

AD-A061 372      OGDEN AIR LOGISTICS CENTER HILL AFB UTAH PROPELLANT L--ETC F/G 21/9.2  
PROPELLANT SURVEILLANCE REPORT. LGM-30 A AND B STAGE I, TP-H101--ETC(U)  
SEP 75 J A THOMPSON  
UNCLASSIFIED      MANCP-328(75)

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MICROCOPY RESOLUTION TEST CHART

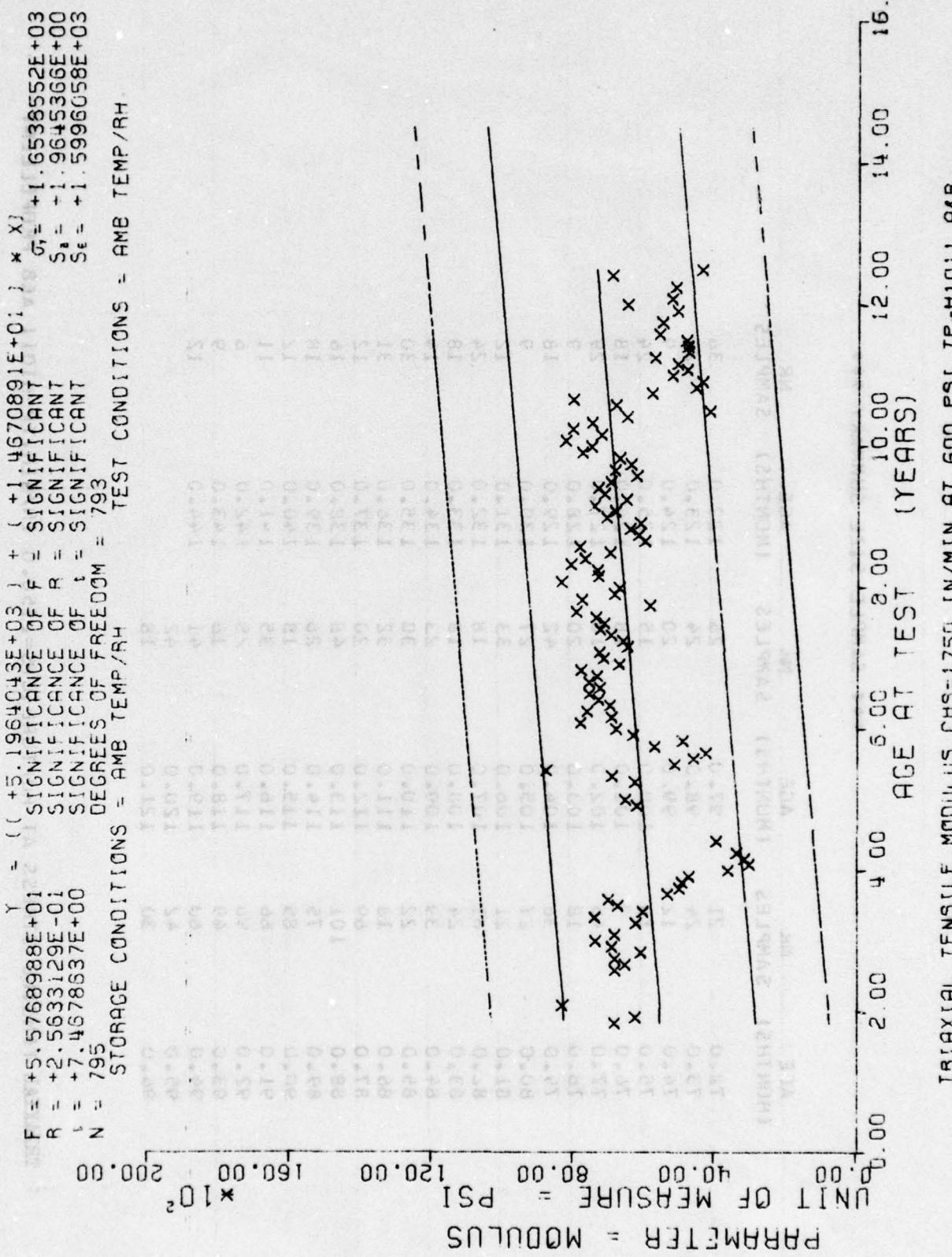


Figure 25

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	SAMPLES (N)	TESTED AGE (MONTHS)	SAMPLES (N)	AGE (MONTHS)	SAMPLES (N)	NP CENTS)	SAMPLES (N)	NP CENTS)
24.0	3	27.0	14	112.0	14	137.0	1	
25.0	4	28.0	21	113.0	7	133.0	2	
25.0	4	26.0	25	114.0	5	129.0	2	
26.0	3	29.0	46	115.0	6	141.0	2	
26.0	3	29.0	13	116.0	9	143.0	2	
26.0	3	29.0	5	117.0	8	144.0	2	
26.0	2	29.0	6	118.0	7	145.0	4	
26.0	2	29.0	3	119.0	9	147.0	2	
26.0	2	29.0	7	120.0	11	148.0	1	
