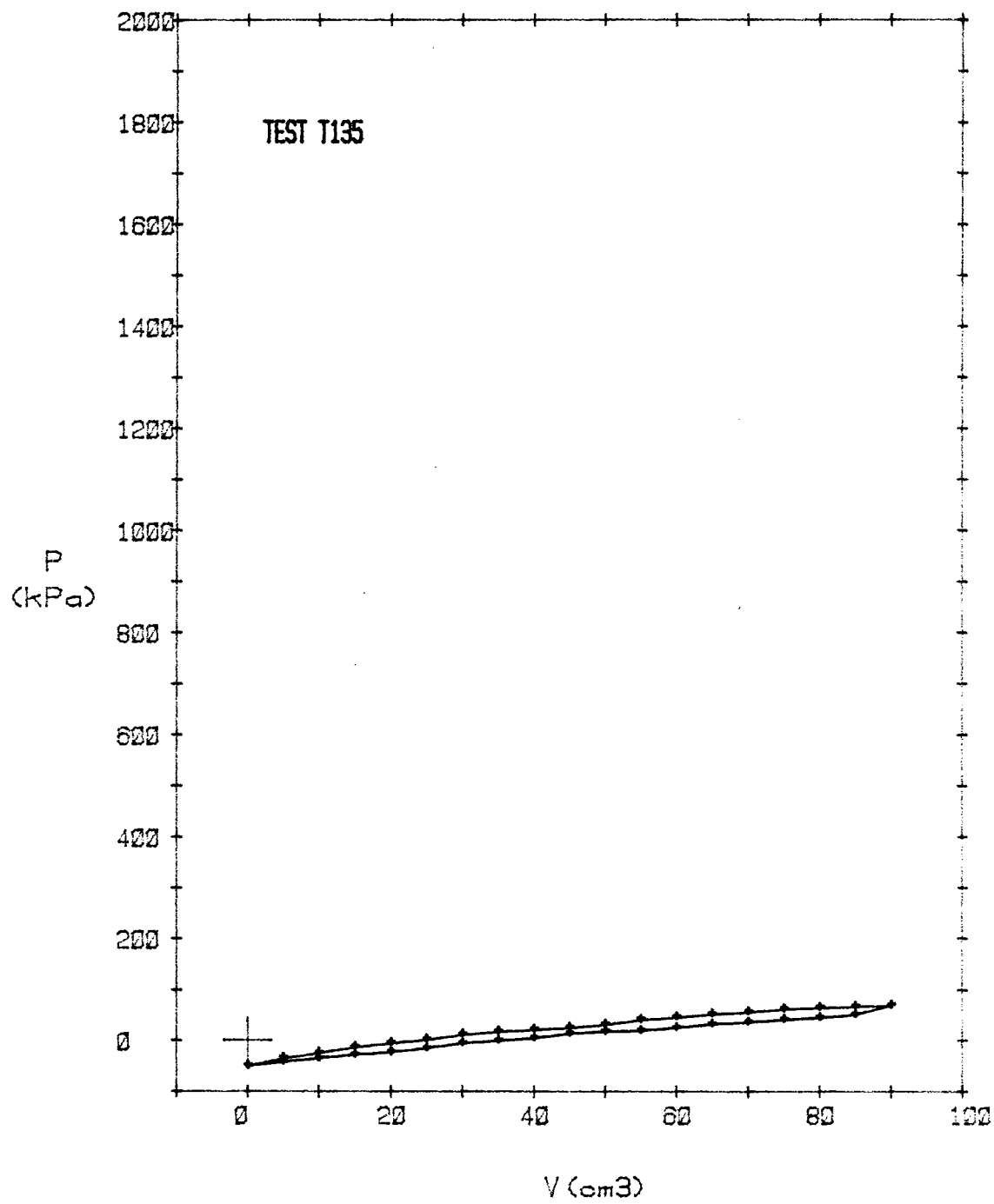
TEST T126

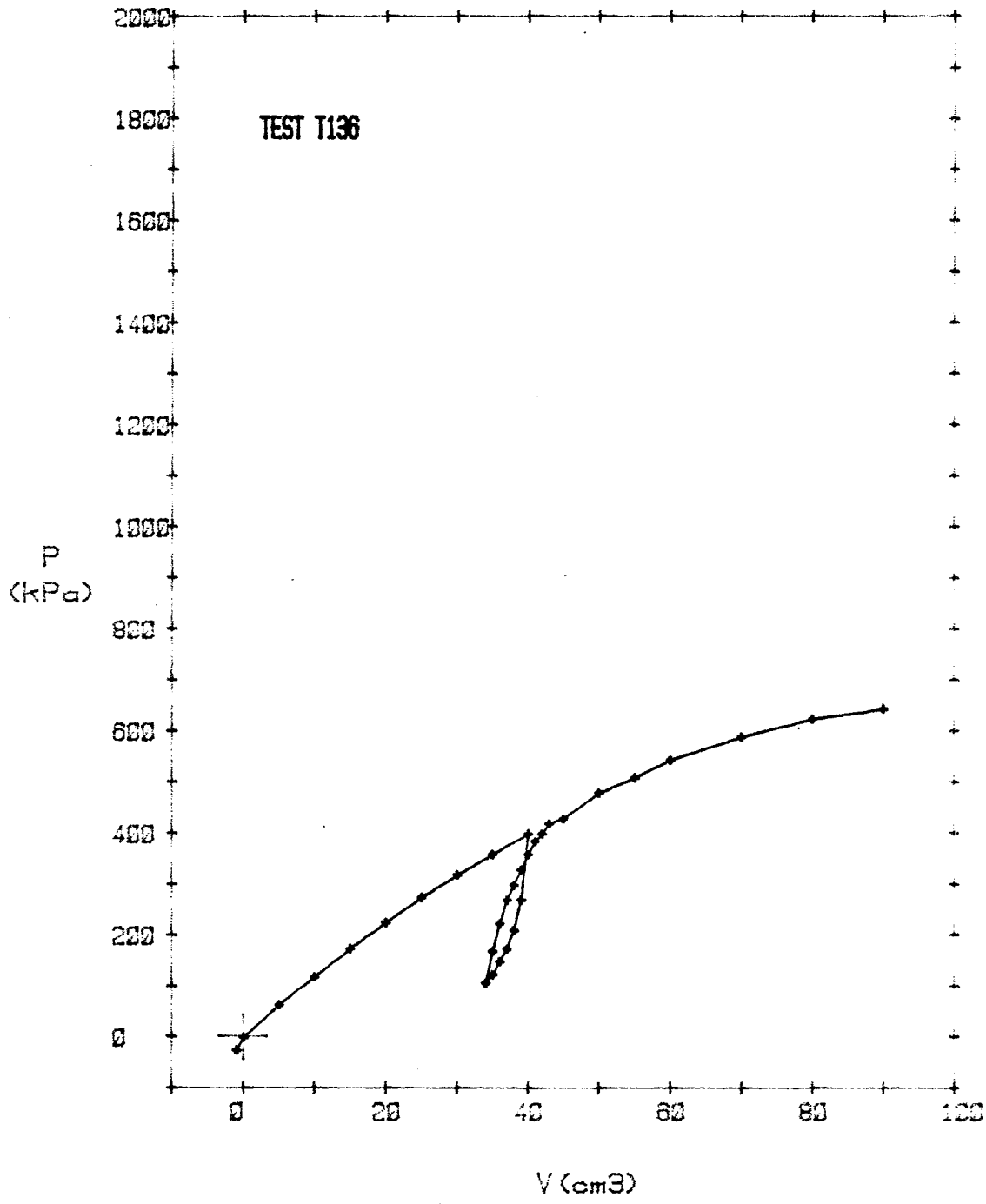


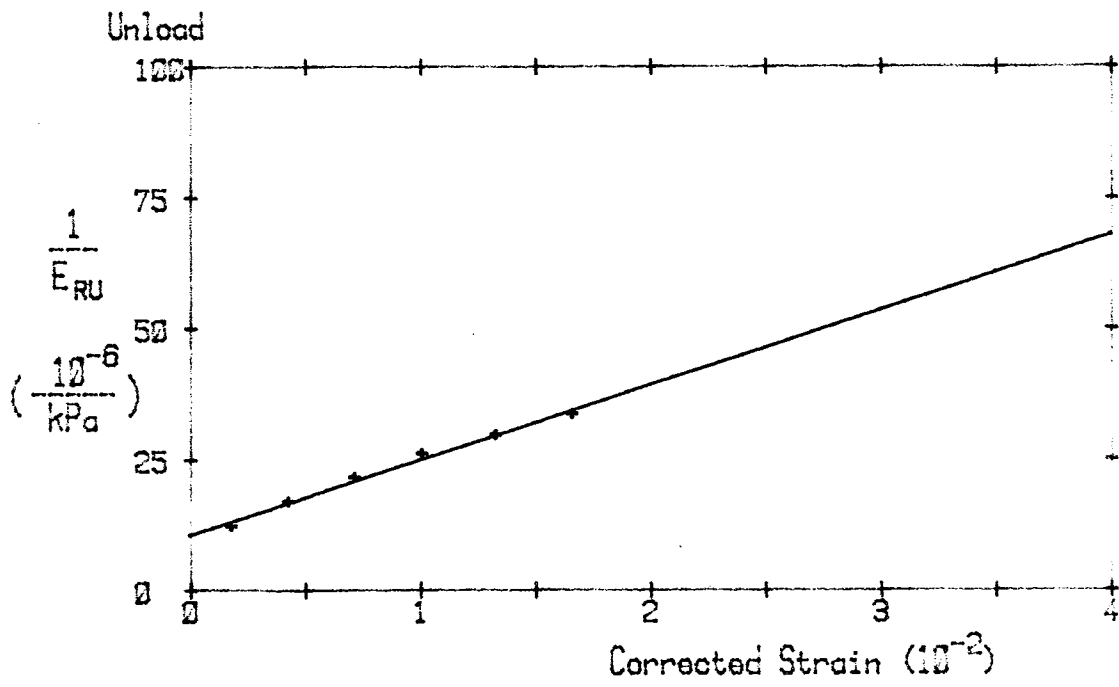




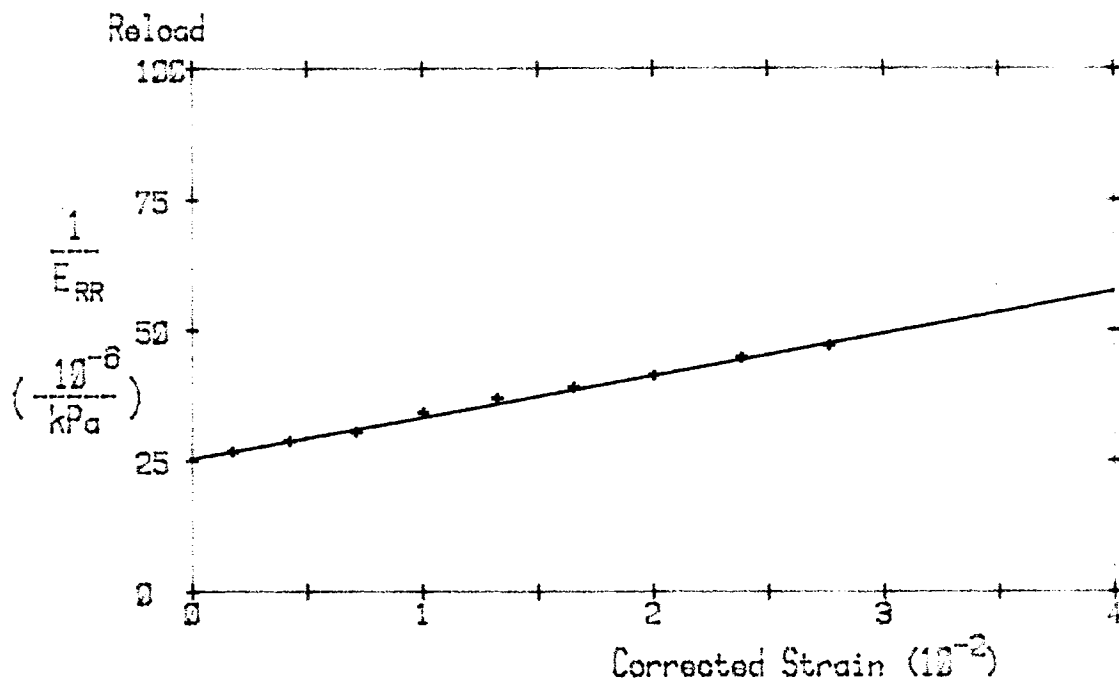


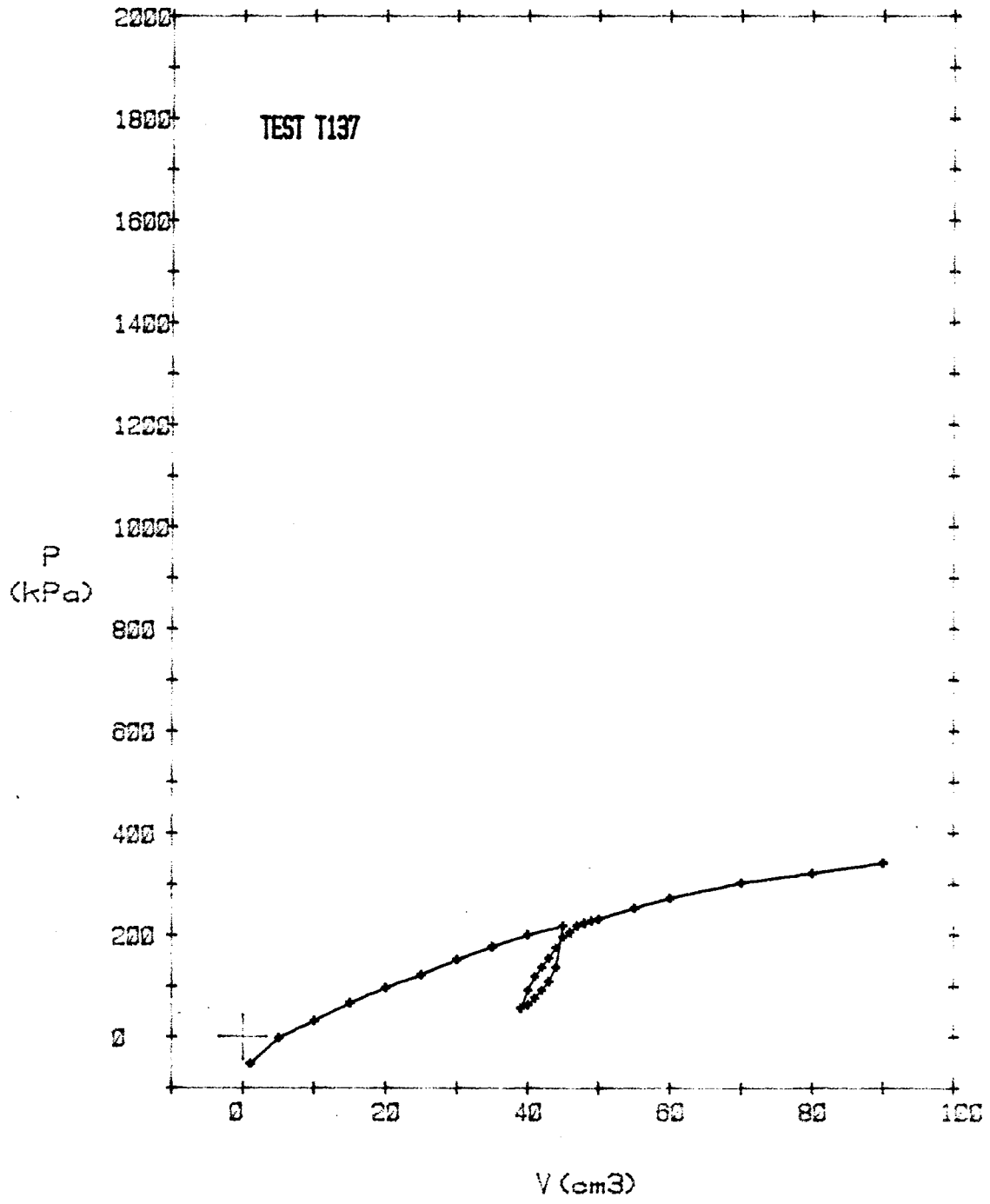


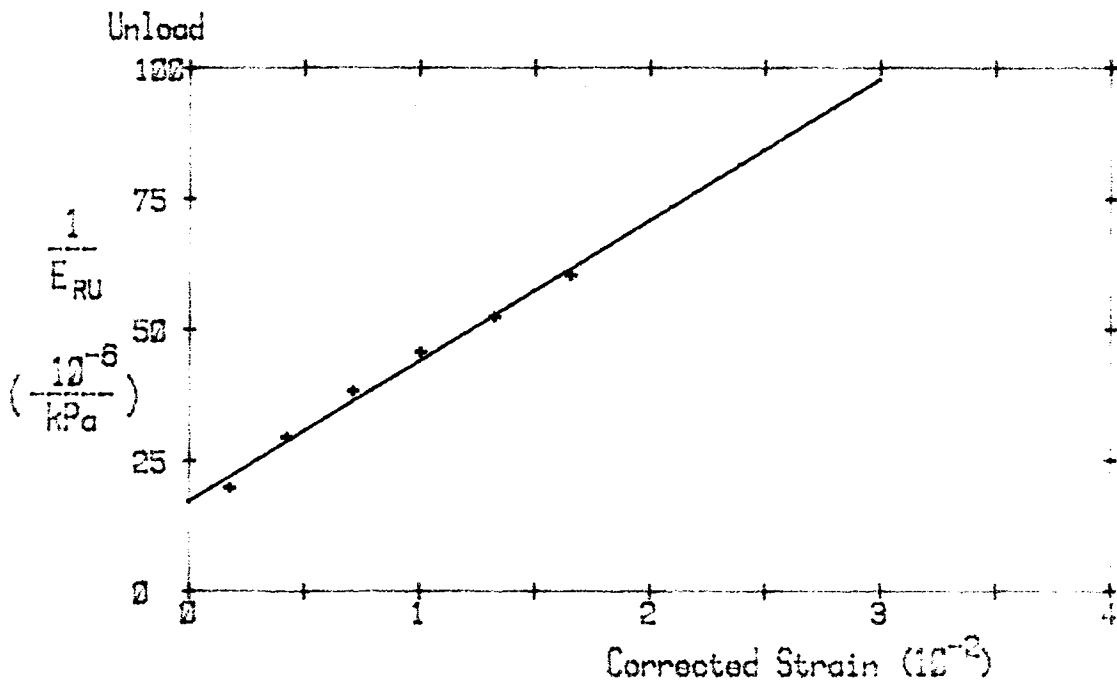




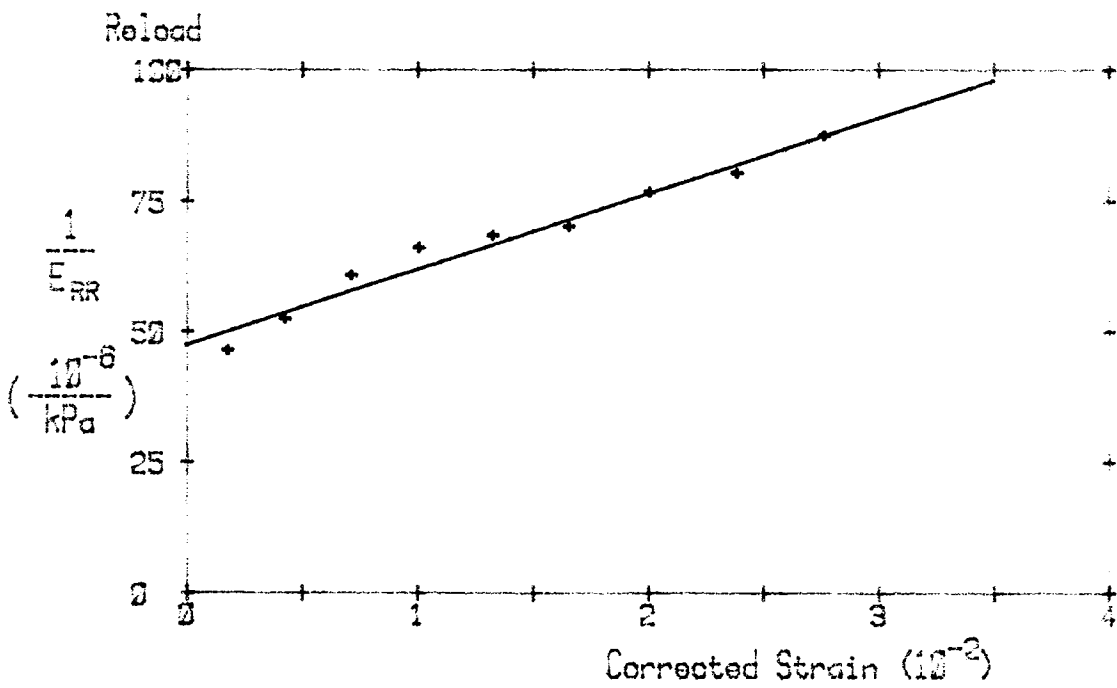
TEST T136

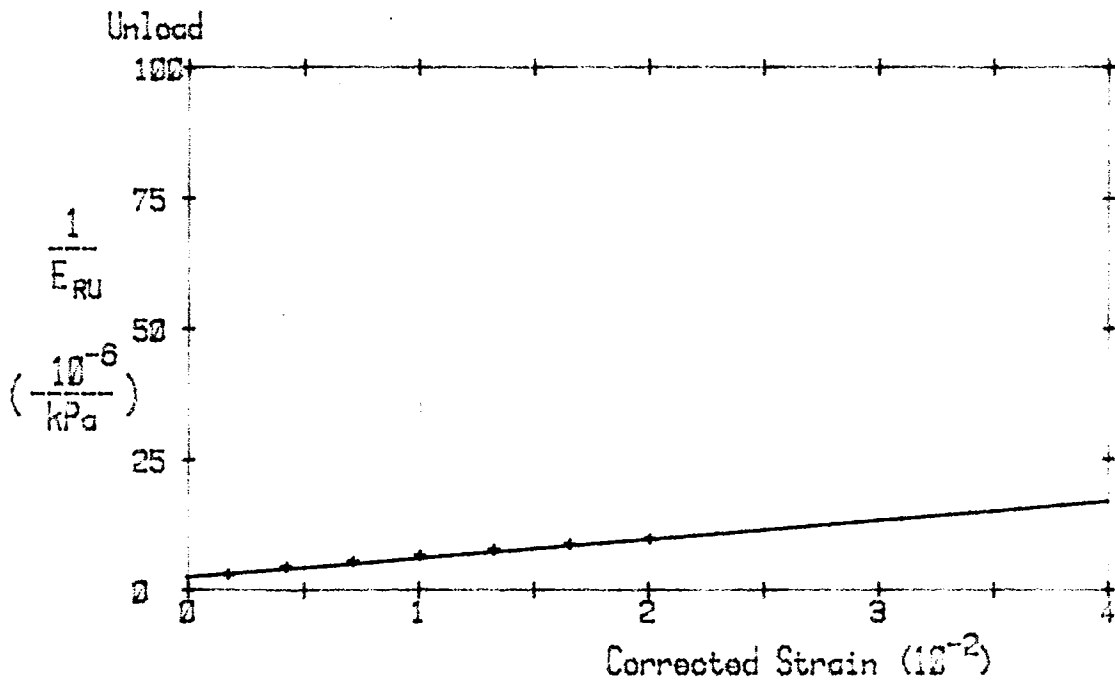




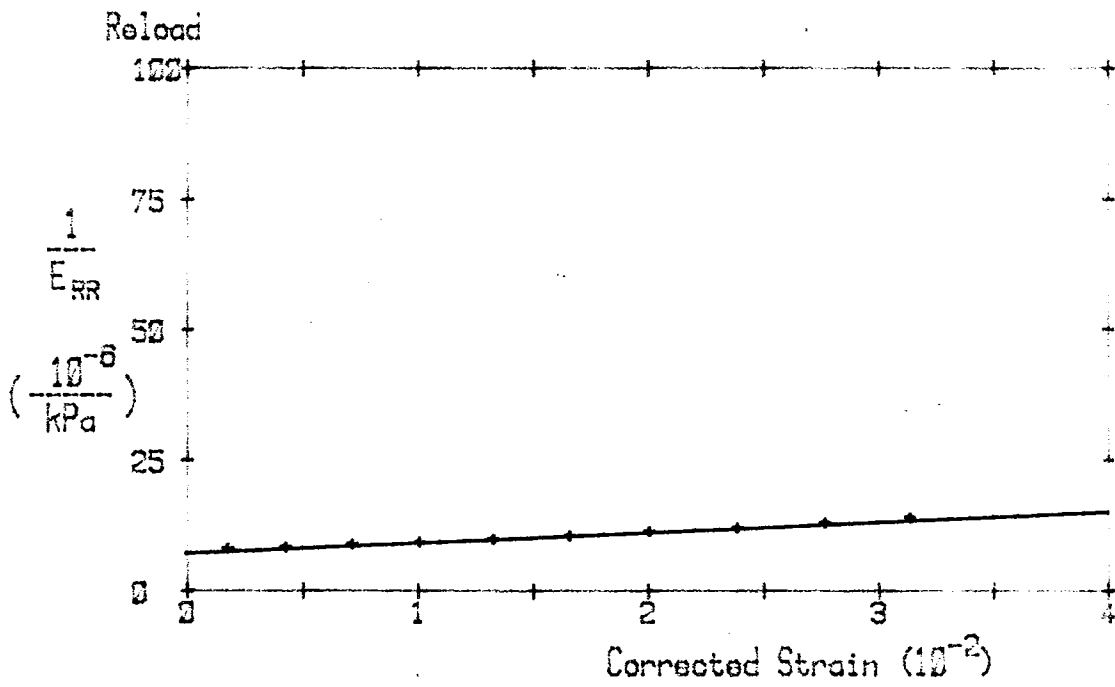


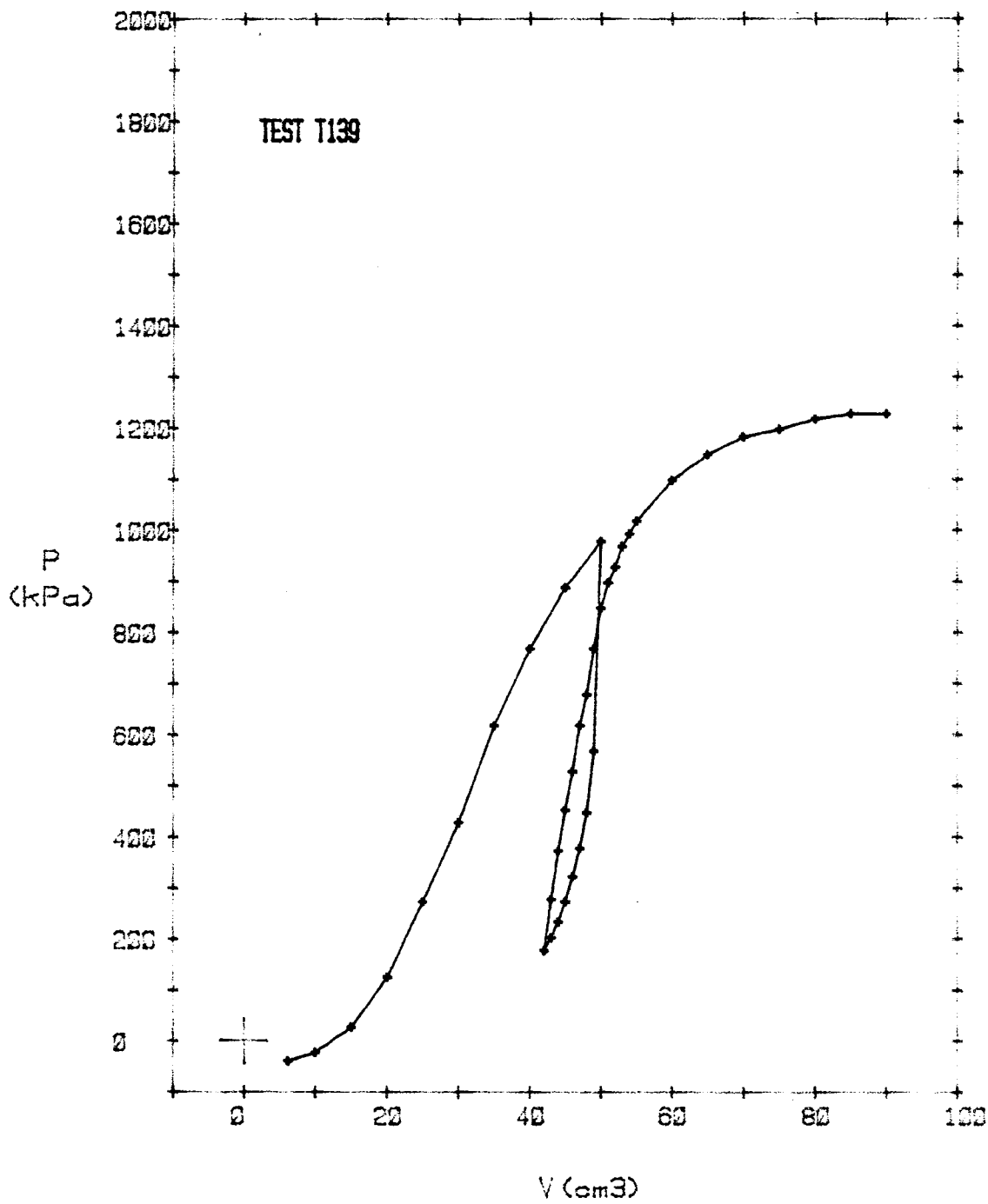
TEST T137

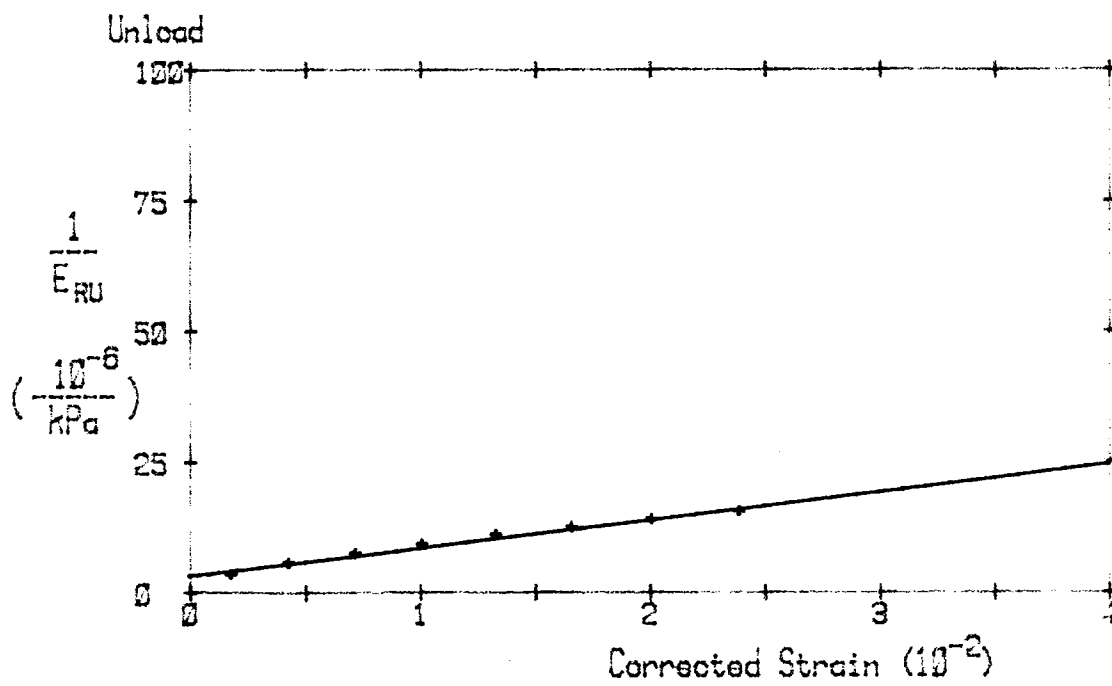




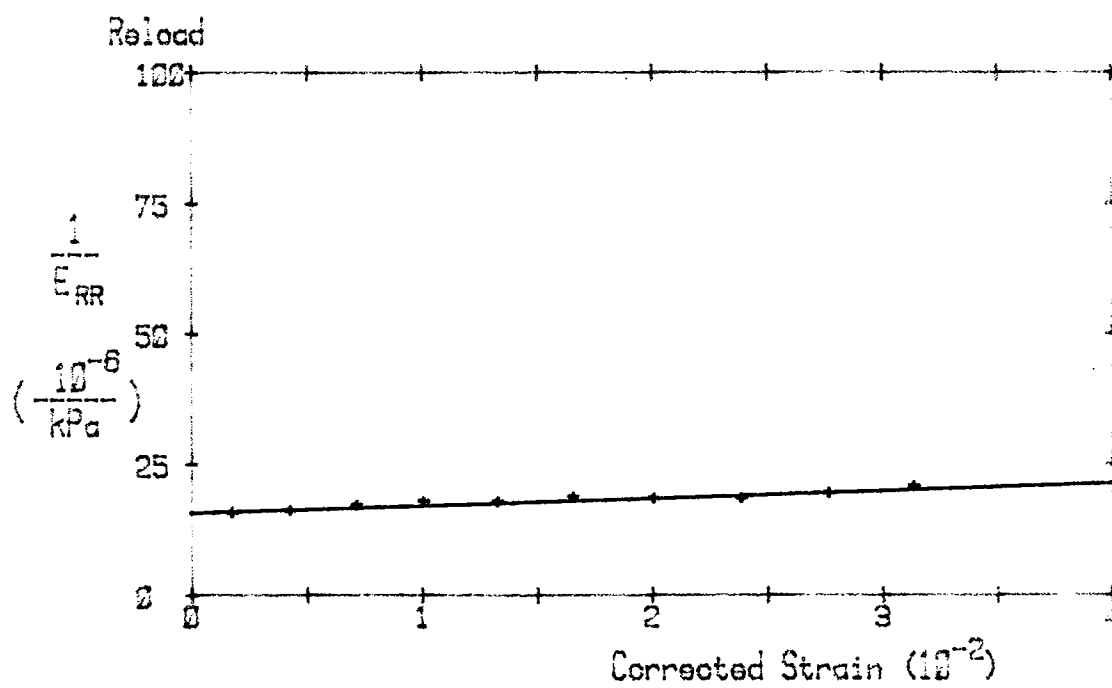
TEST T138

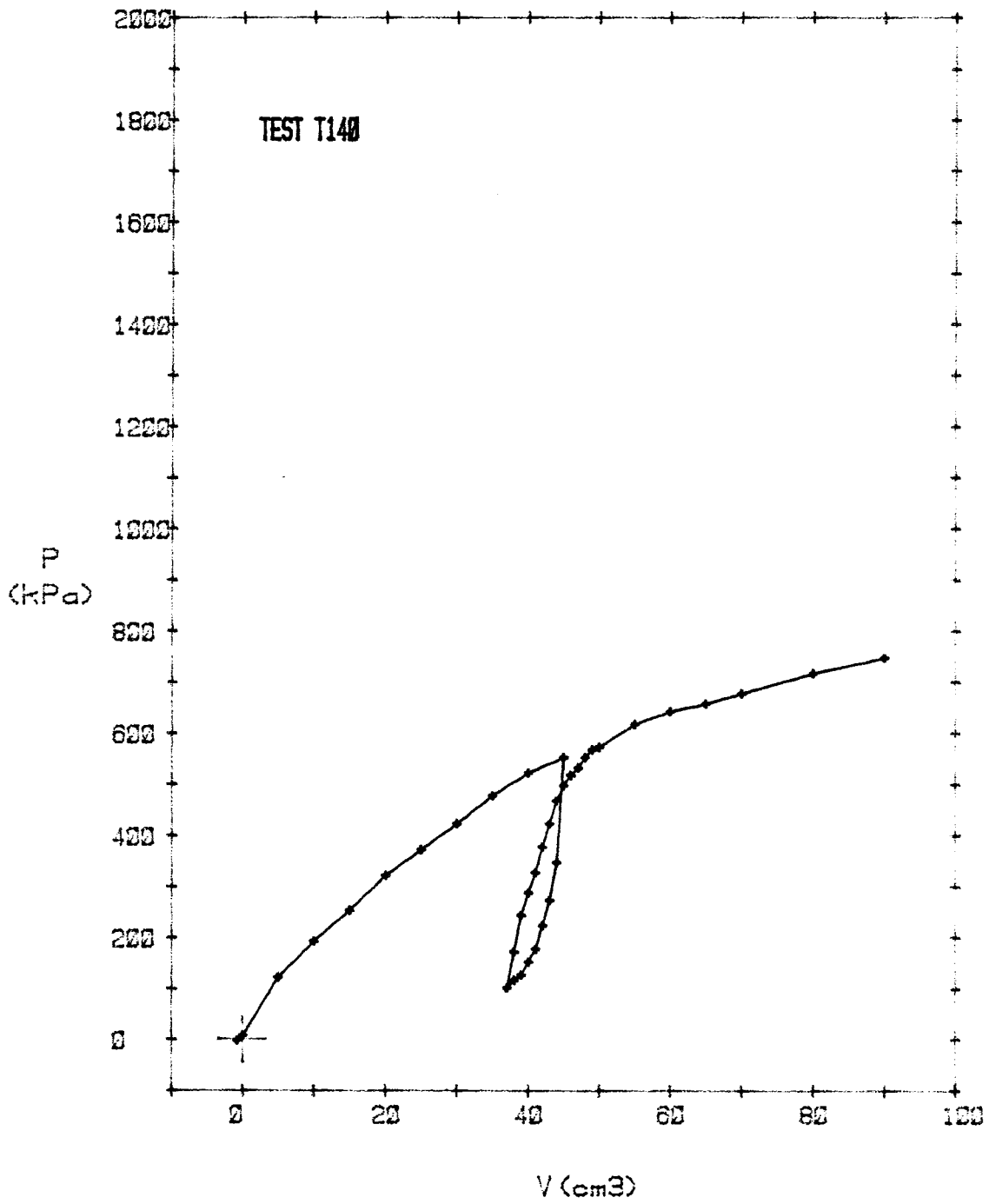


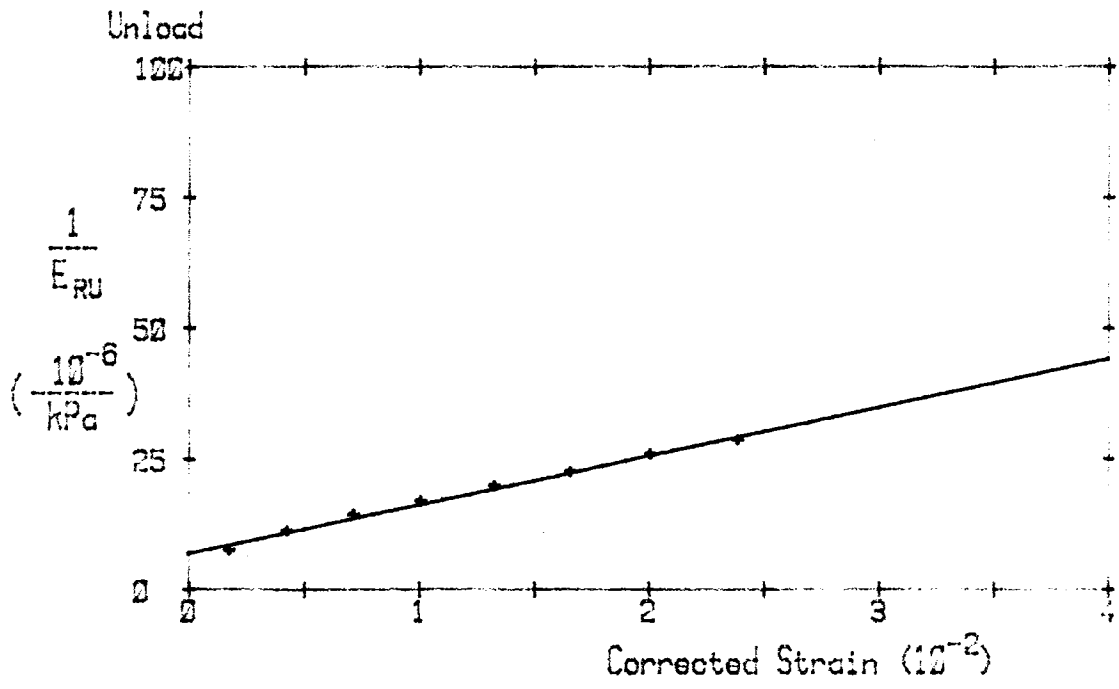




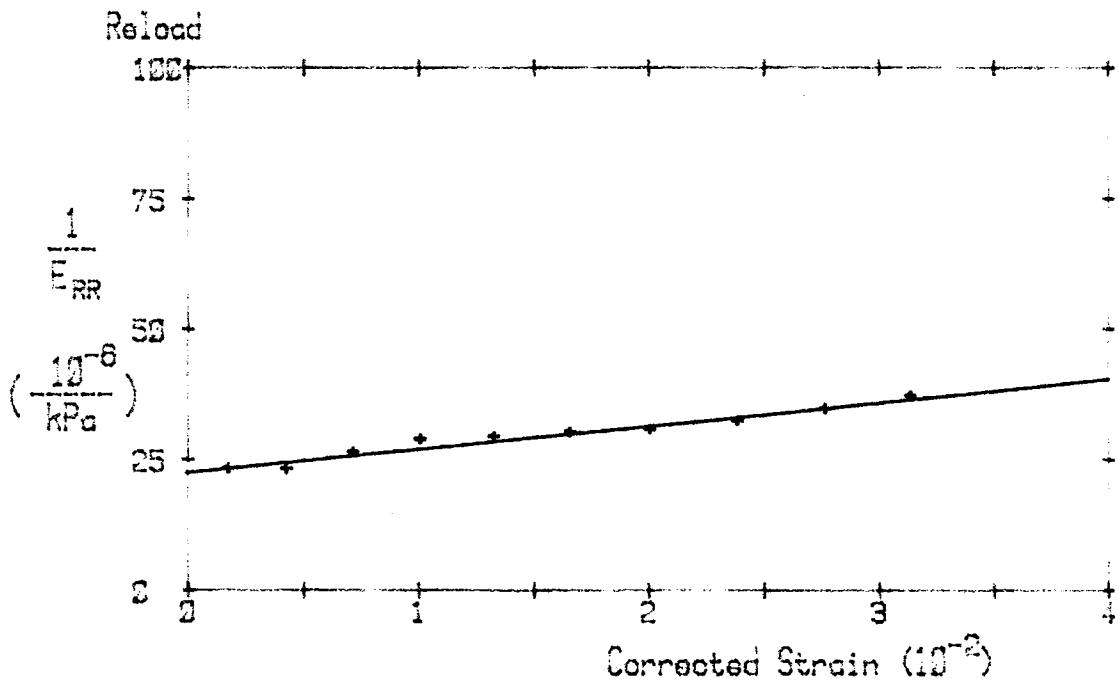
TEST T139

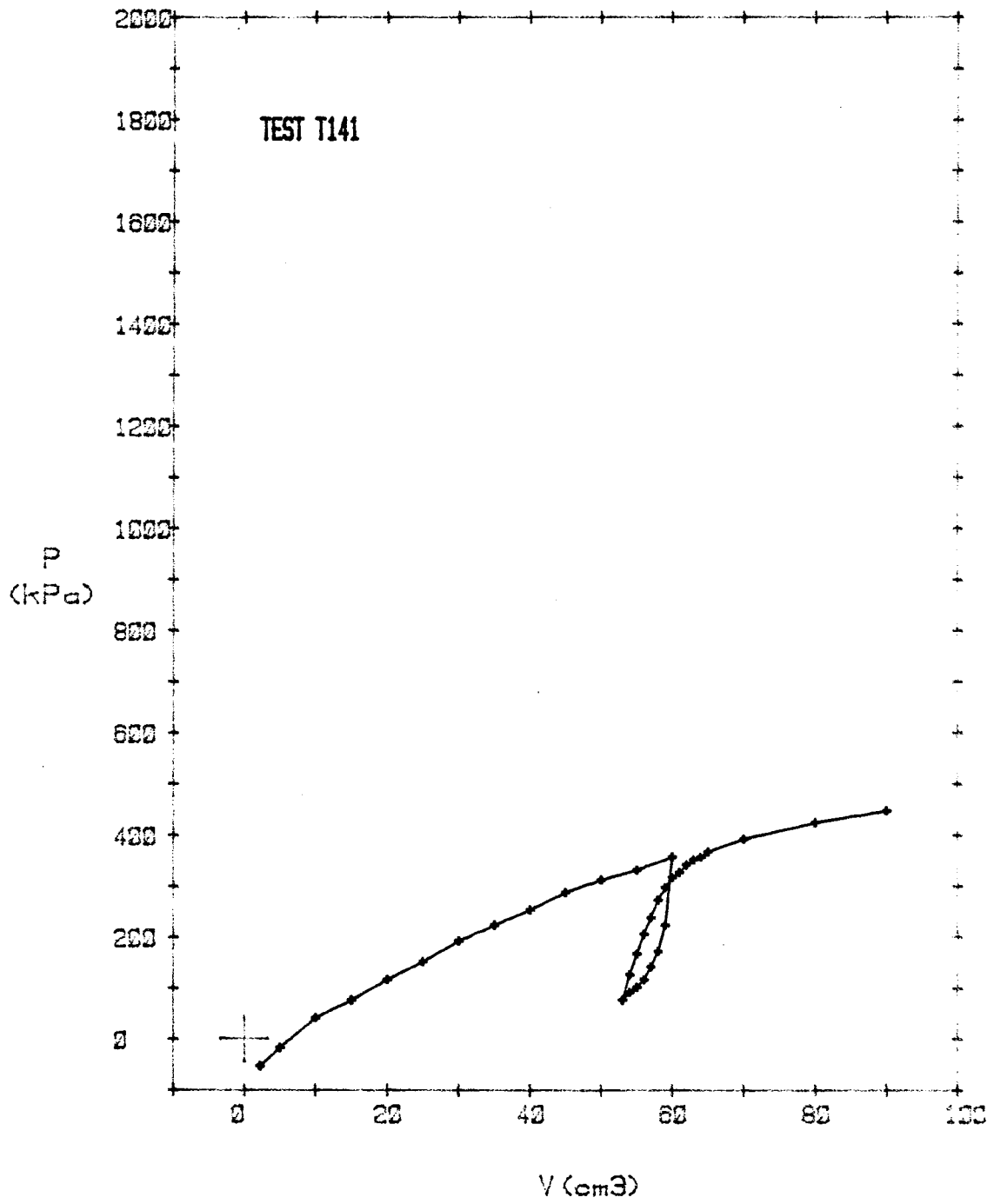


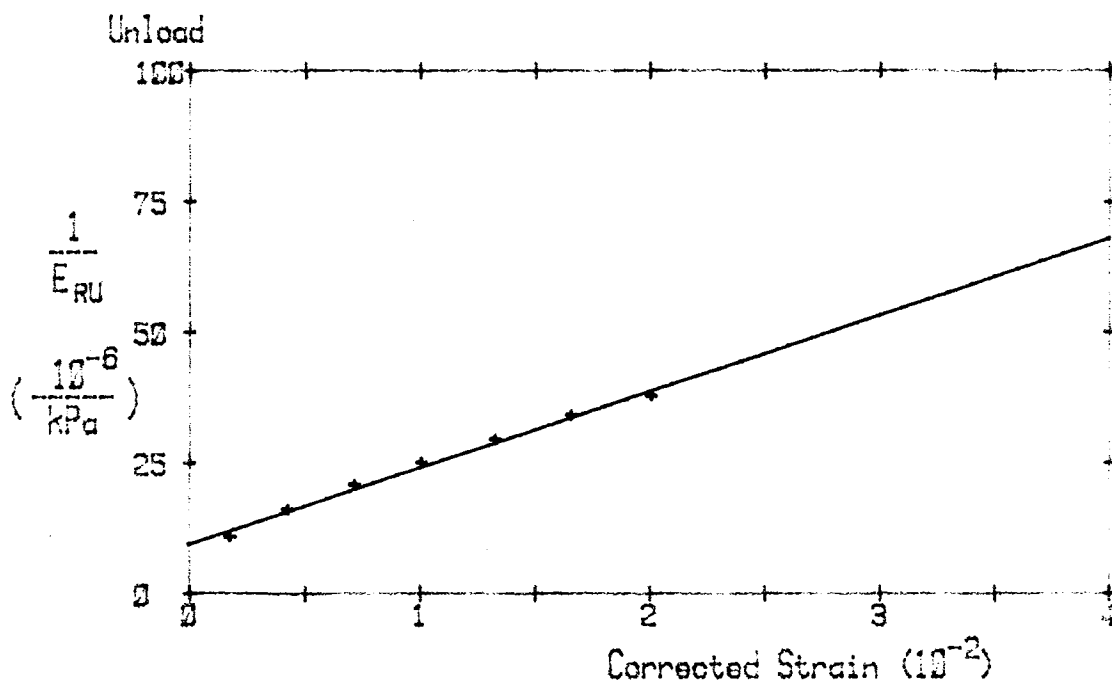




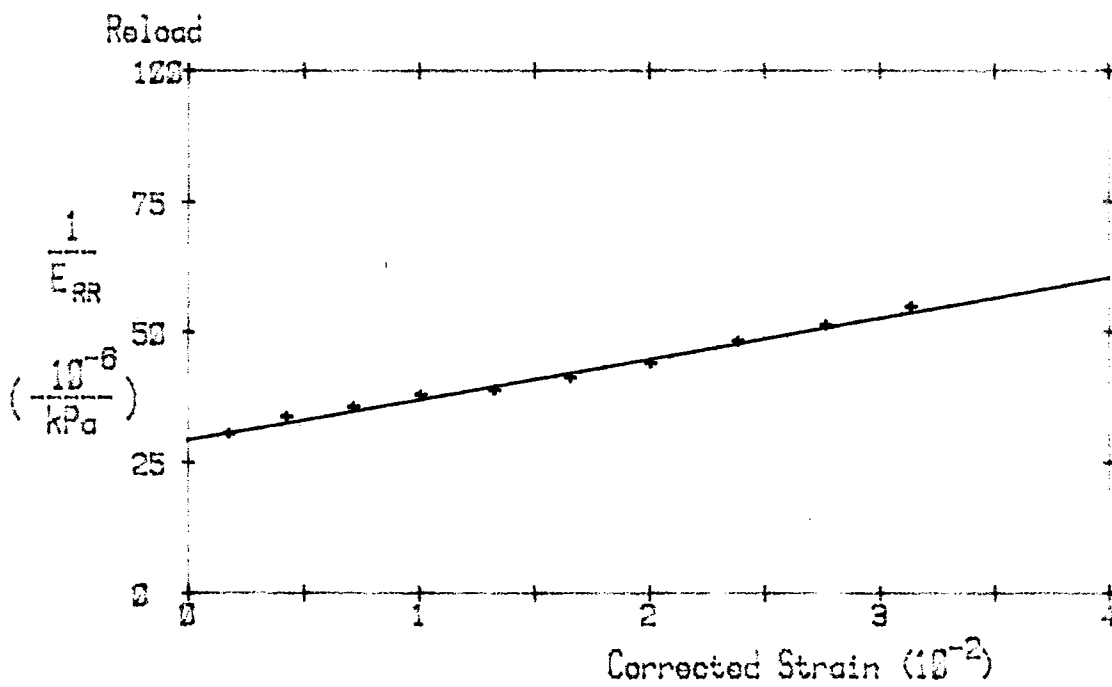
TEST T140

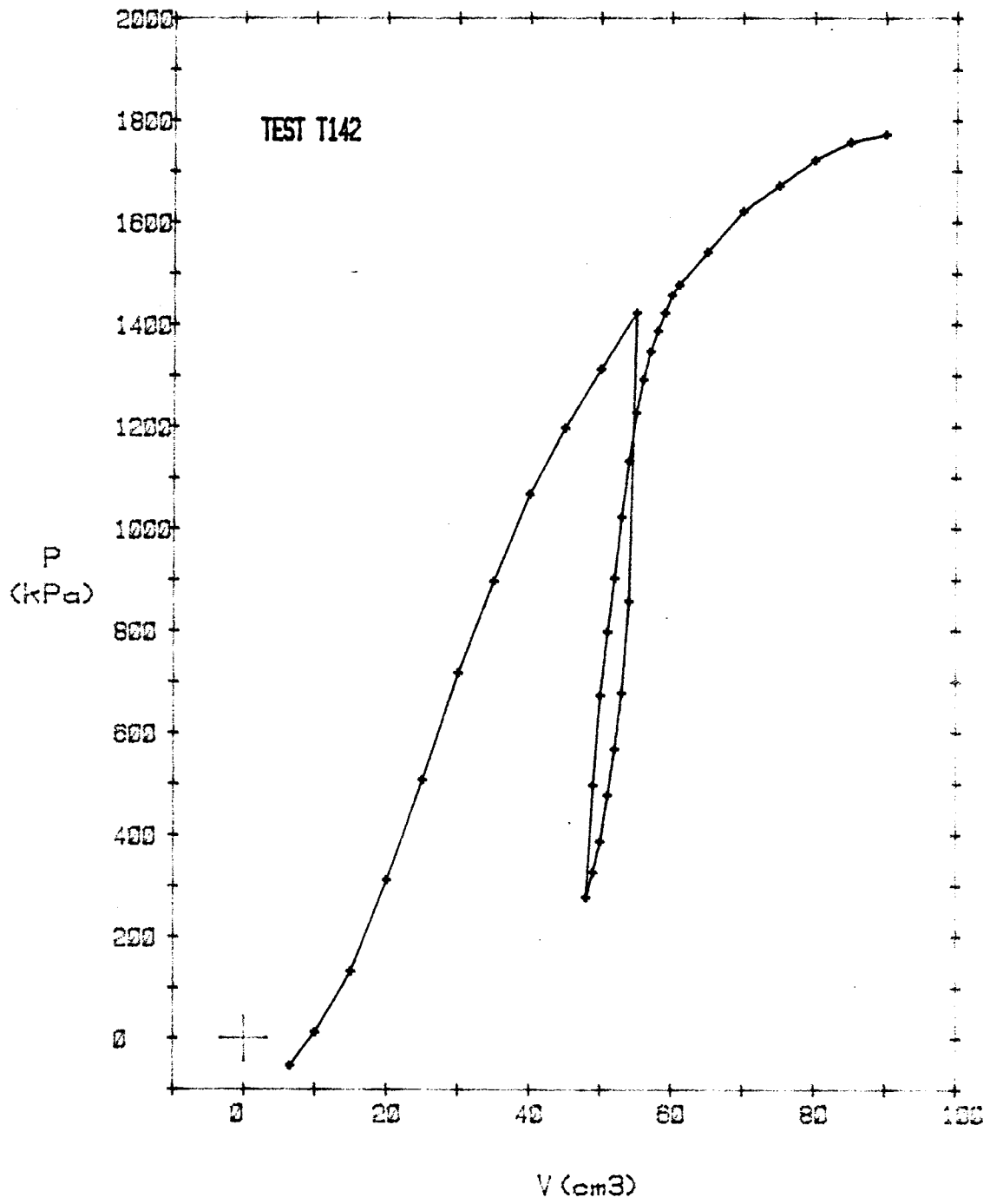


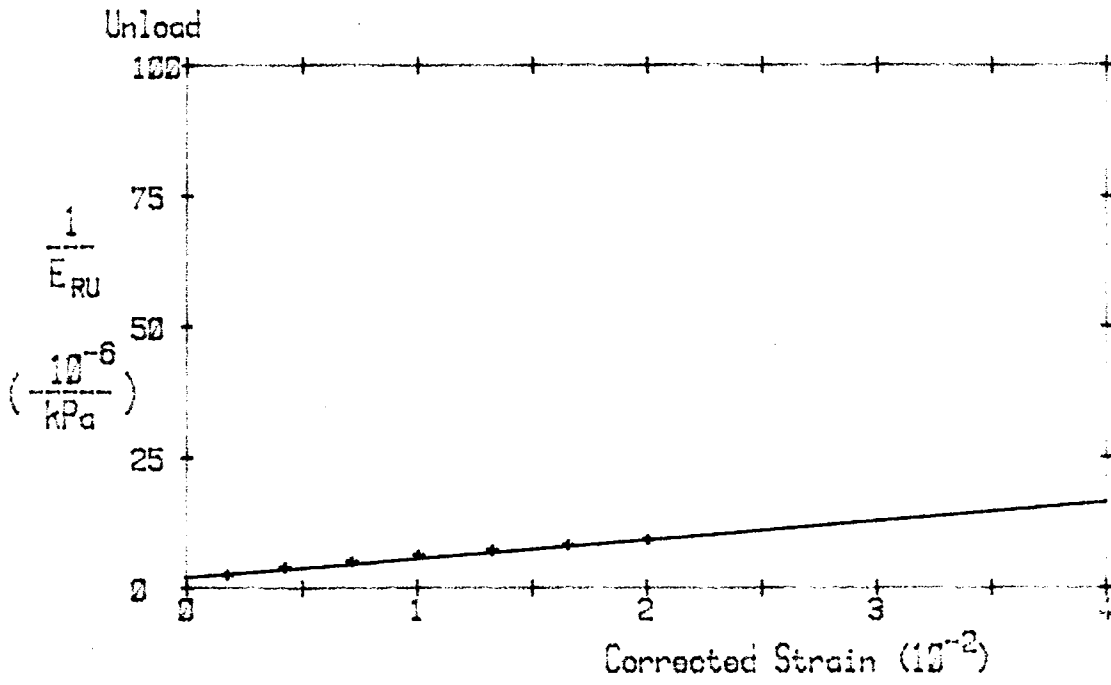




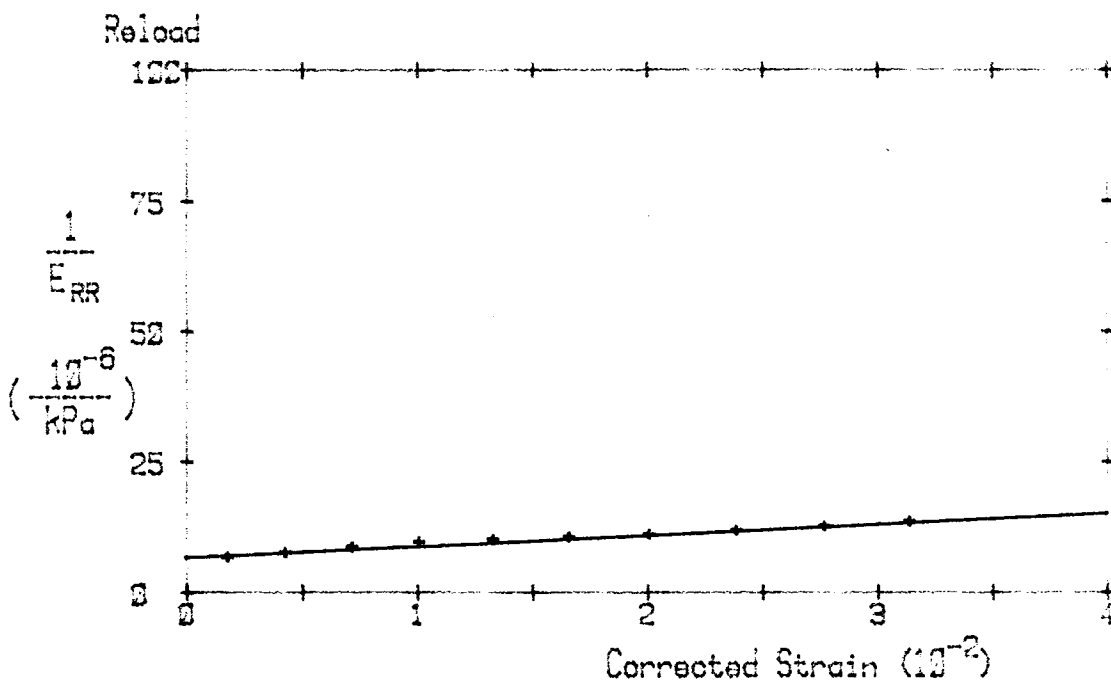
TEST T141