26.0	2	29.0	7	121.0	8	149.0	4	
26.0	2	29.0	3	122.0	10			
27.0	4	29.0	12	123.0	6			
27.0	4	29.0	10	124.0	9			
27.0	7	29.0	10	125.0	15			
27.0	7	29.0	8	126.0	2			
27.0	3	29.0	10	127.0	7			
27.0	3	29.0	5	128.0	7			
27.0	5	29.0	7	129.0	8			
27.0	5	29.0	7	130.0	5			
27.0	11	29.0	7					
27.0	4	29.0	12	131.0	2			
27.0	12	29.0	13	132.0	6			
27.0	7	29.0	14	133.0	9			
28.0	4	29.0	8	134.0	5			
28.0	3	29.0	12	135.0	2			
28.0	15	29.0	7	136.0	2			
29.0	5	29.0						

TESTED FLUIDS, COLD JUICE, CHG=1750 RPM AT 600 PSI, TP-H1011 AEB

$y = 11.0136251E+03 + 1.0219664E+01 x$   
 SIGNIFICANCE OF TEST =  $S_1 = +1.4218793E+03$   
 SIGNIFICANCE OF TEST =  $S_2 = +3.0066889E+00$   
 SIGNIFICANCE OF TEST =  $S_3 = +1.3718916E+03$   
 DEGREES OF FREEDOM = 595  
 STORAGE CONDITIONS = AMB TEMP/RH