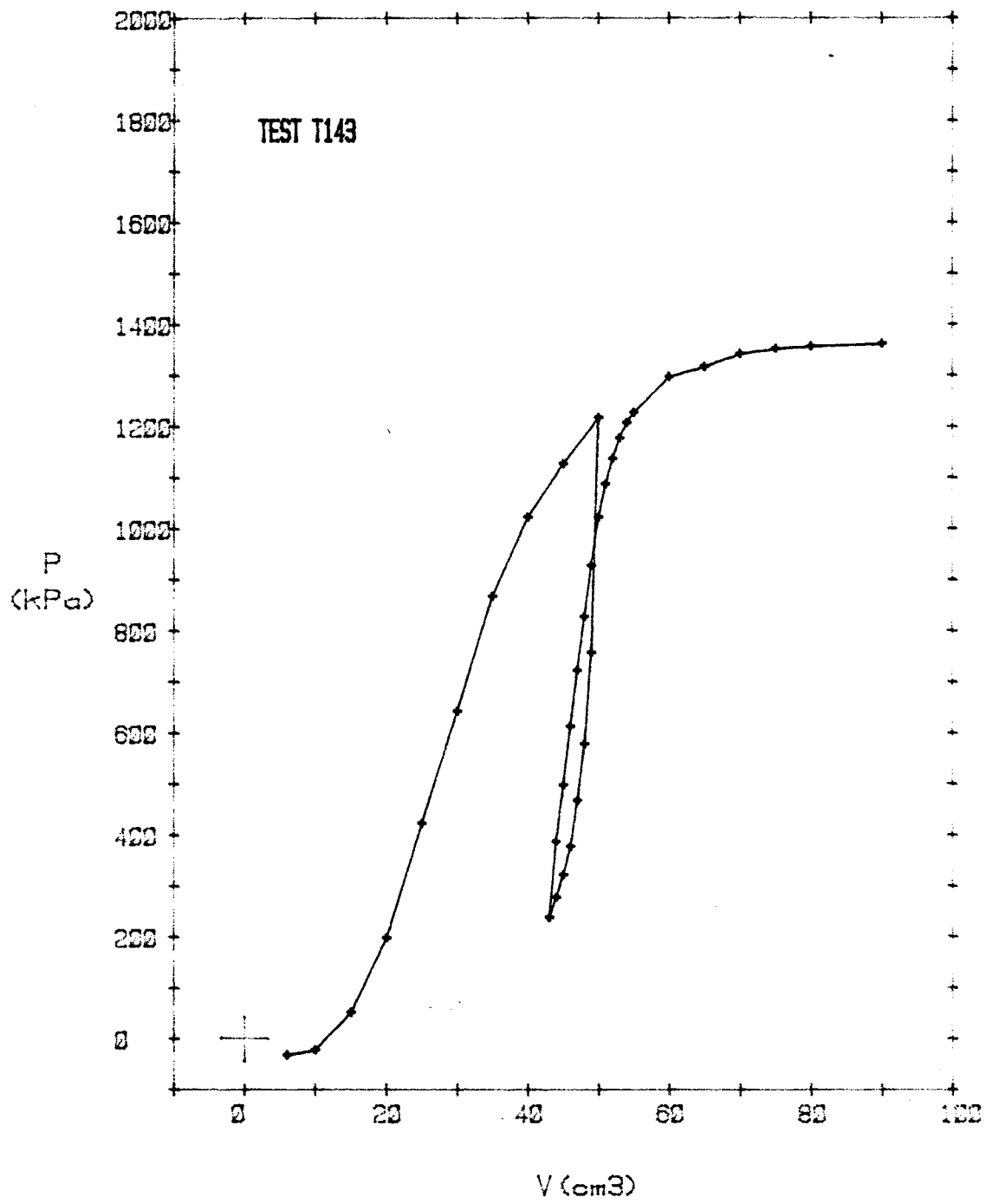


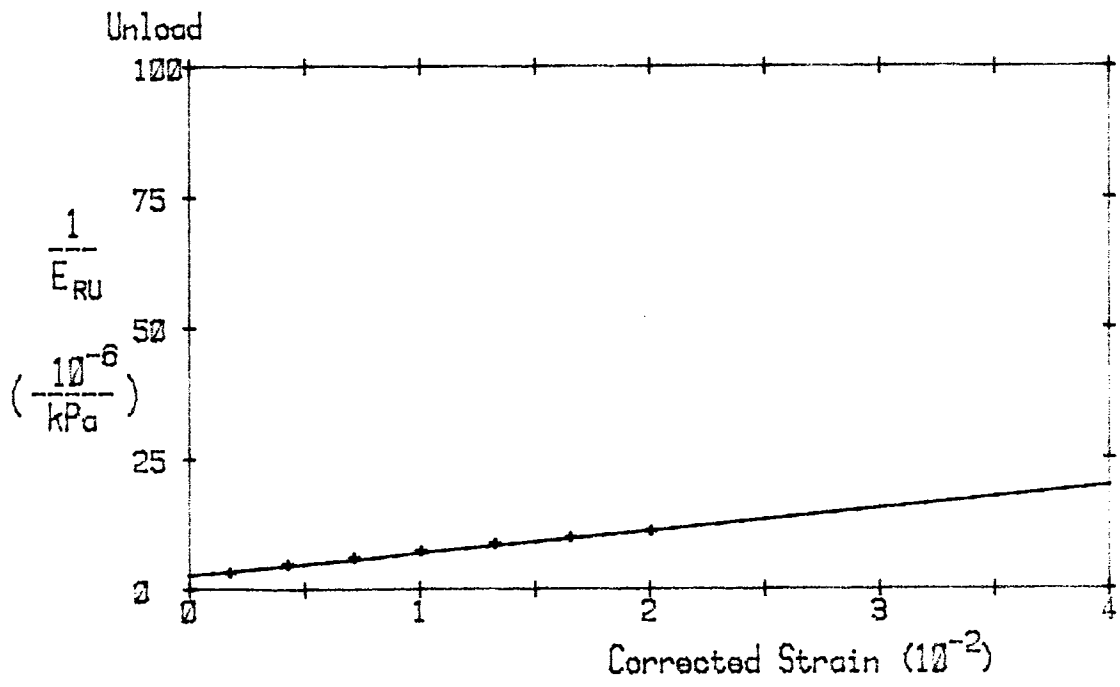




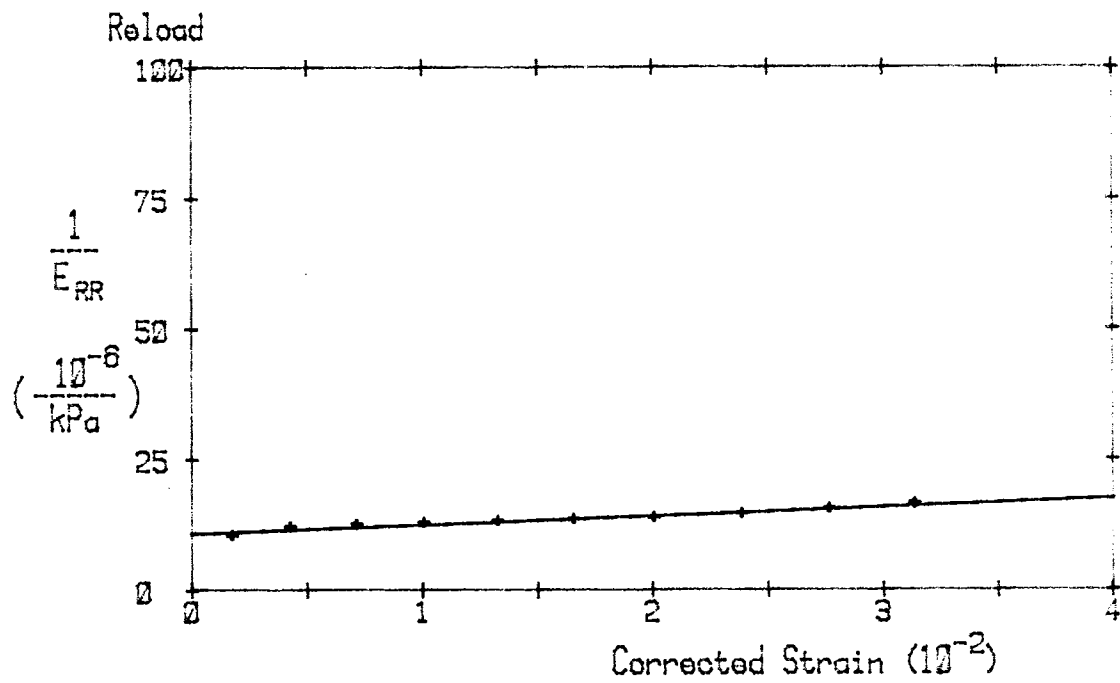
TEST T142

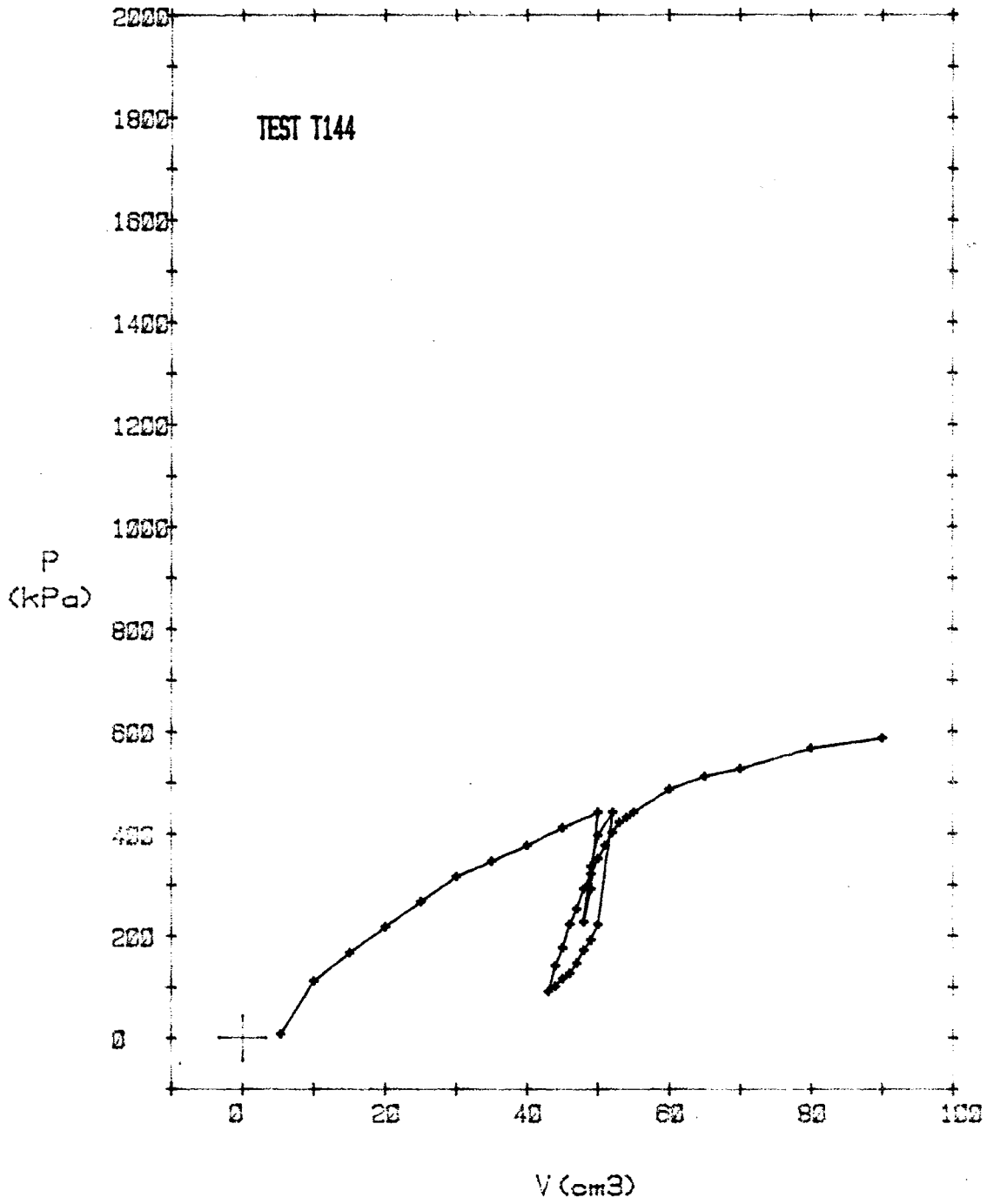


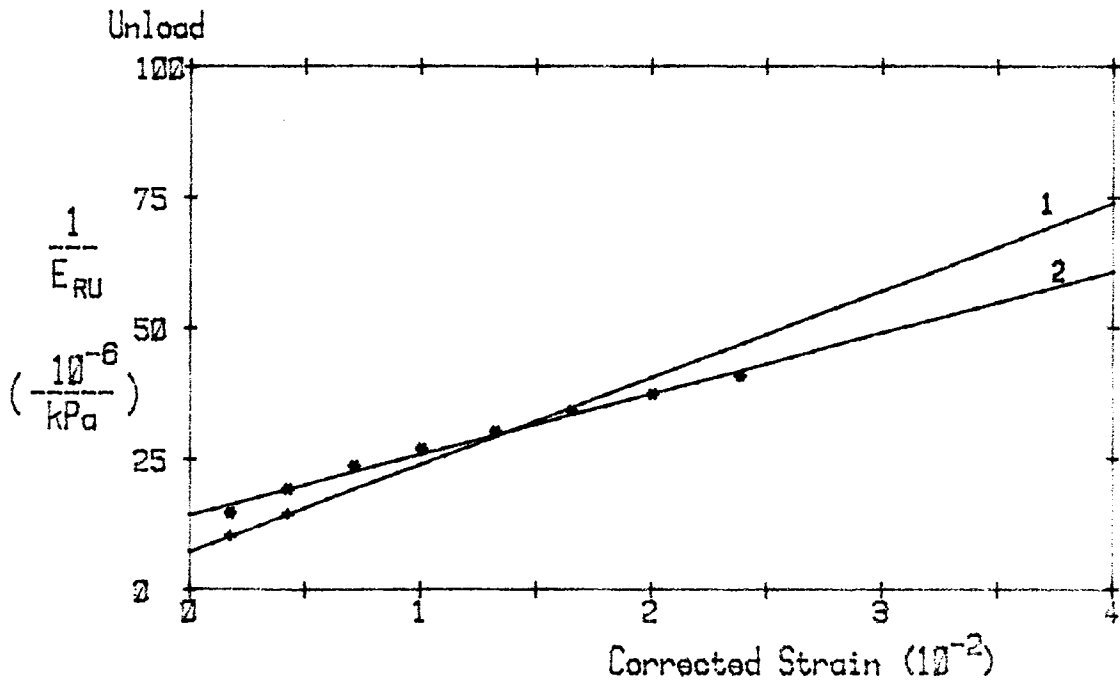




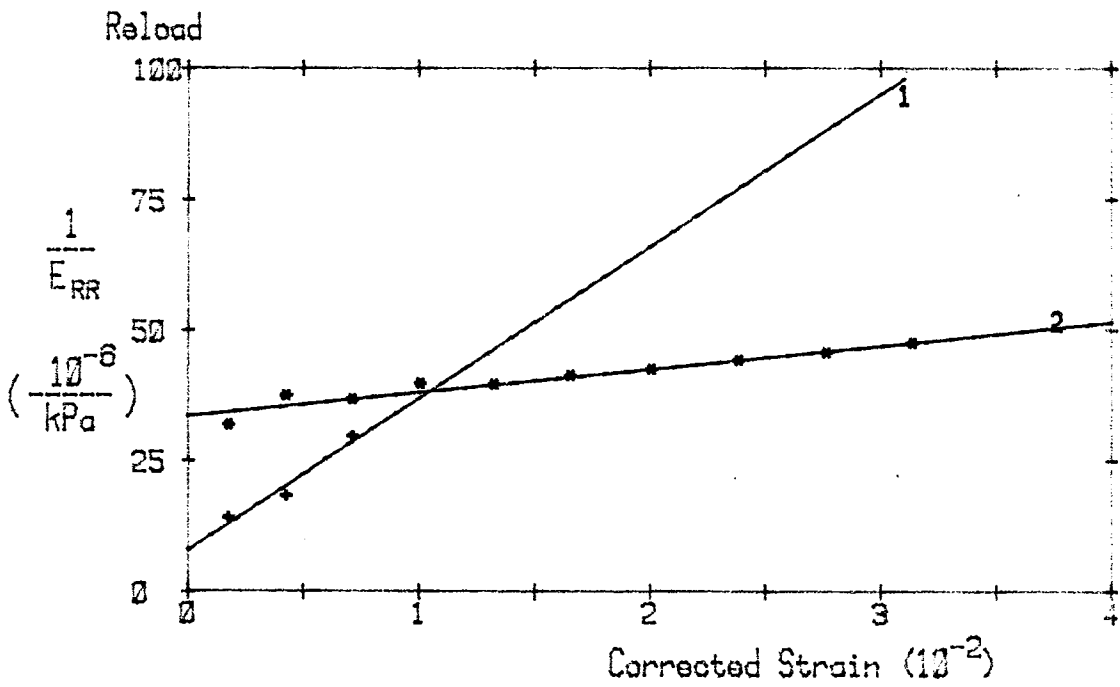
TEST T143

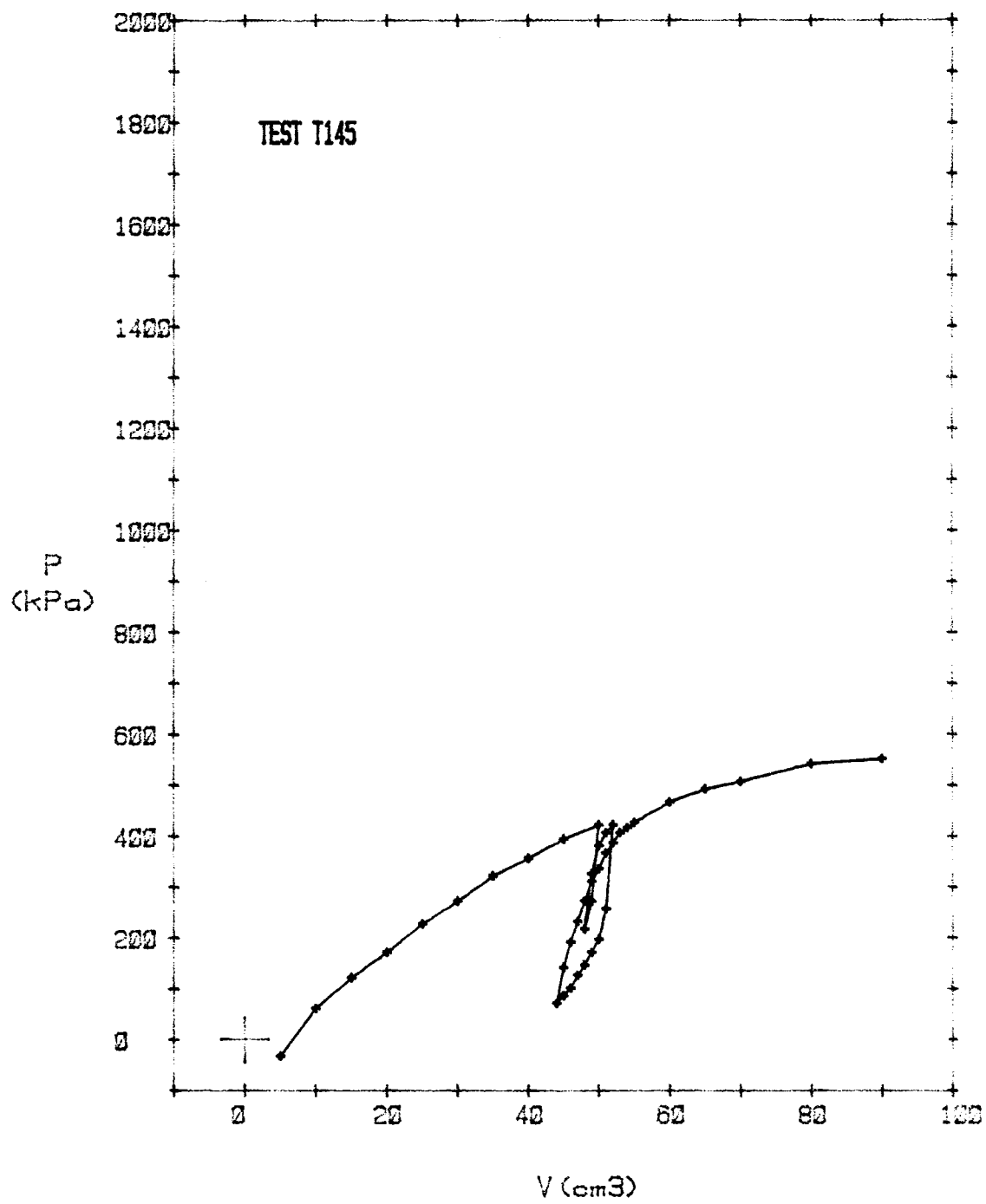


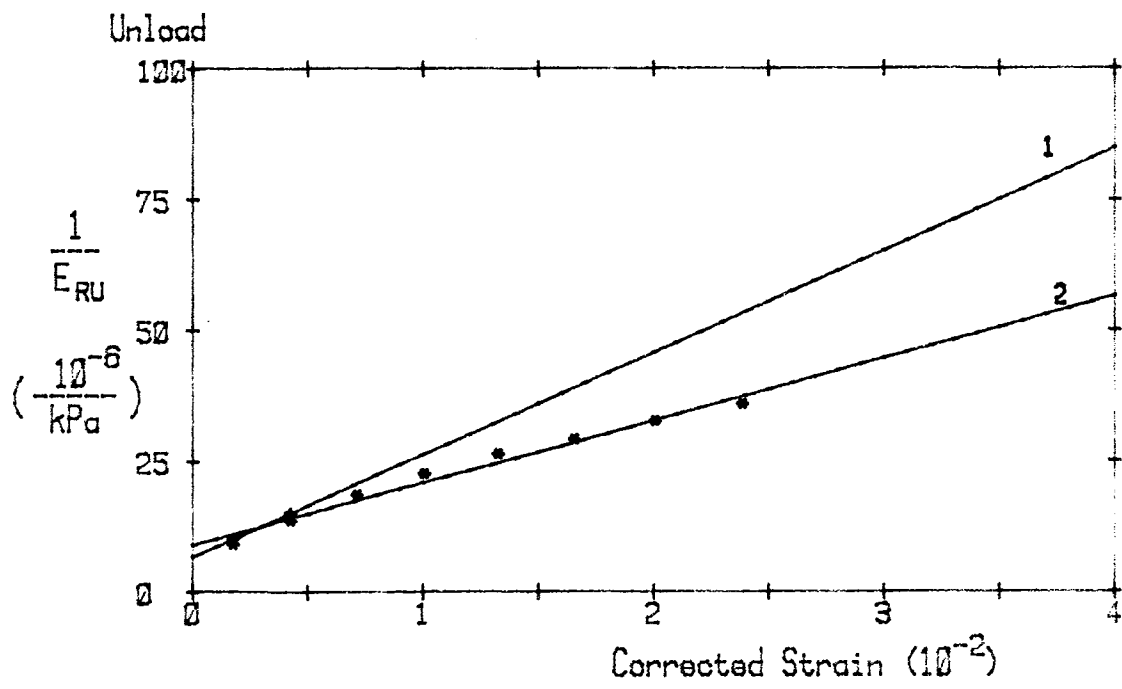




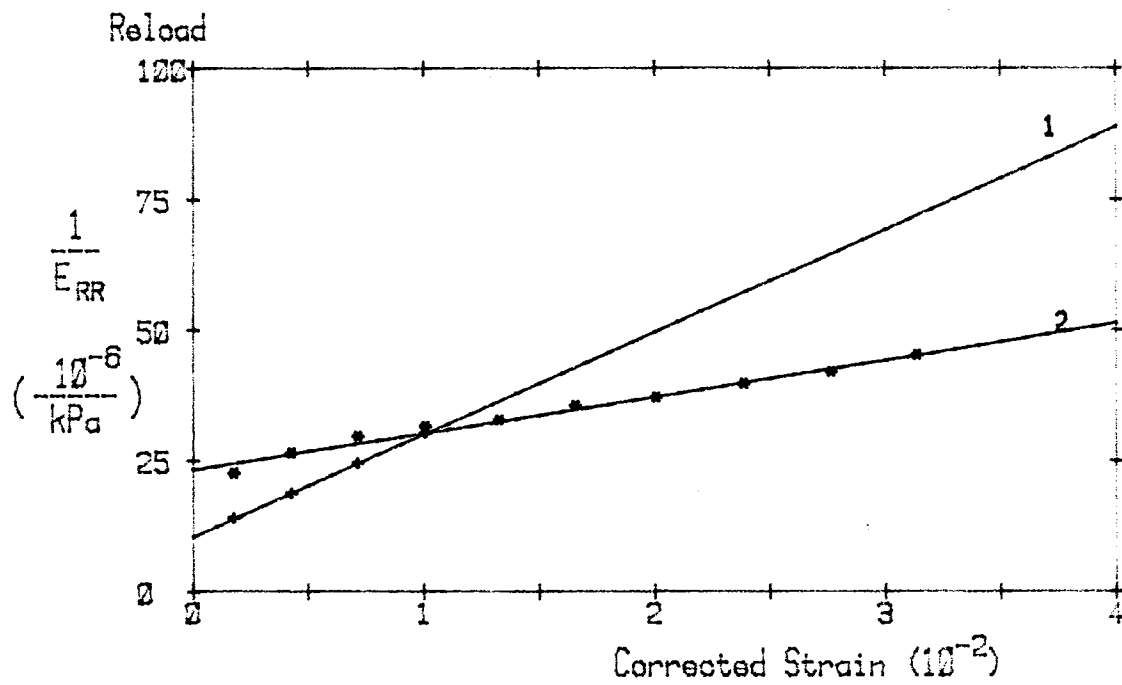
TEST T144

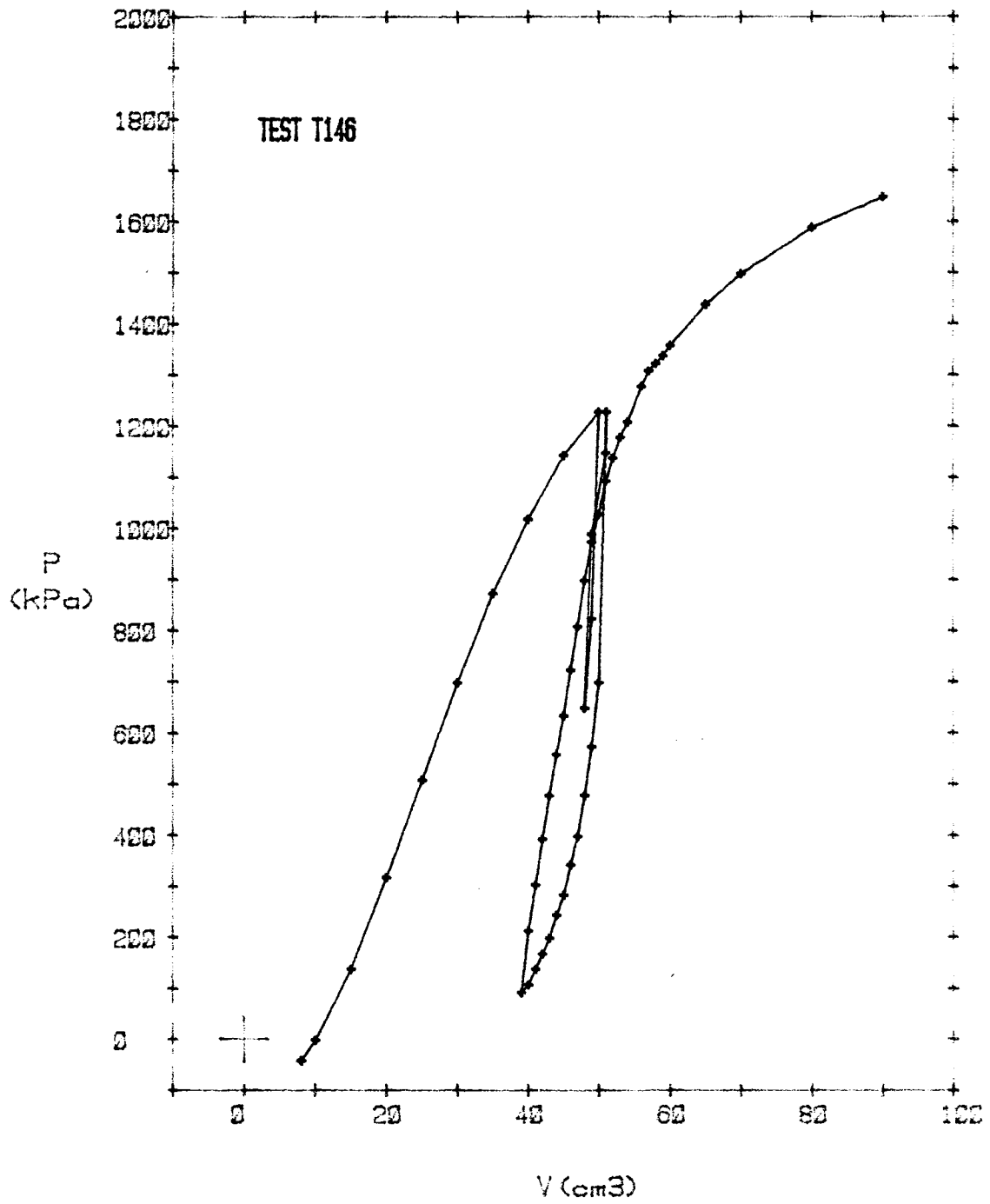


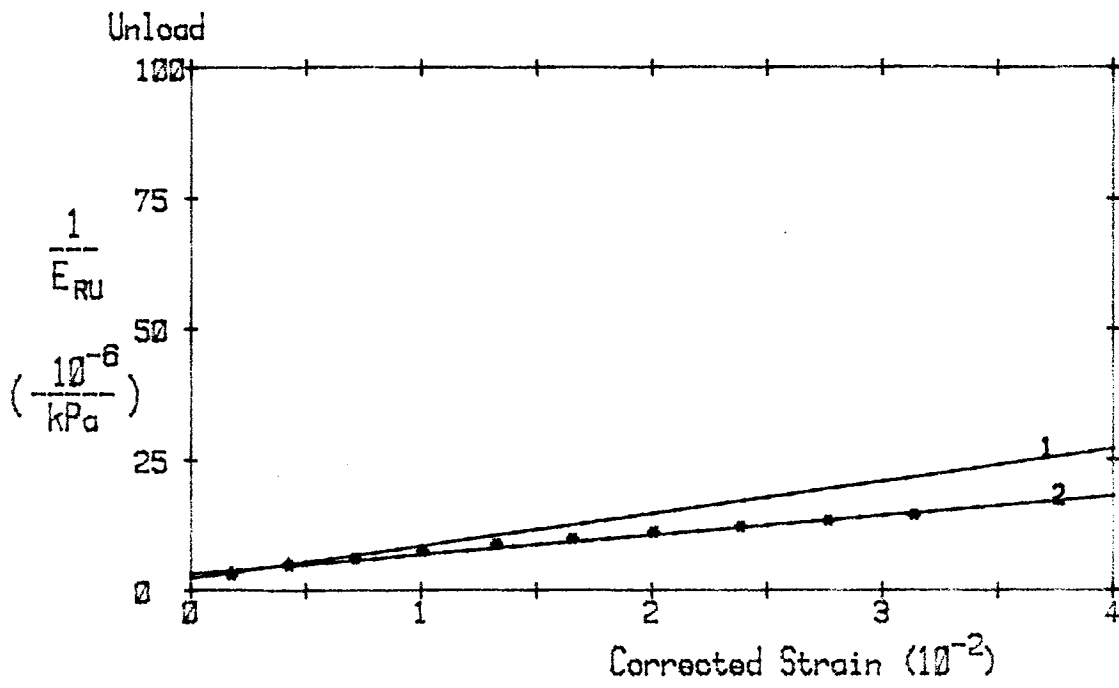




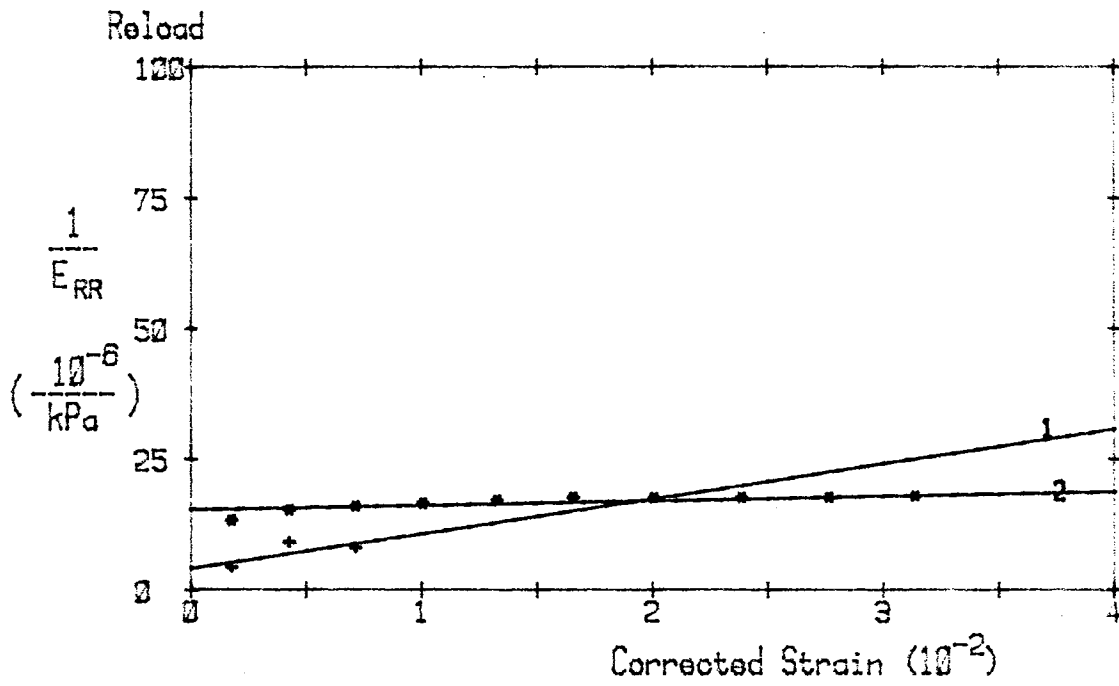
TEST T145

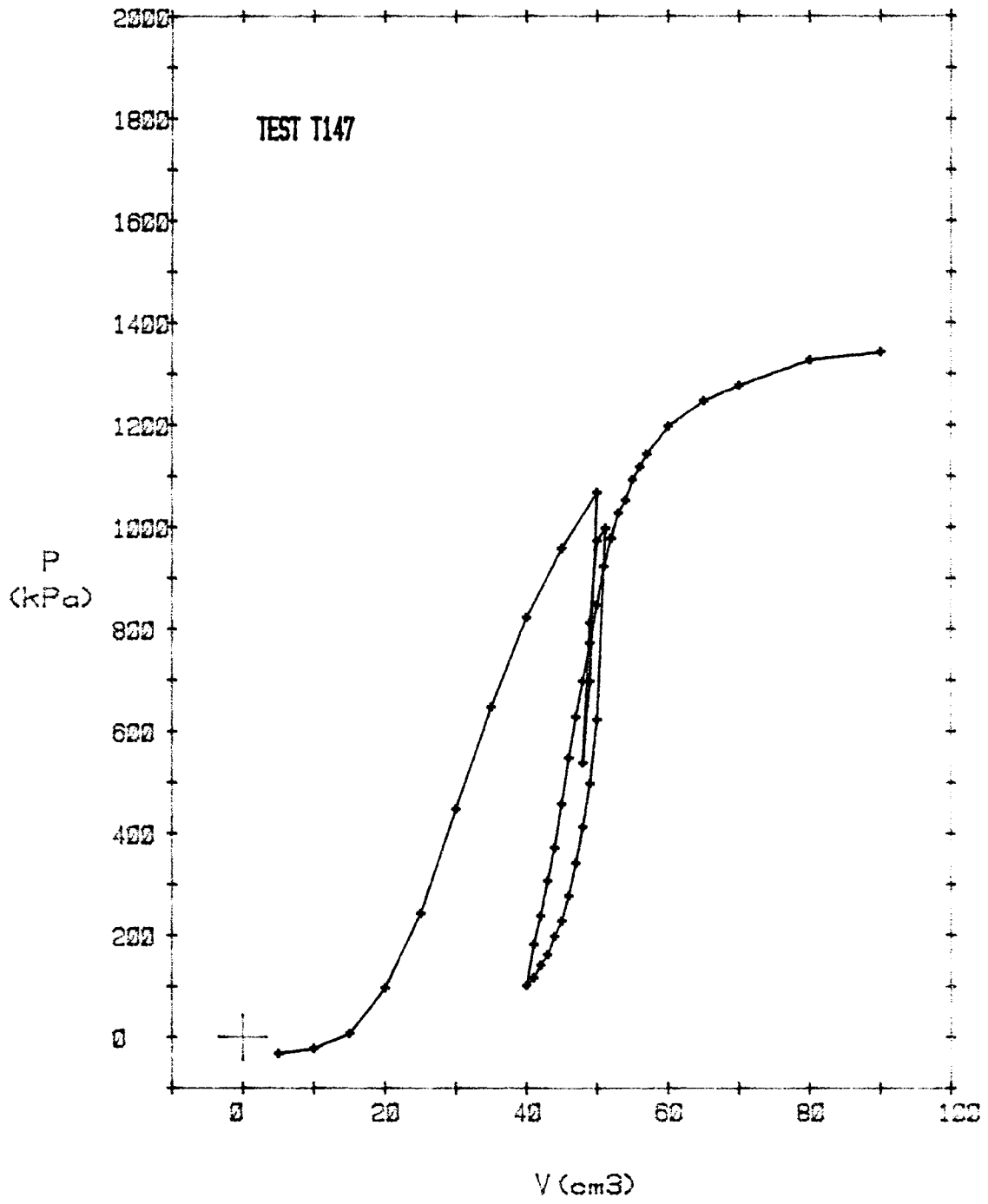


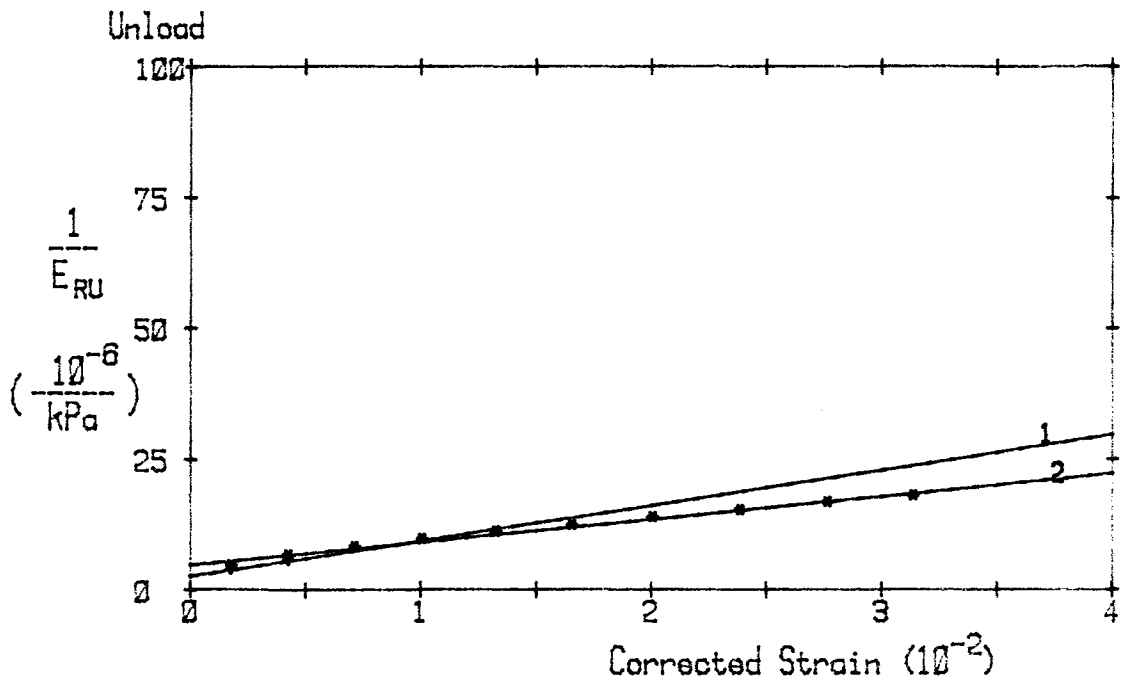




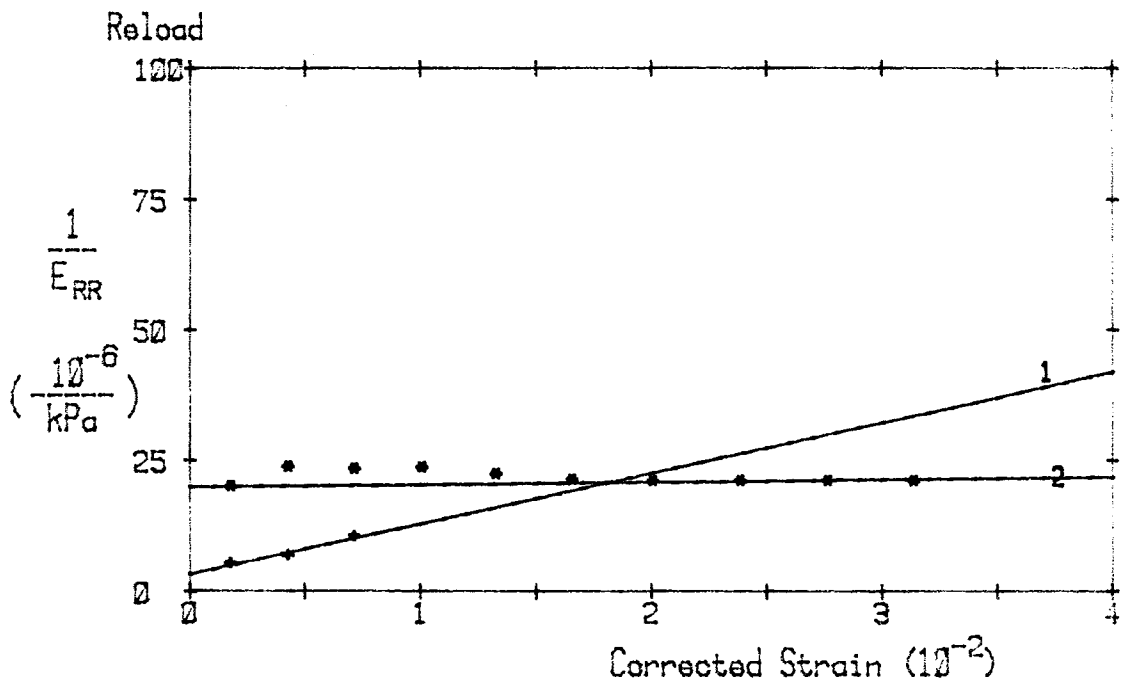
TEST T146

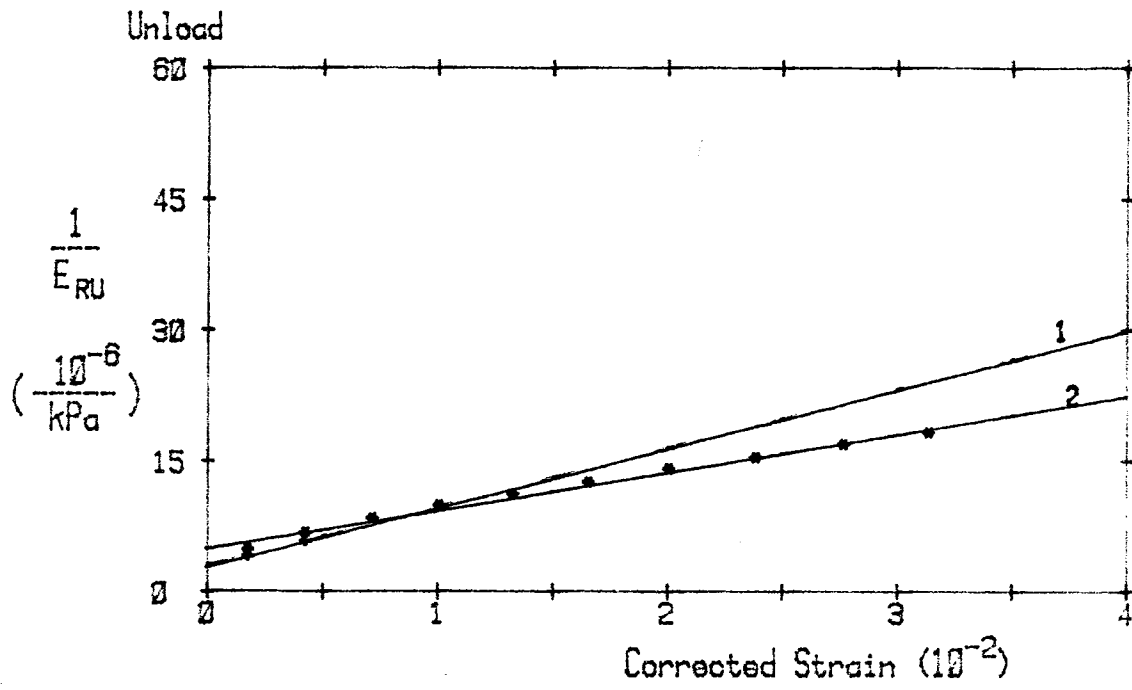




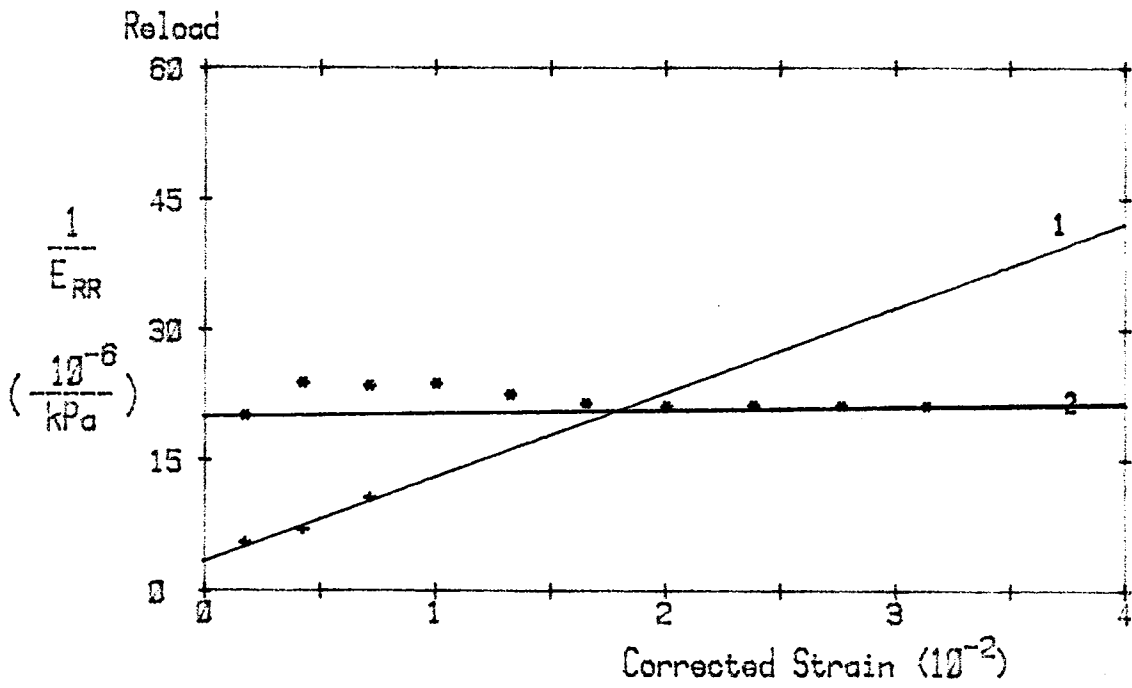


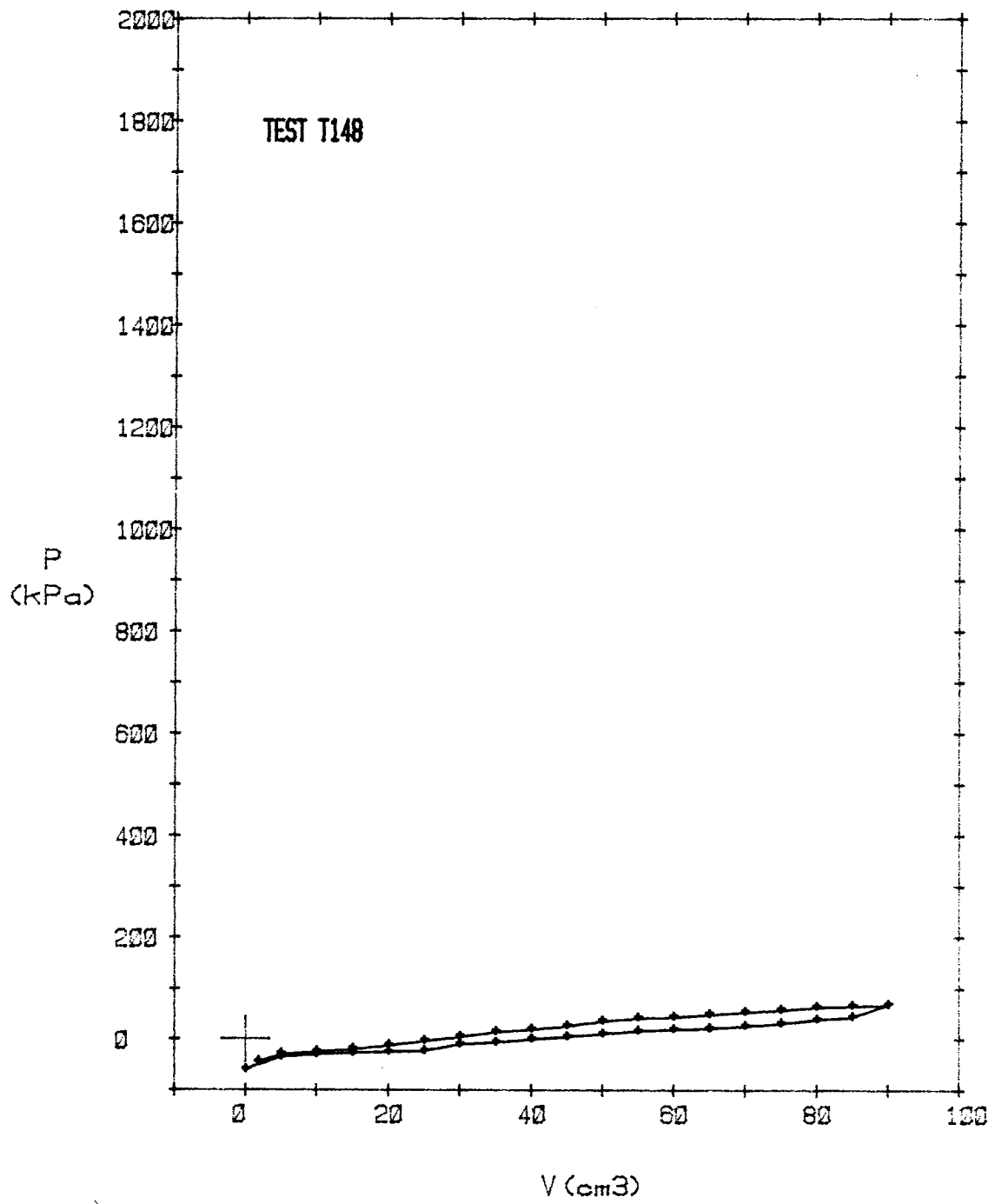
TEST T147

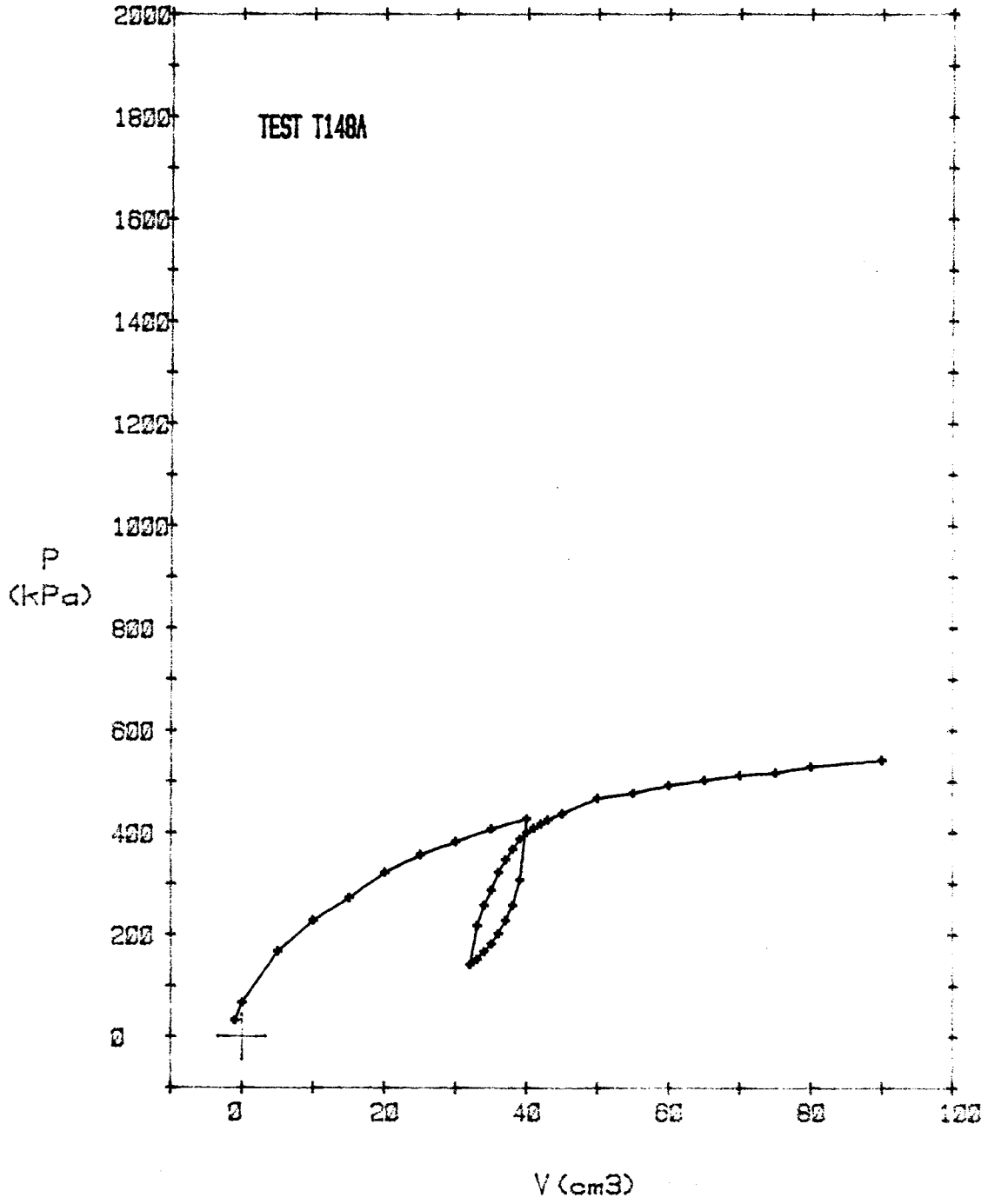


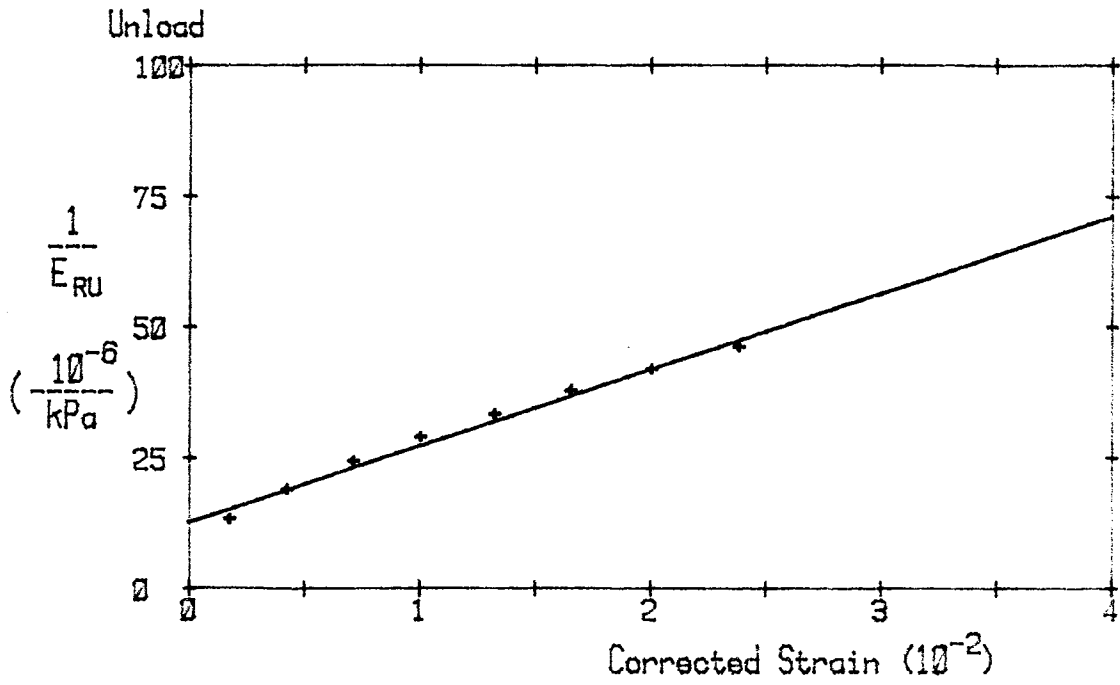


TEST T147

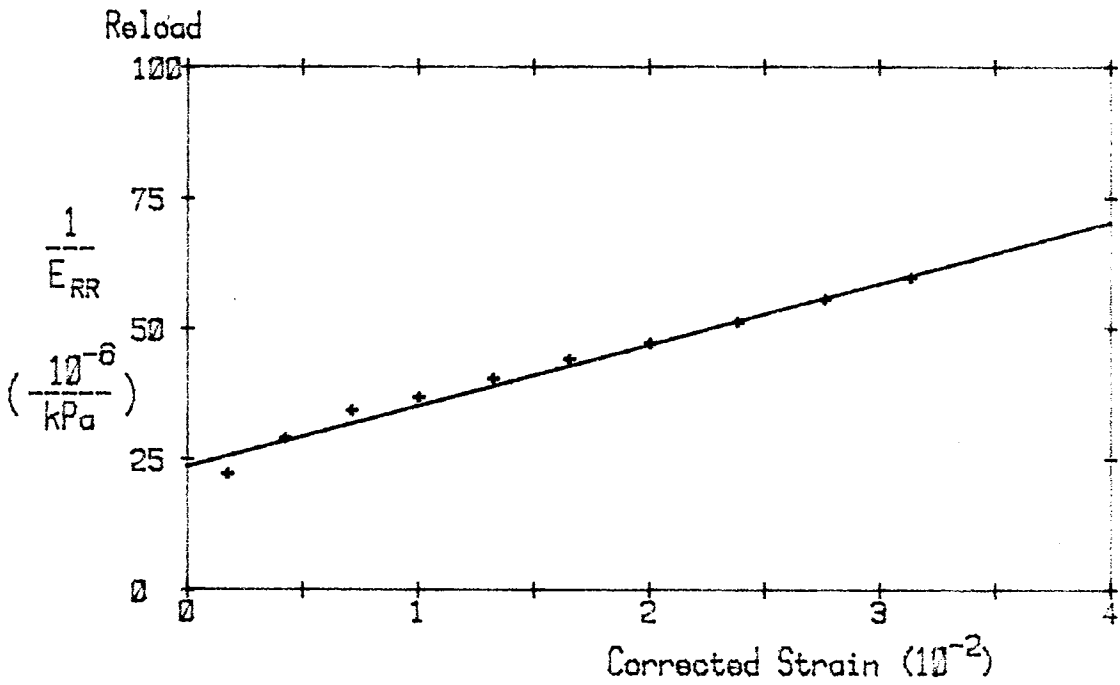


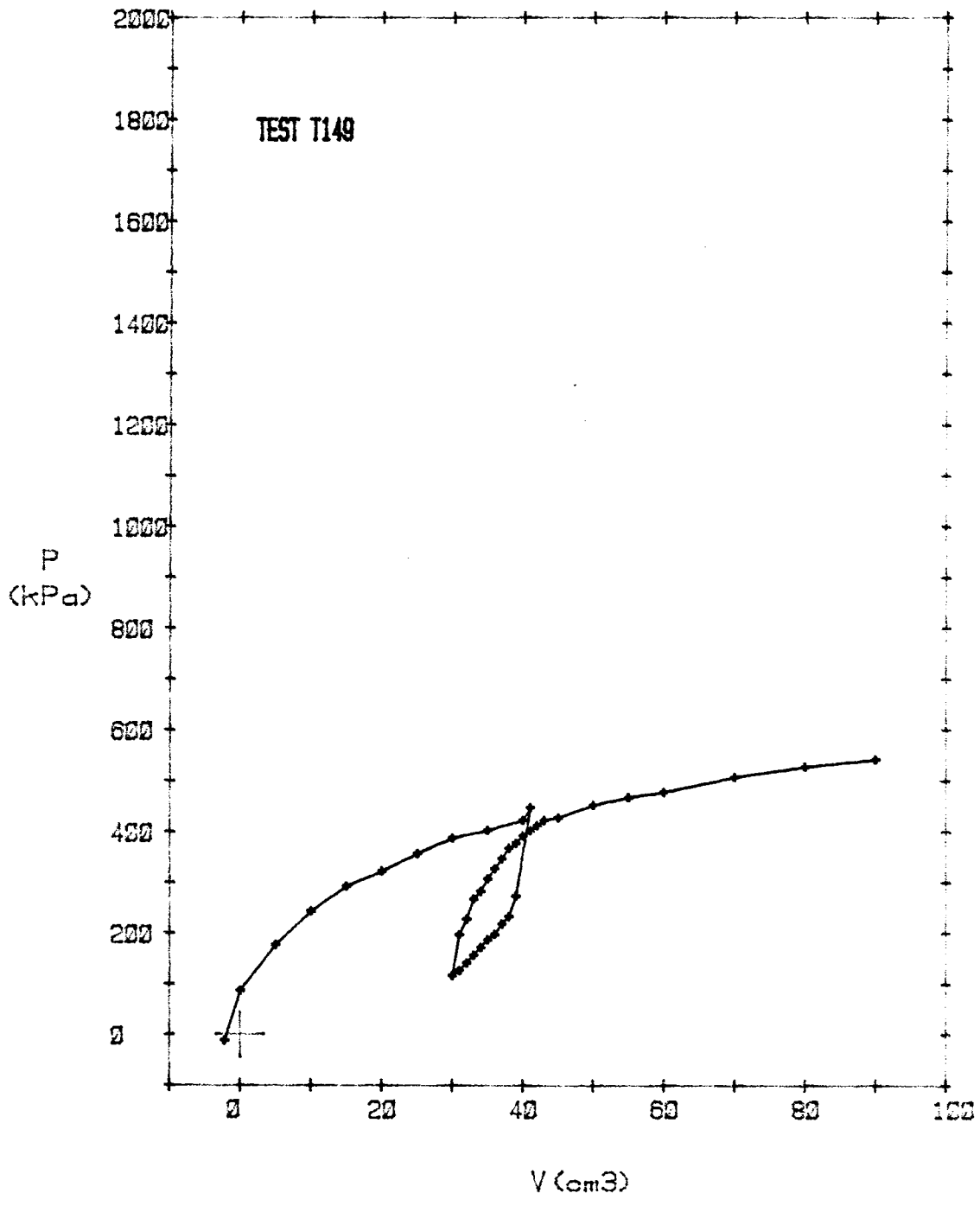


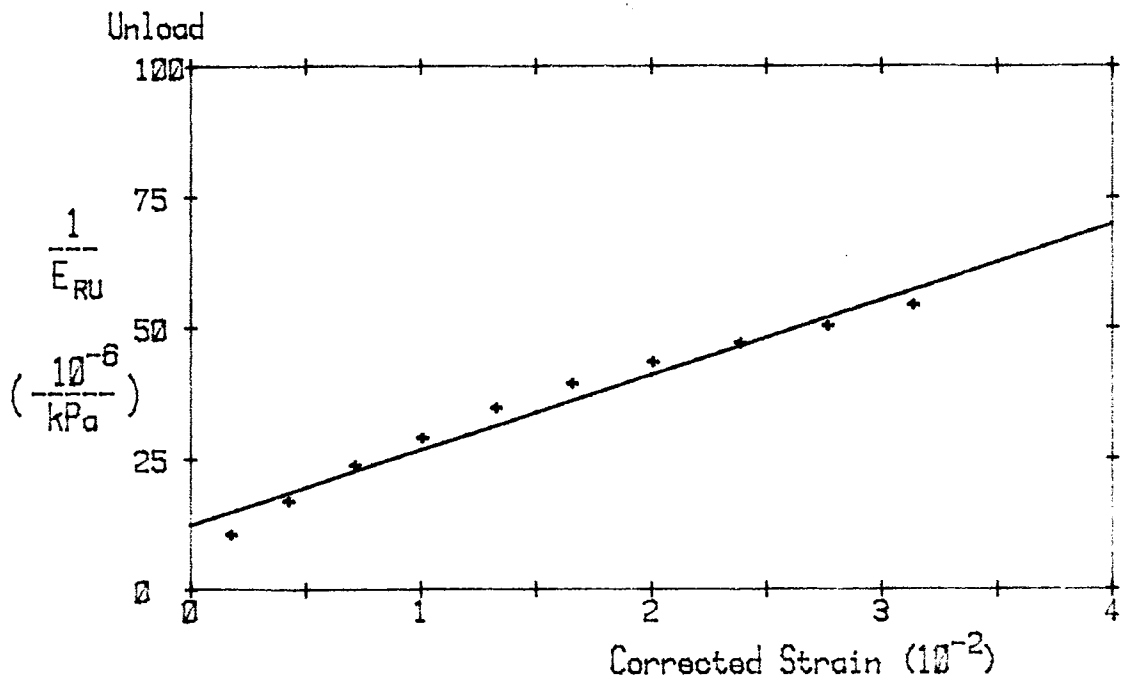




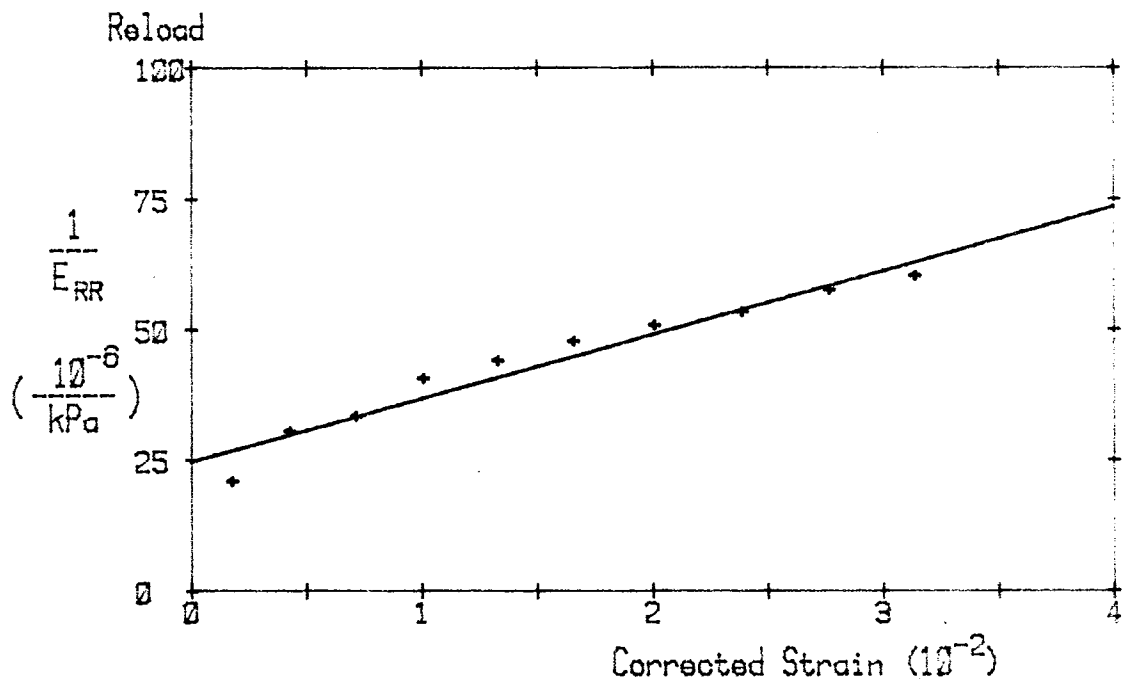
TEST T148A

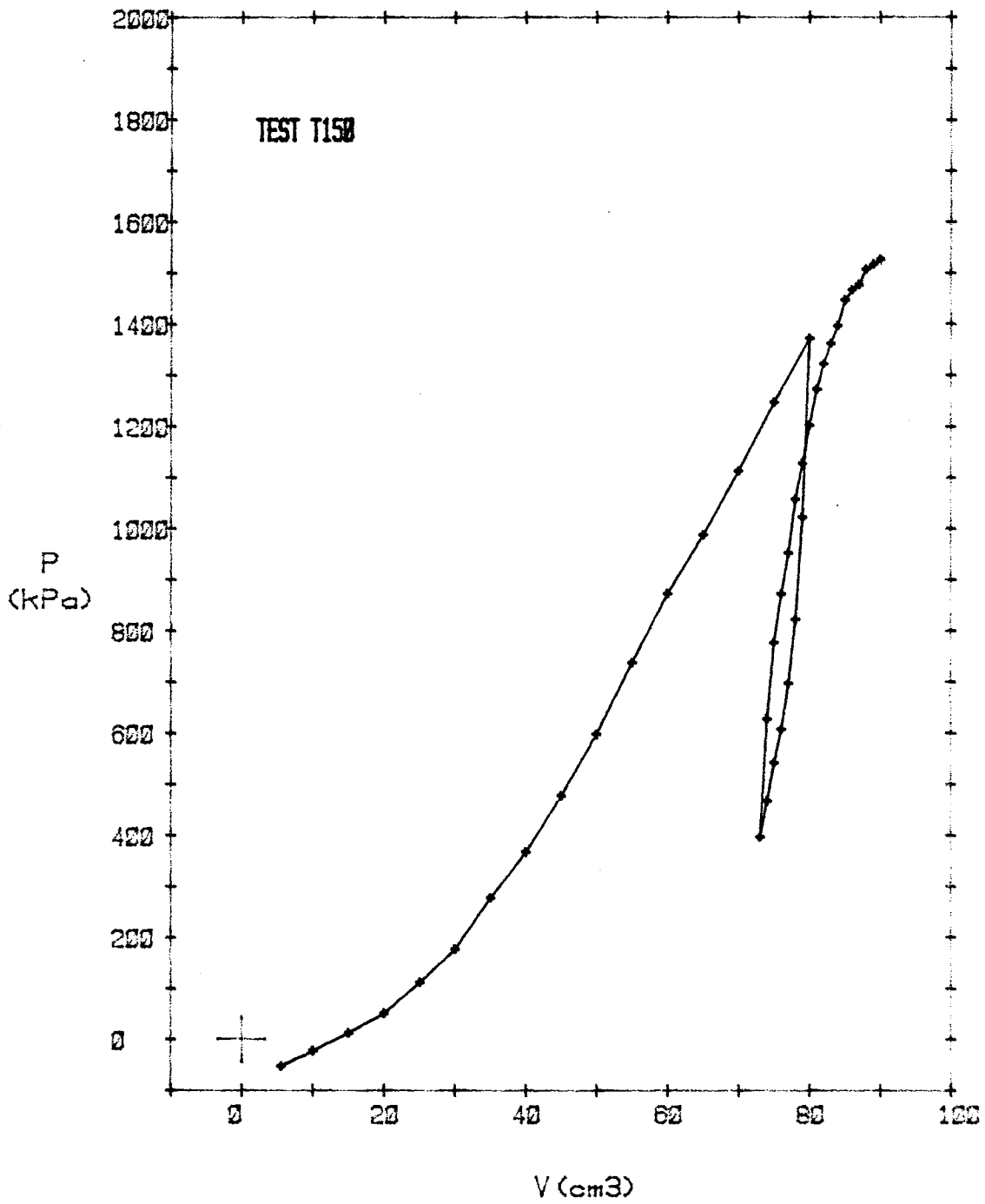


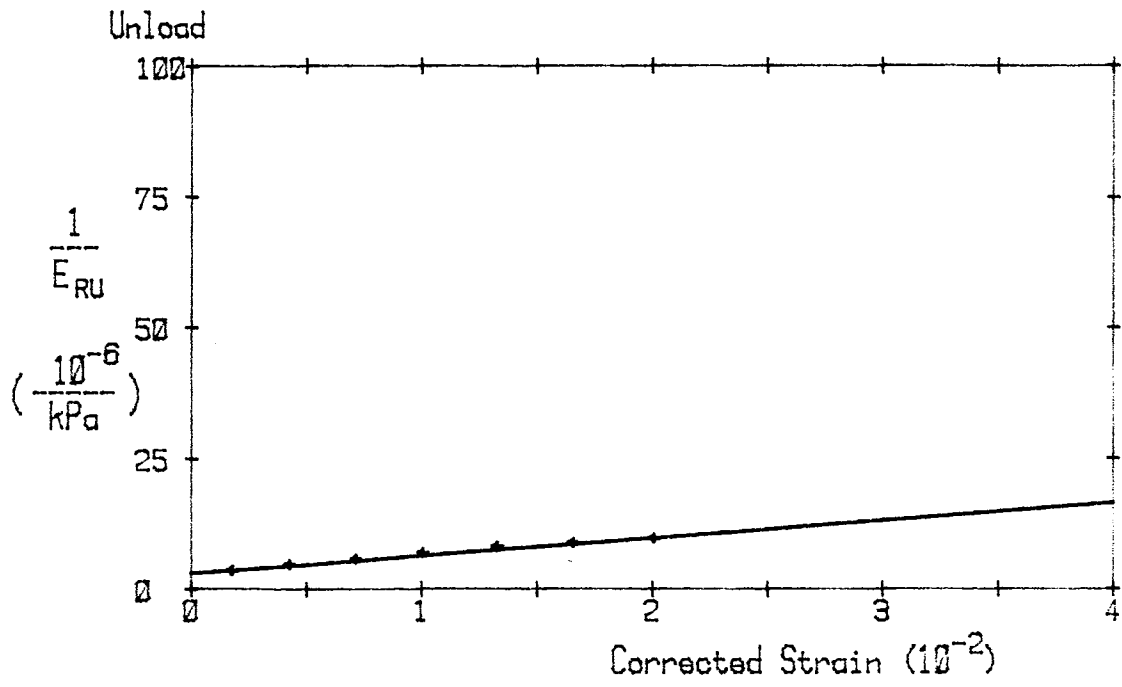




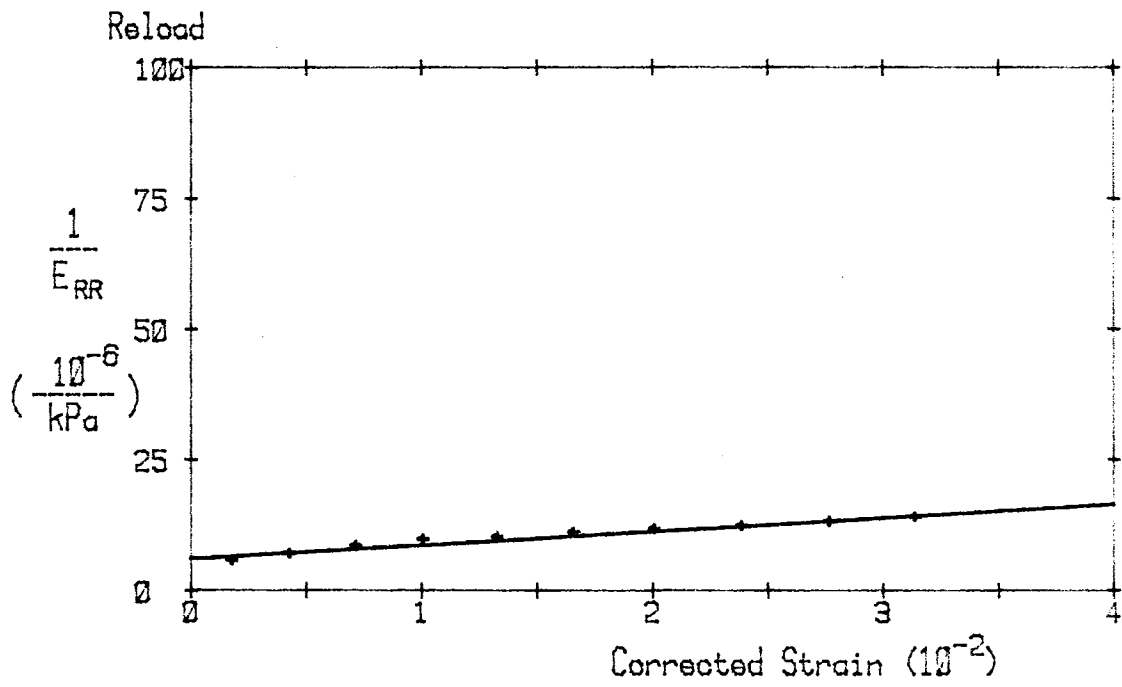
TEST T149

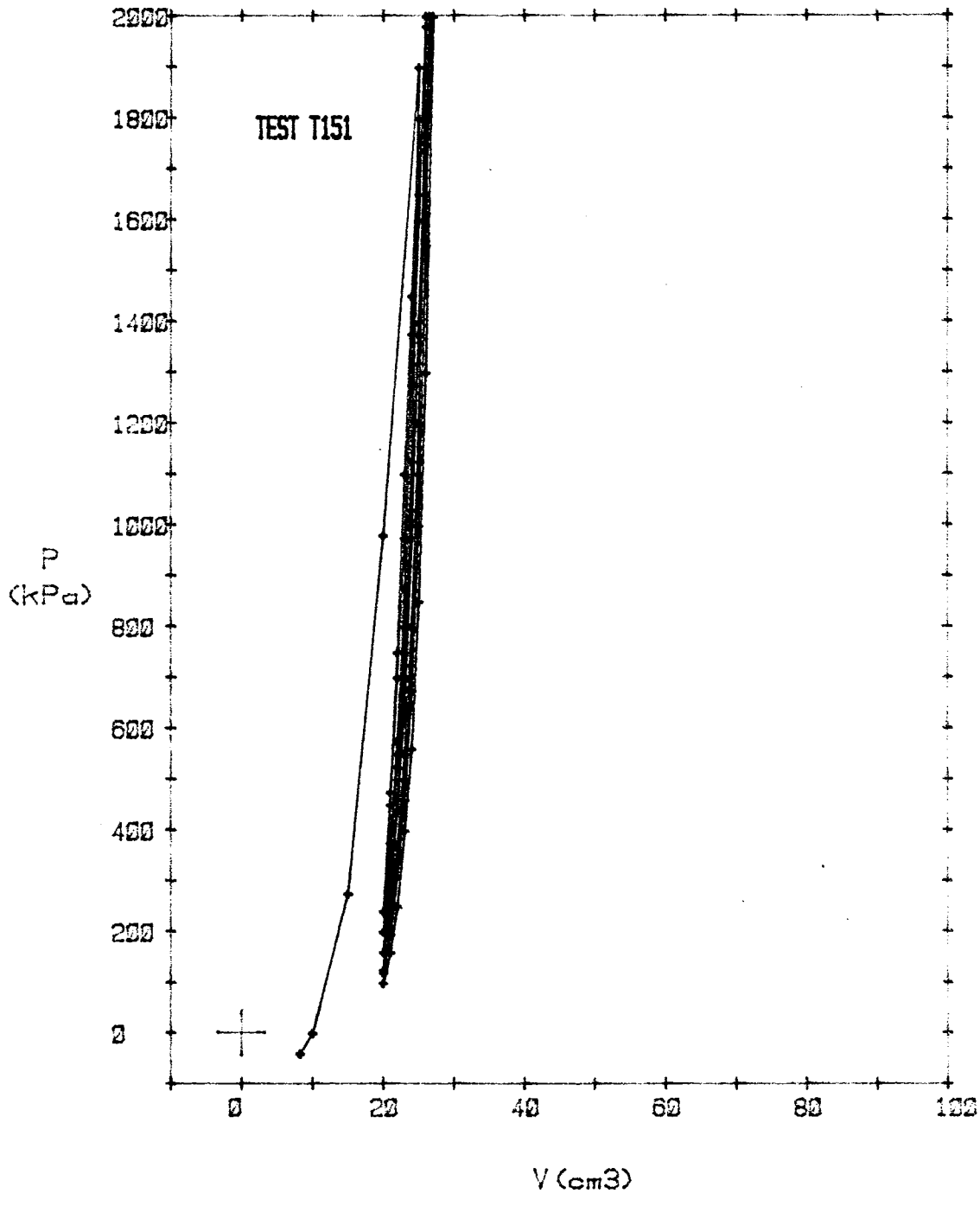


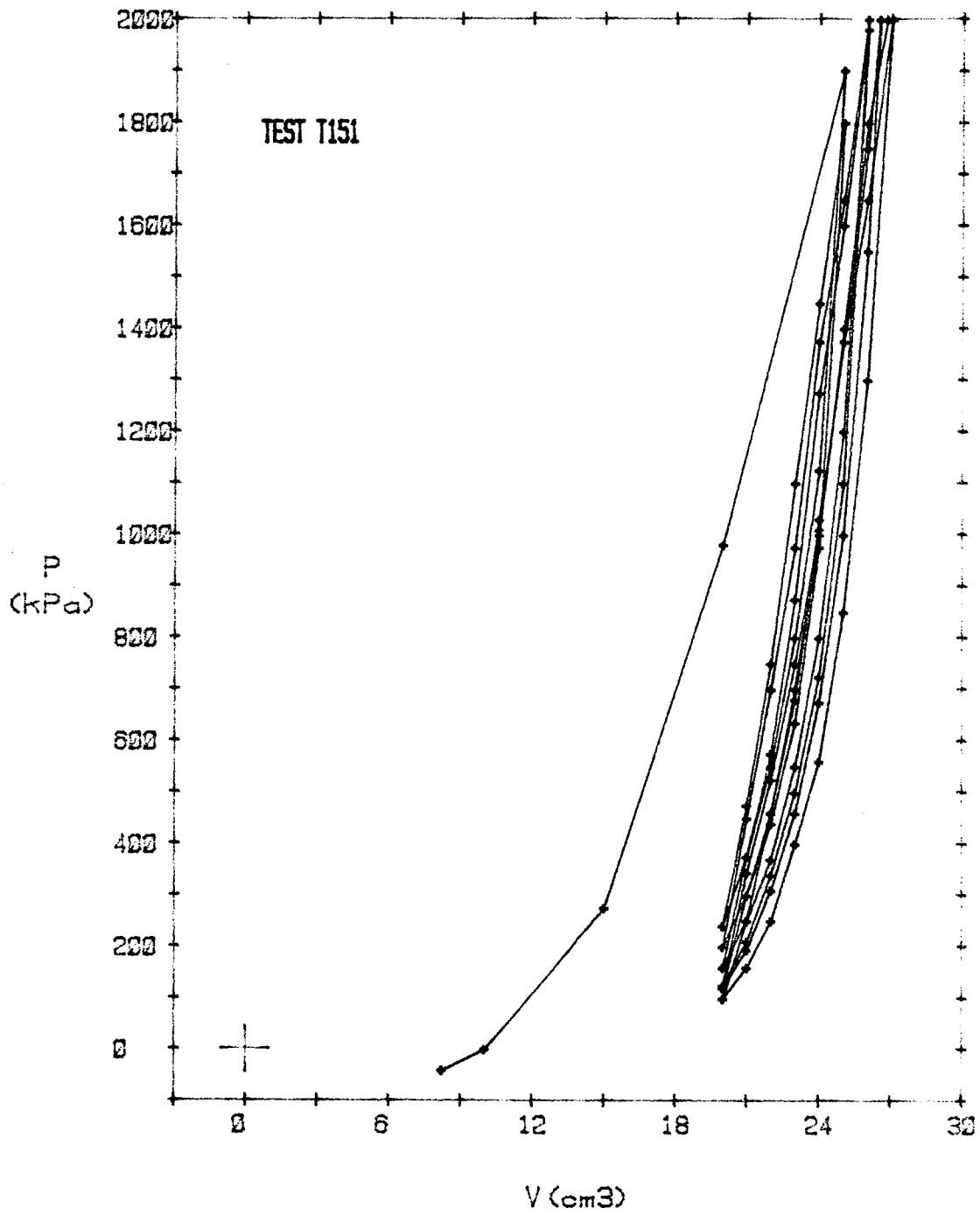


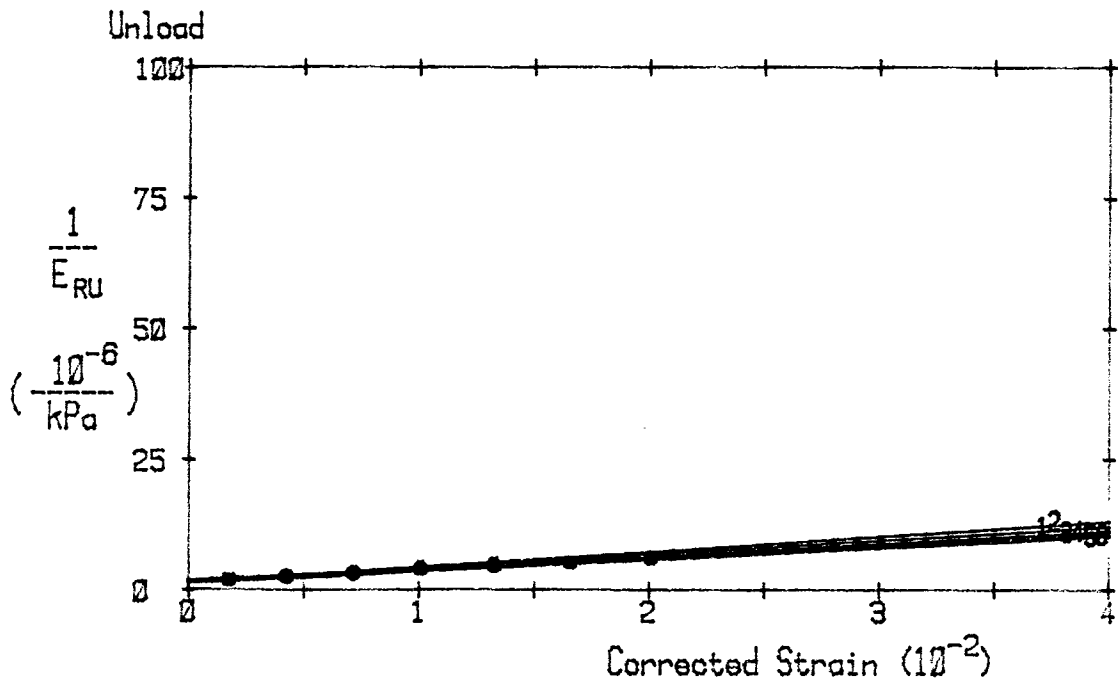


TEST T150

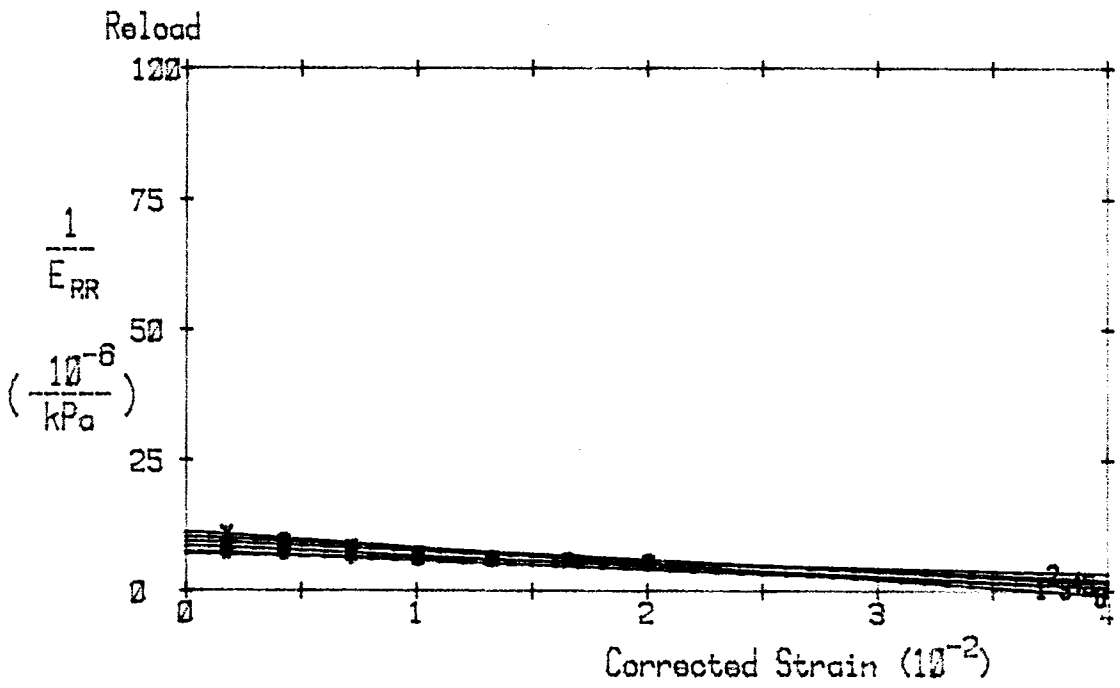


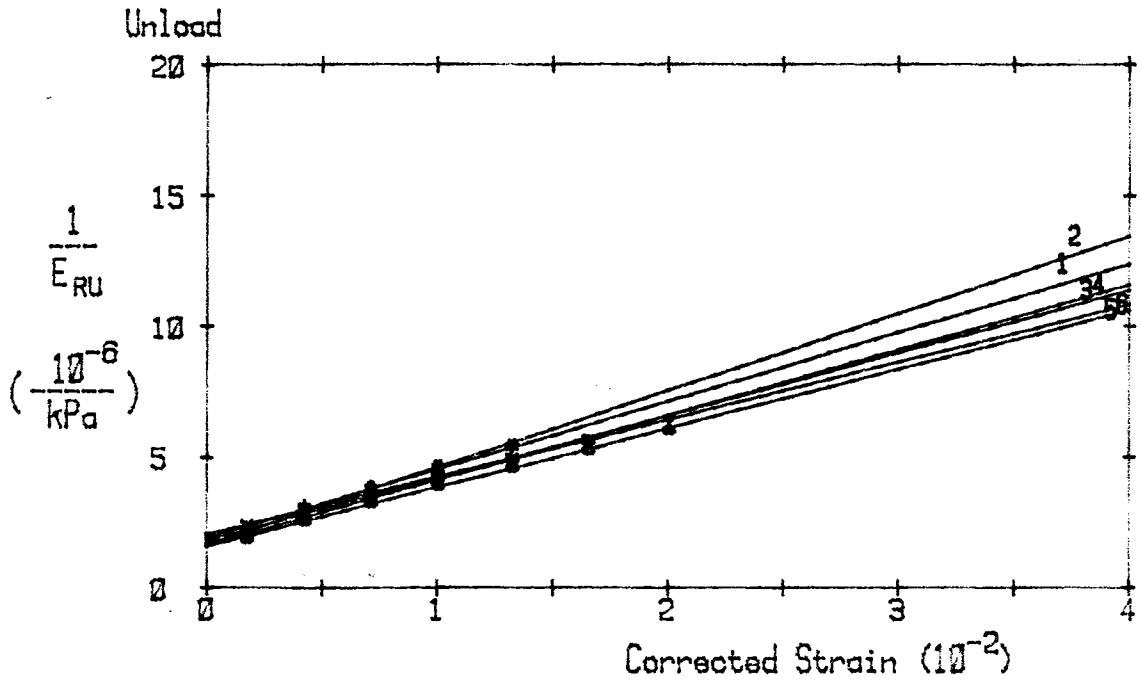




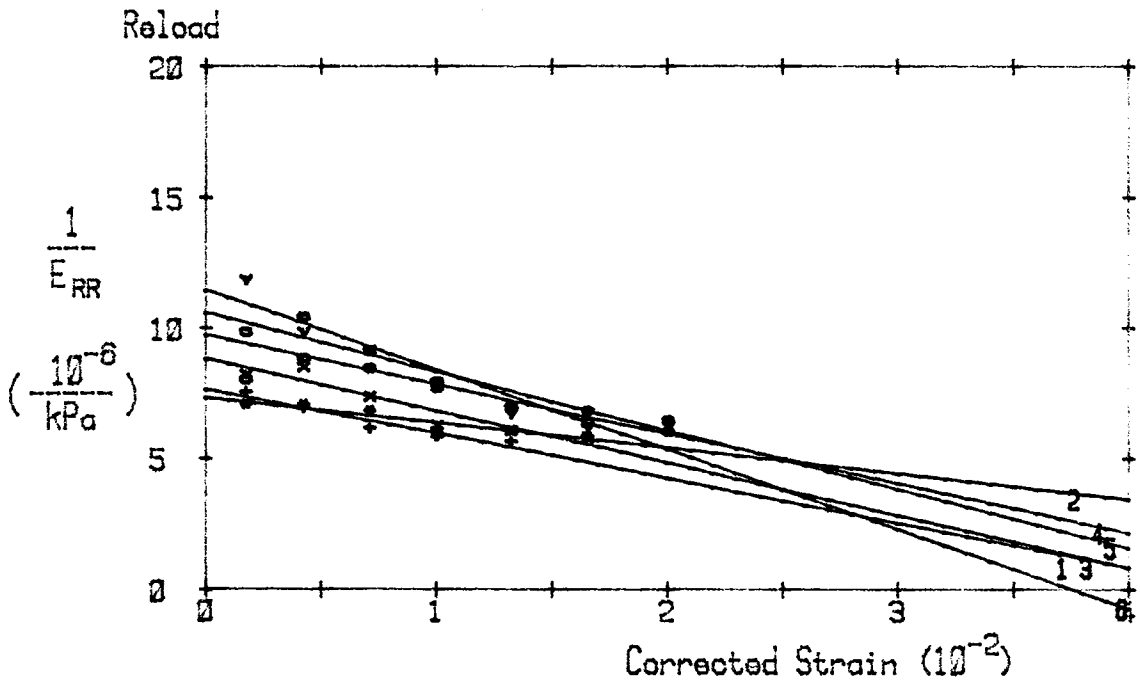


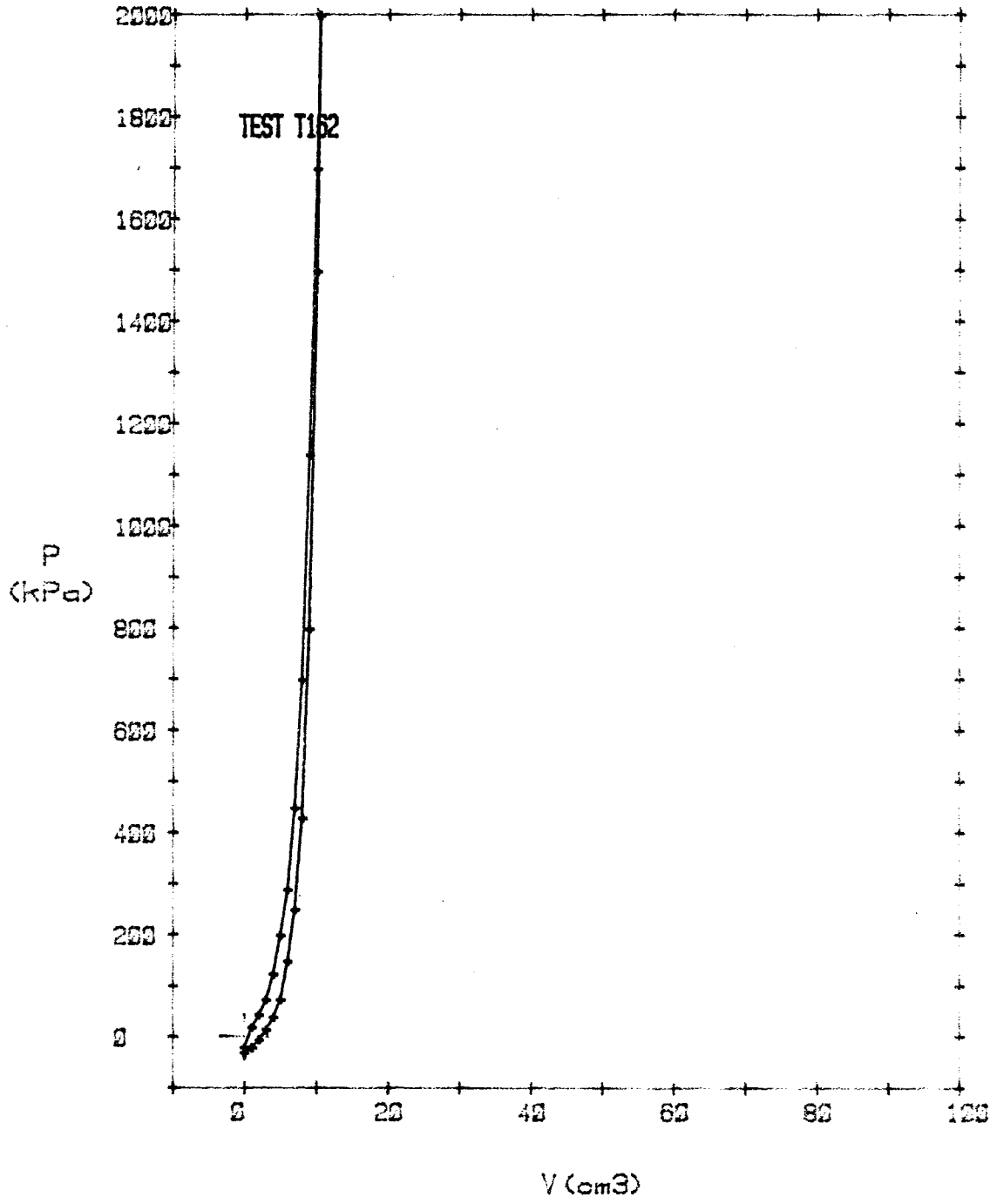
TEST T151

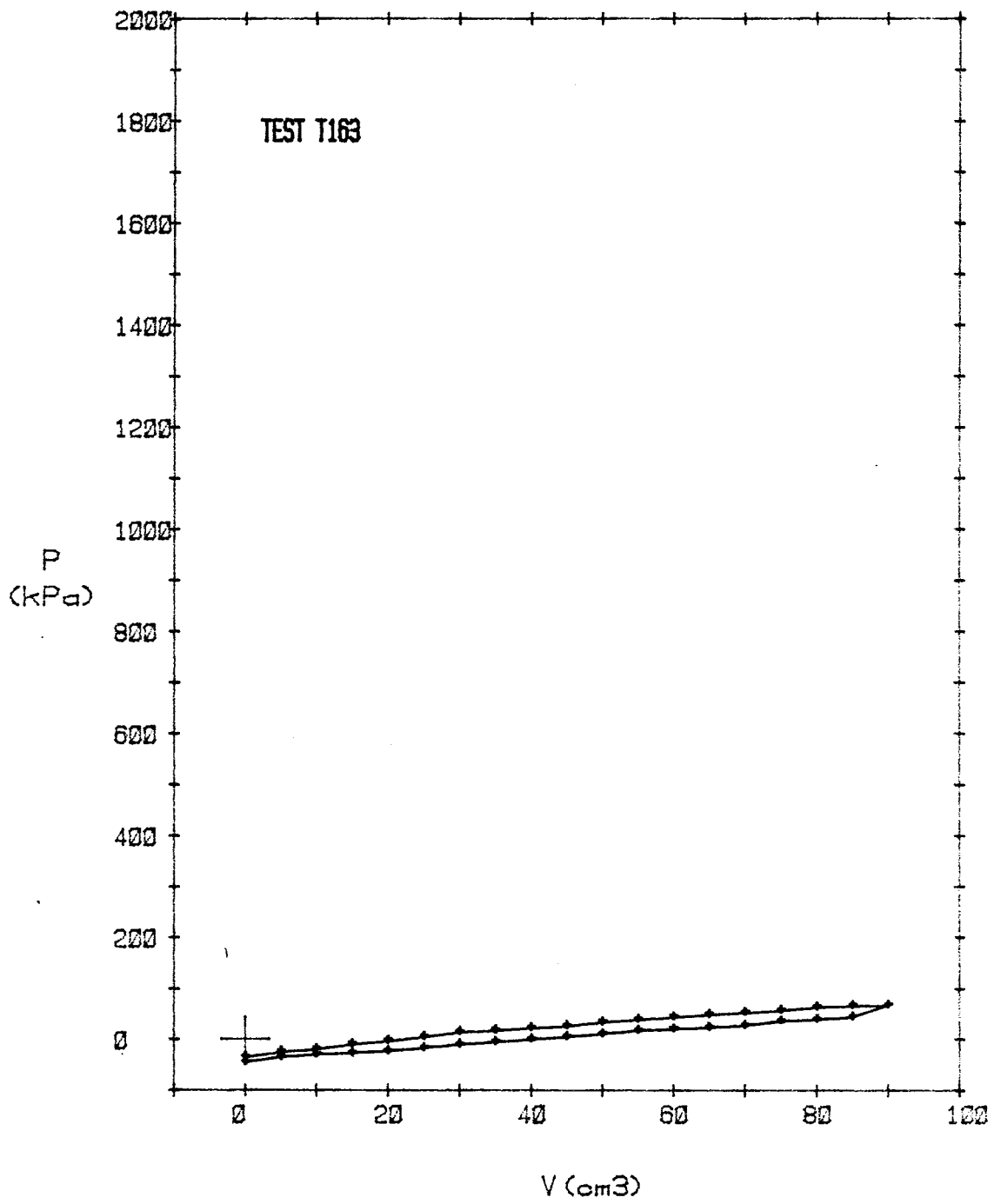


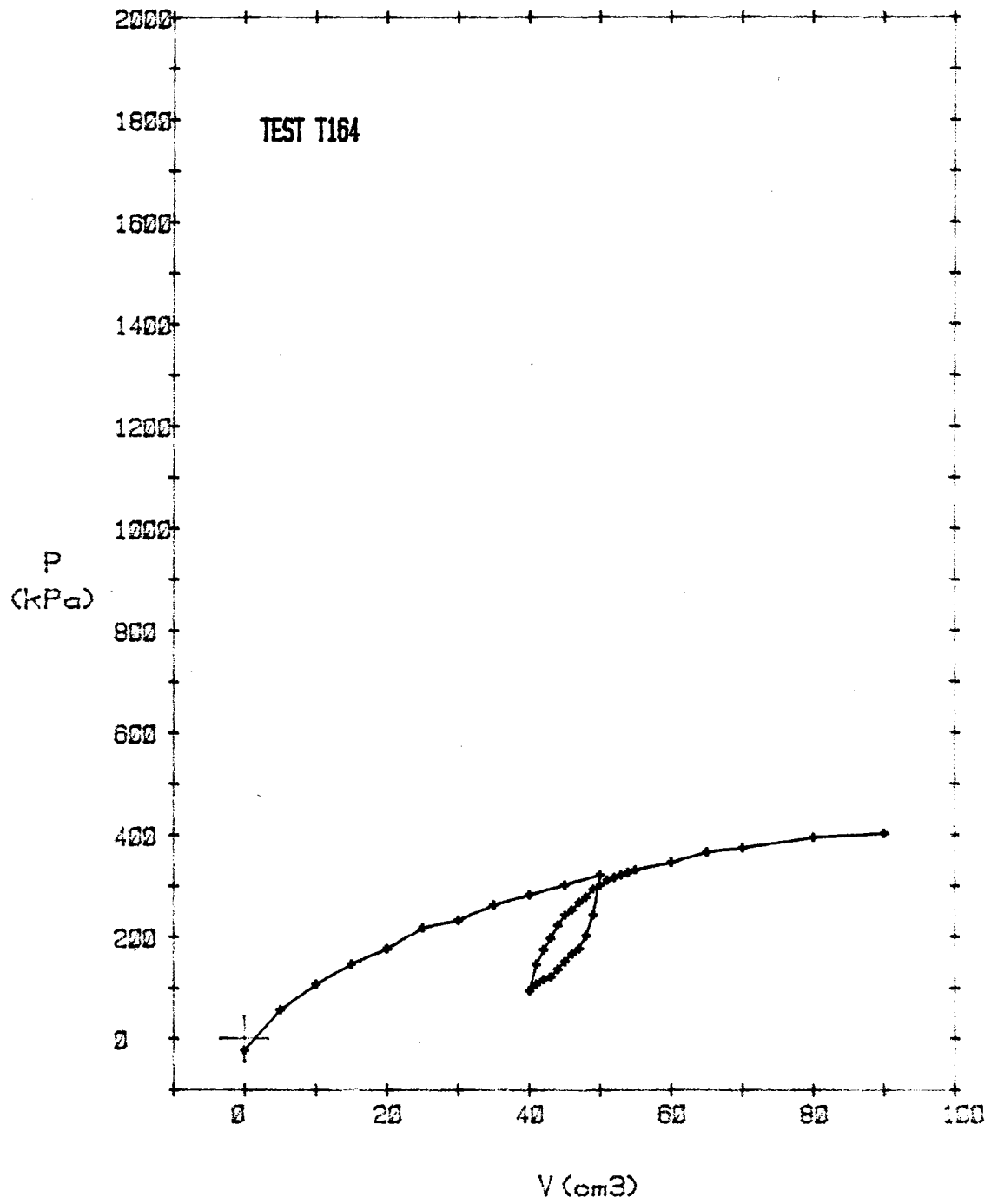


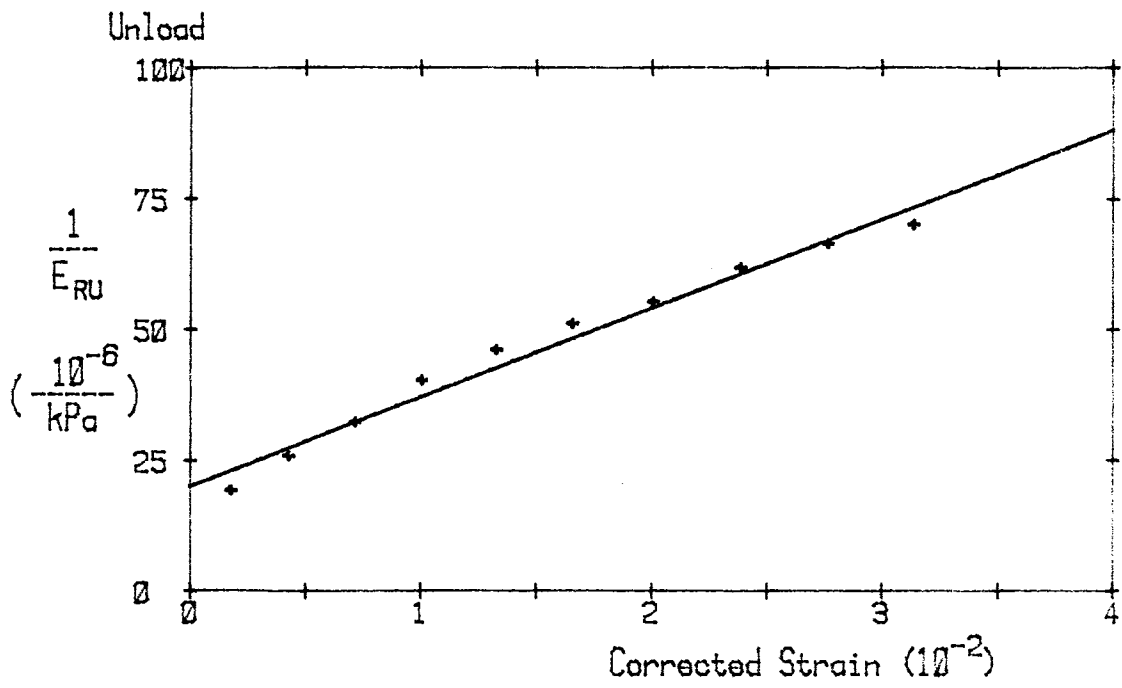
TEST T151



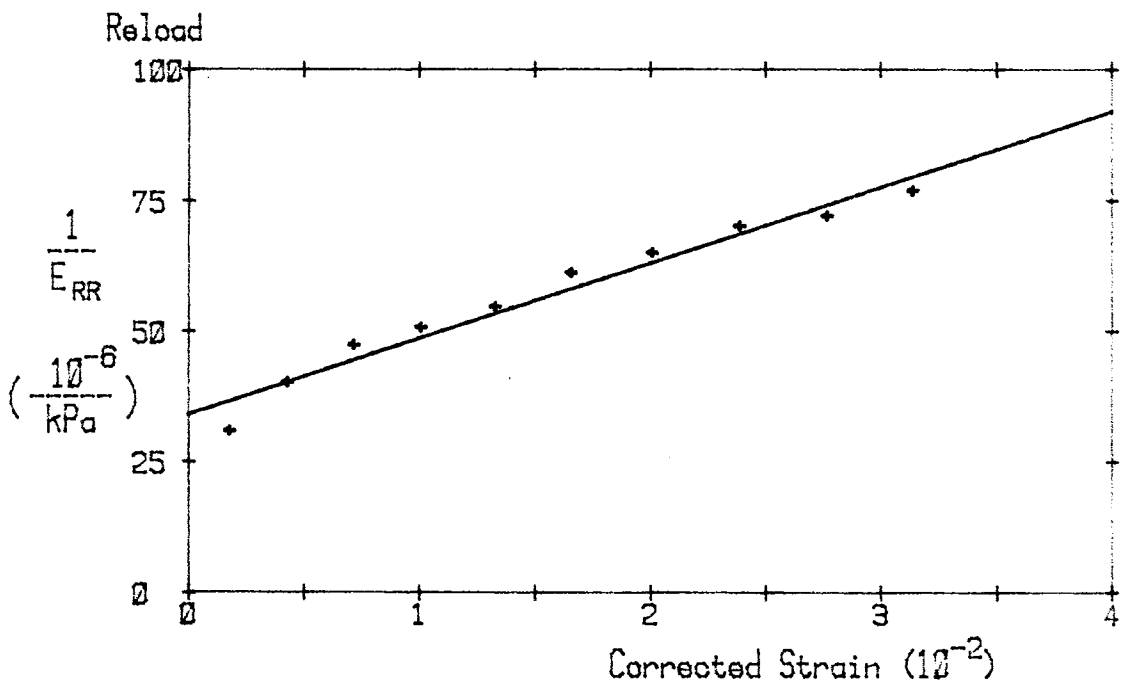


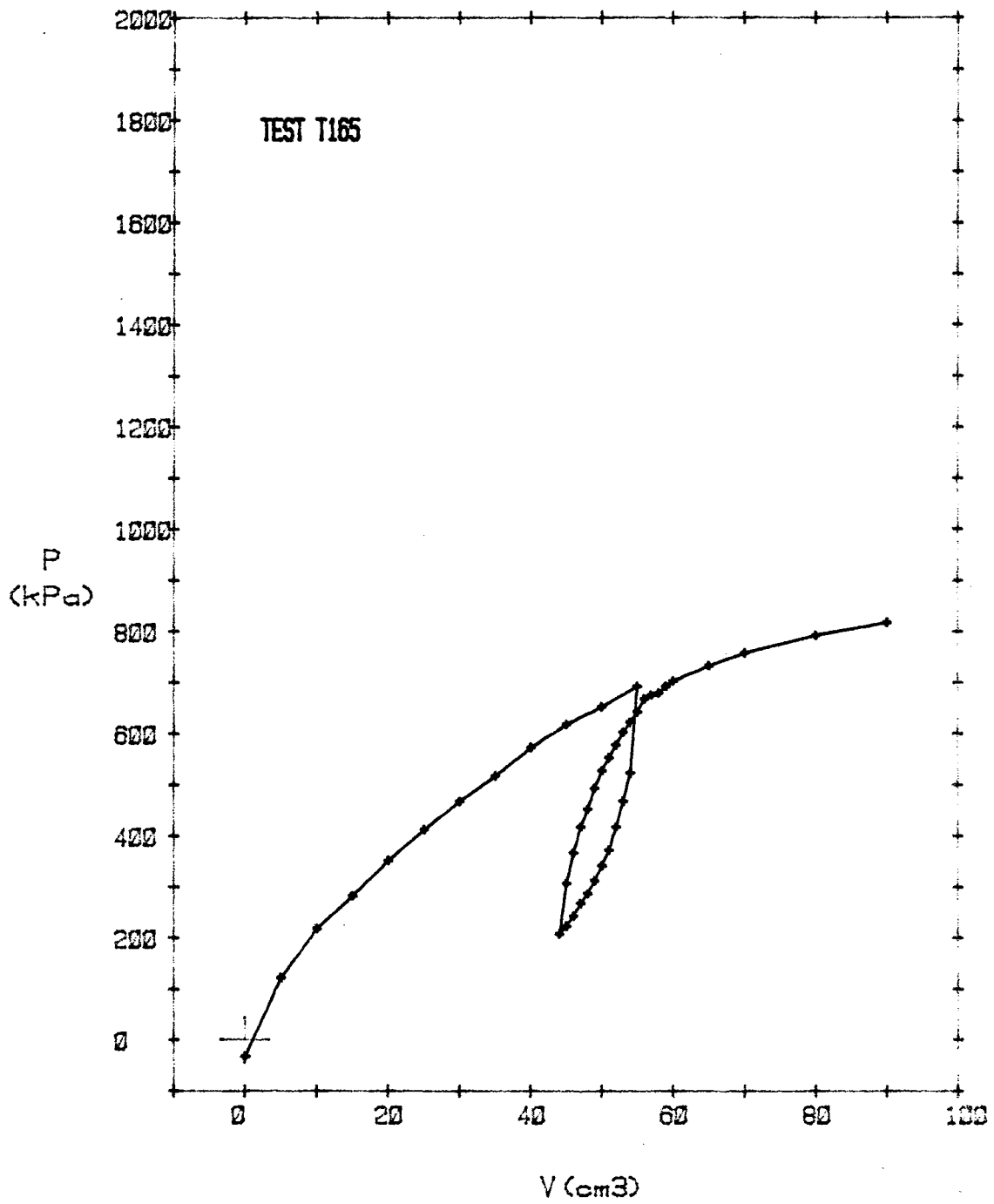


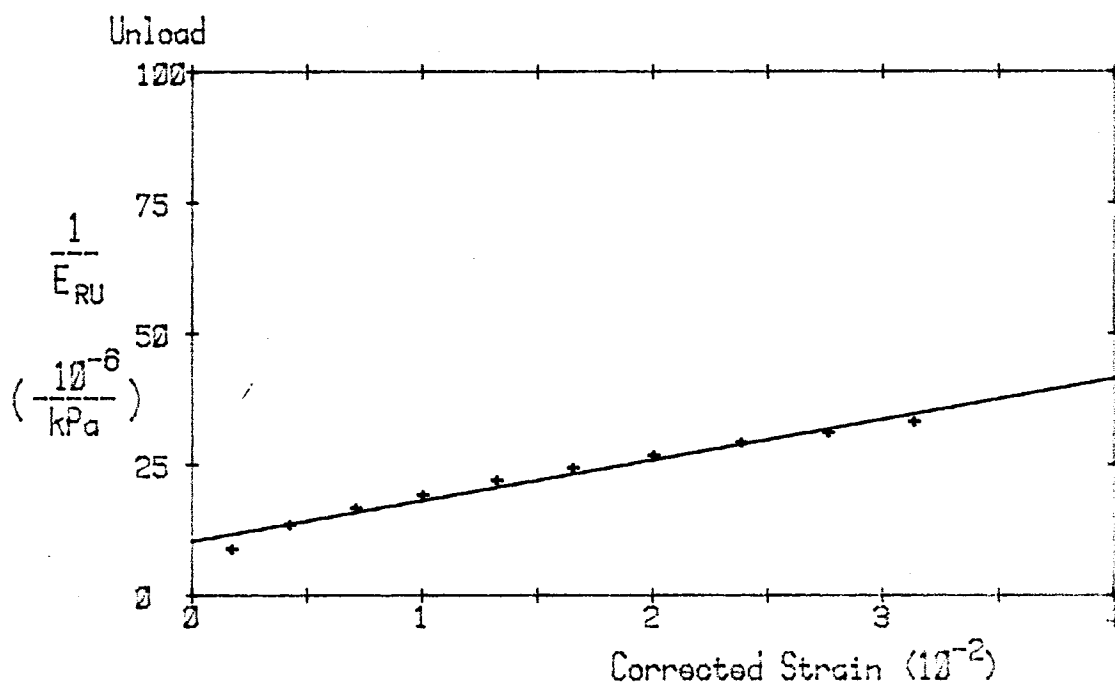




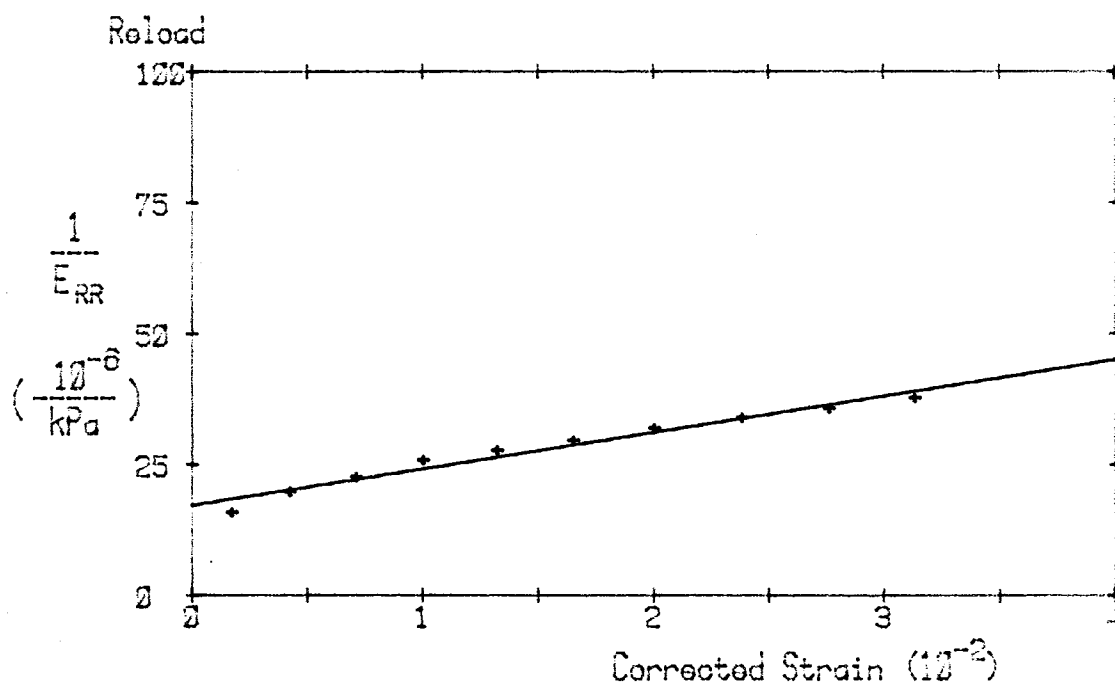
TEST T164

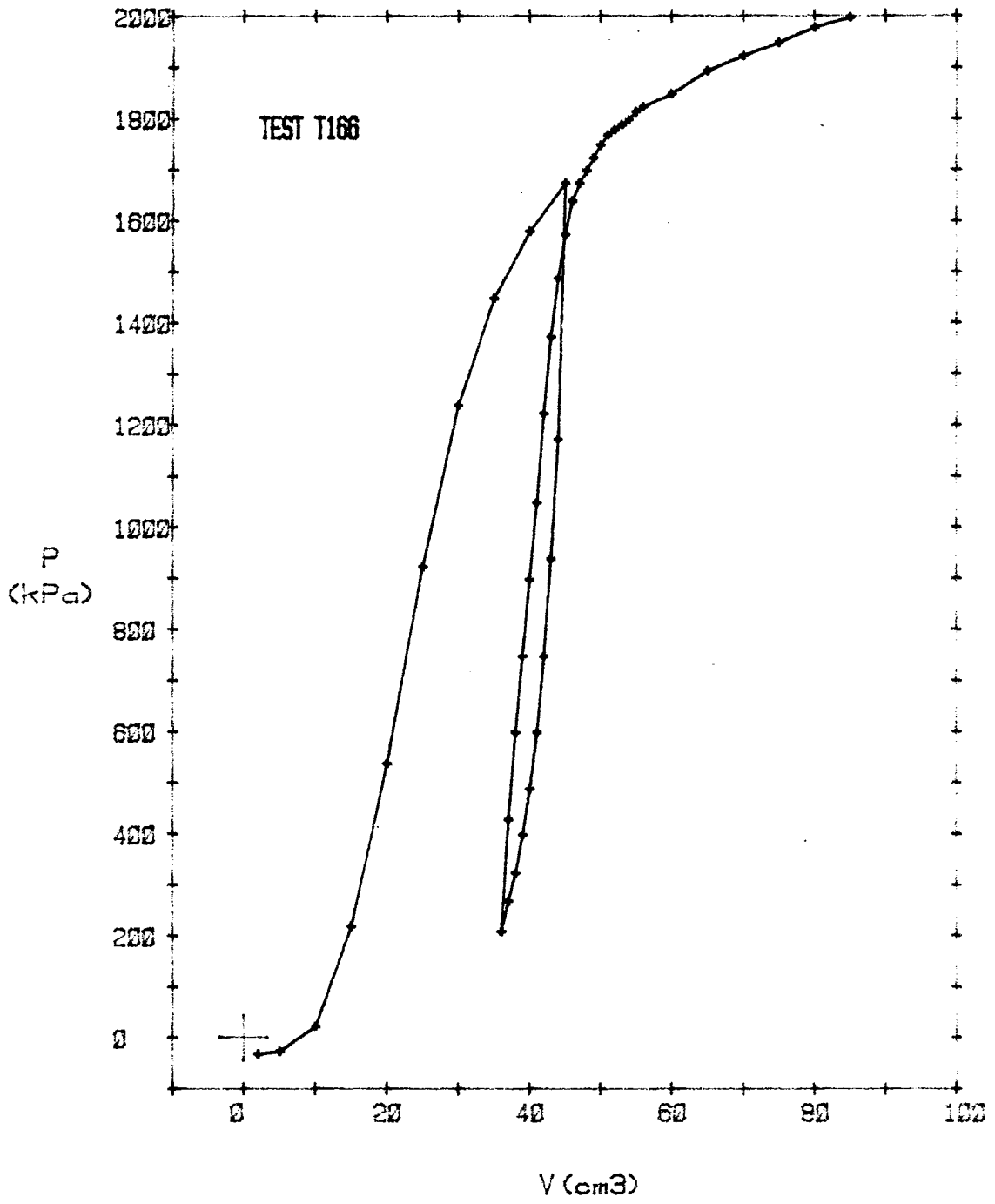