UNIT OF MEASURE = PSI  $\times 10^2$   
 PARAMETER = MODULUS

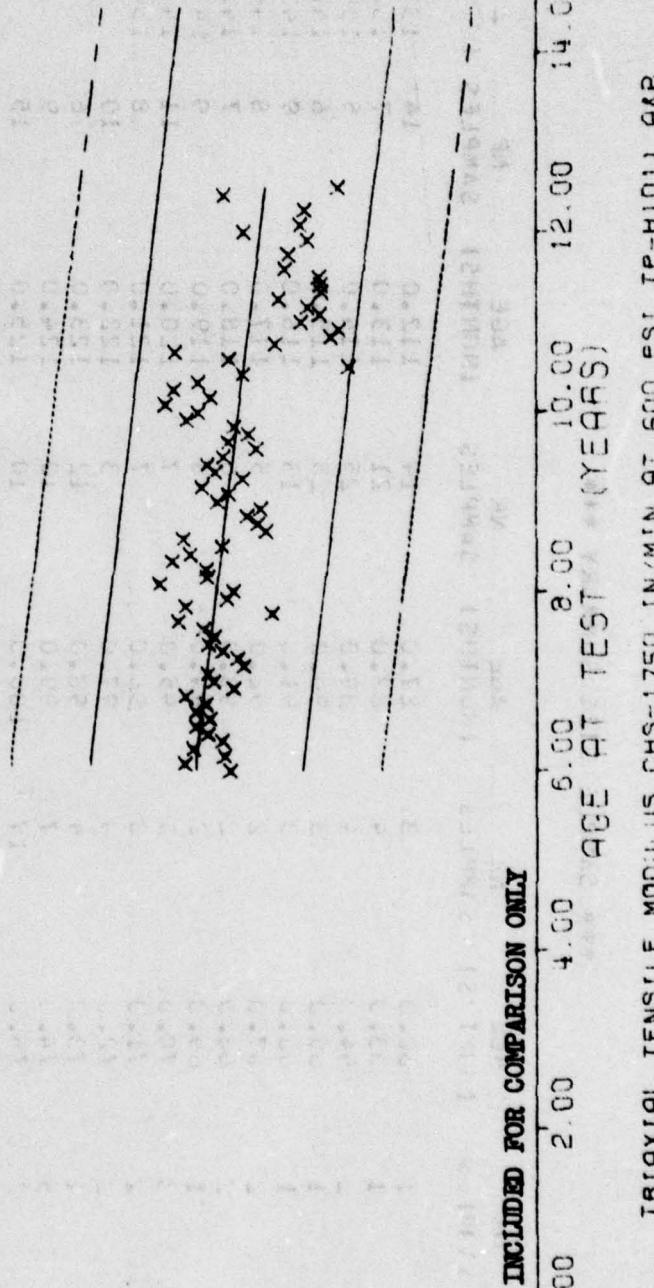


Figure 25A

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	Nr. SAMPLES	AGE (MONTHS)	Nr. SAMPLES	AGE (MONTHS)	Nr. SAMPLES
72.0	21	97.0	26	122.0	36
73.0	24	98.0	24	123.0	24
74.0	12	99.0	40	124.0	9
75.0	18	100.0	15	125.0	24
76.0	9	101.0	18	126.0	18
77.0	45	102.0	18	127.0	29
78.0	18	103.0	20	128.0	9
79.0	36	104.0	42	129.0	18
80.0	27	105.0	27	130.0	9
81.0	21	106.0	33	131.0	12
82.0	63	107.0	18	132.0	24
83.0	24	108.0	16	133.0	18
84.0	39	109.0	23	134.0	14
85.0	22	110.0	30	135.0	30
86.0	18	111.0	52	136.0	31
87.0	69	112.0	20	137.0	12
88.0	101	113.0	46	138.0	16
89.0	75	114.0	26	139.0	18
90.0	62	115.0	18	140.0	12
91.0	66	116.0	35	141.0	11
92.0	96	117.0	25	142.0	6
93.0	49	118.0	16	143.0	9
94.0	60	119.0	41	144.0	12
95.0	42	120.0	42		
96.0	31	121.0	18		