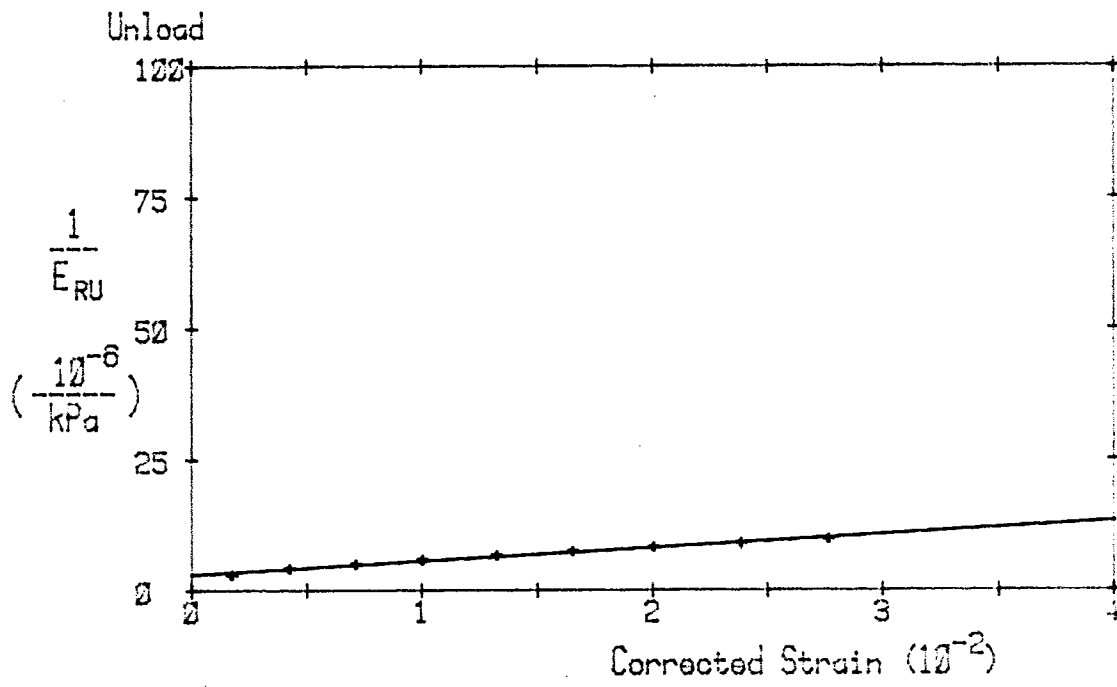




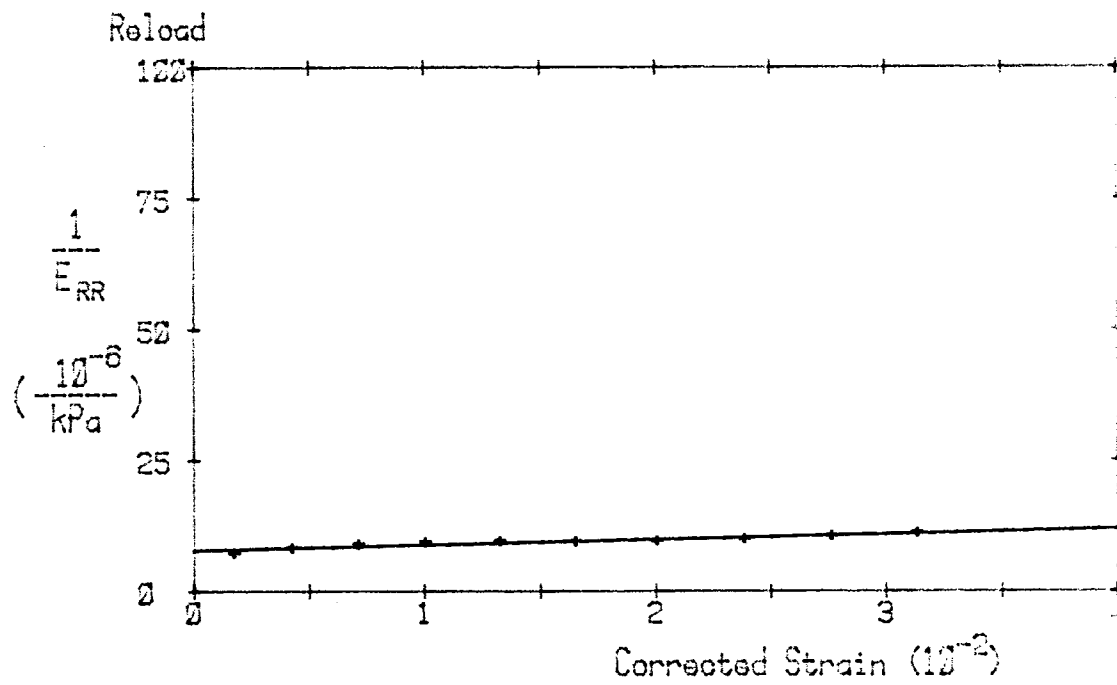
TEST T165

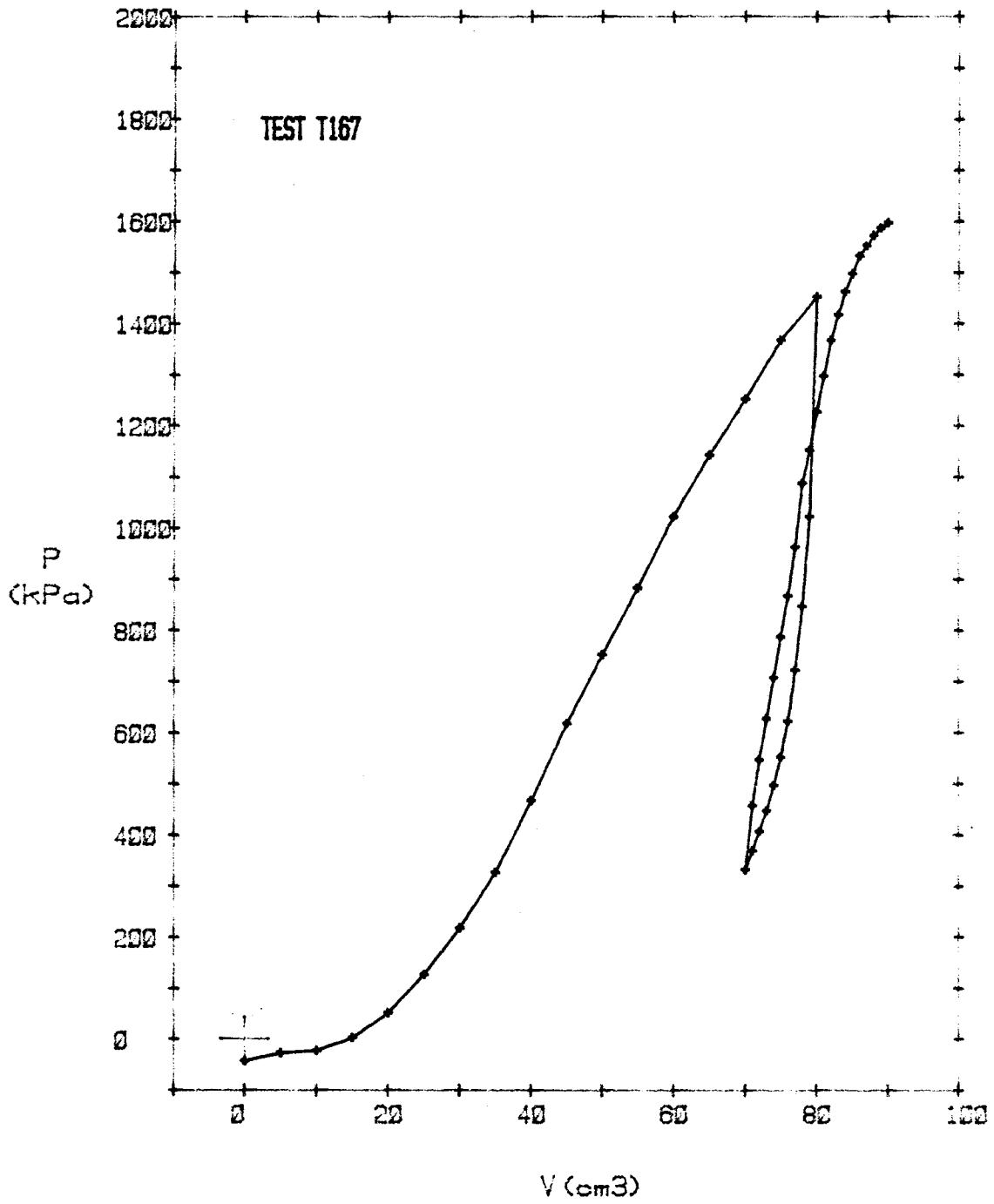


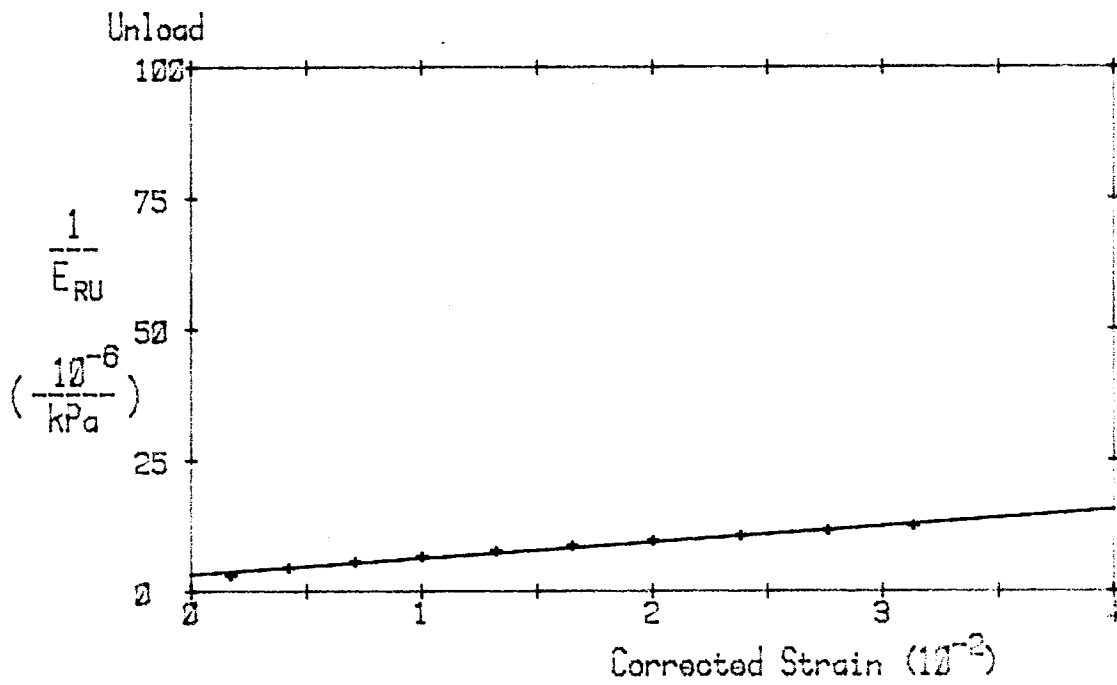




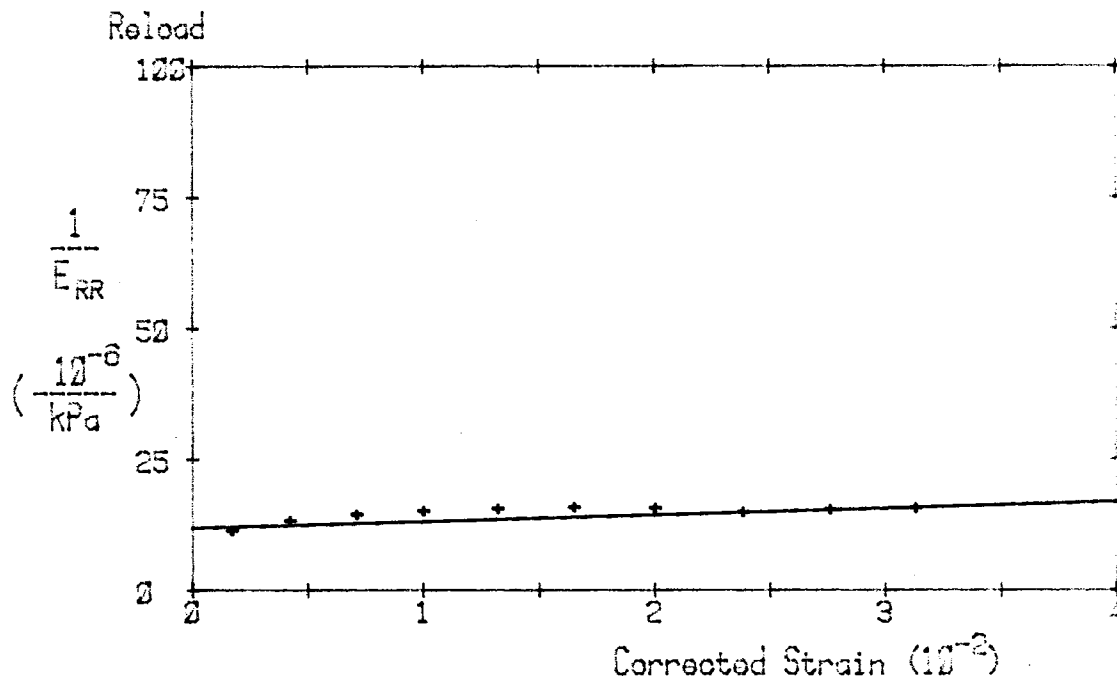
TEST T166

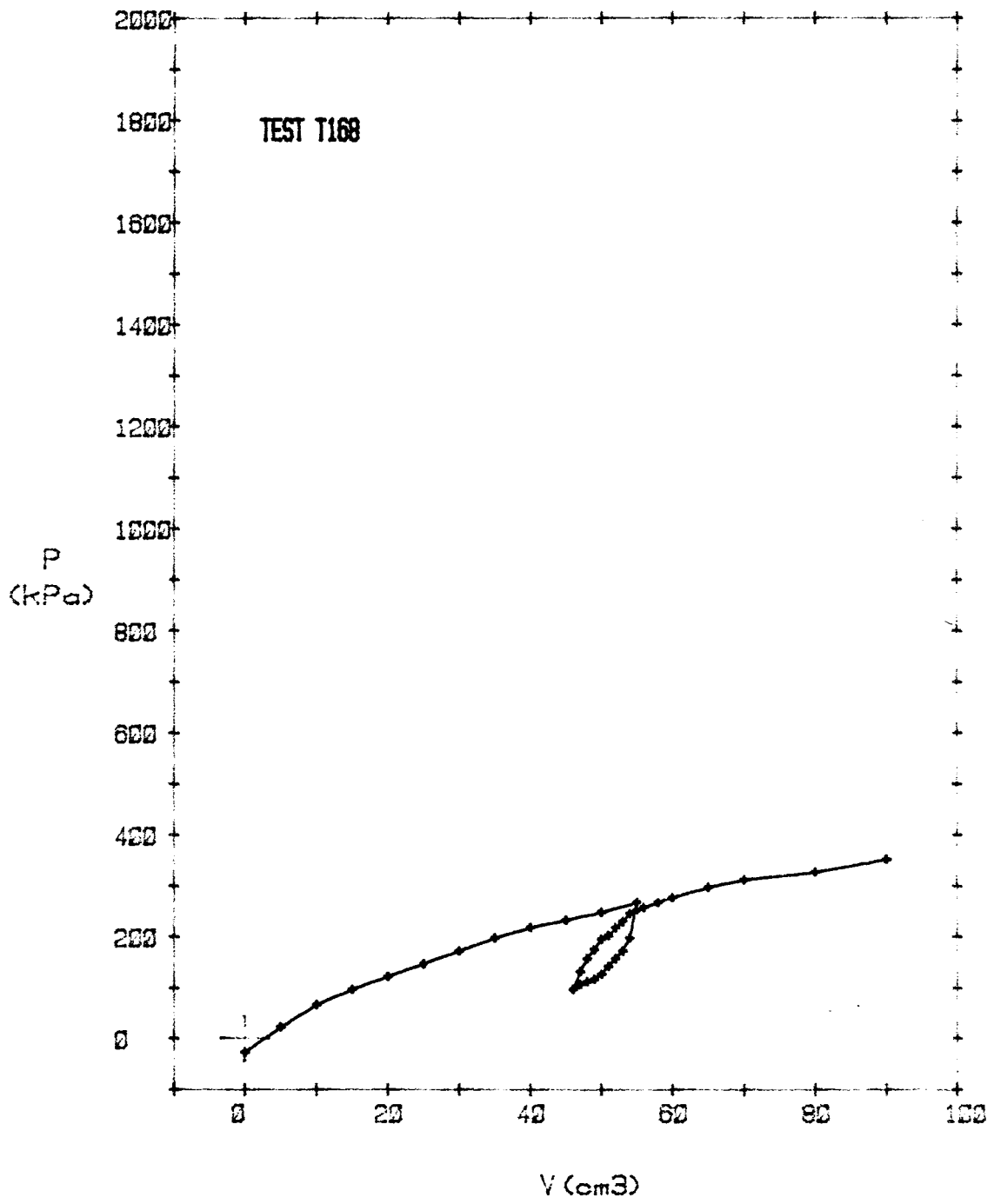


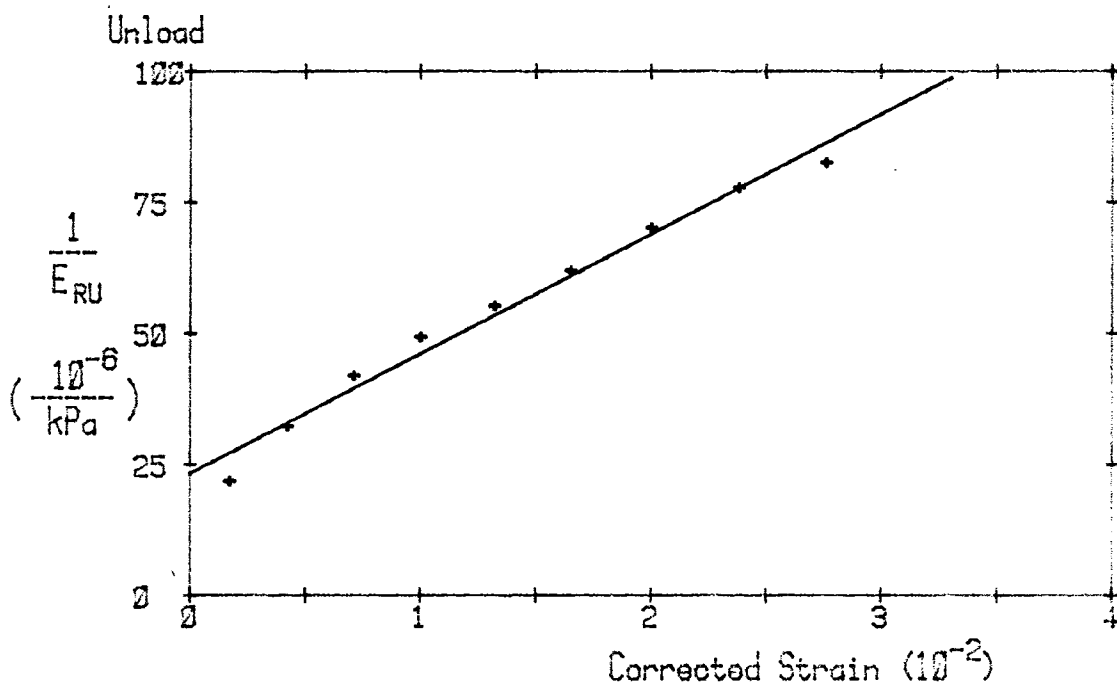




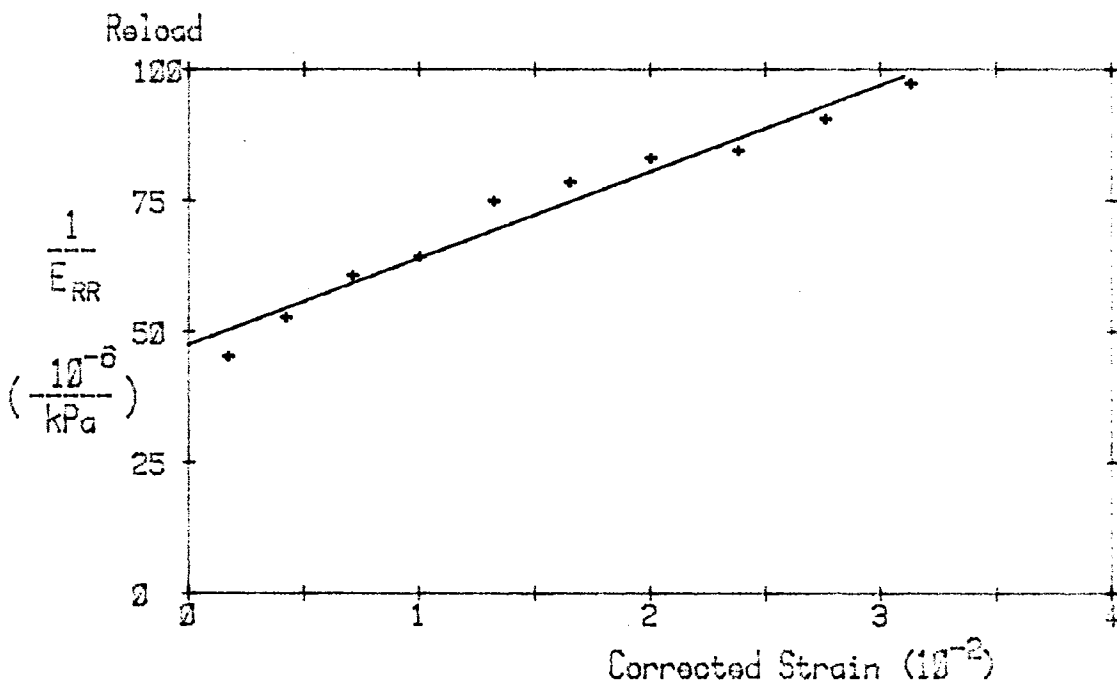
TEST T167

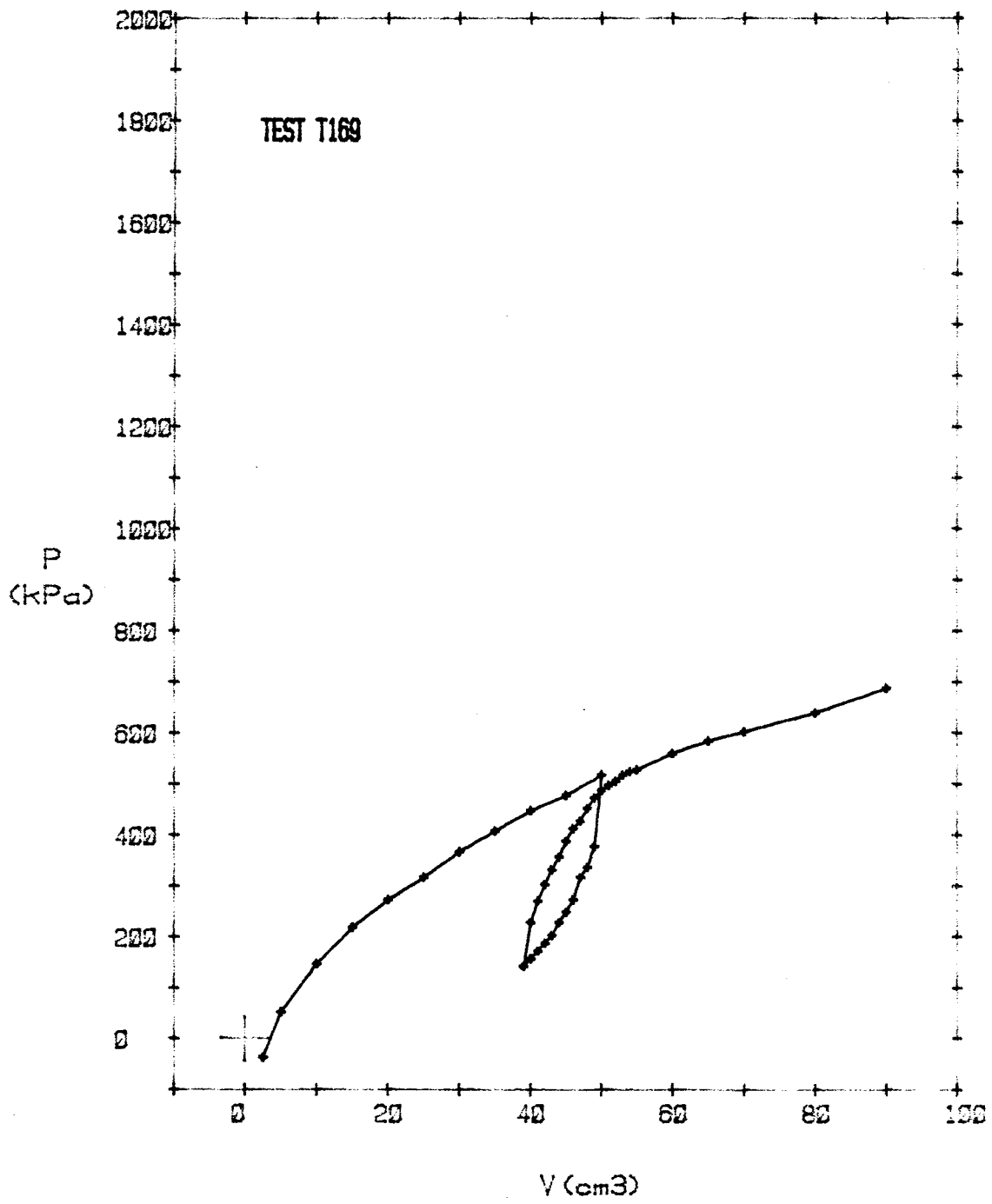


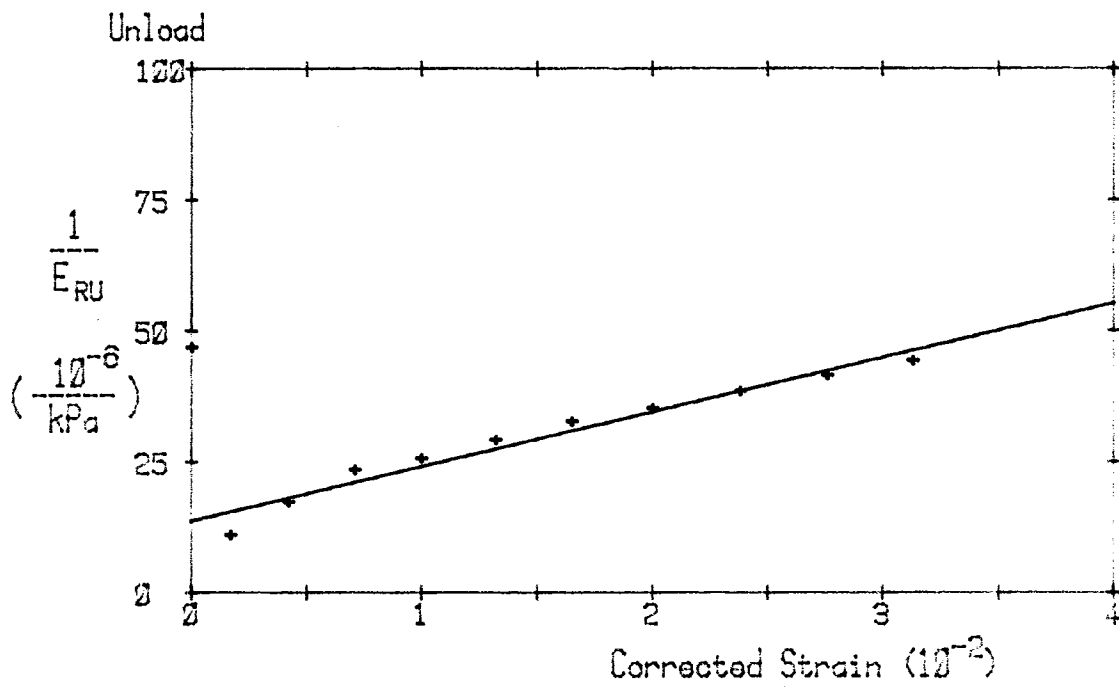




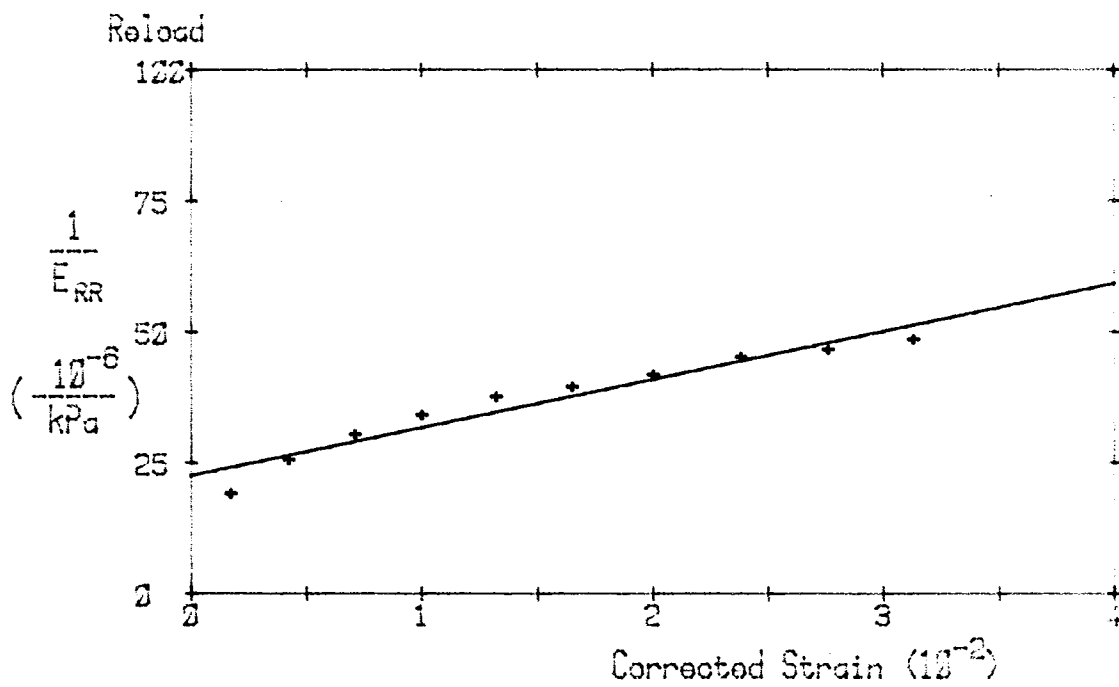
TEST T168

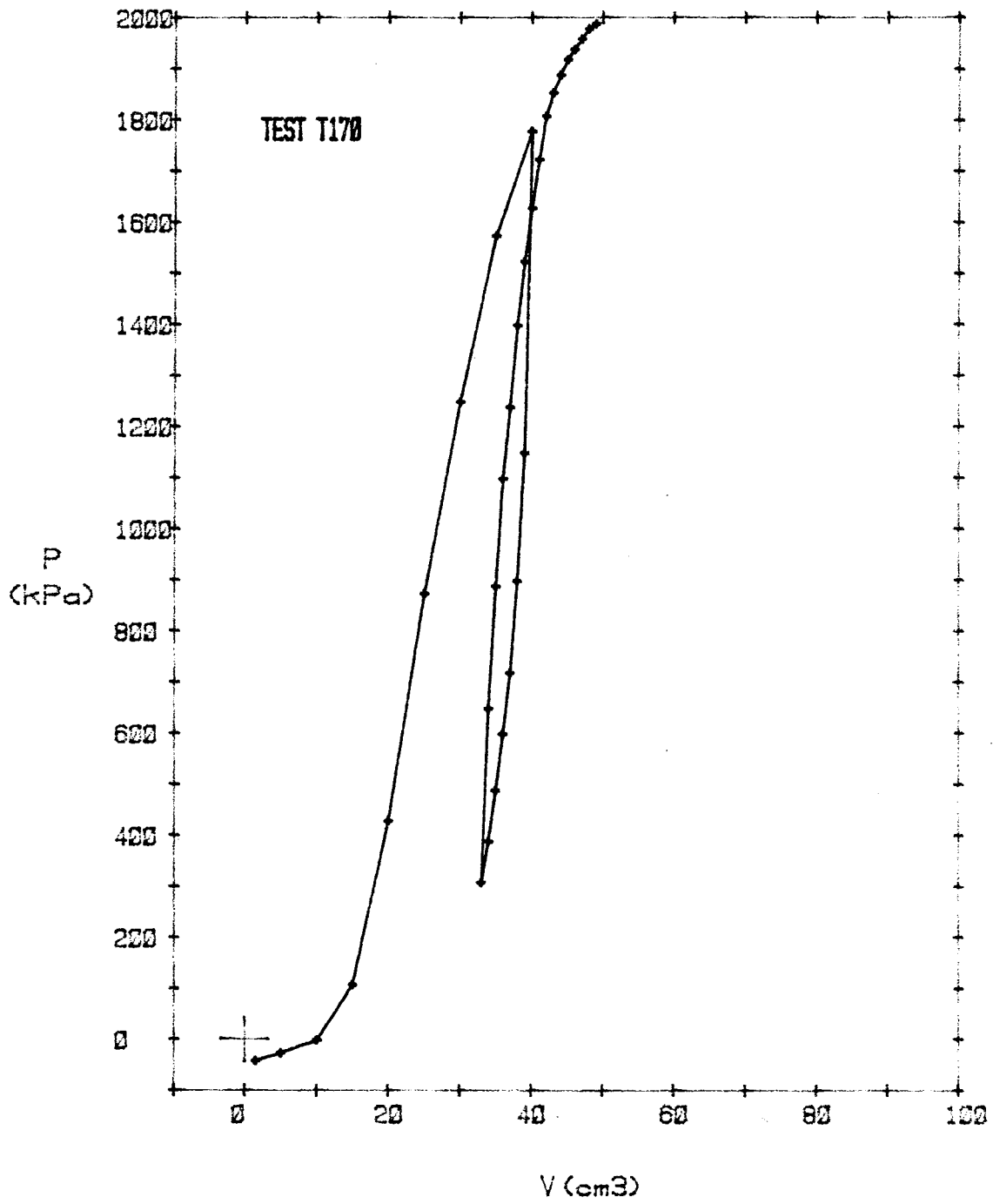


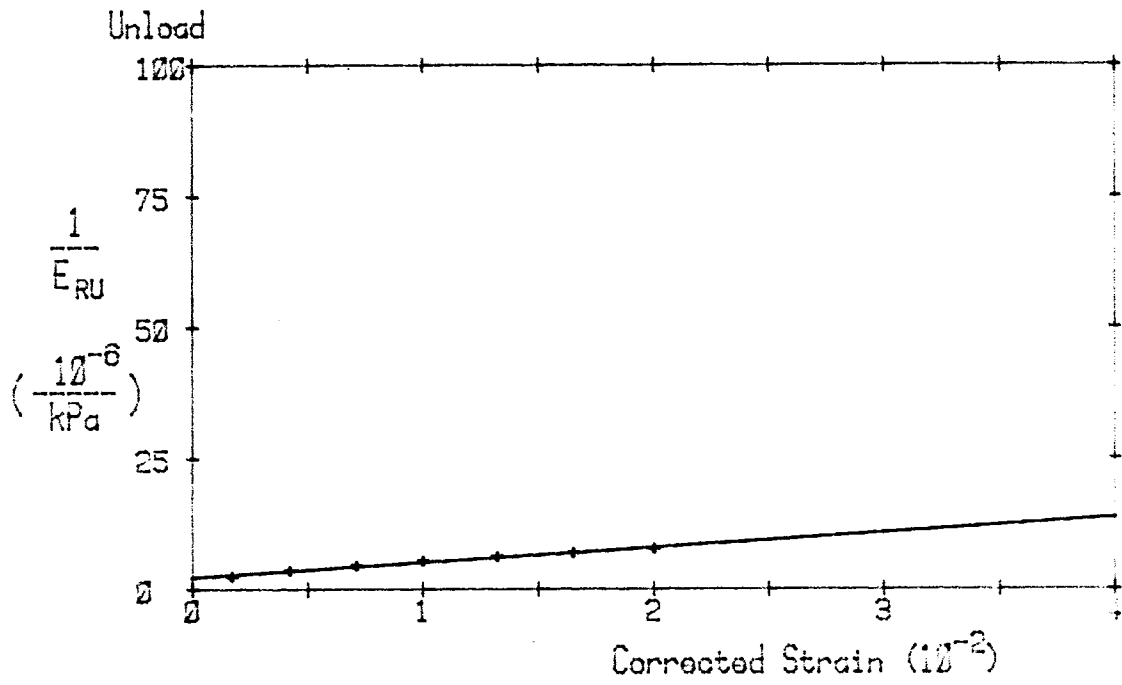




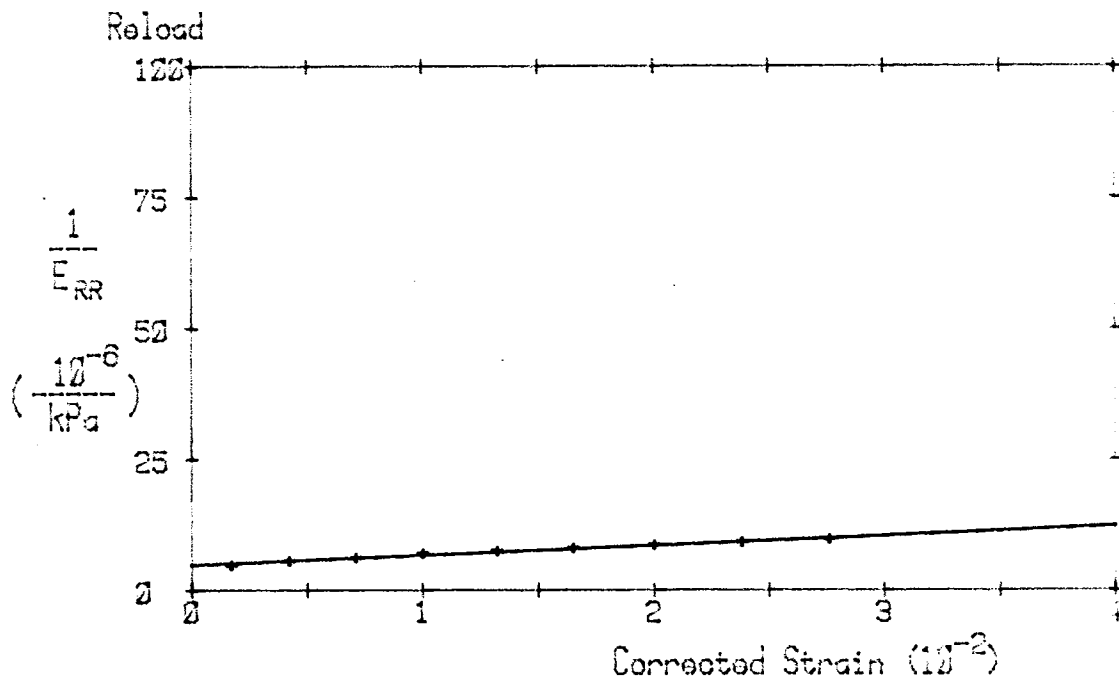
TEST T169

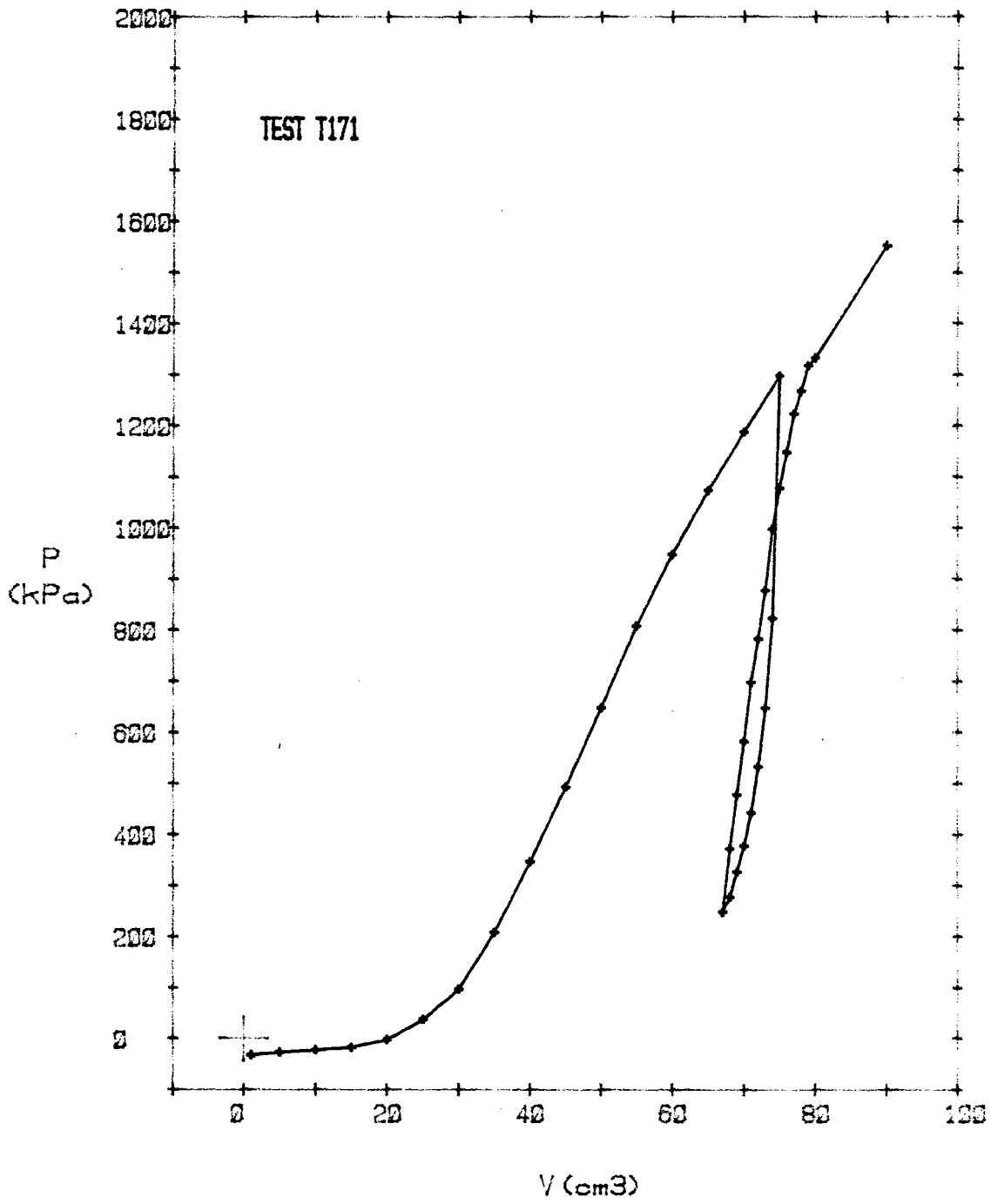


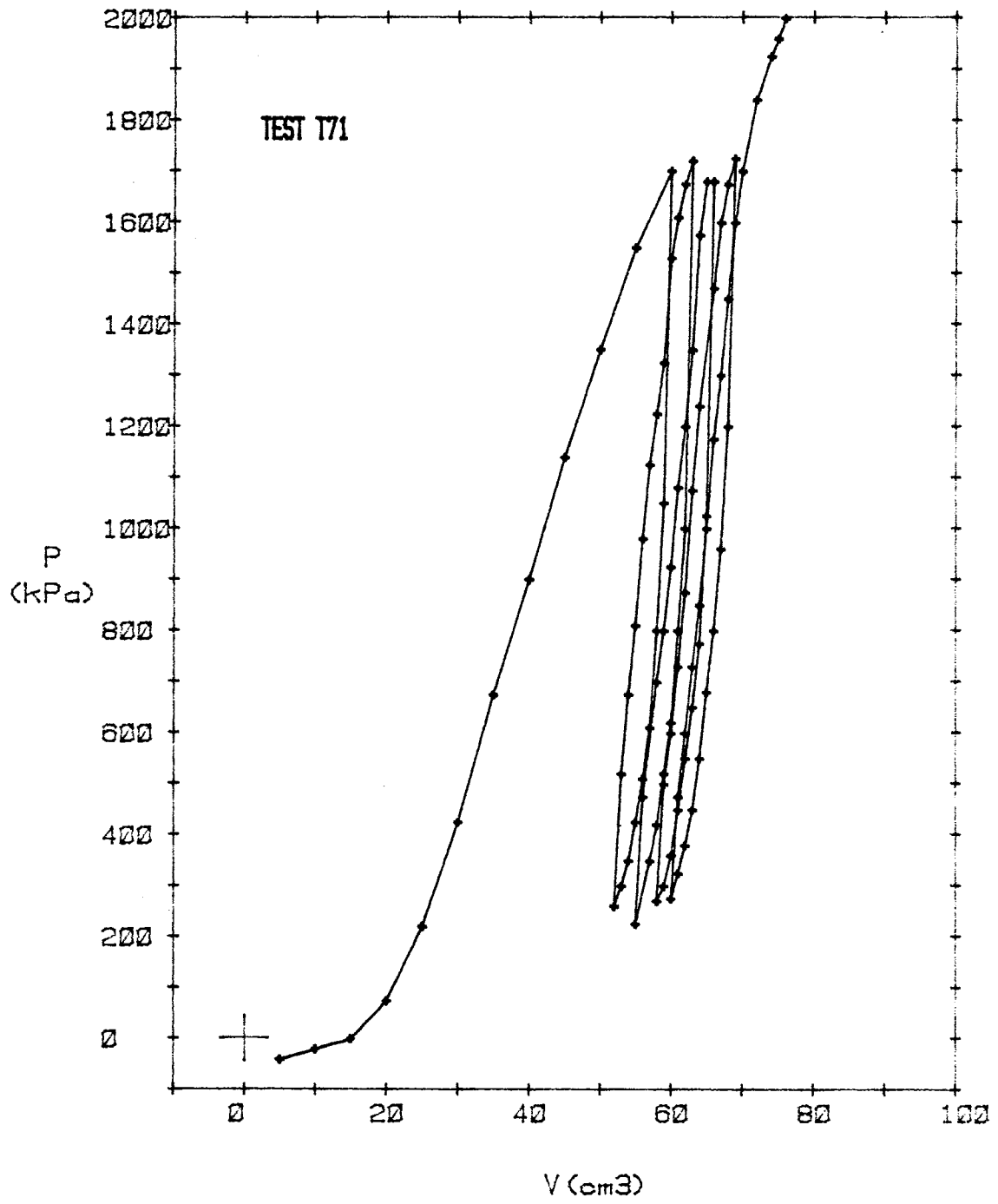


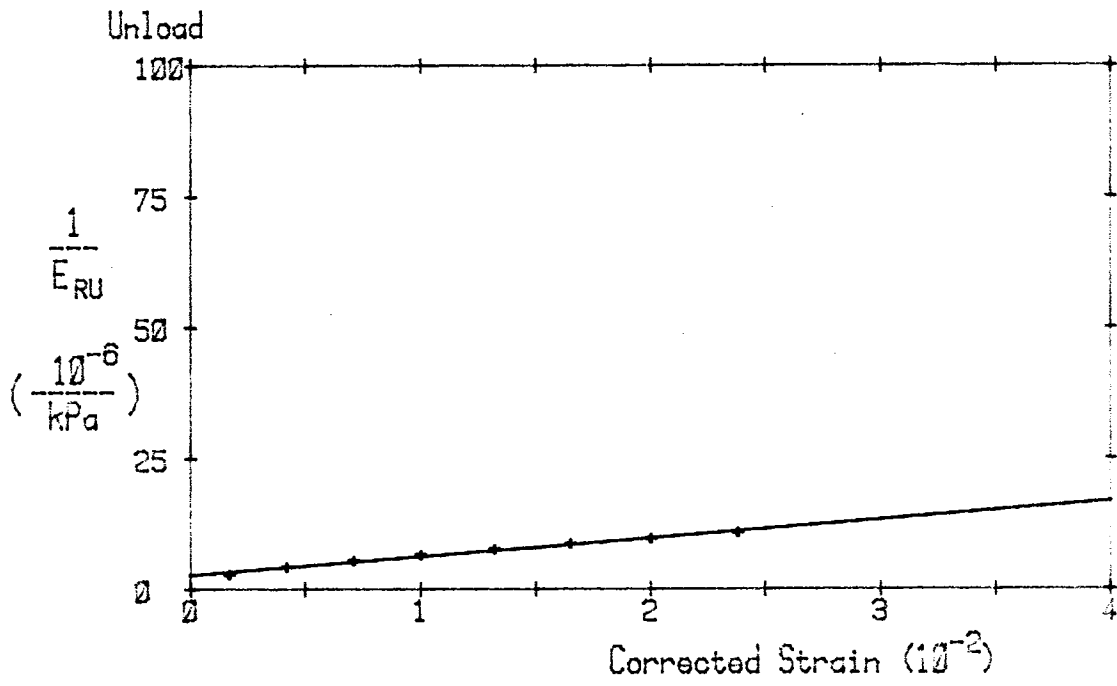


TEST T170

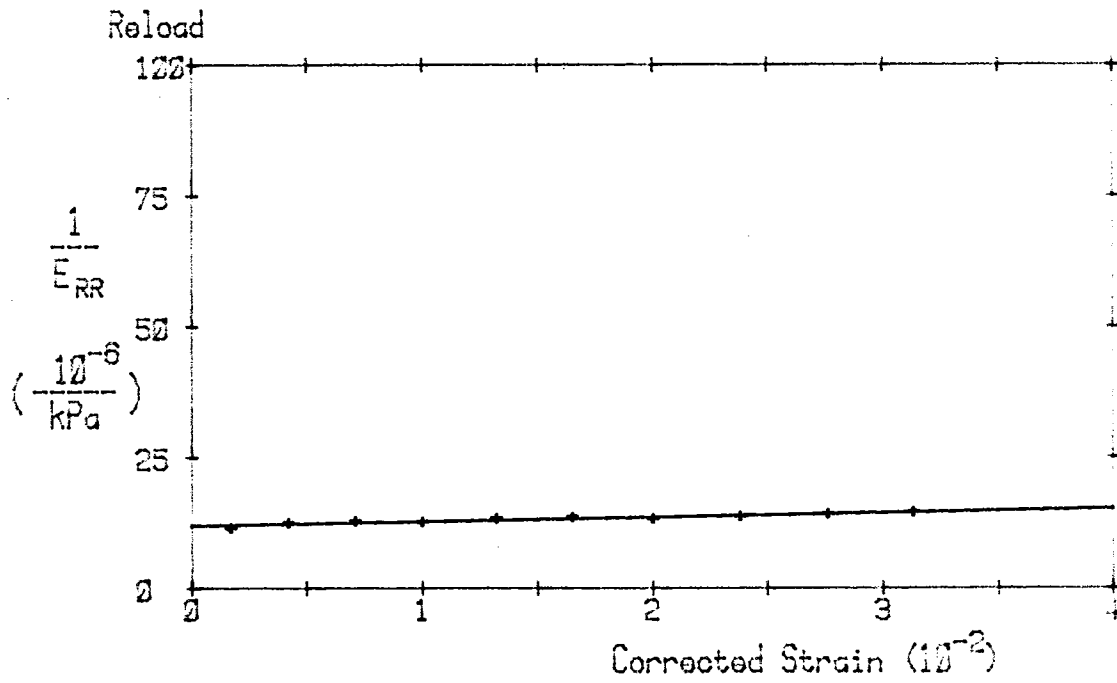


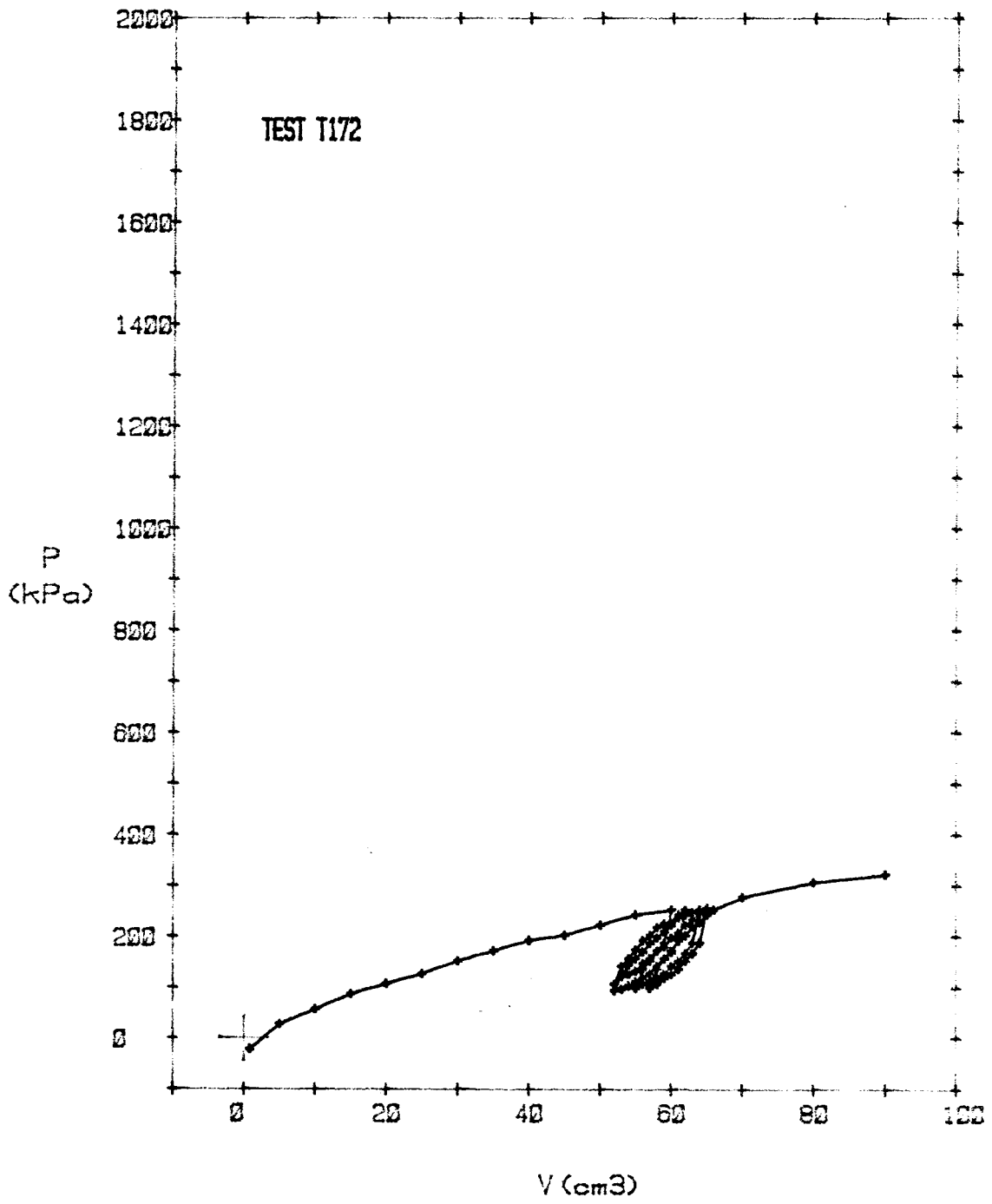


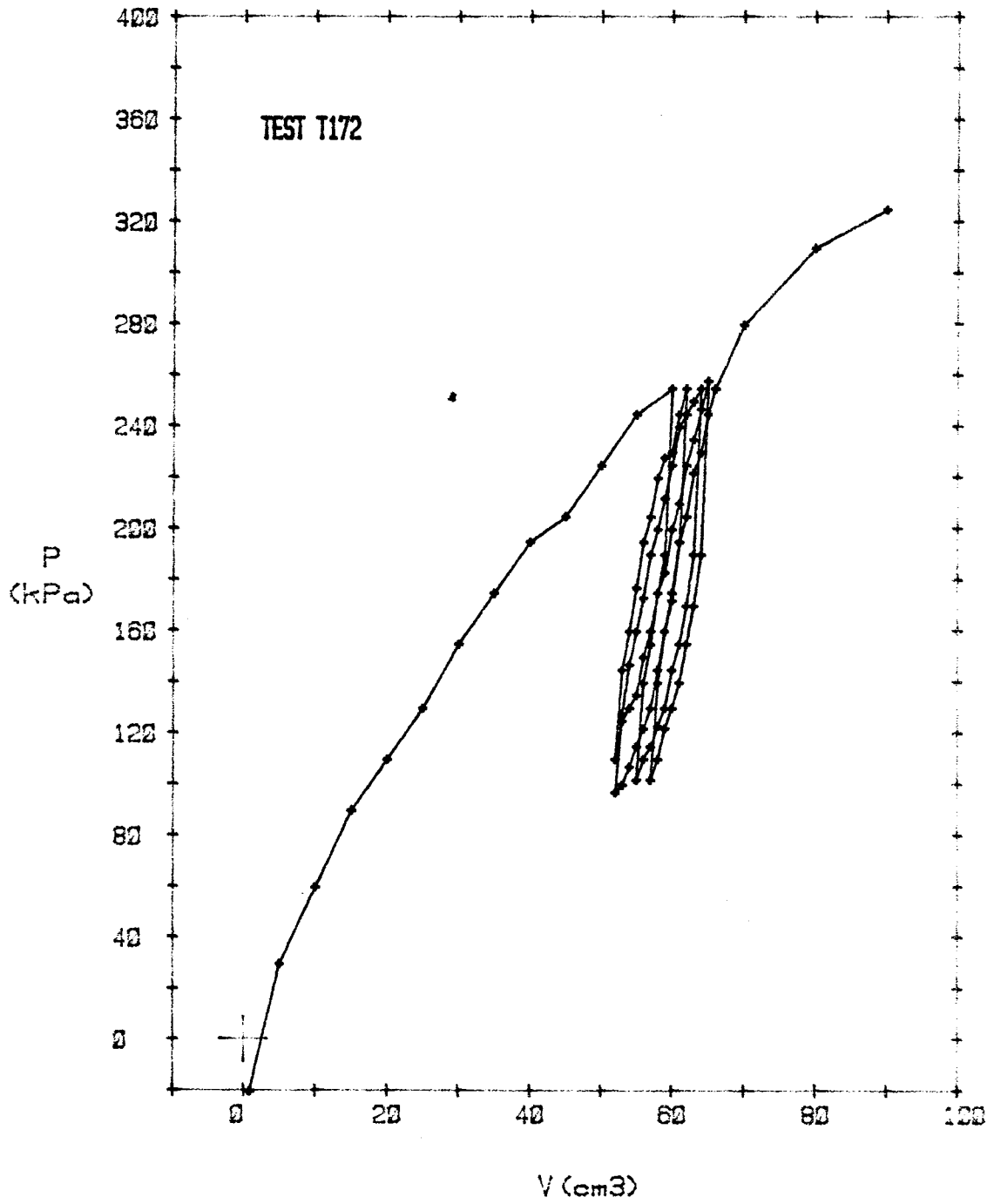


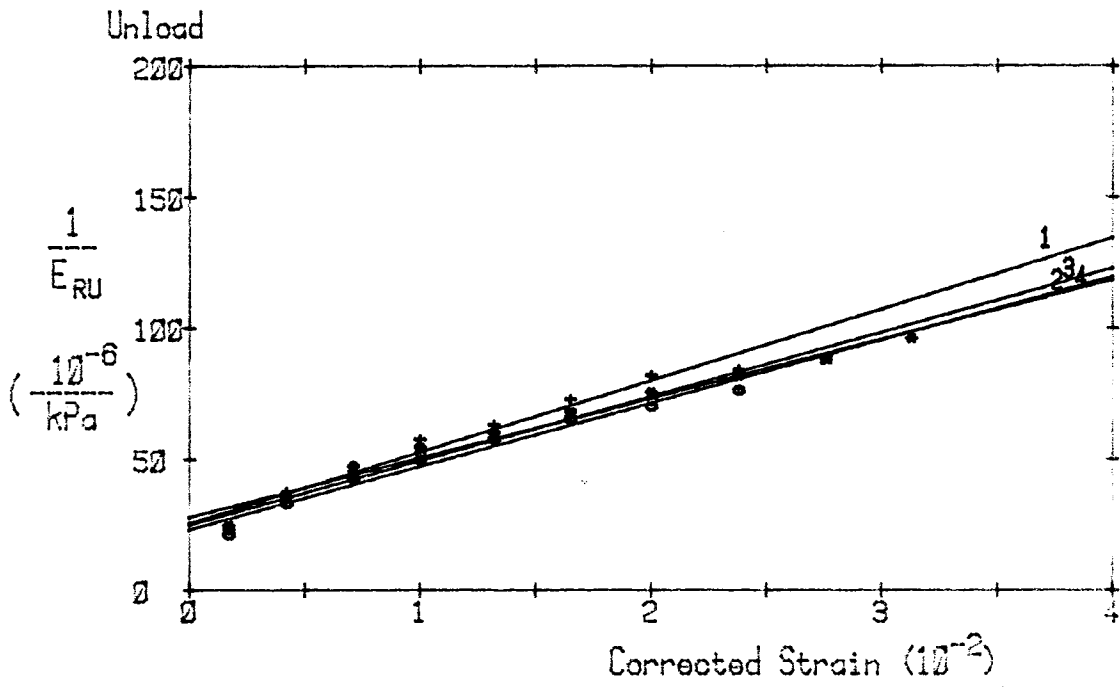


TEST T171

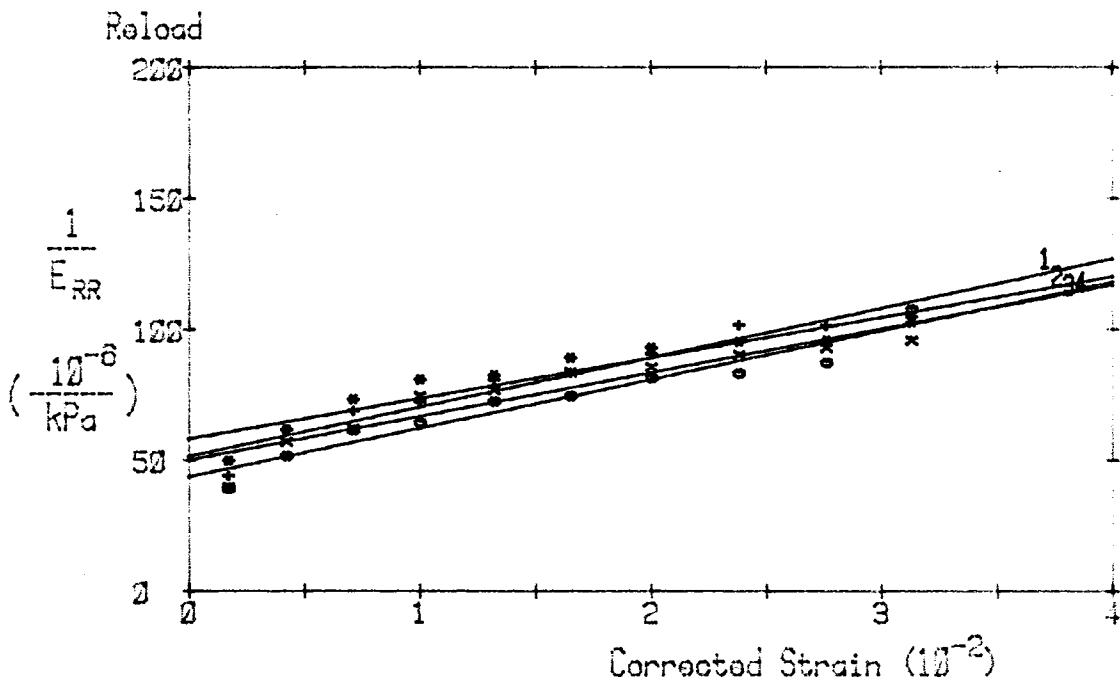


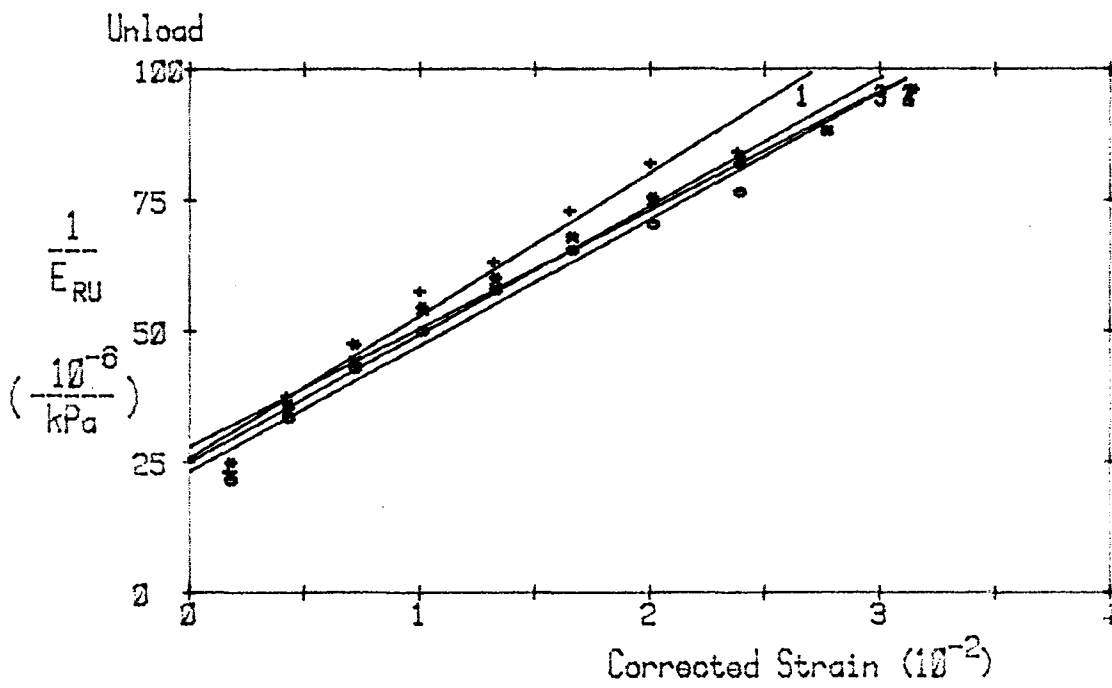




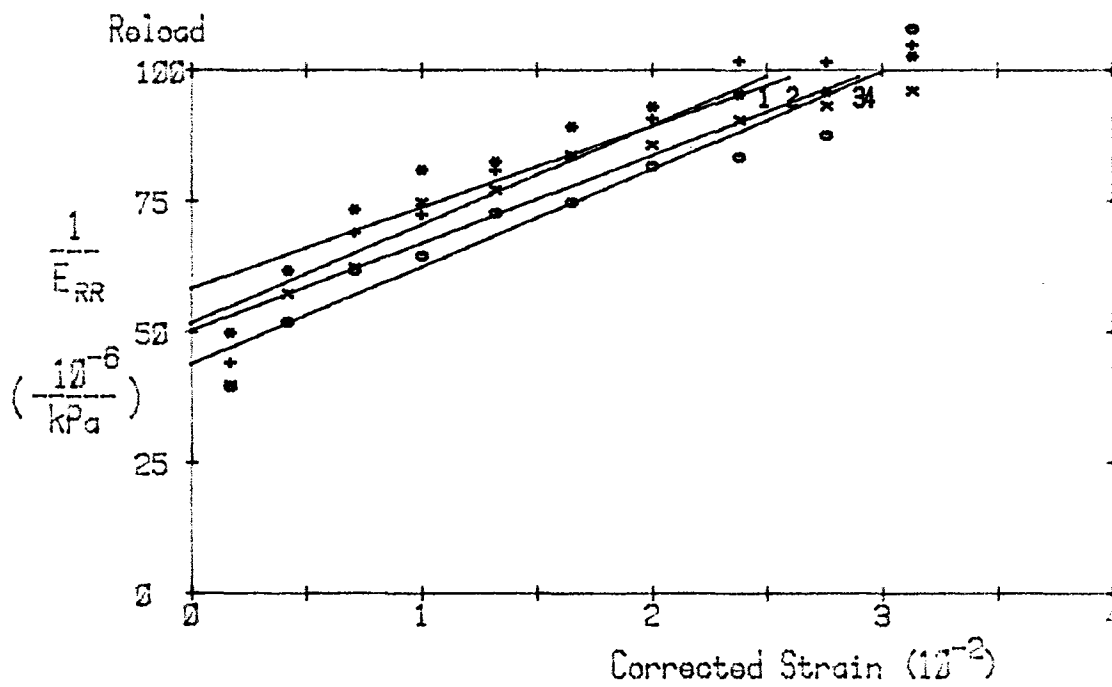


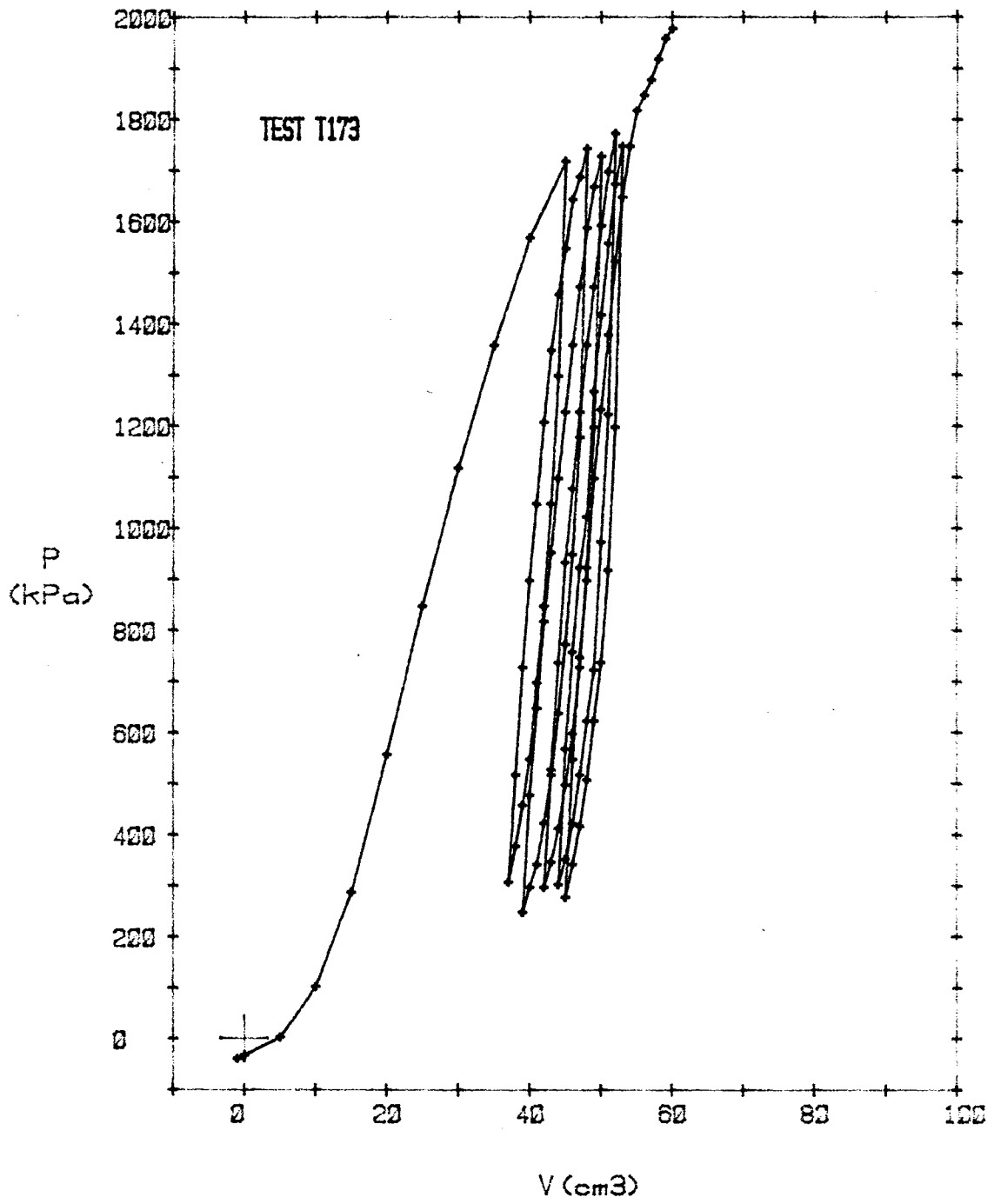
TEST T172

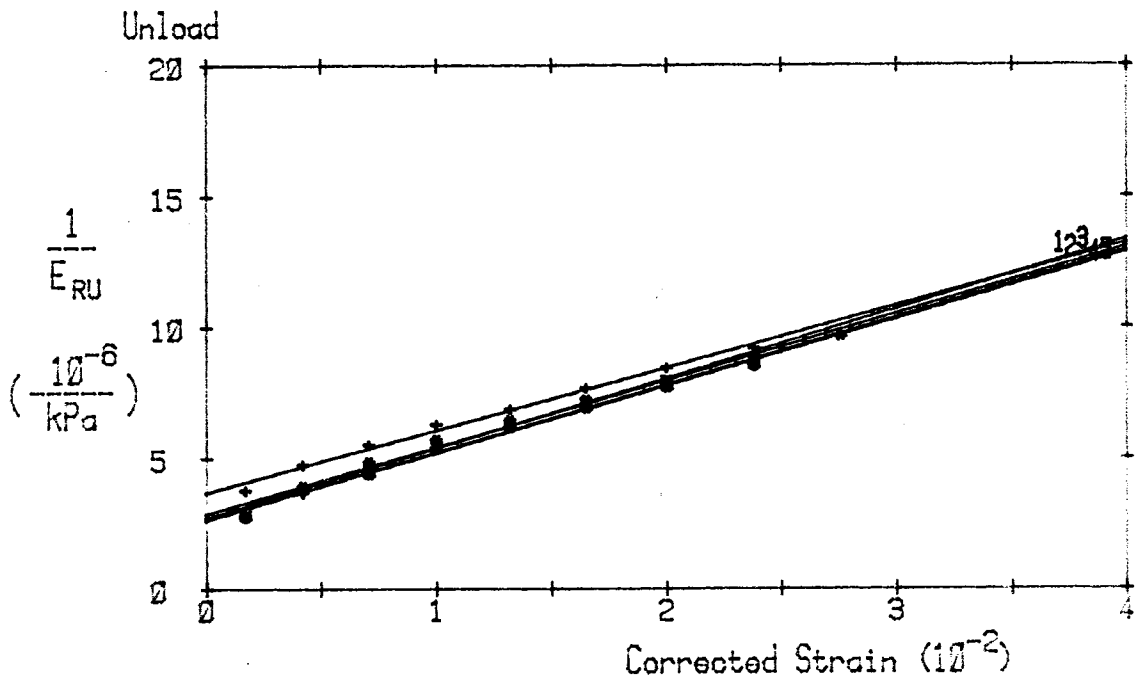




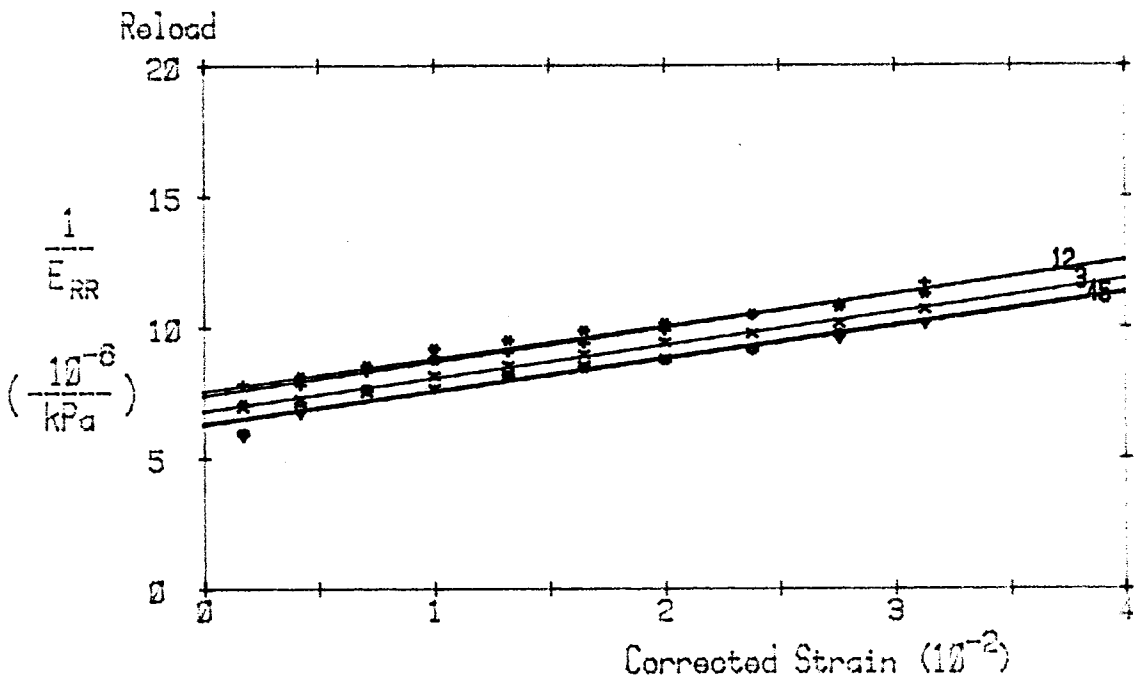
TEST T172

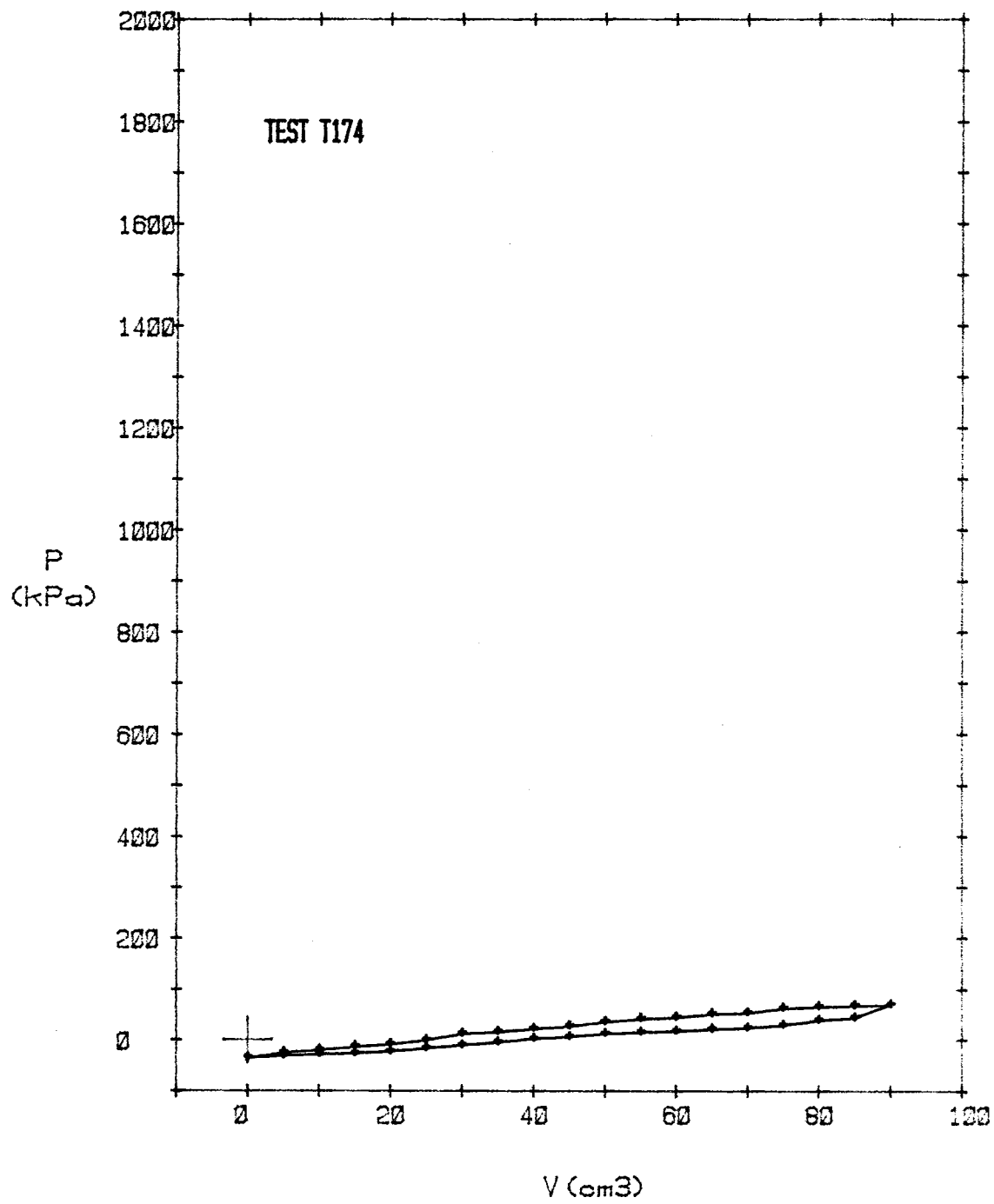


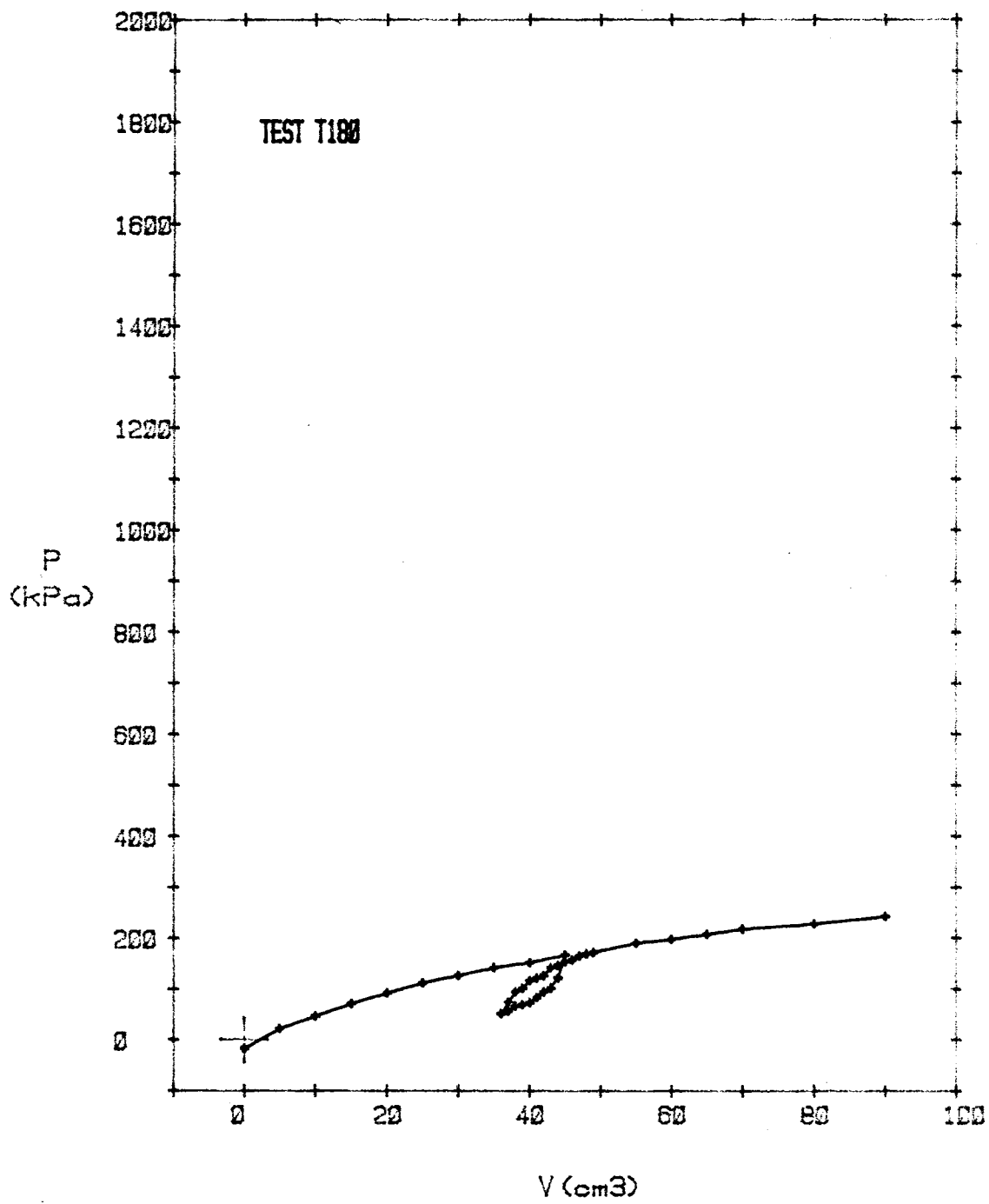


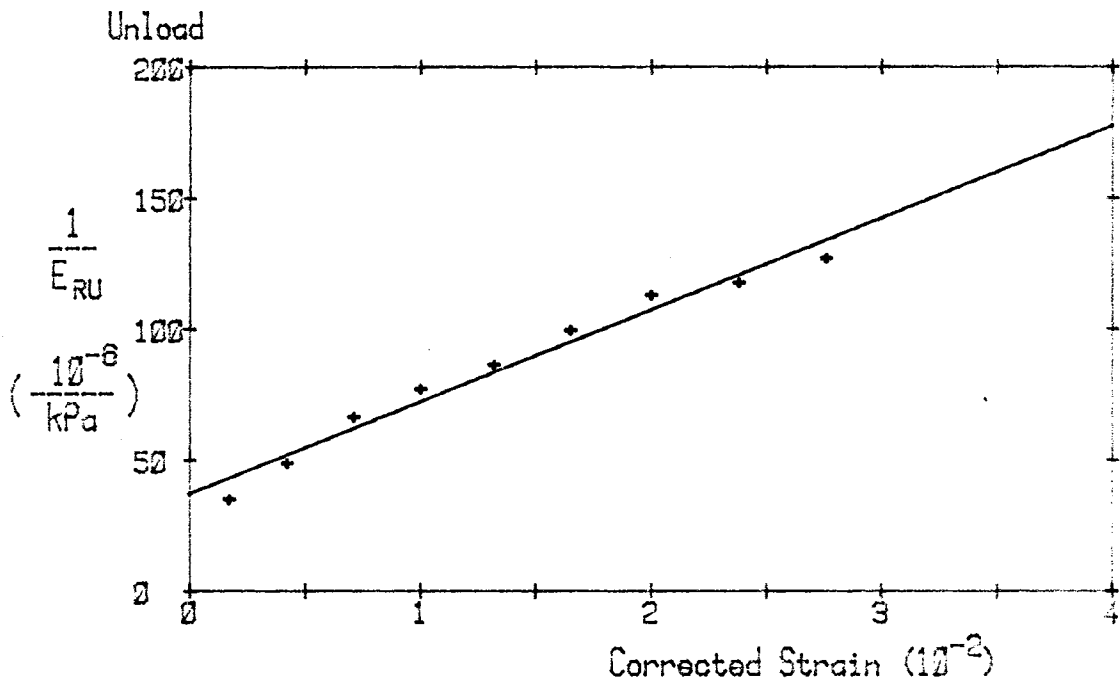


TEST T173

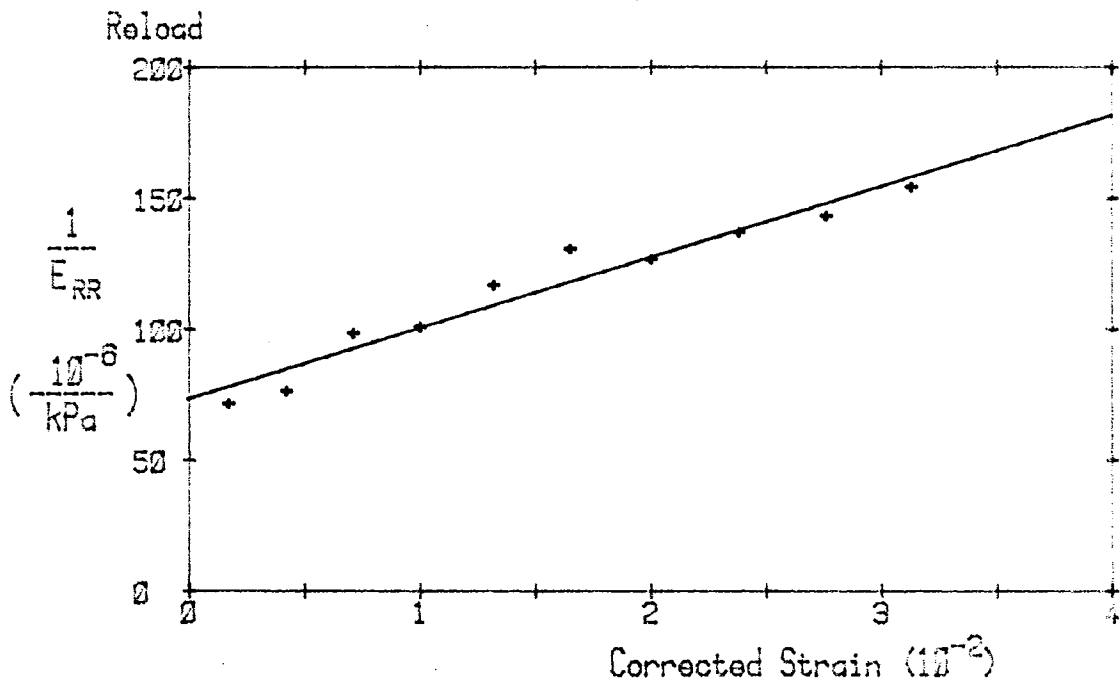


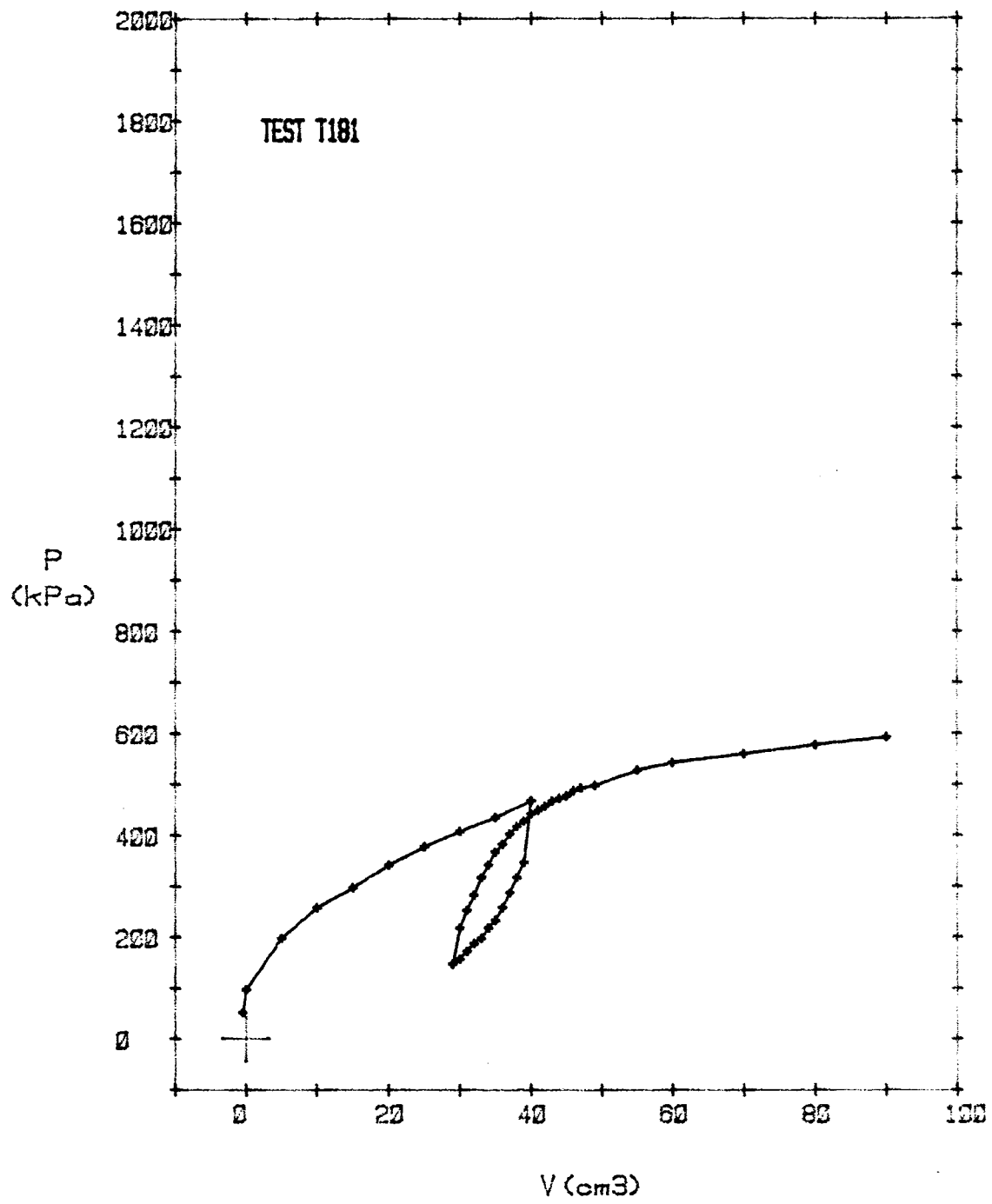


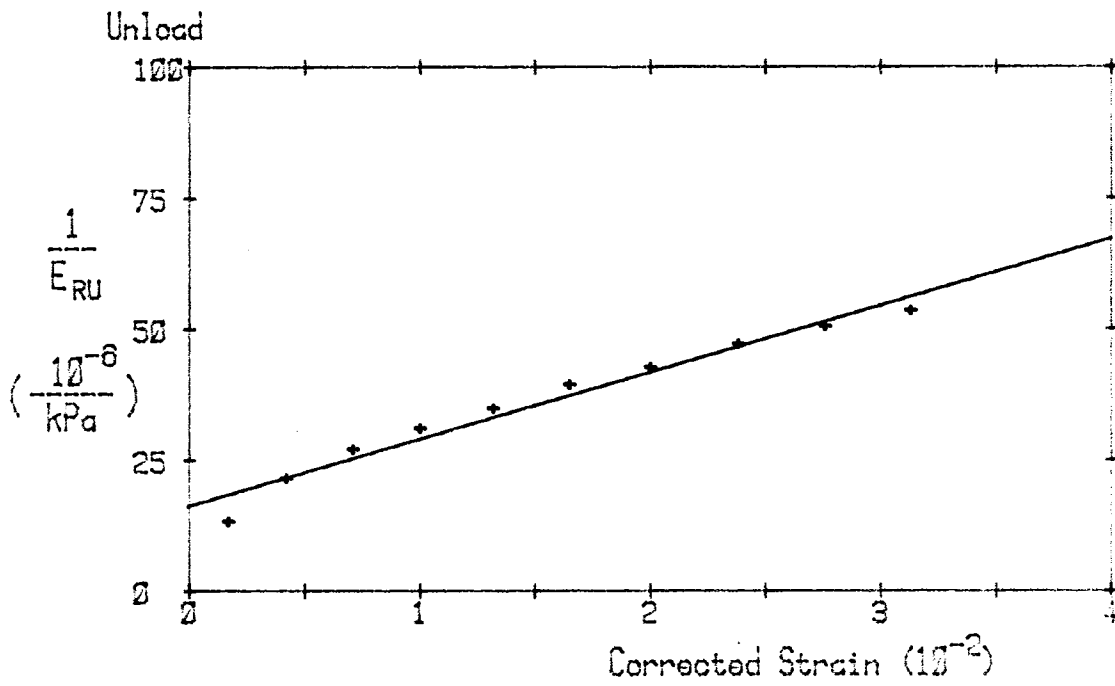




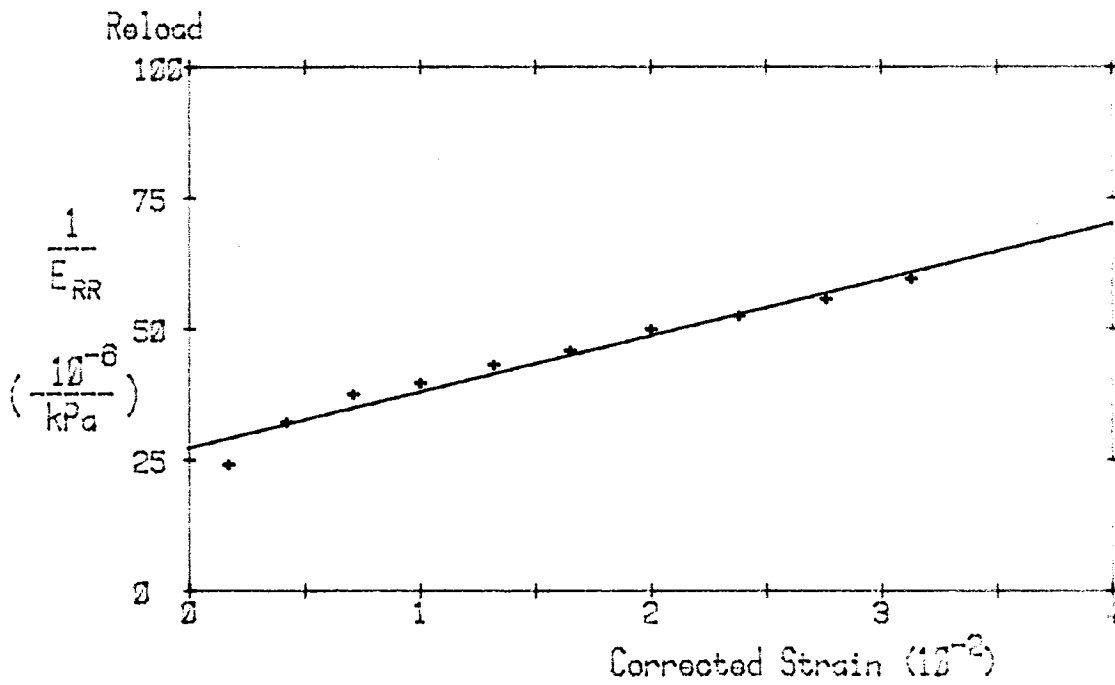
TEST T180

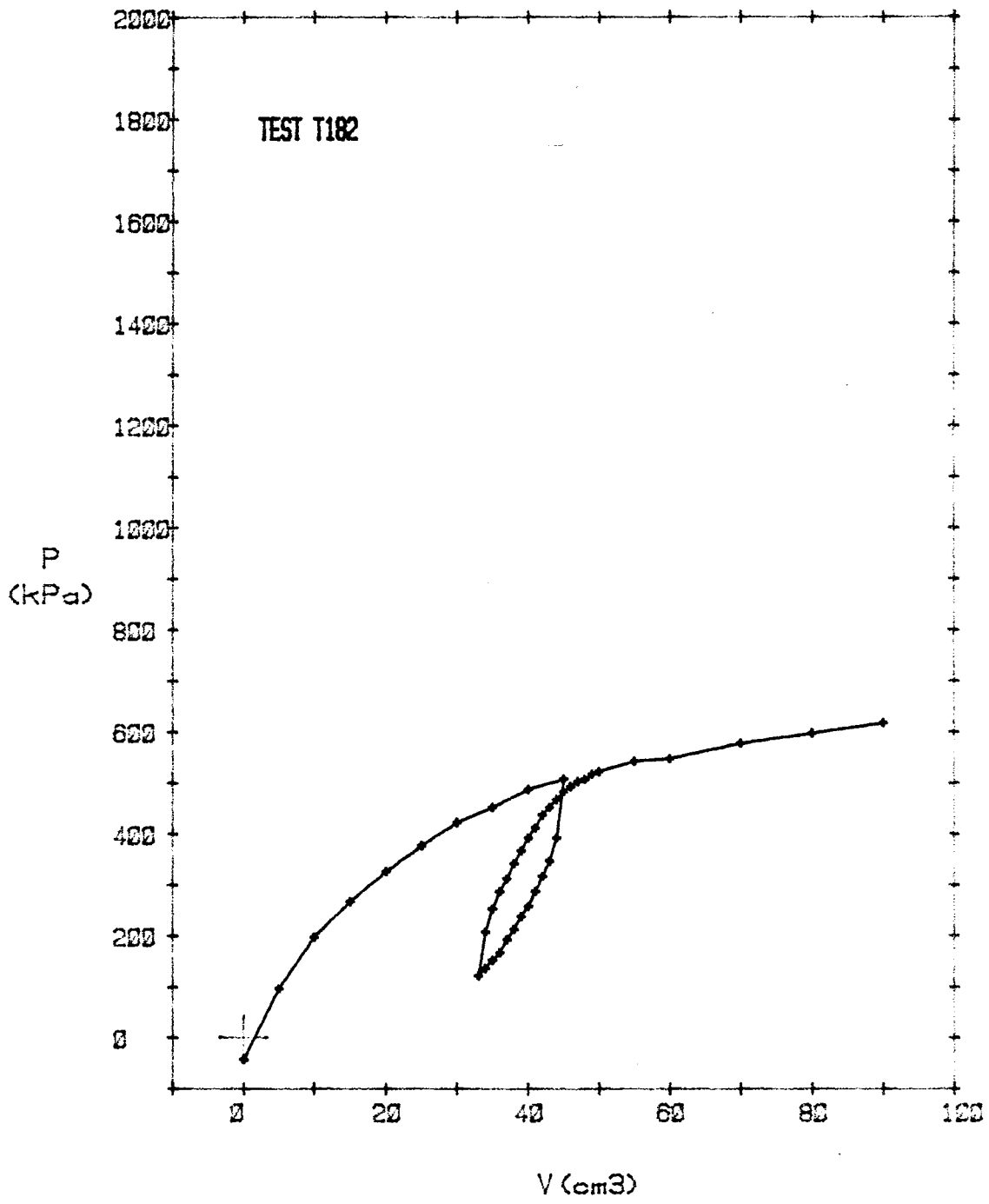


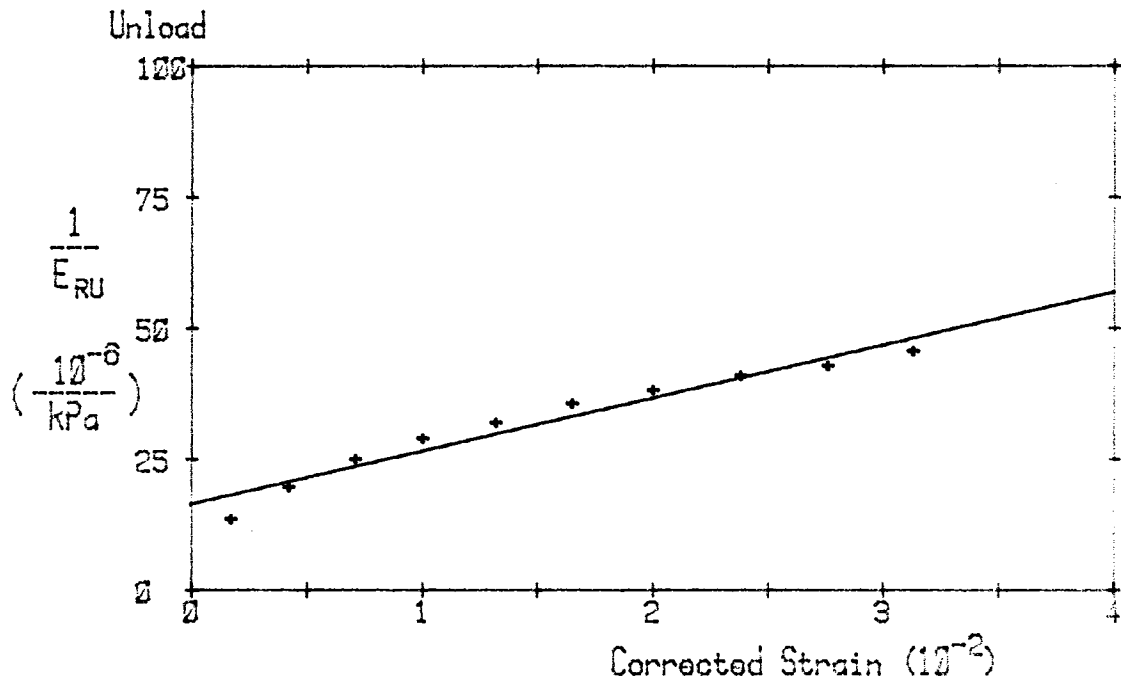




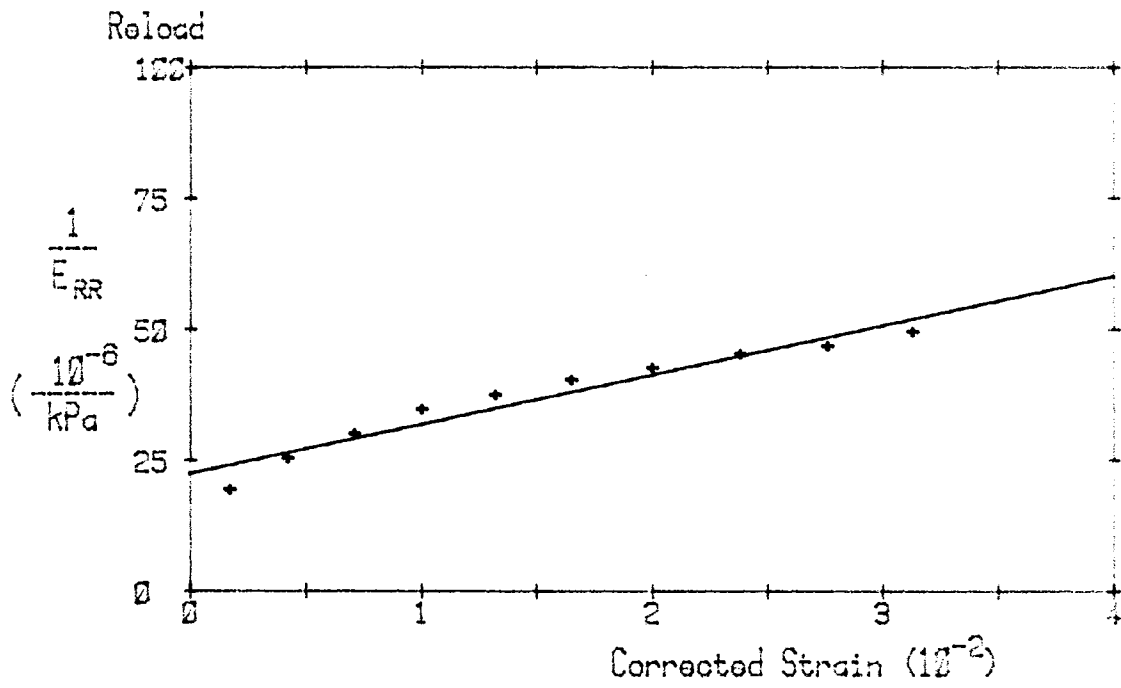
TEST T181

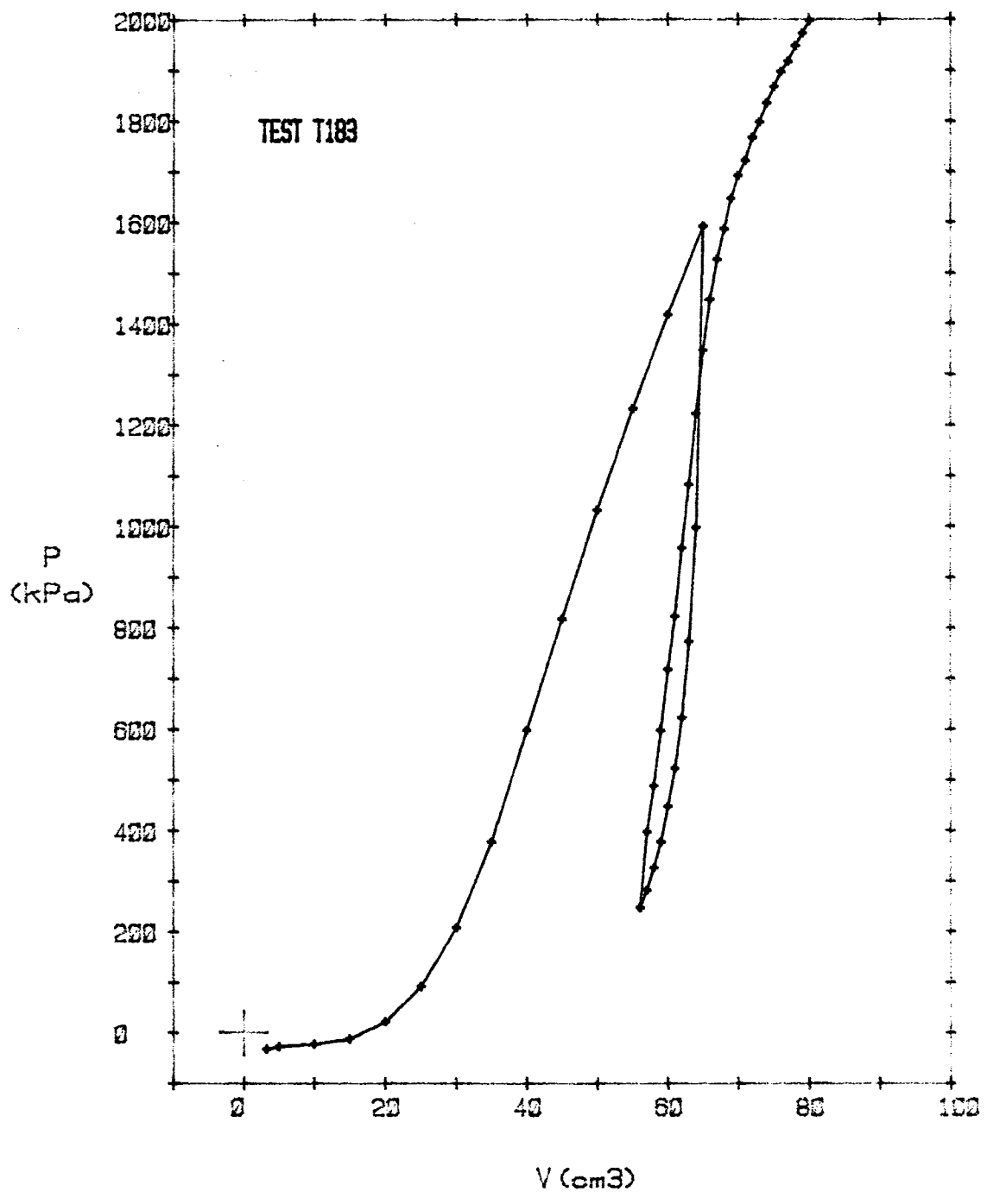


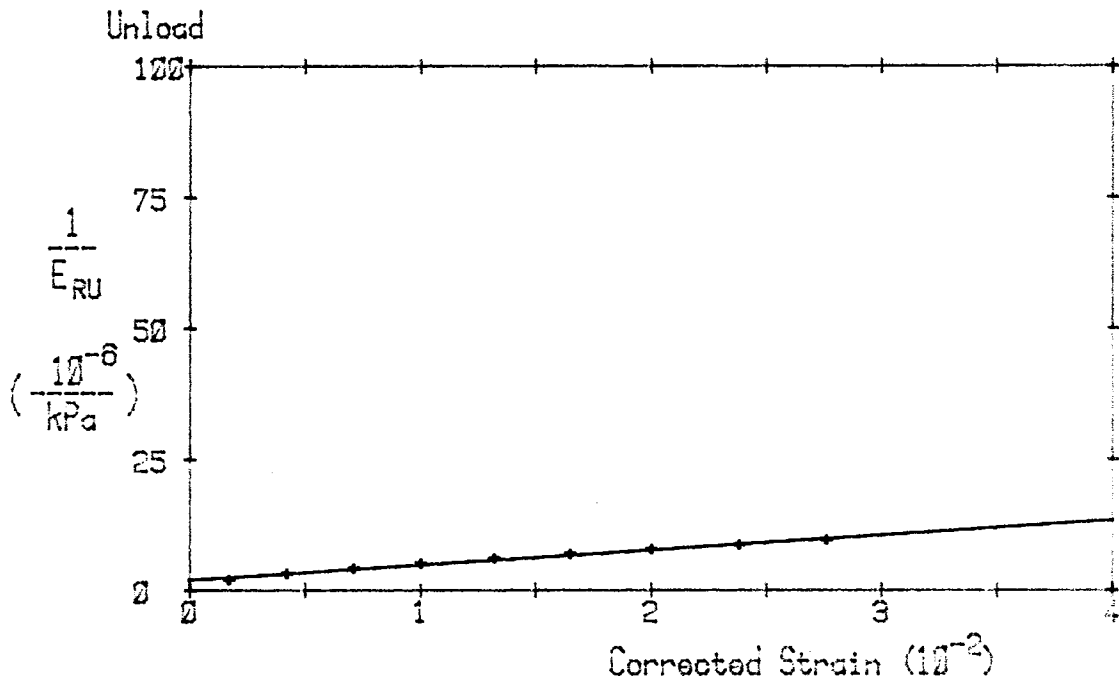




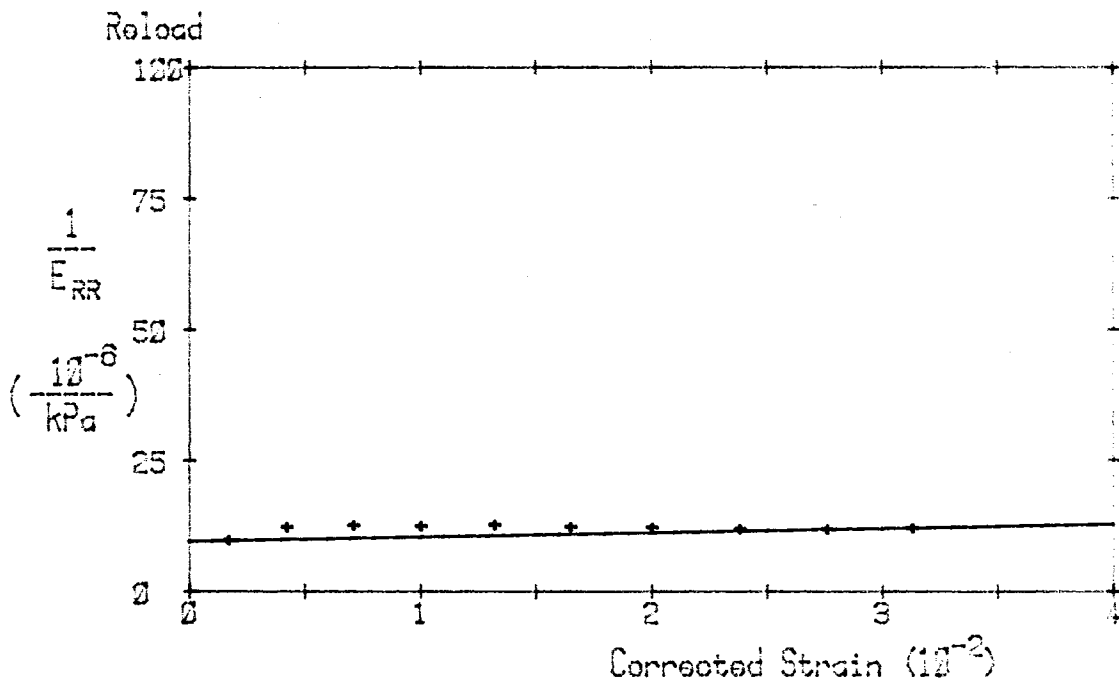
TEST T182

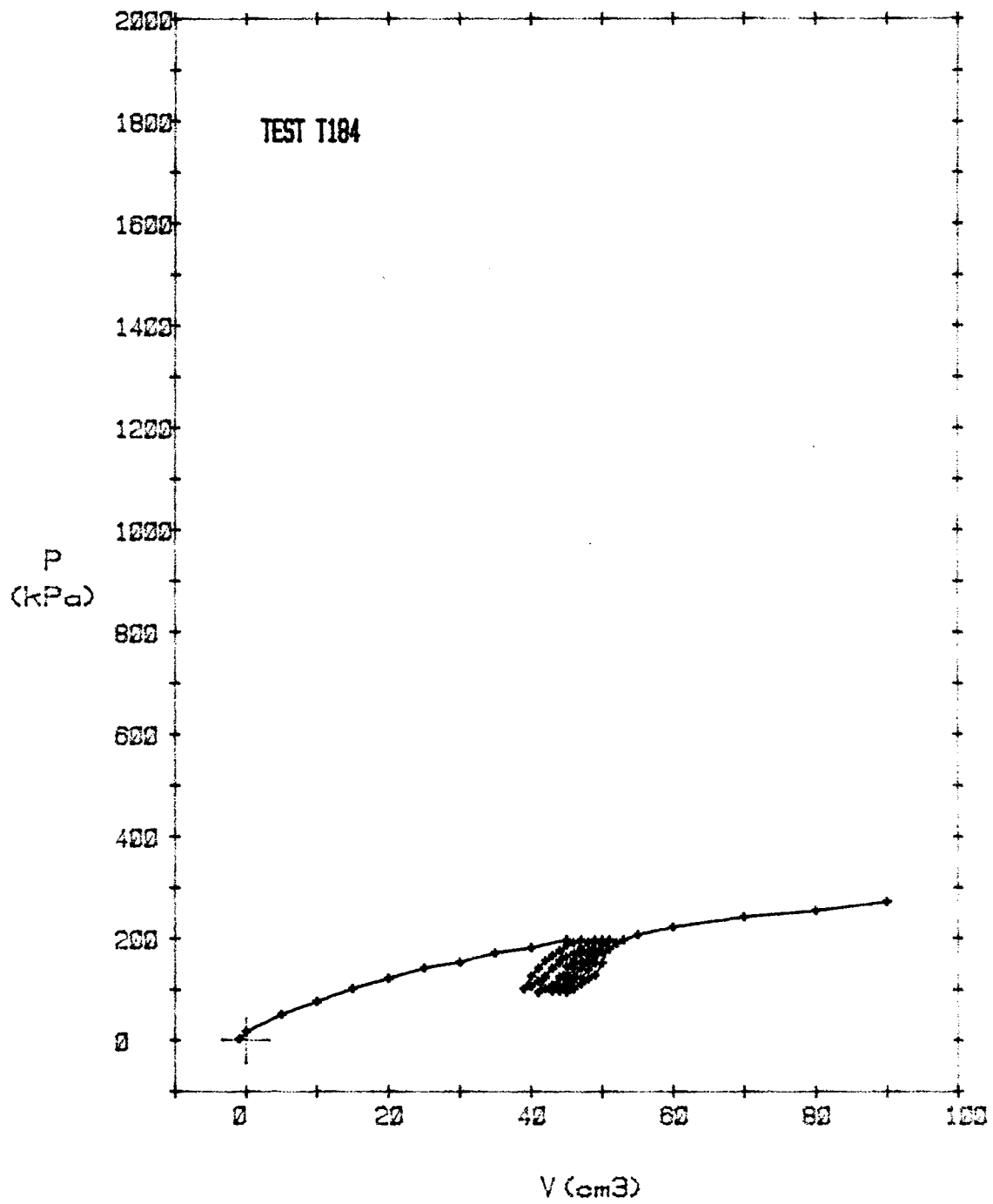


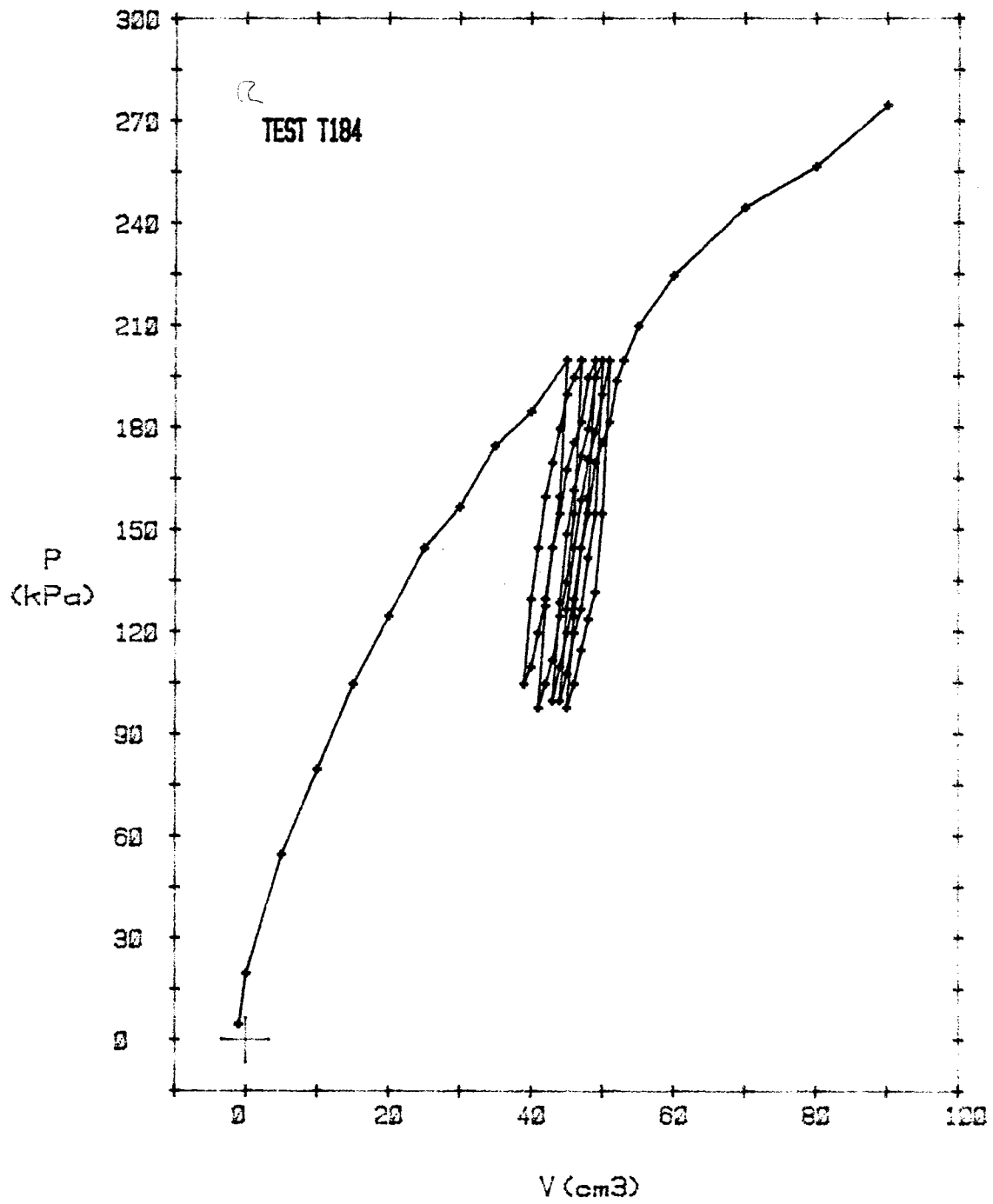