TRIAXIAL TENSILE MODULUS. CHS=1750.0 IN/MIN. TP-H1011 A&B PROPELLANT

STORAGE CONDITIONS = 84.3 TEMP / RH  
TEST CONDITIONS = 84.3 TEMP / RH

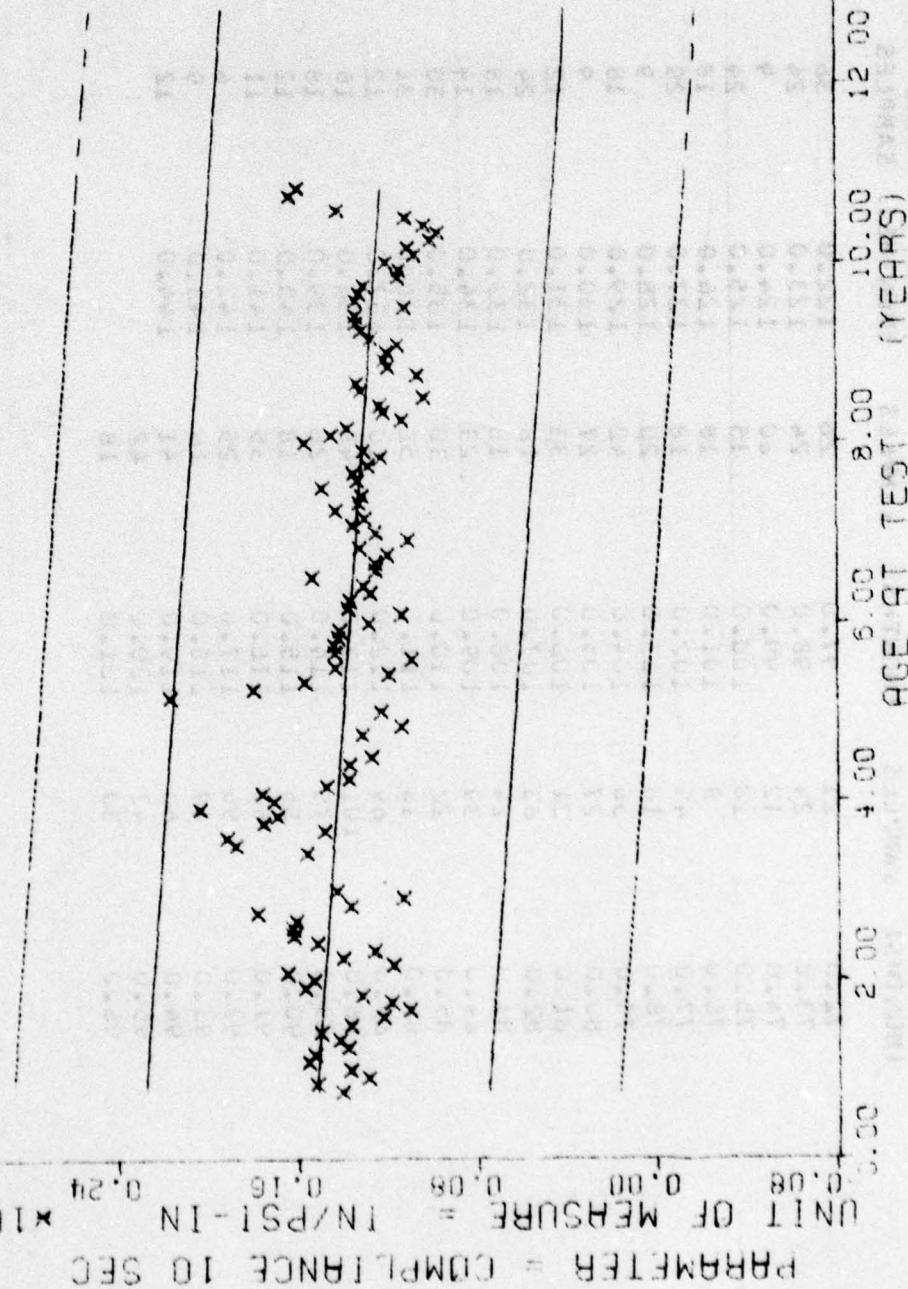


Figure 26

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES										
9.0	2	34.0	14	62.0	7	93.0	26	113.0	5		
10.0	3	35.0	2	69.0	18	94.0	24	119.0	4		
11.0	4	36.0	1	70.0	4	95.0	25	120.0	7		
12.0	42	41.0	1	71.0	13	96.0	8	121.0	2		
13.0	10	42.0	2	72.0	9	97.0	18	122.0	3		
14.0	14	43.0	6	73.0	5	98.0	7	123.0	3		
15.0	15	44.0	1	74.0	5	99.0	12	124.0	6		
16.0	45	45.0	6	75.0	9	100.0	9	125.0	9		
17.0	12	46.0	1	76.0	7	101.0	13	126.0	7		
18.0	5	47.0	6	77.0	13	102.0	6	127.0	2		
19.0	3	48.0	9	78.0	7	103.0	9	129.0	3		
20.0	9	49.0	4	79.0	8	104.0	12	130.0	2		
21.0	11	50.0	5	80.0	8	105.0	10				
22.0	17	51.0	3	81.0	10	106.0	12				
23.0	11	53.0	4	82.0	5	107.0	7				
24.0	24	54.0	4	83.0	8	108.0	6				
25.0	30	57.0	2	84.0	9	109.0	7				
26.0	26	58.0	1	85.0	14	110.0	6				
27.0	43	60.0	2	86.0	10	111.0	7				
28.0	34	62.0	2	87.0	21	112.0	8				
29.0	57	63.0	5	88.0	13	113.0	7				
30.0	53	64.0	13	89.0	12	114.0	11				
31.0	43	65.0	4	90.0	16	115.0	12				
32.0	22	66.0	11	91.0	21	116.0	7				
33.0	16	67.0	1	92.0	9	117.0	6				