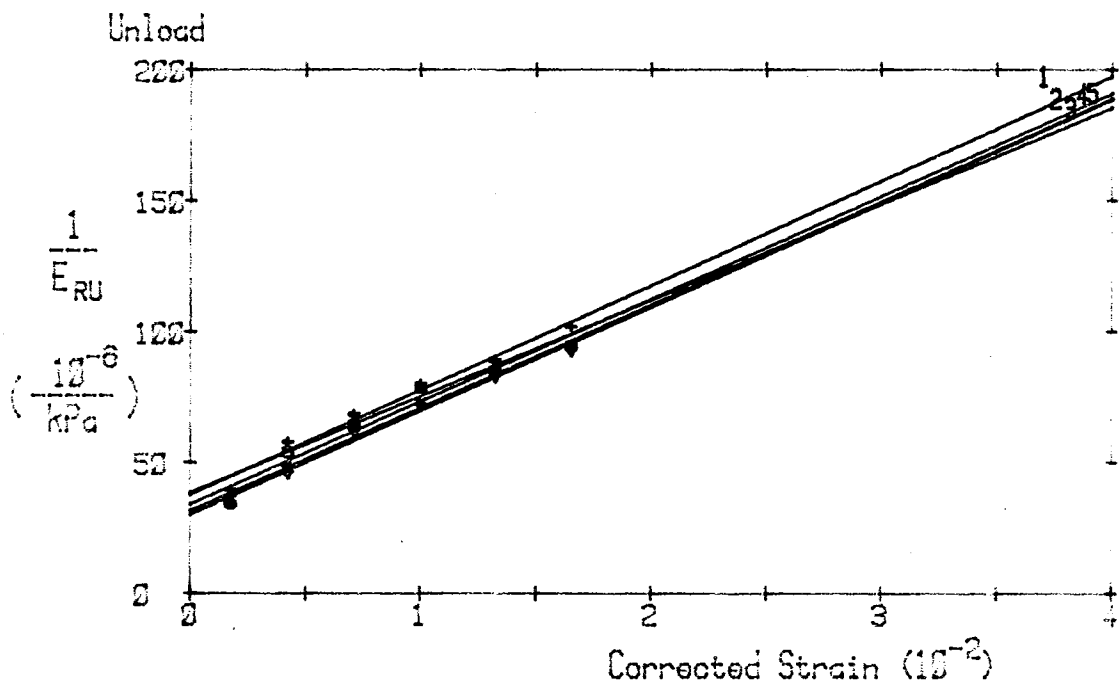


TEST T183

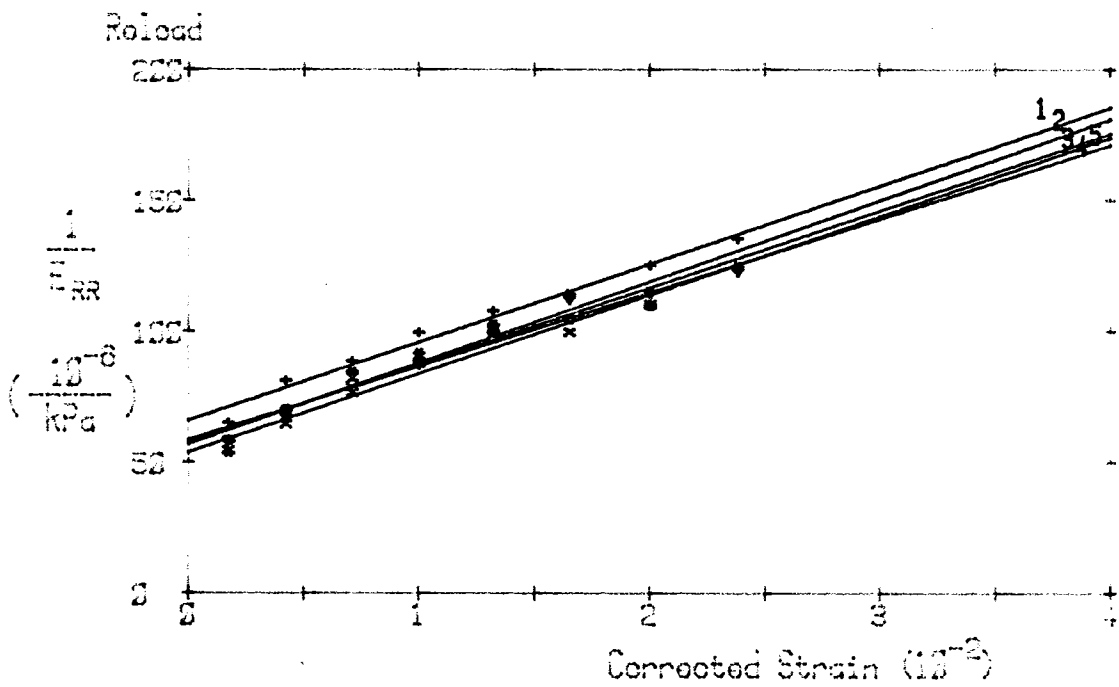


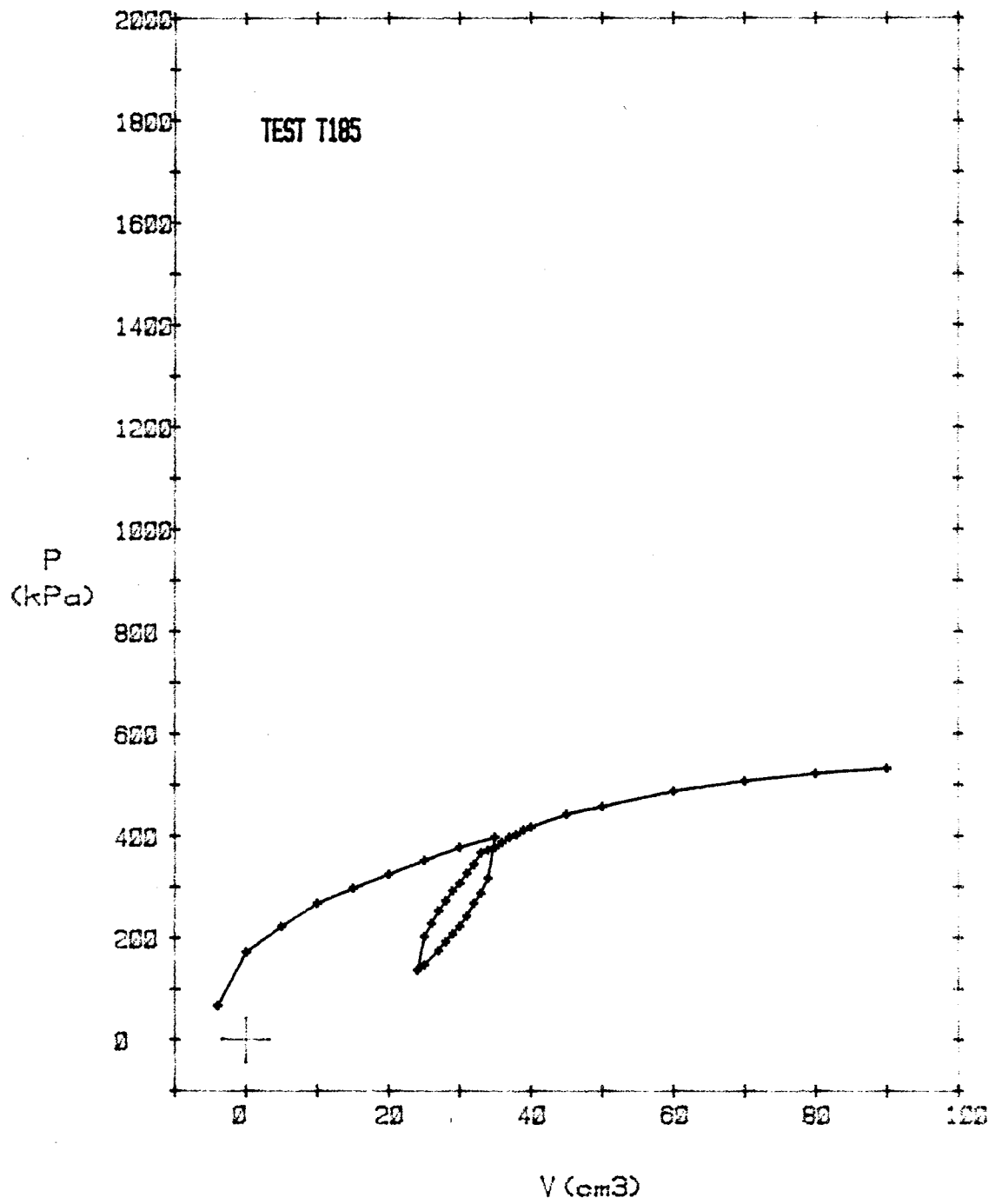


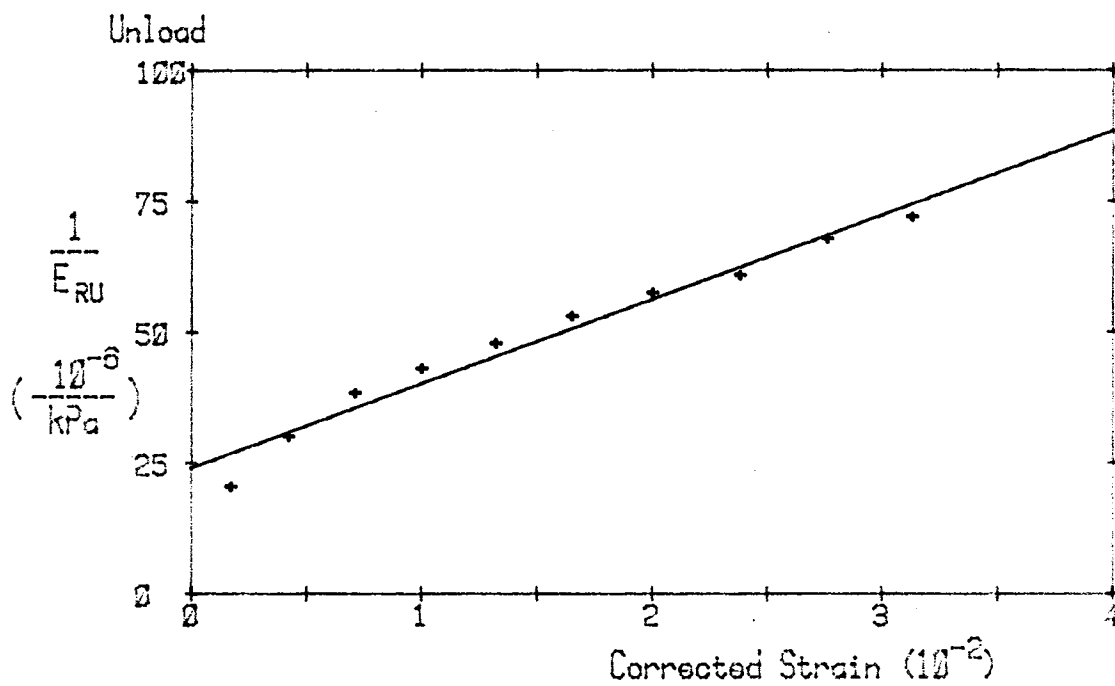




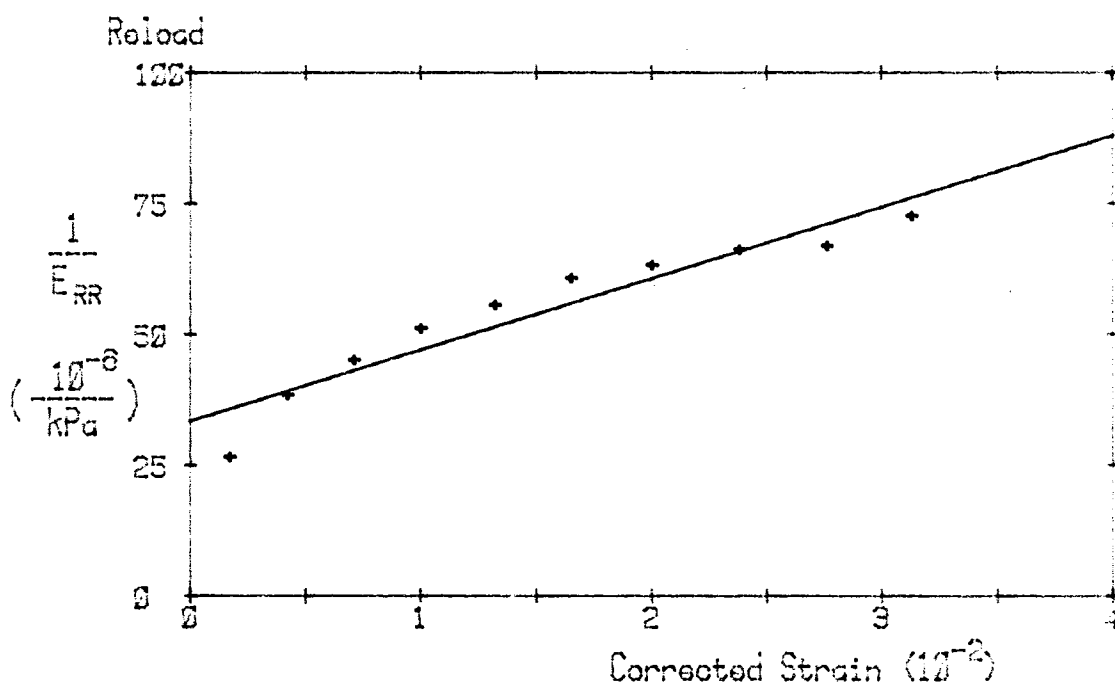
TEST T184

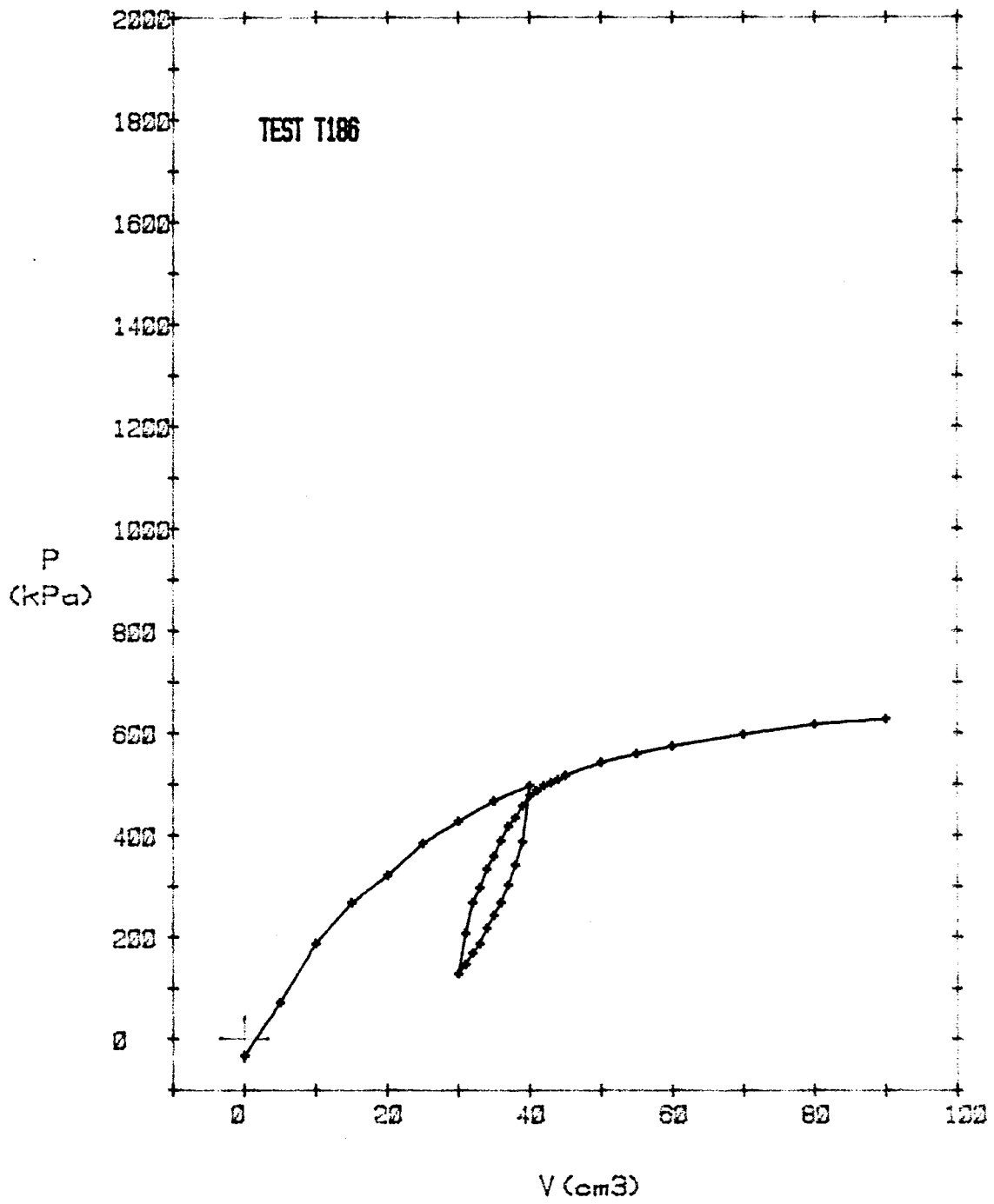


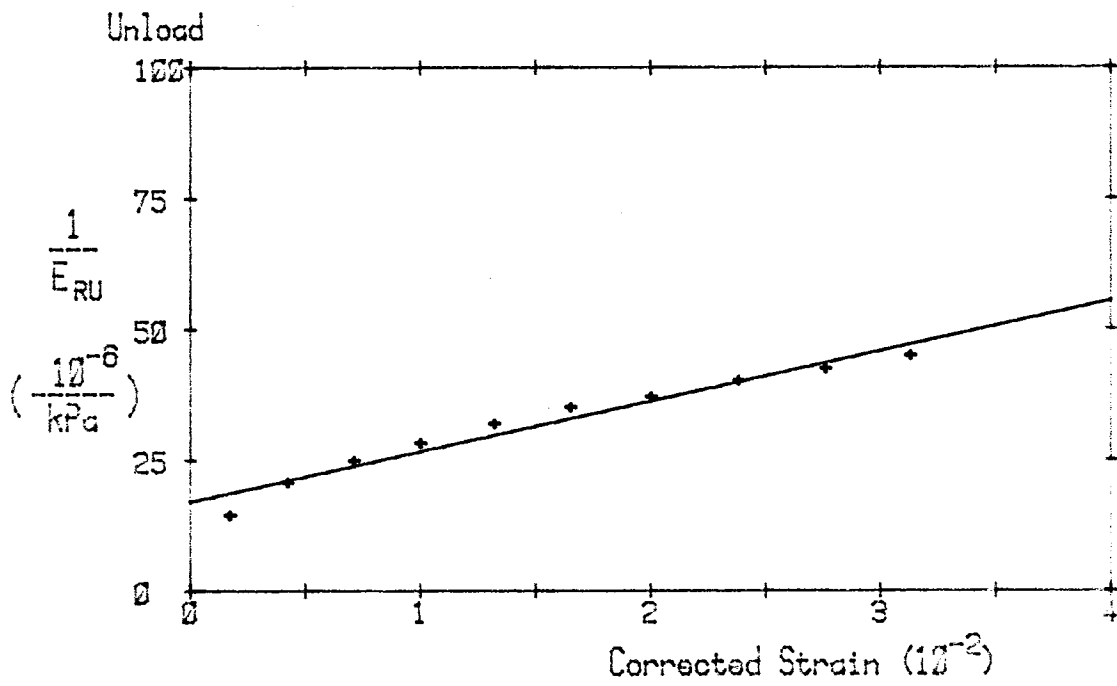




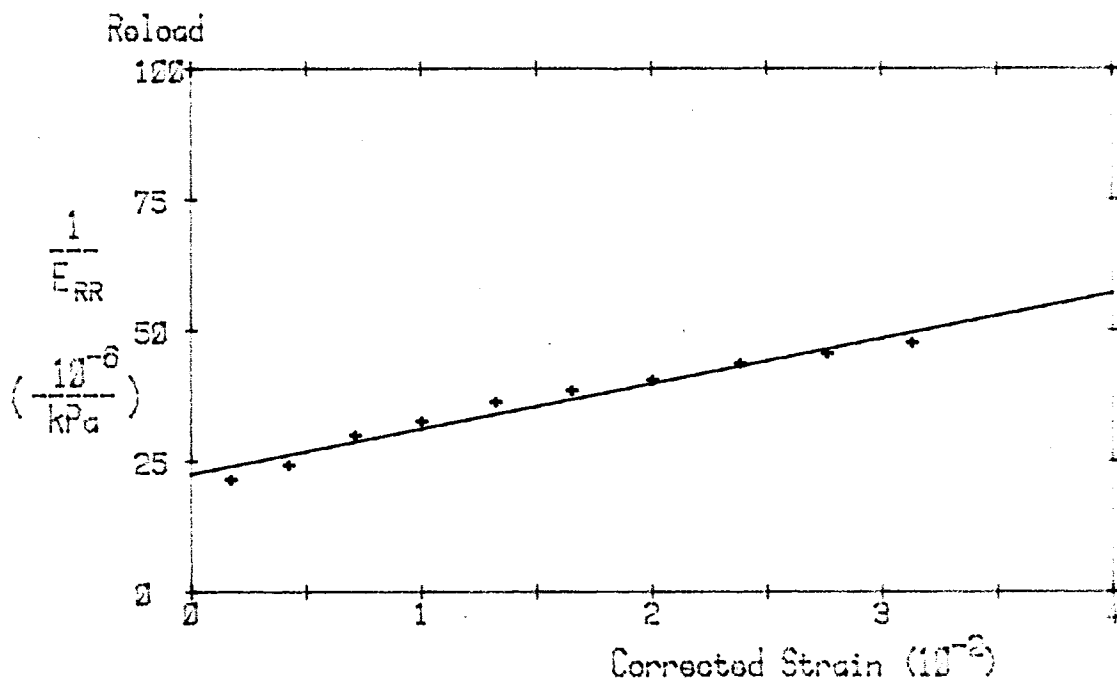
TEST T185

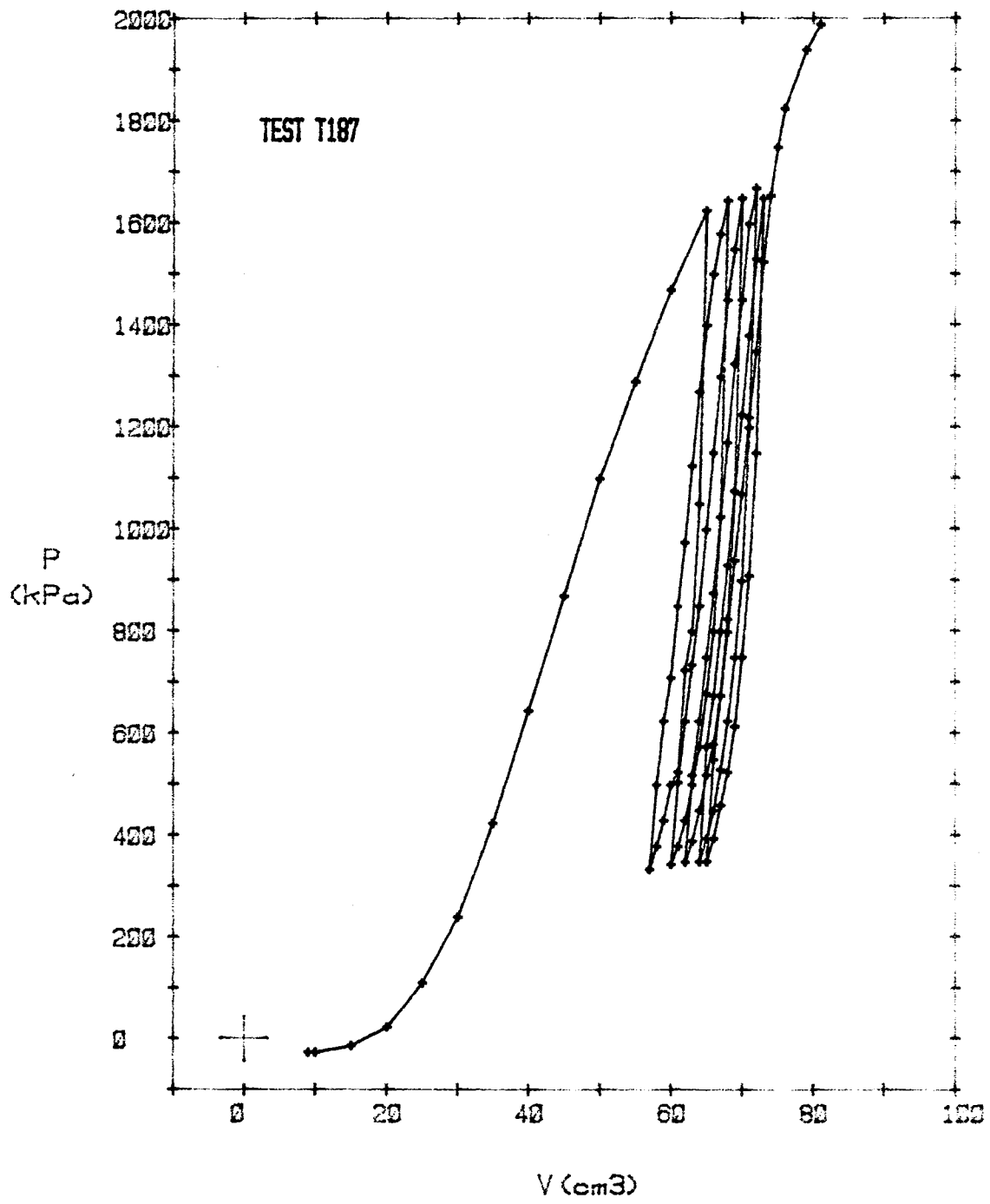


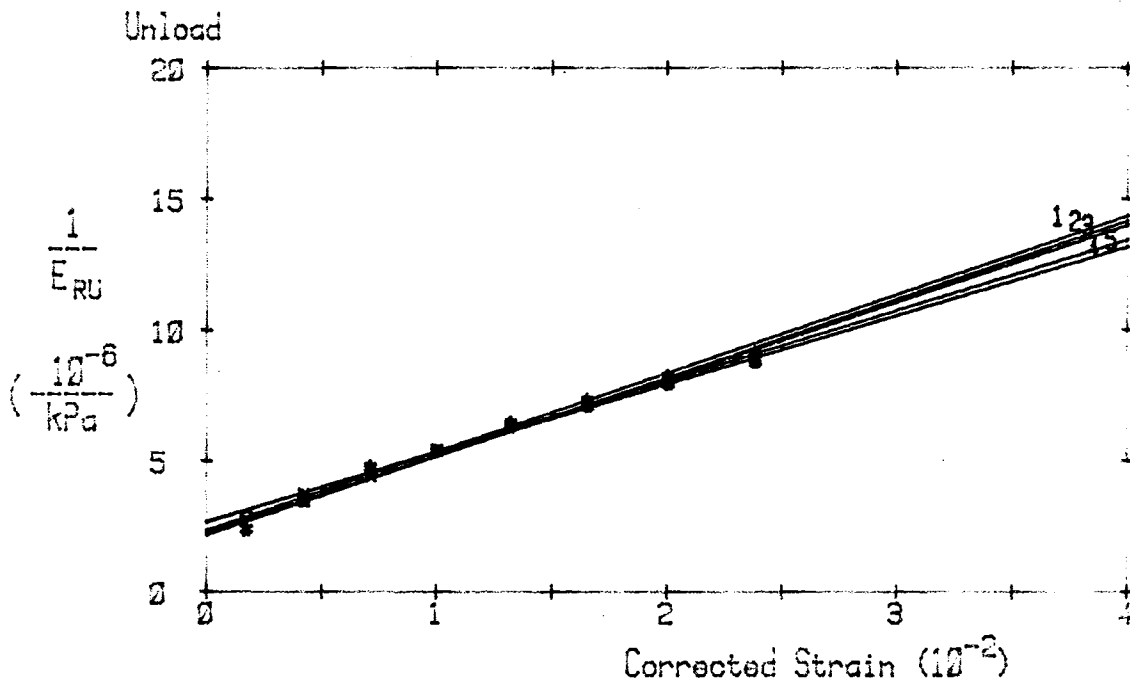




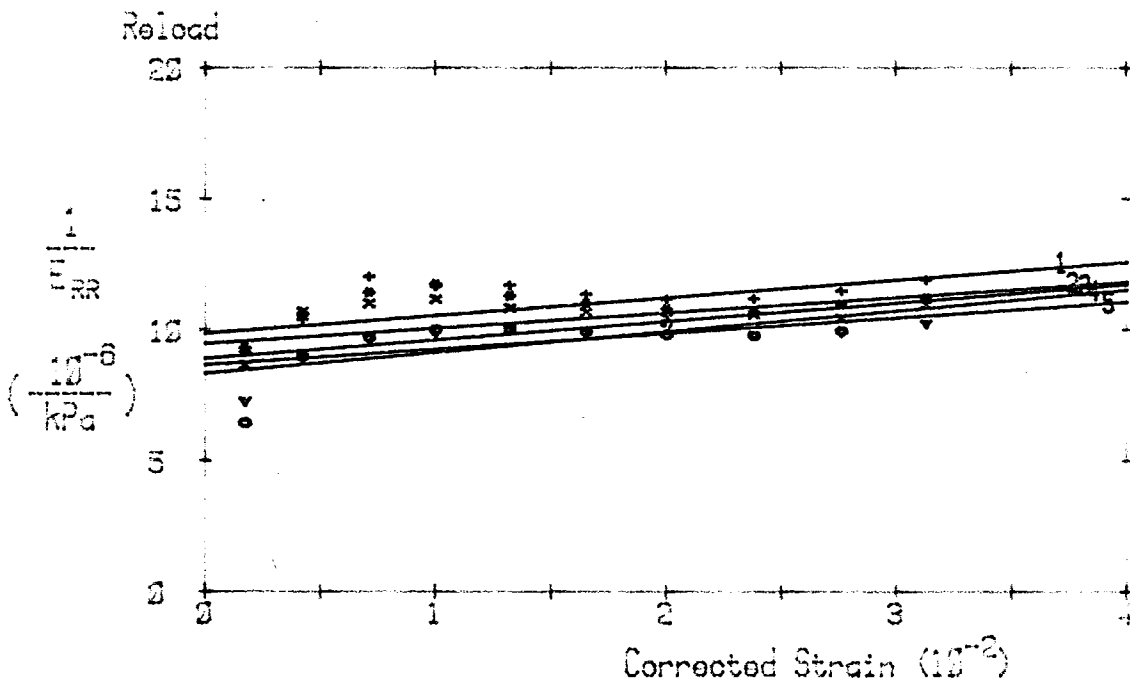
TEST T186

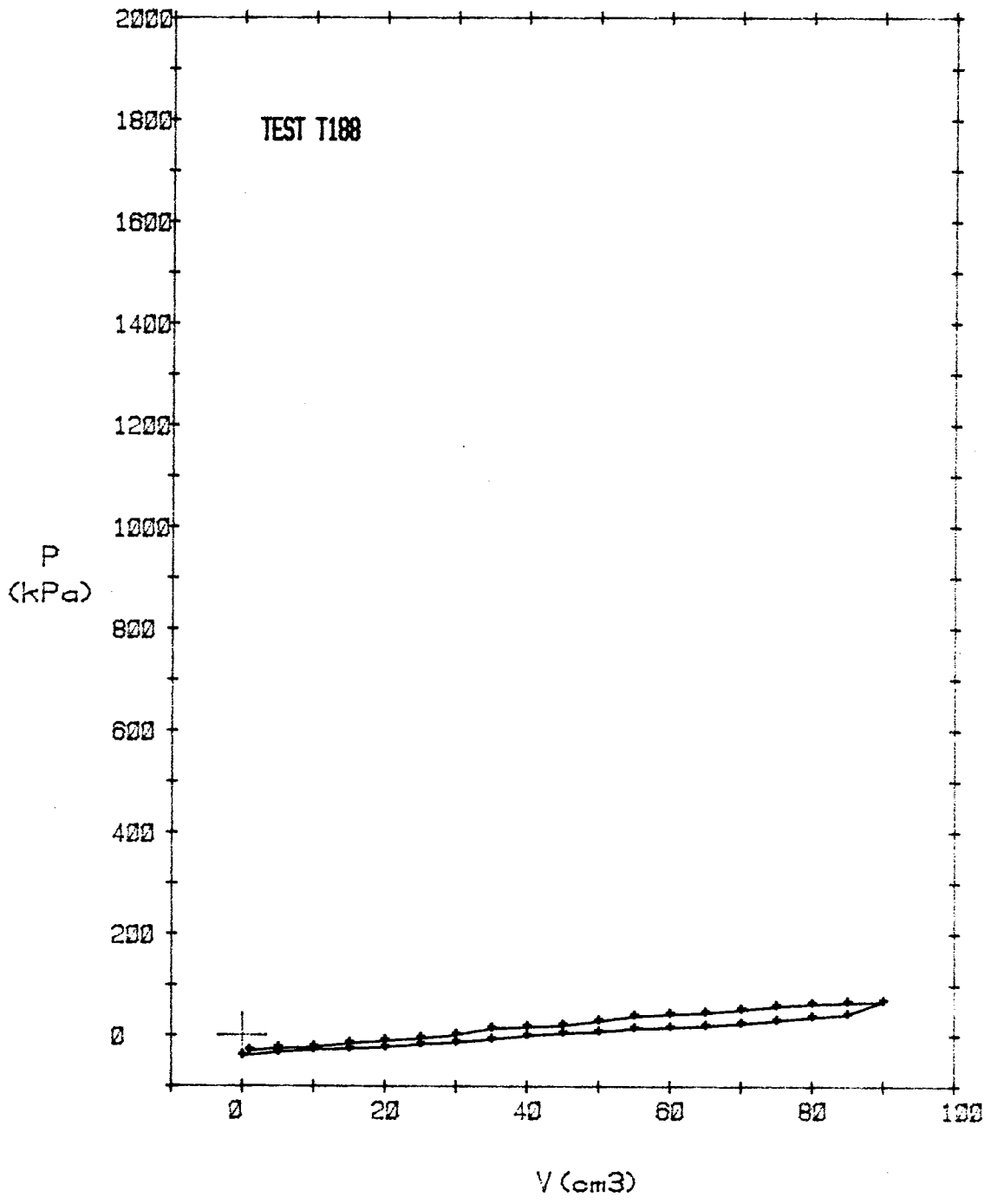


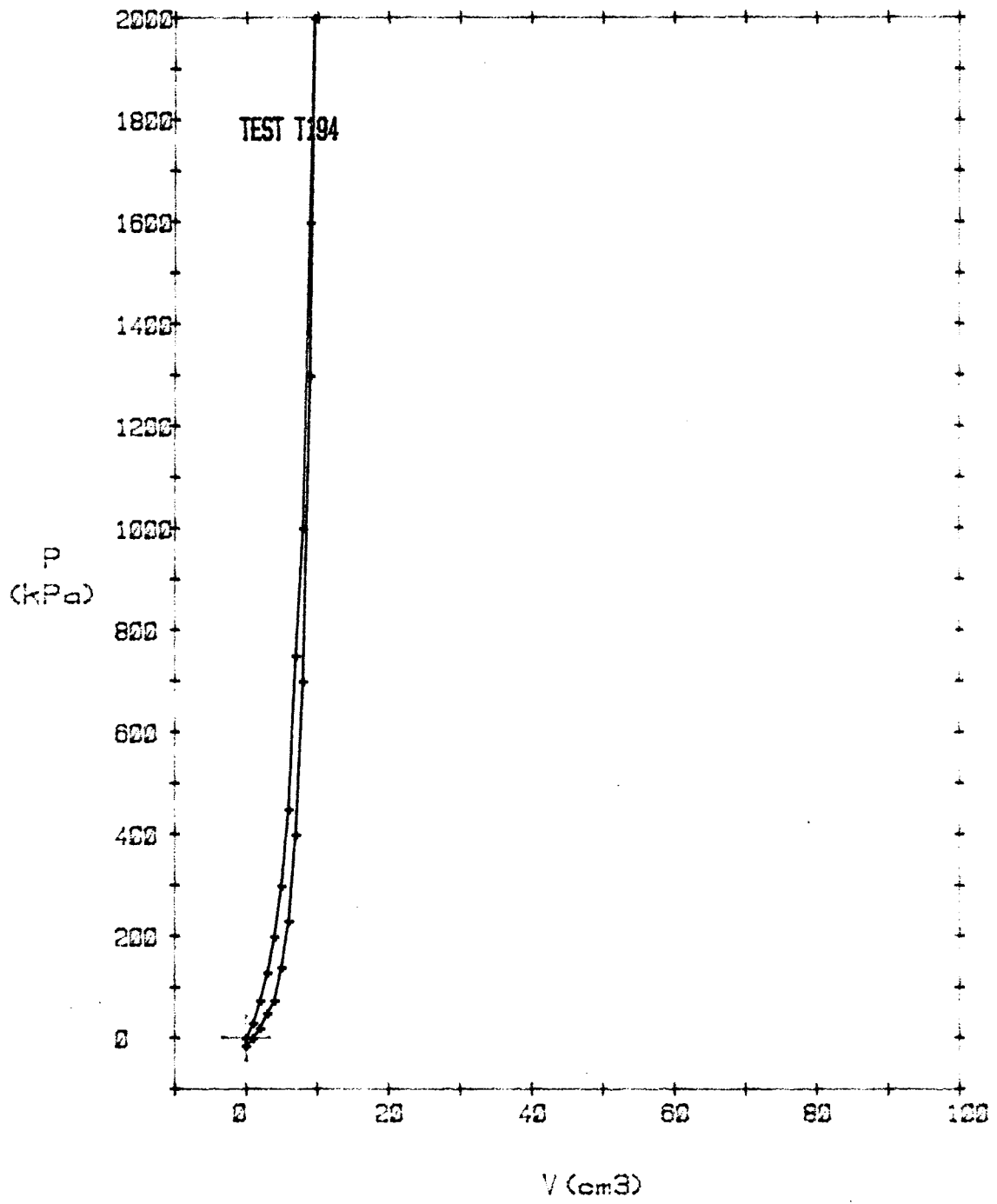


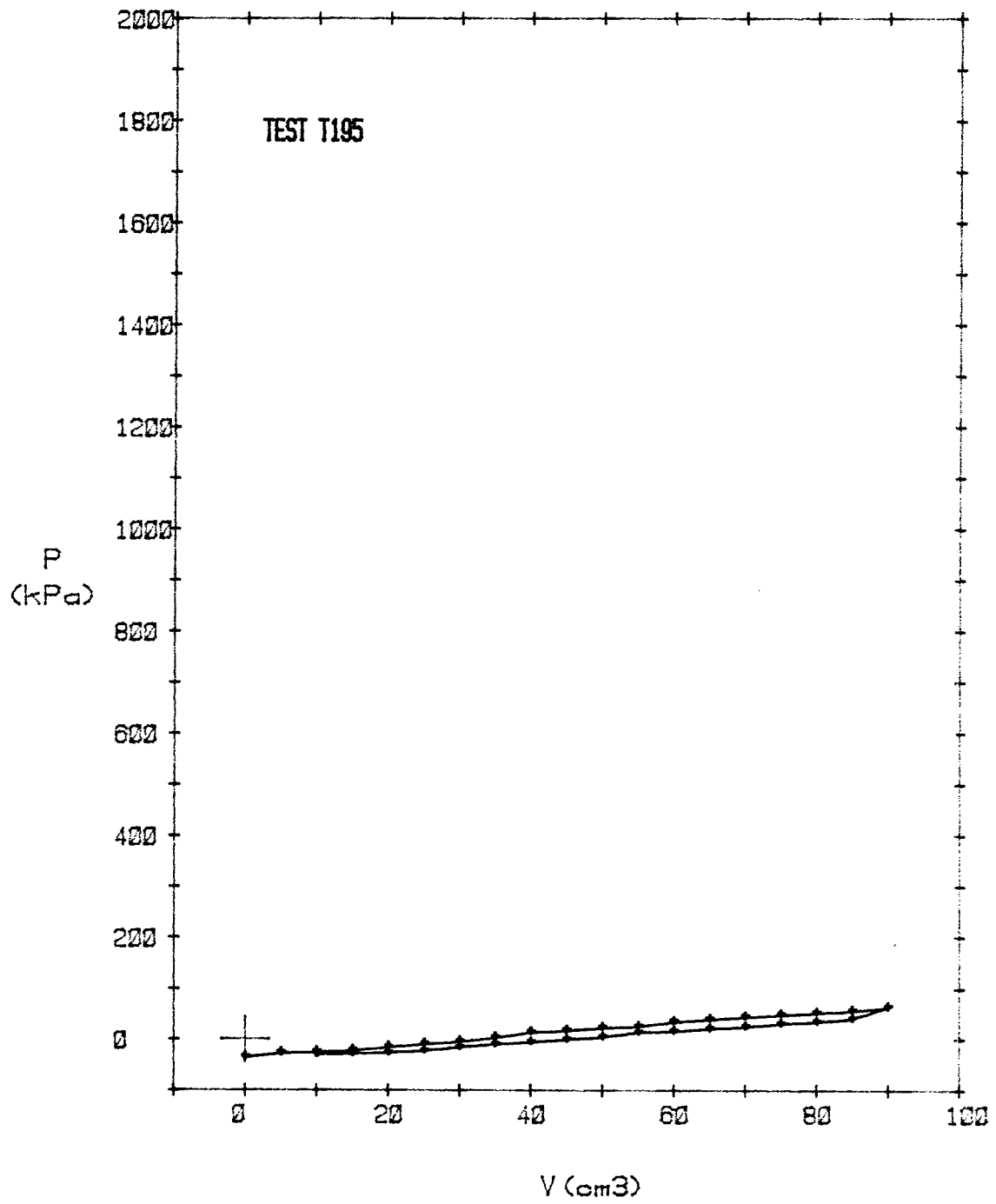


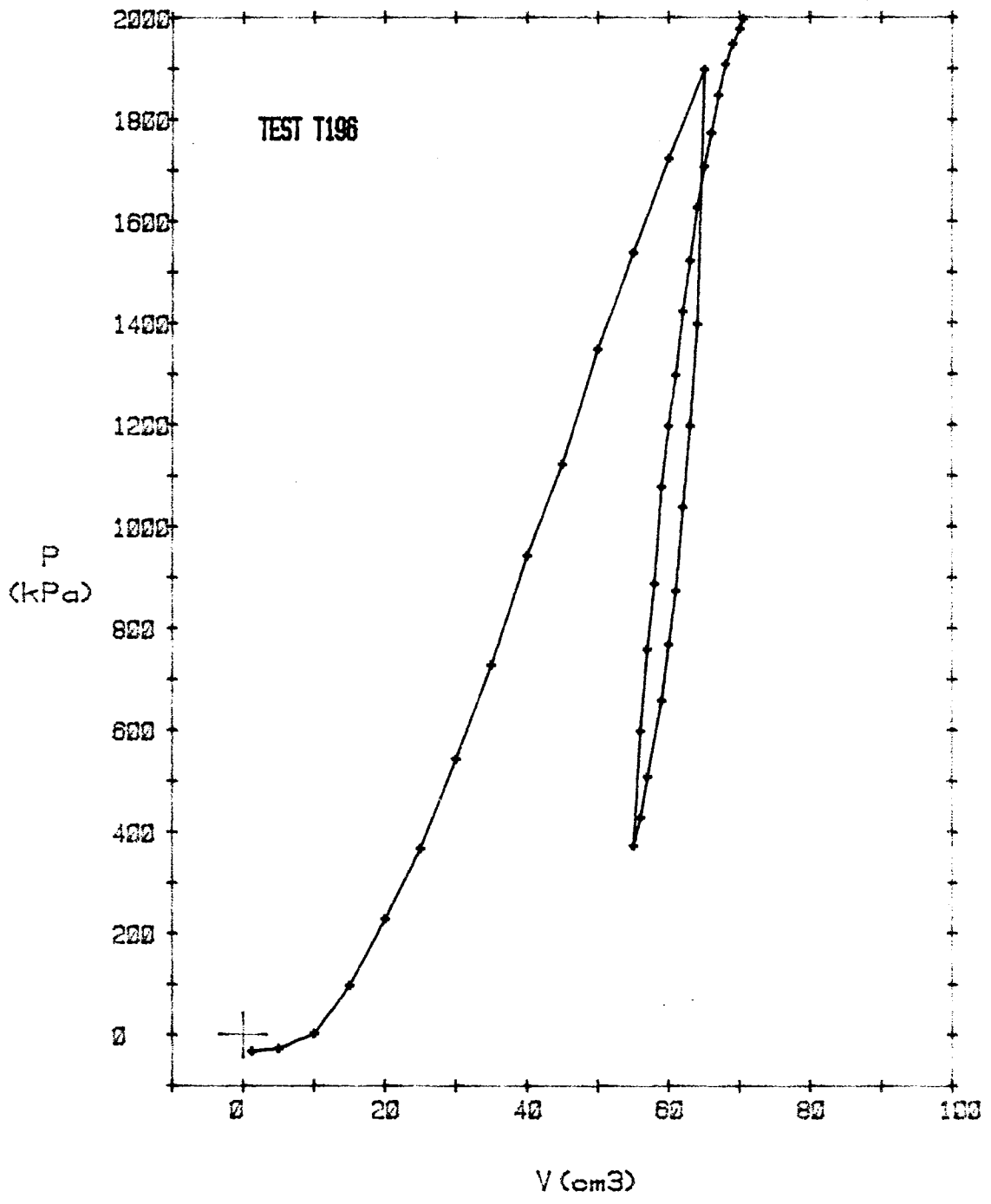
TEST T187

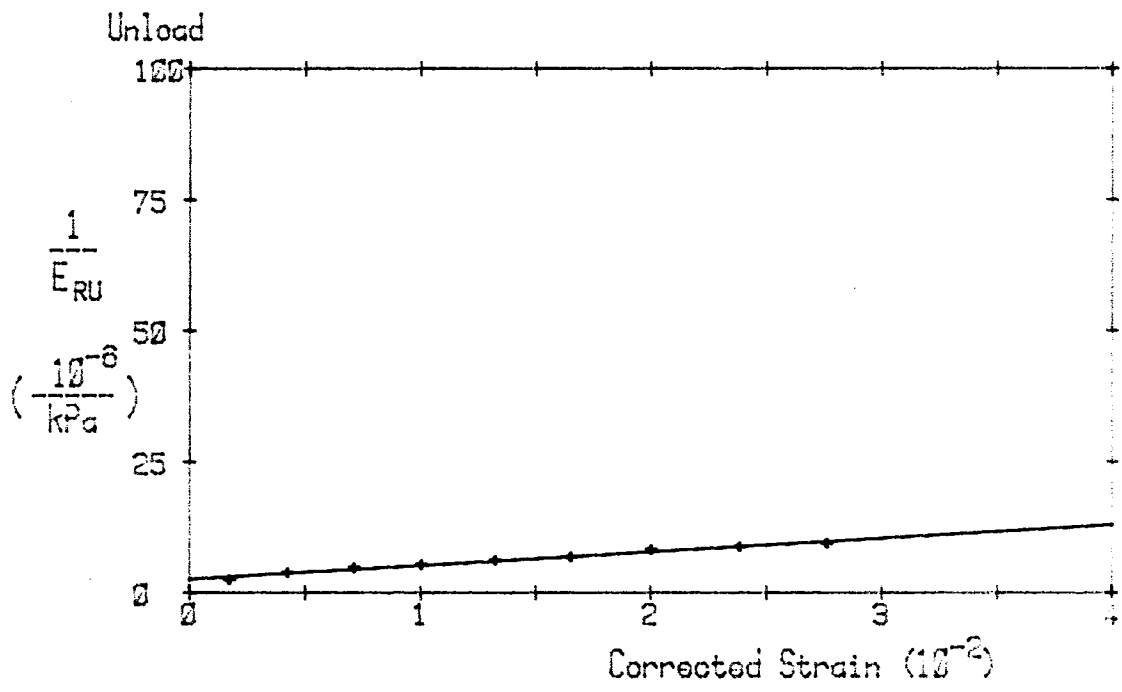




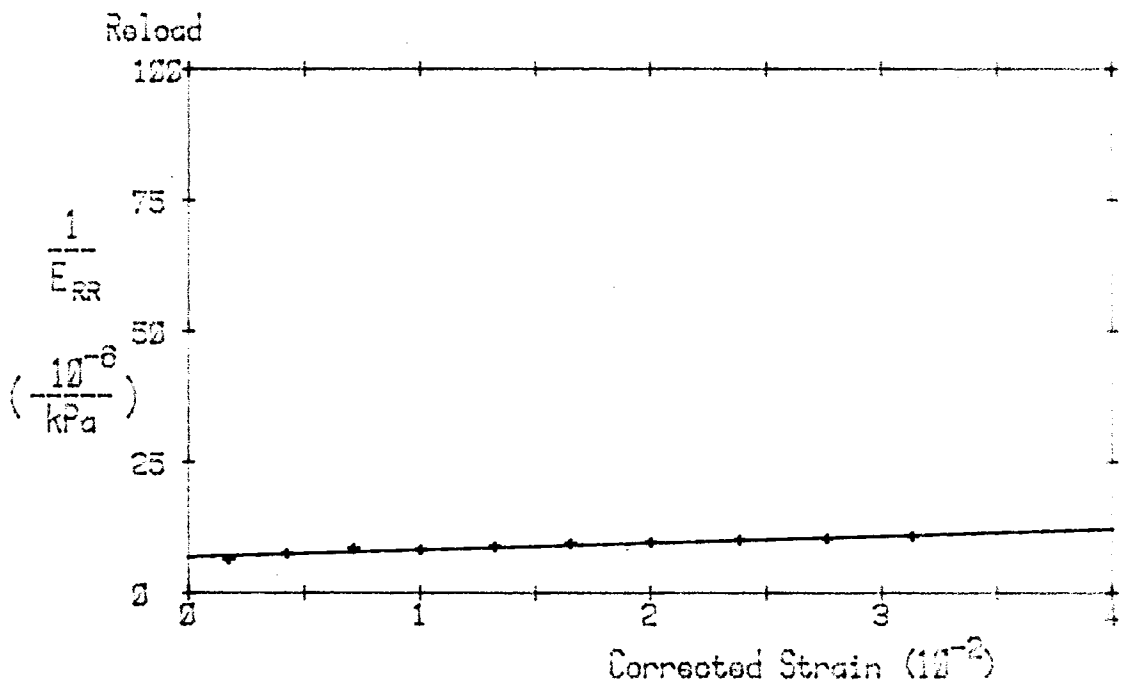


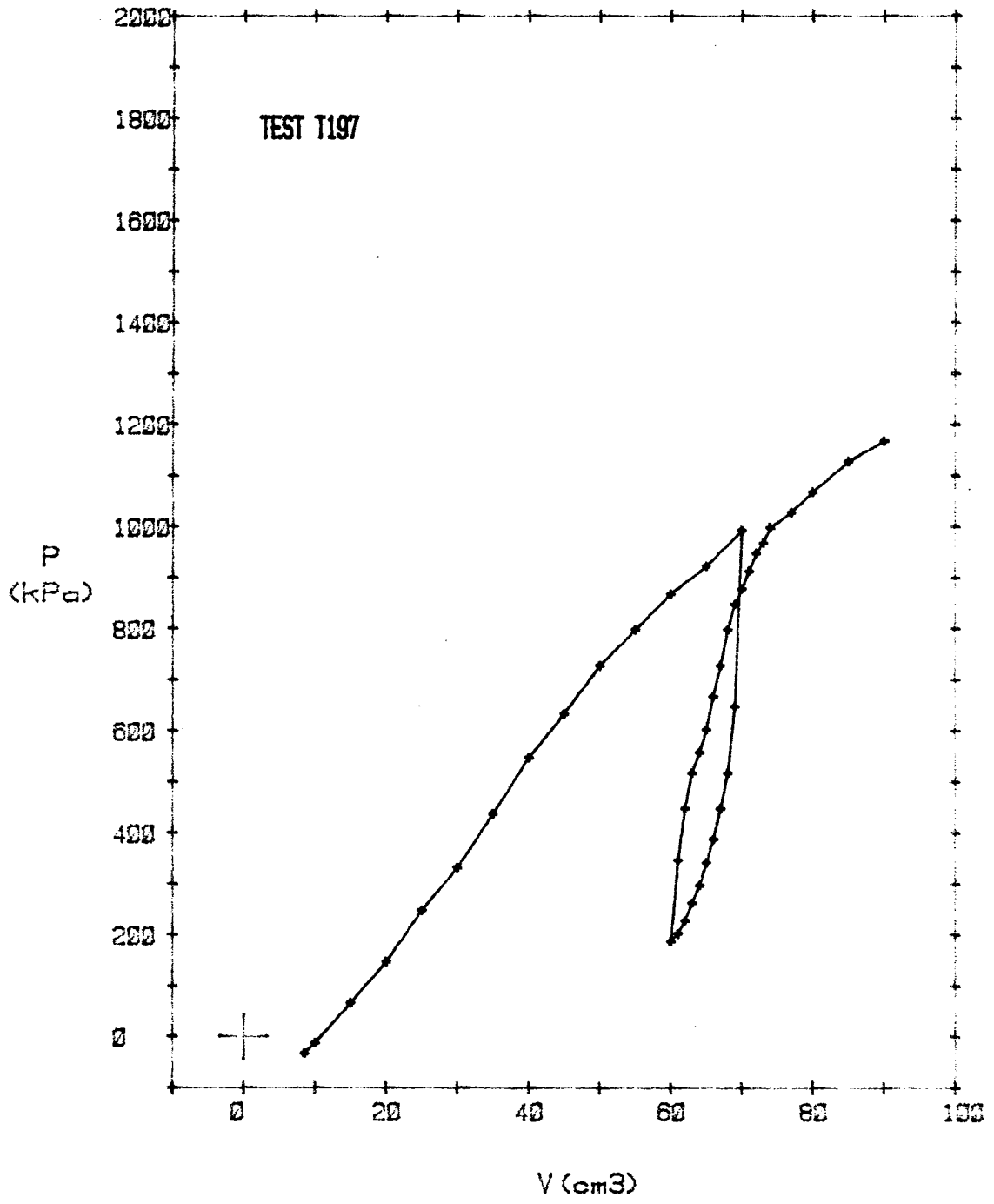


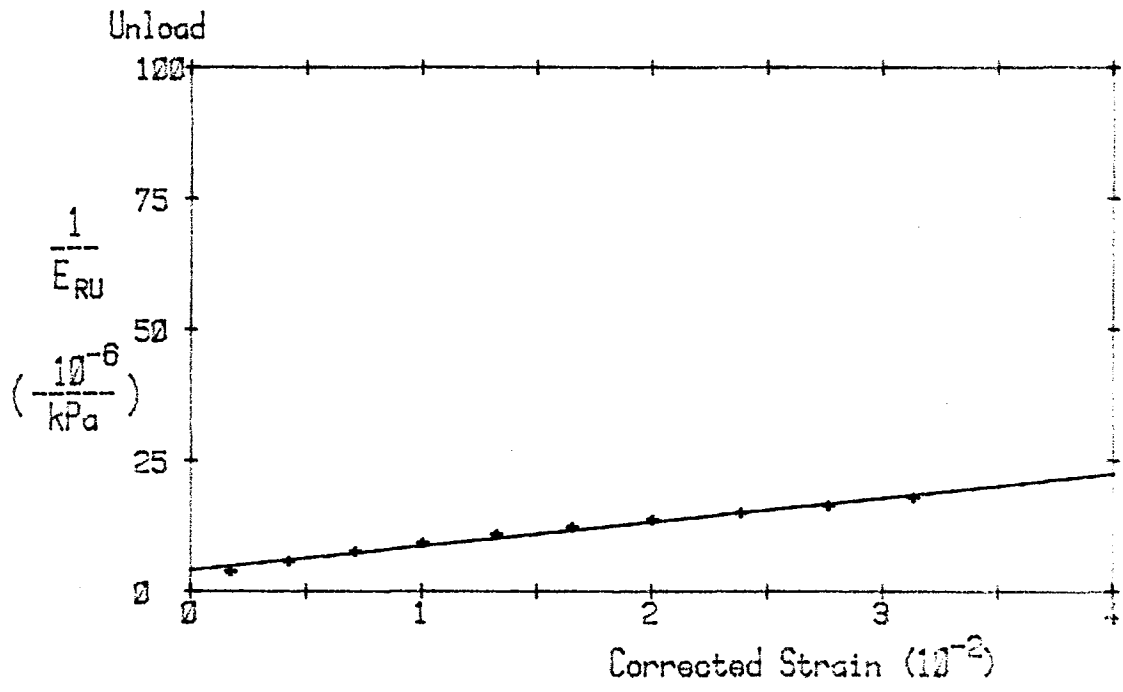




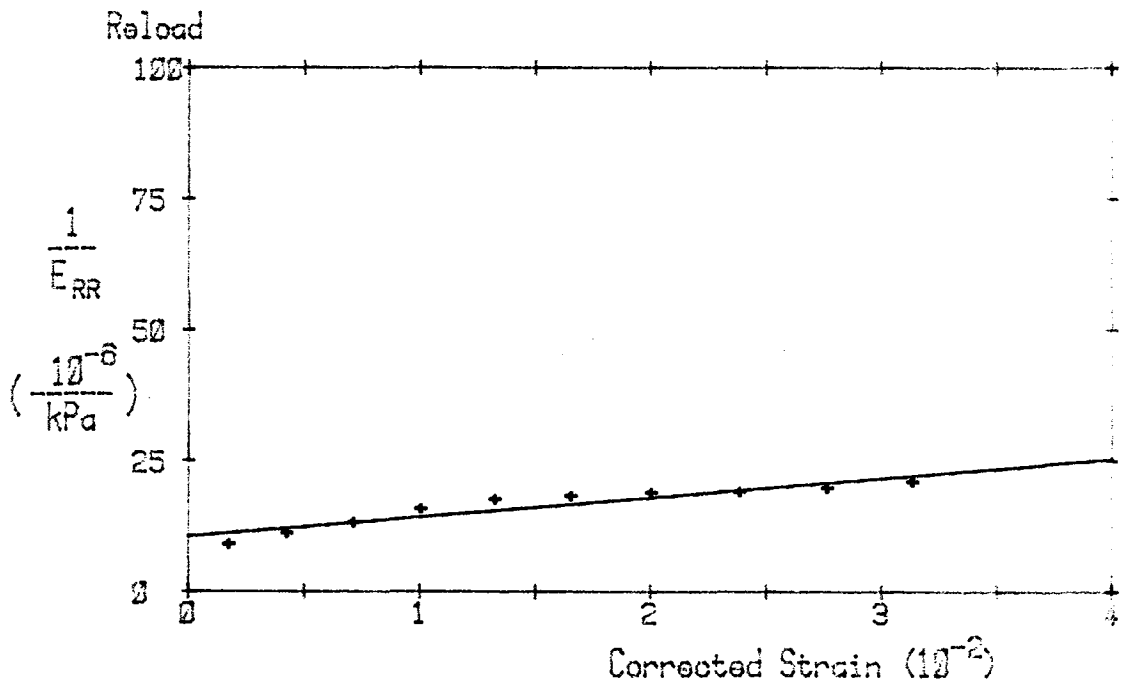
TEST T196

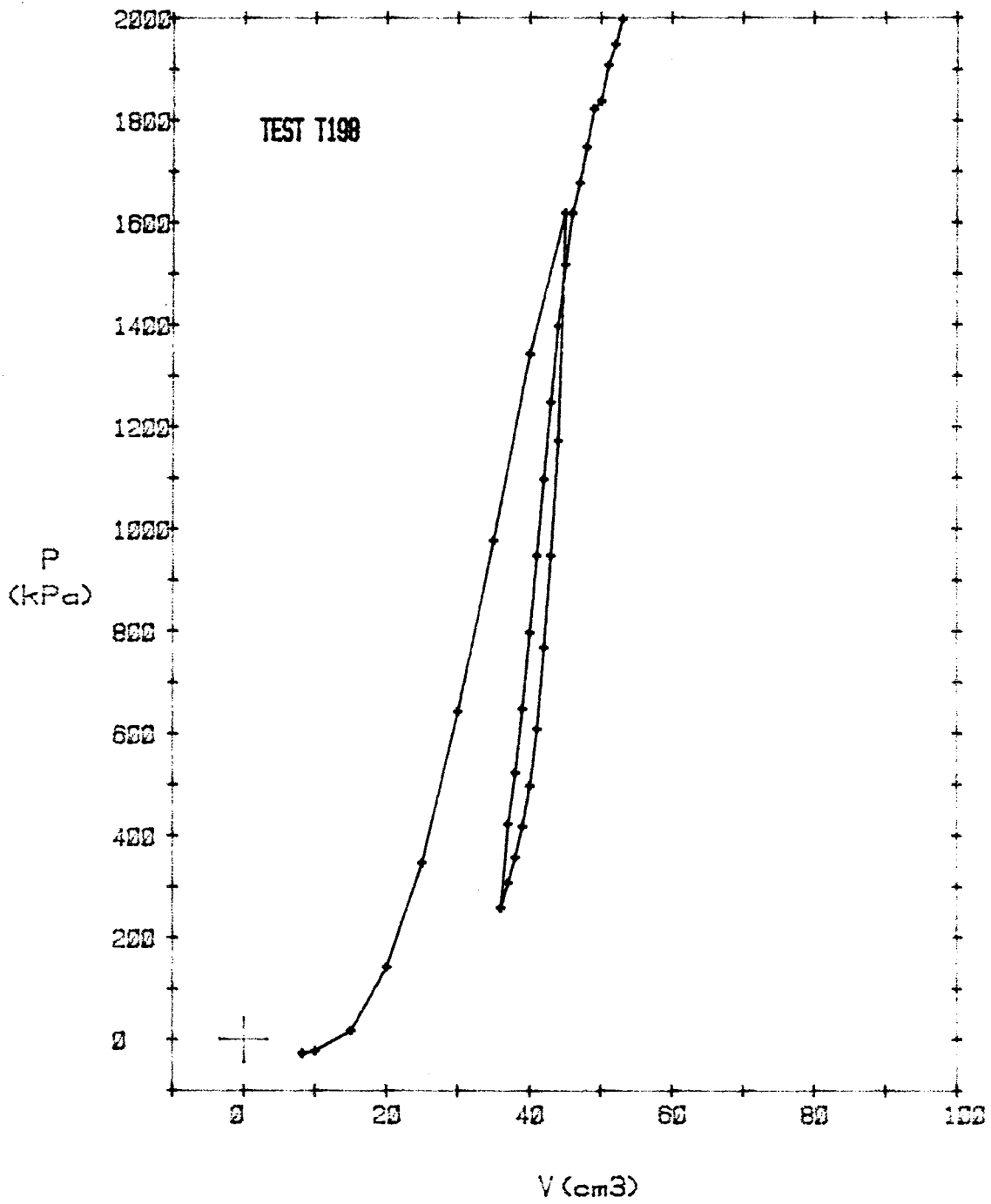


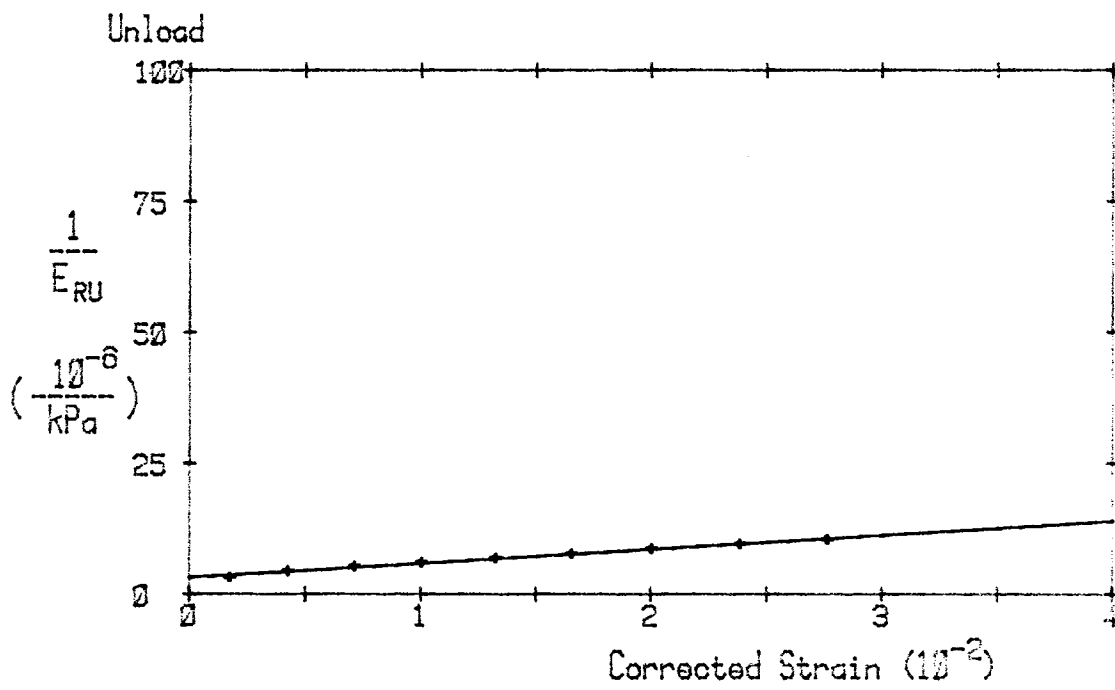




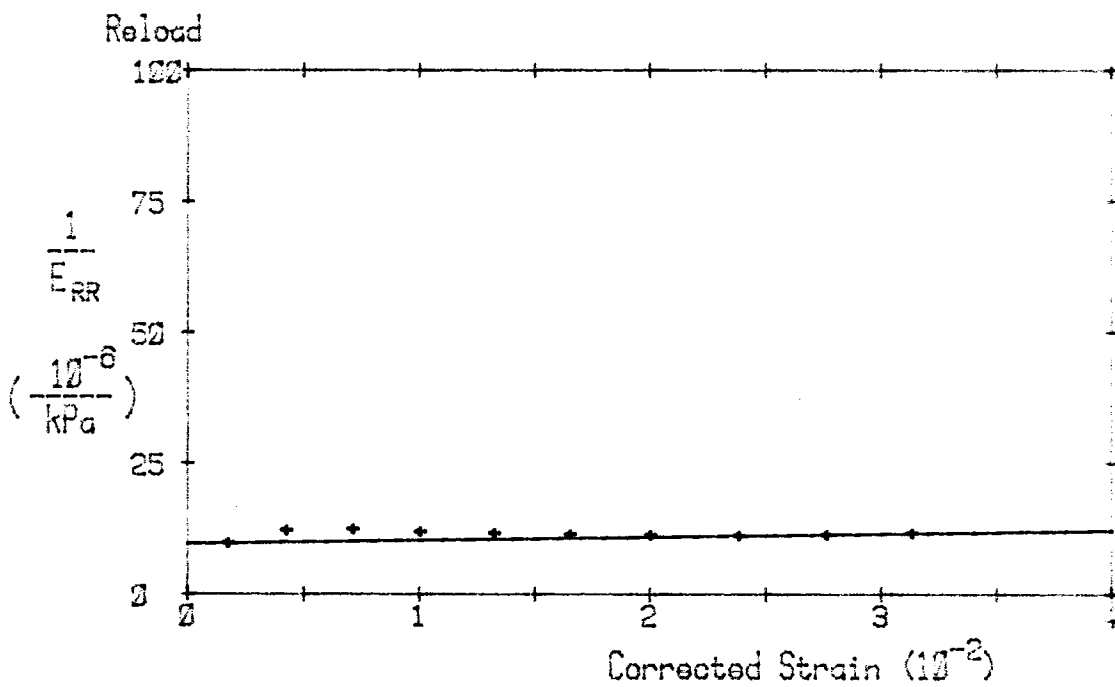
TEST T197

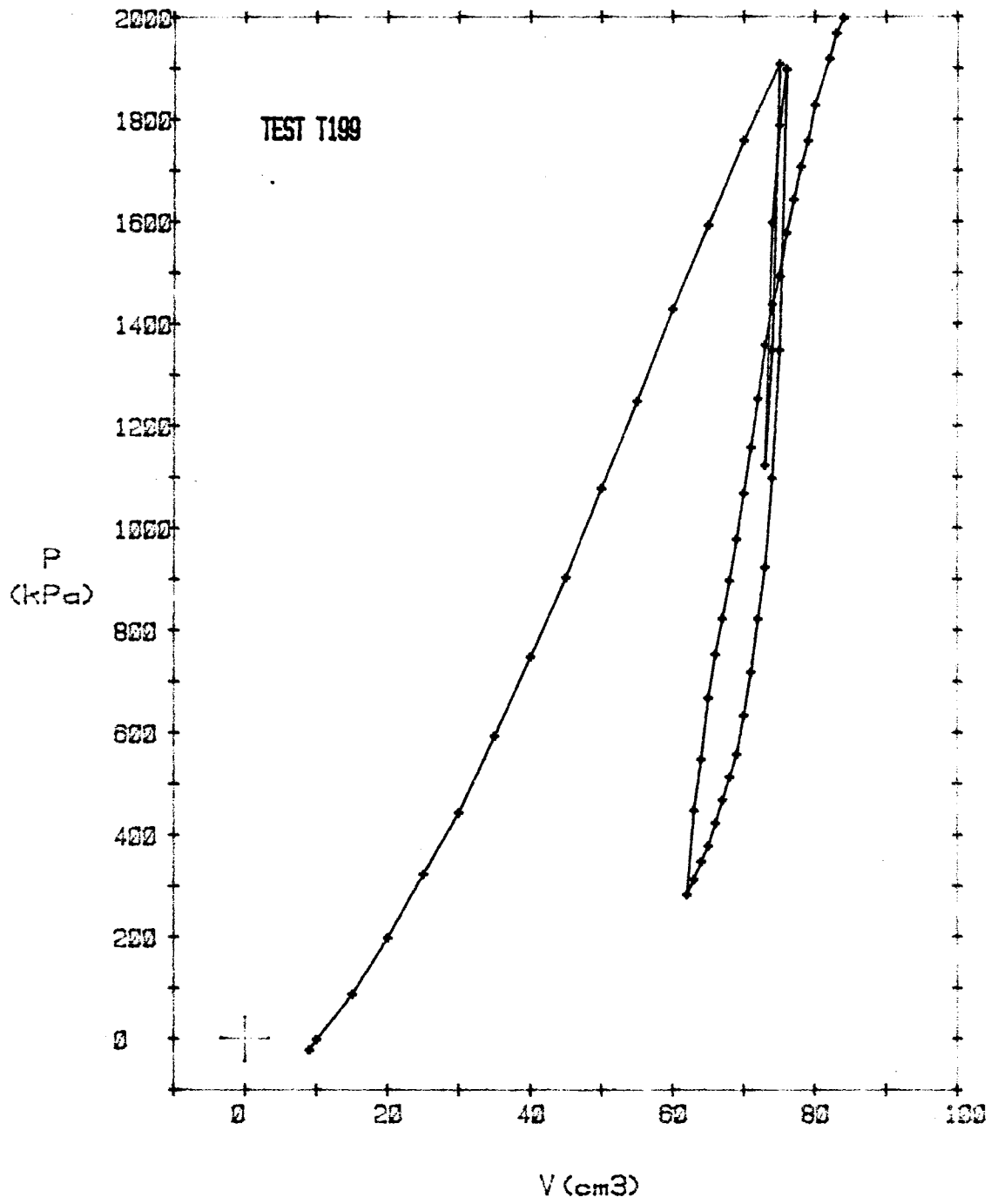


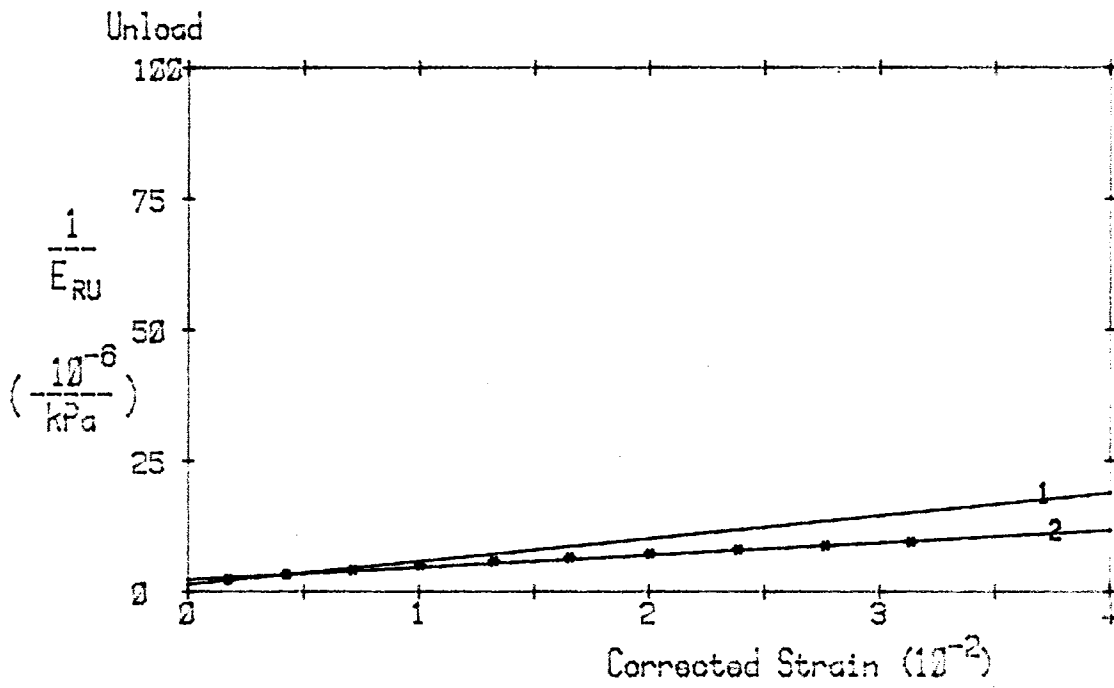




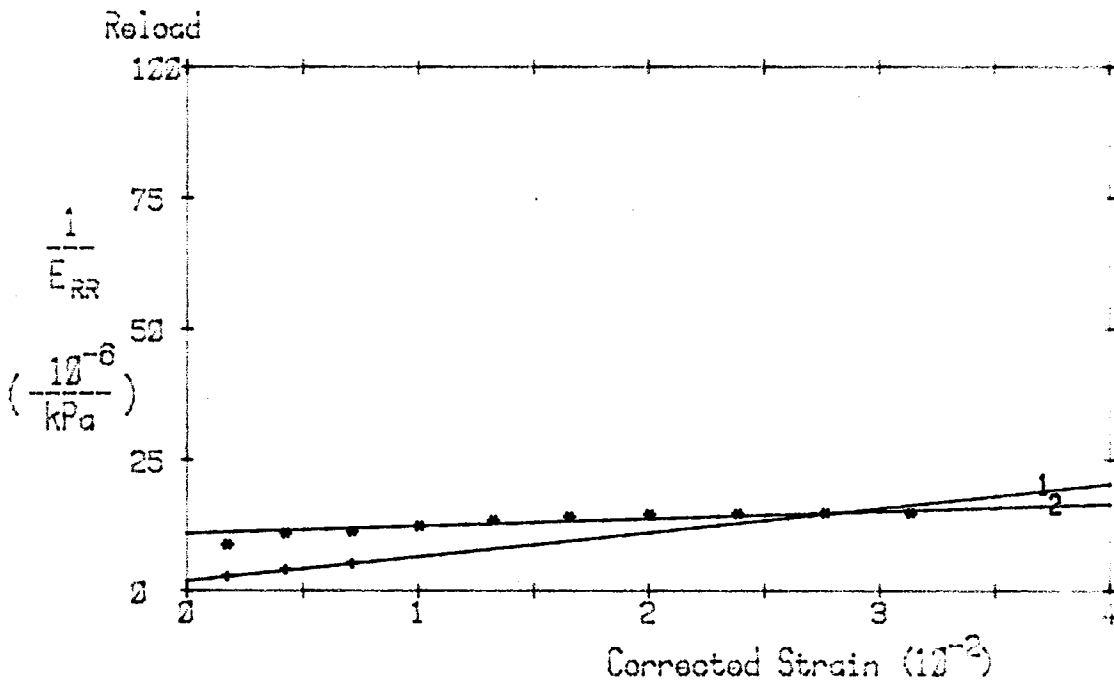
TEST T198

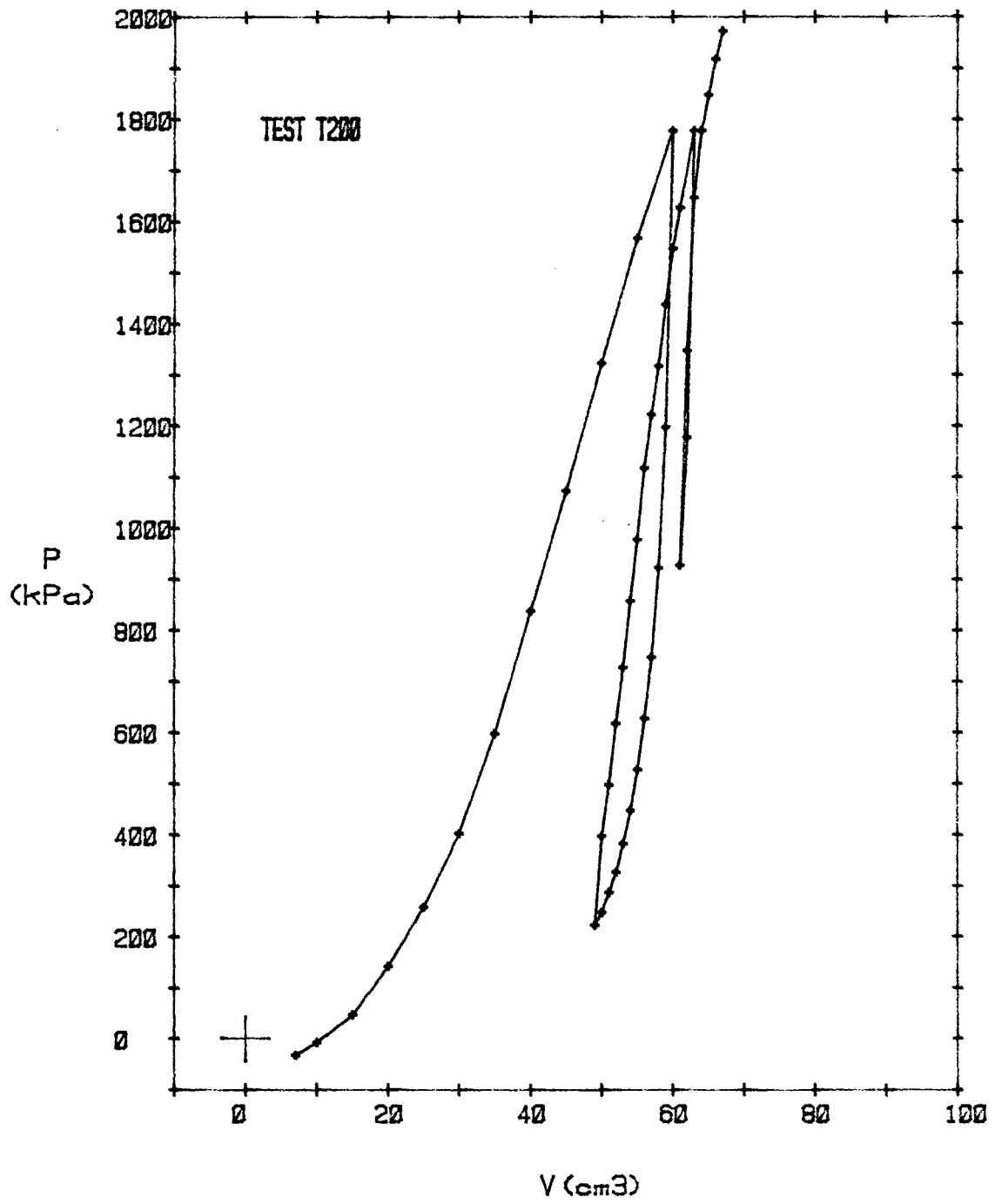


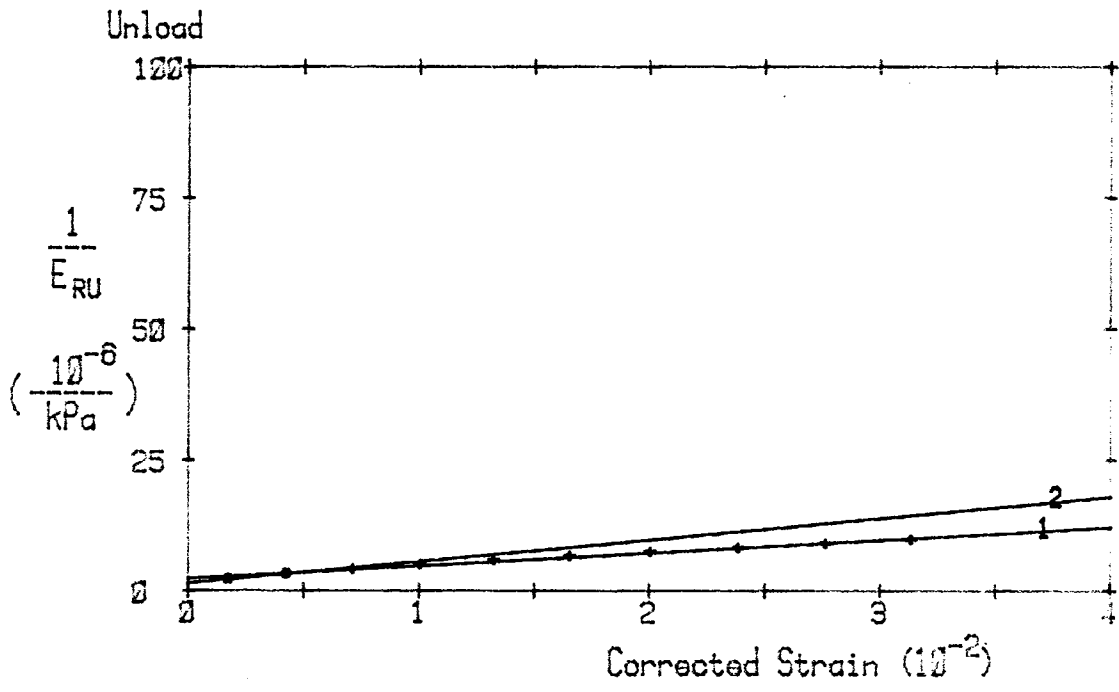




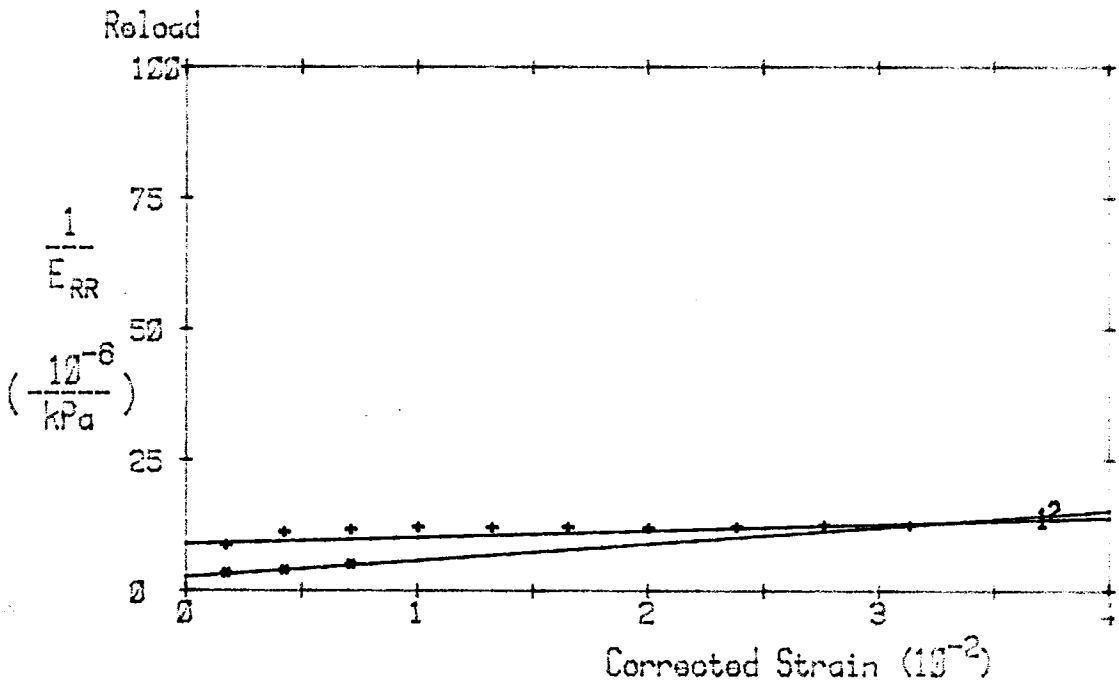
TEST T199

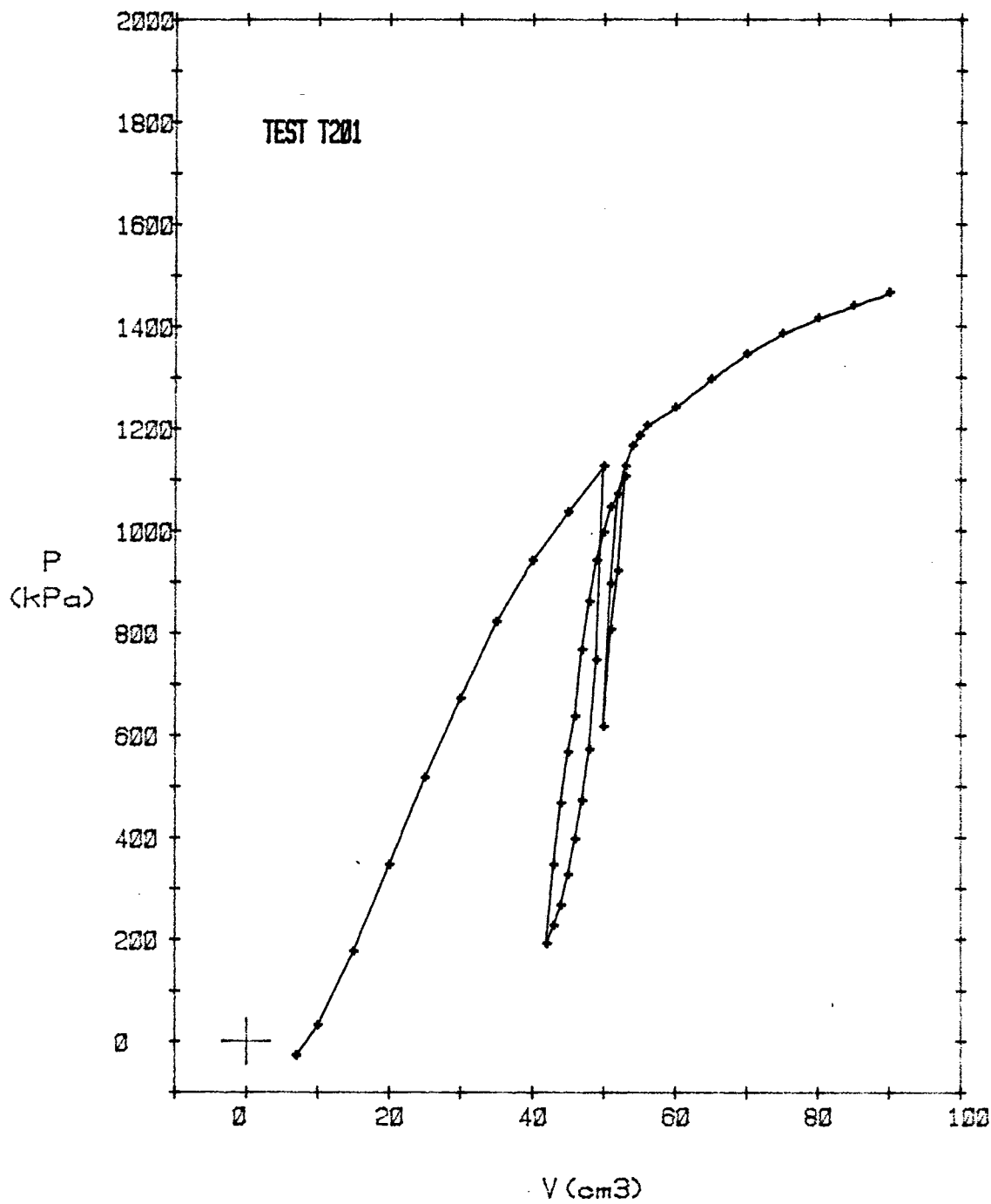


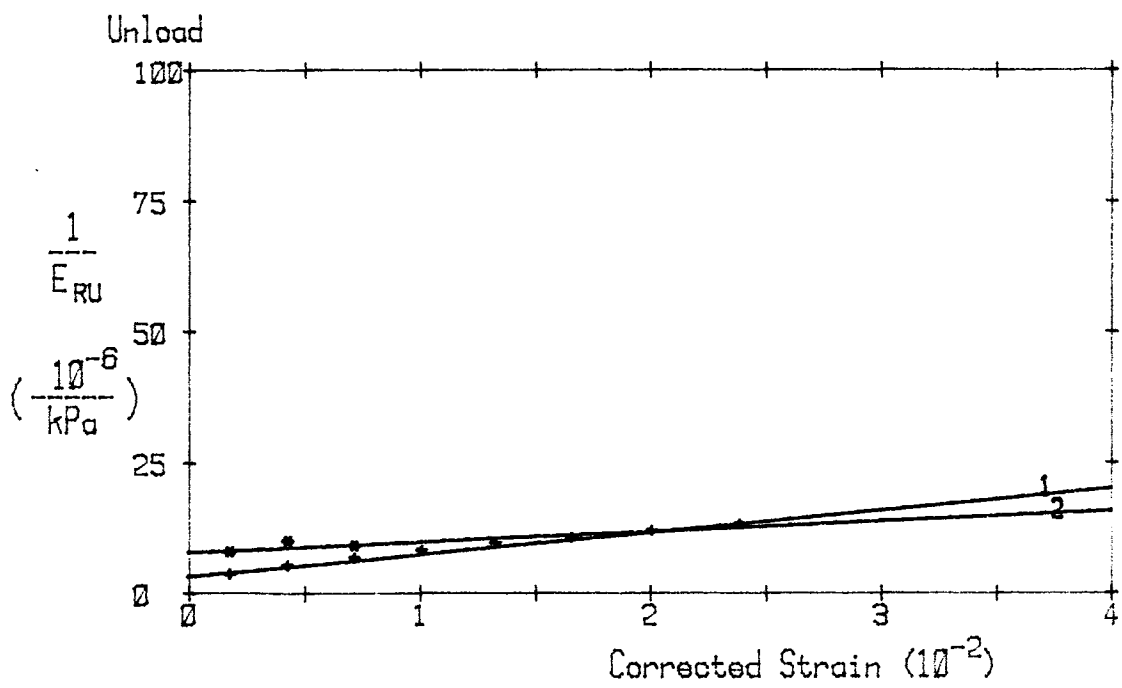




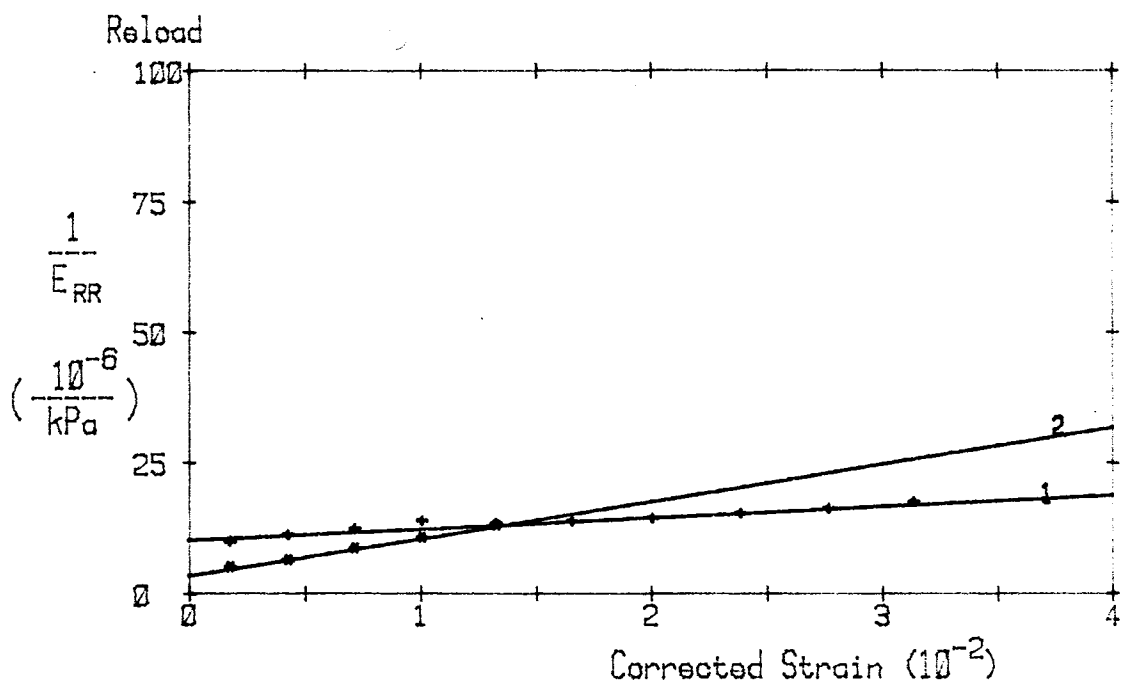
TEST T200

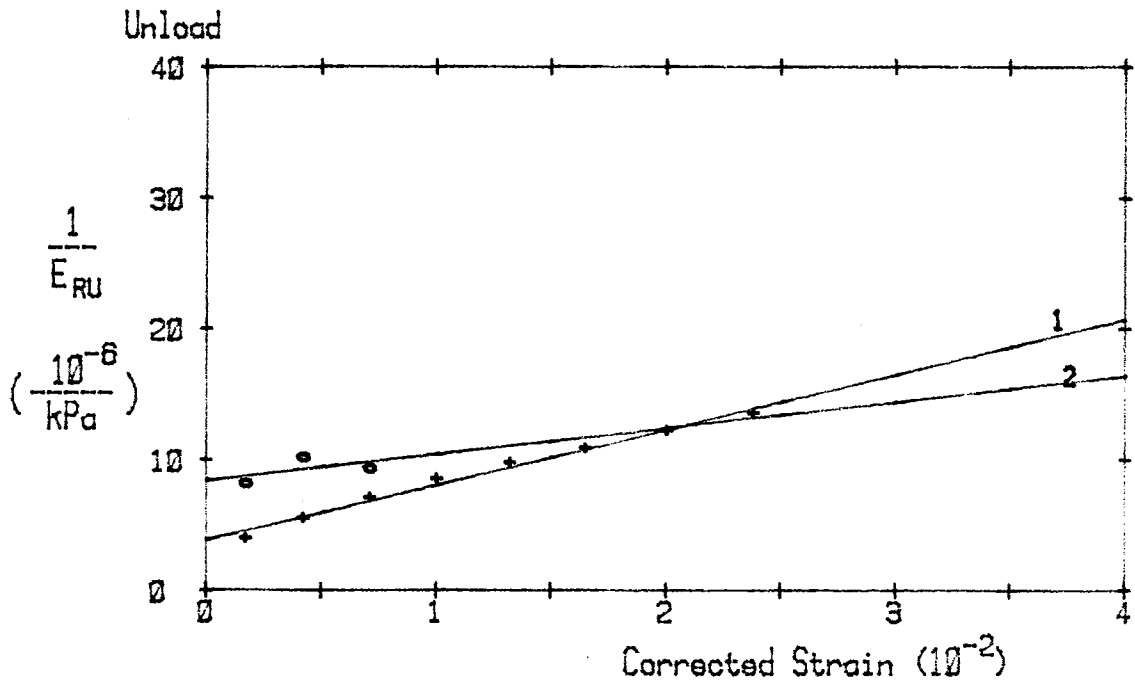




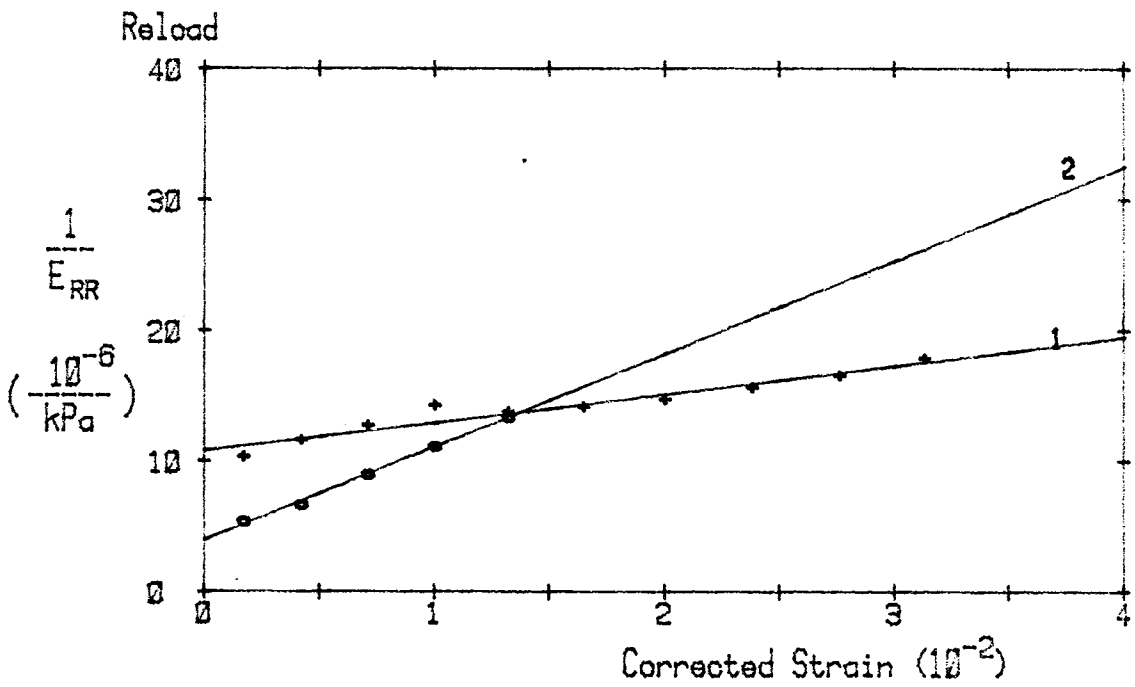


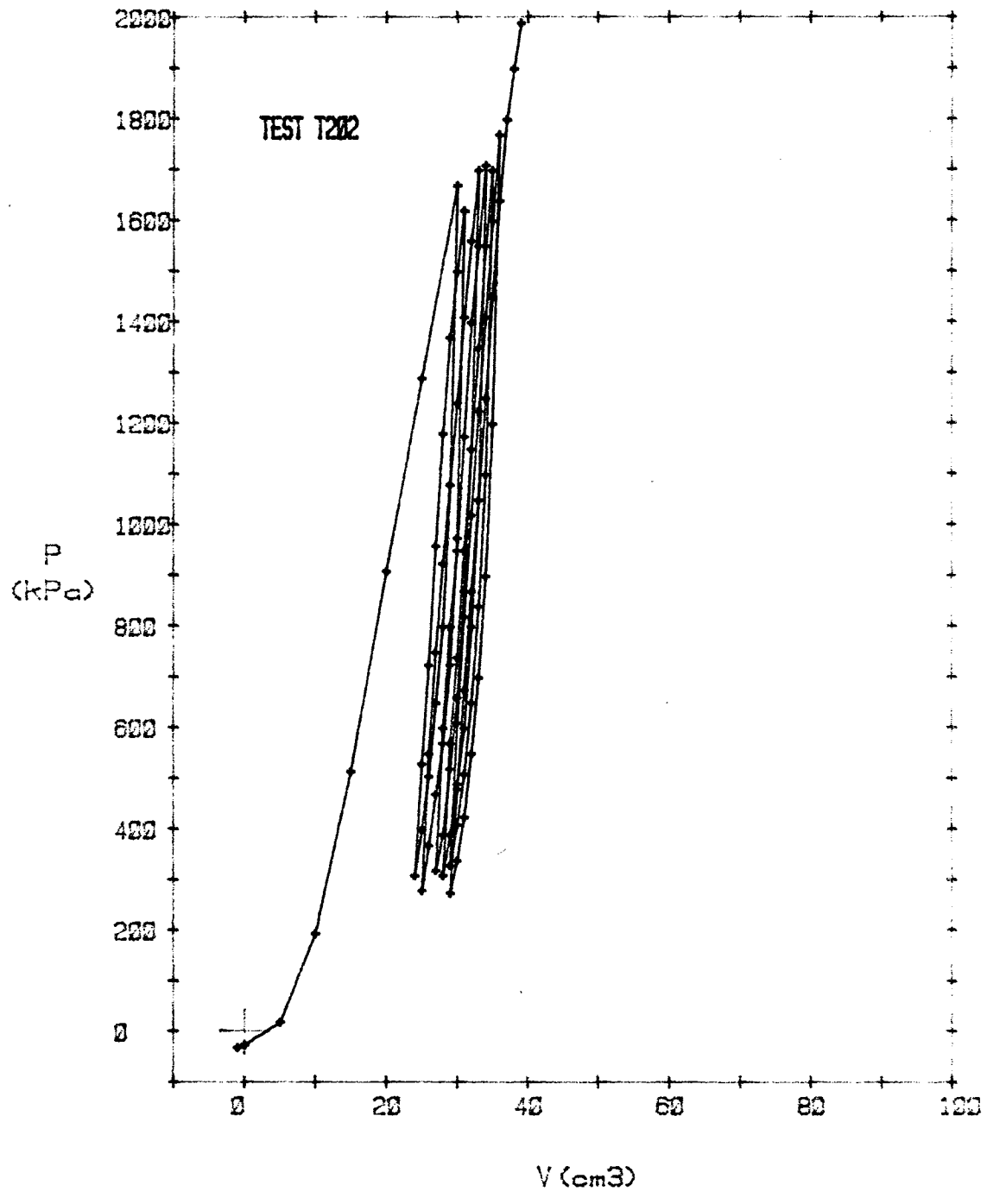
TEST T201

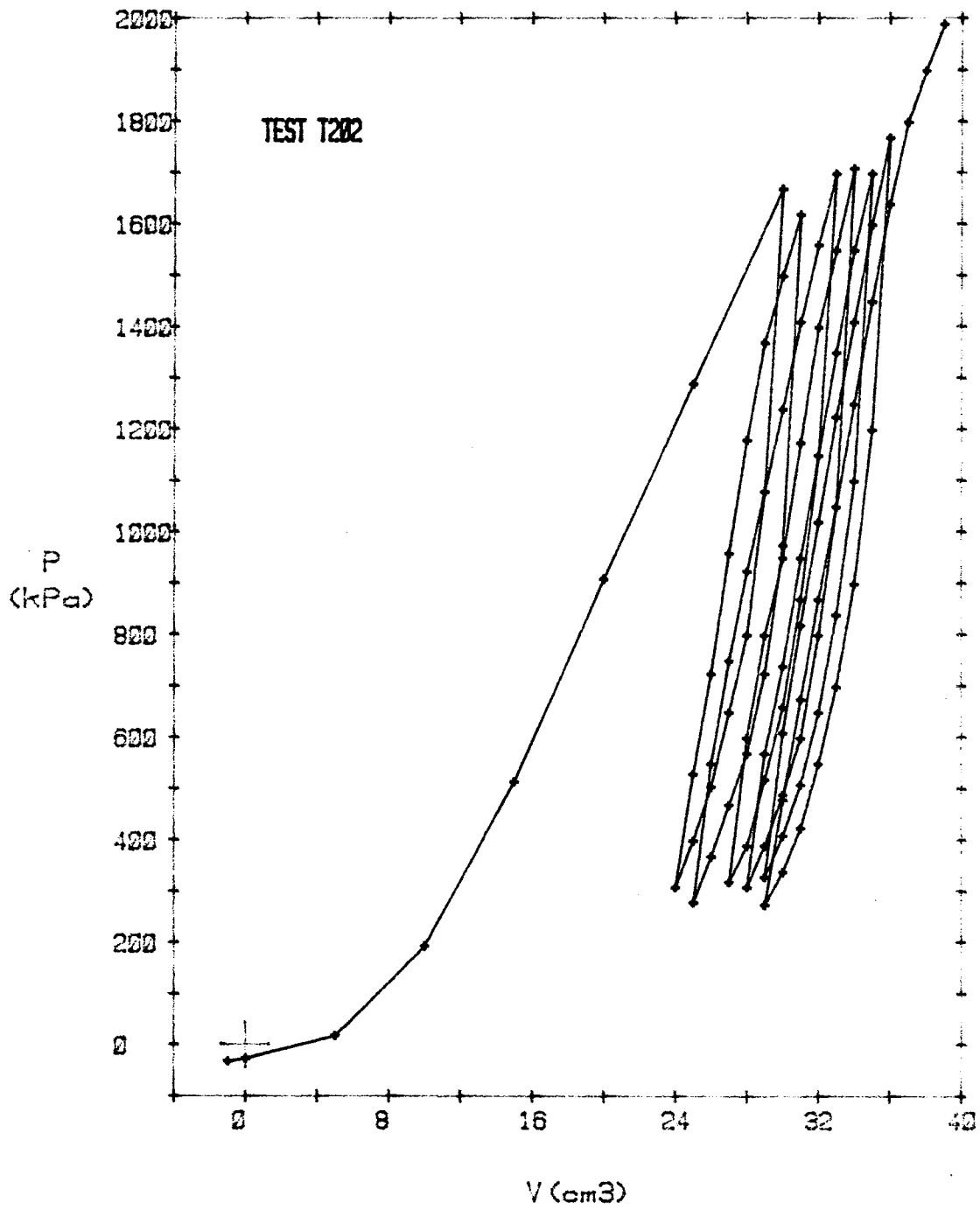


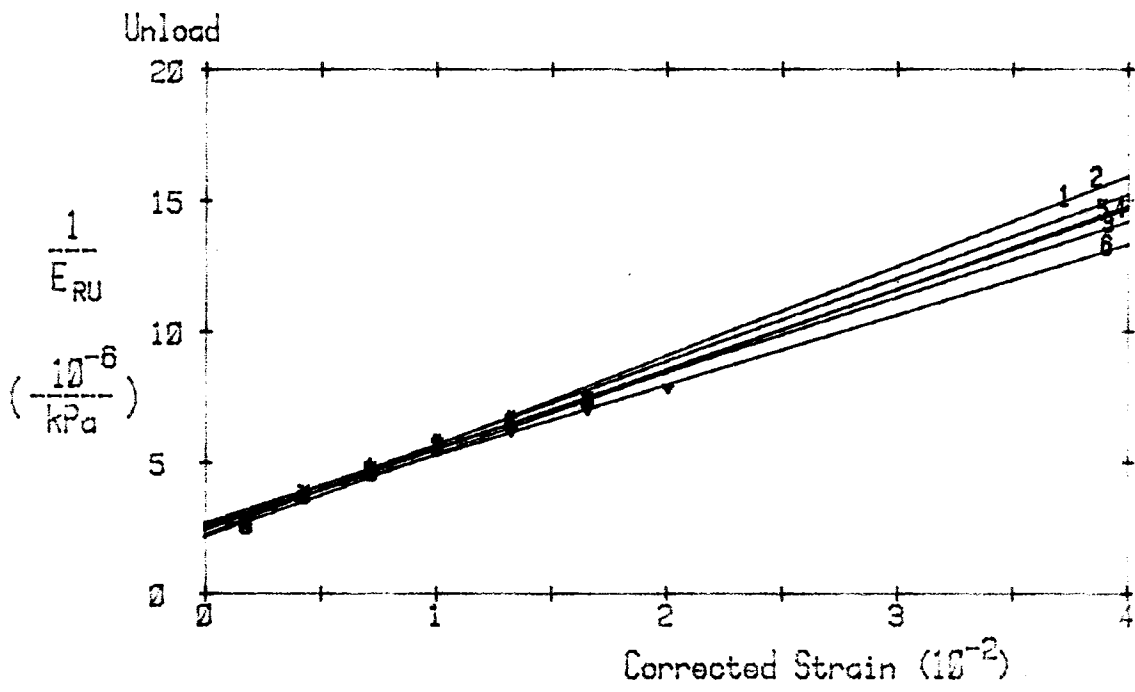


TEST T201

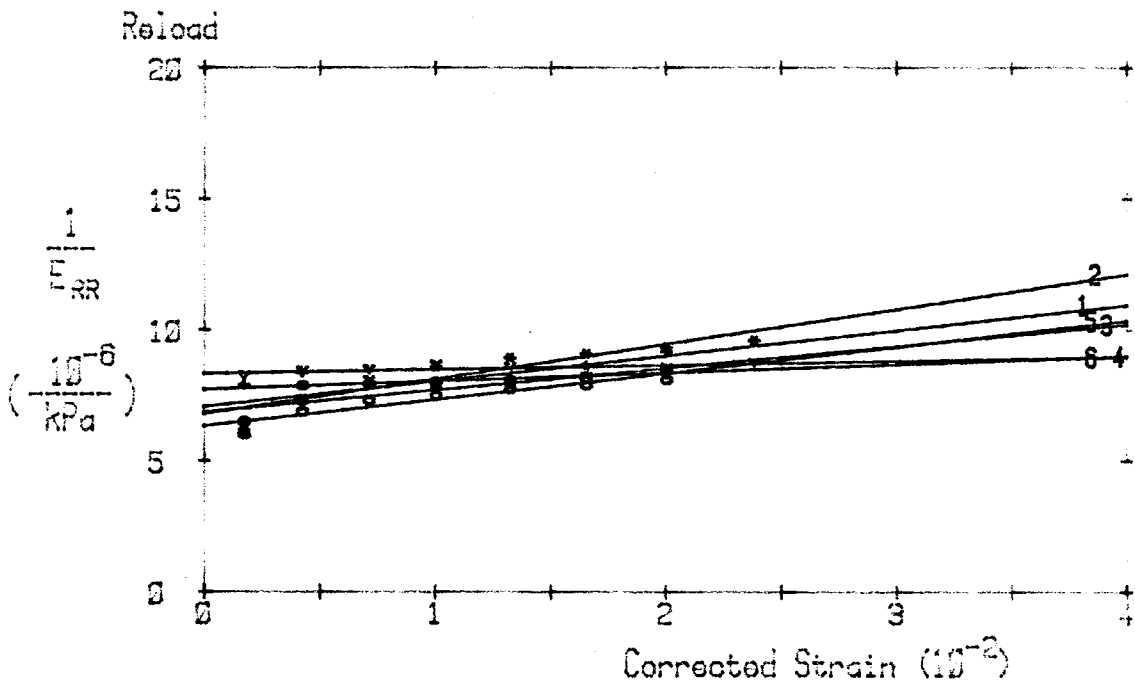








TEST T202



METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
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LENGTH

in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km

AREA

in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha

MASS (weight)

oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t

VOLUME

tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³

TEMPERATURE (exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
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LENGTH

mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi

AREA

cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10,000 m ²)	2.5	acres	

MASS (weight)

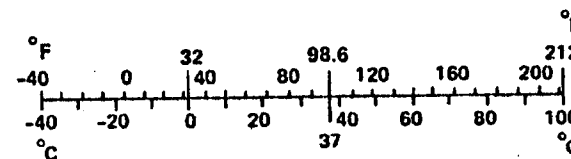
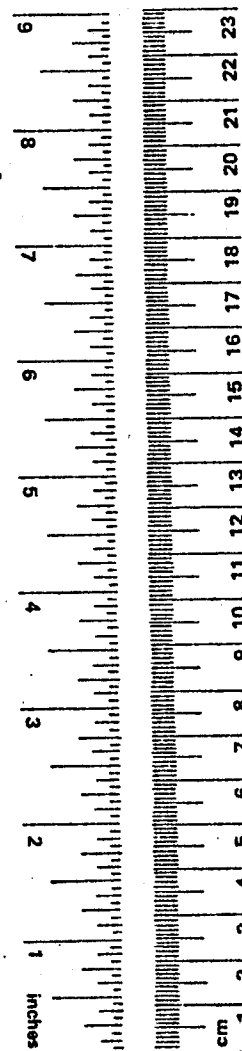
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	

VOLUME

ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m ³	cubic meters	35	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³

TEMPERATURE (exact)

°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F
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* 1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C13.10:286.