CHEER COMPLIANCE AT 10 SEC. WITH 10 LB LOAD, TP-H1011 A&B PROPELLANT

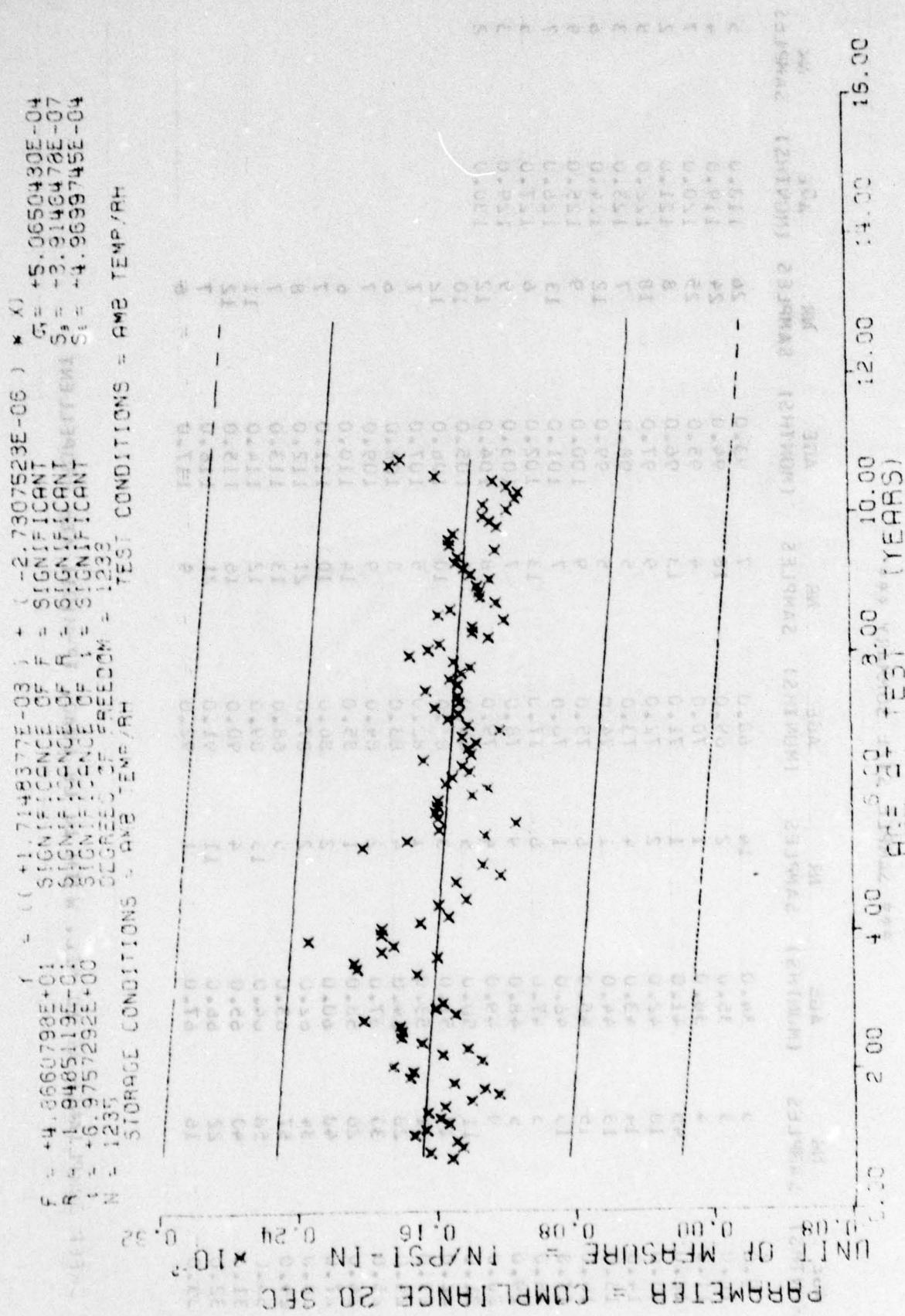


Figure 27

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES								
9.0	5	34.0	14	68.0	7	93.0	26	118.0	5
10.0	3	35.0	2	69.0	18	94.0	24	119.0	4
11.0	4	36.0	1	70.0	4	95.0	25	120.0	7
12.0	45	41.0	1	71.0	13	96.0	8	121.0	2
13.0	10	42.0	2	72.0	9	97.0	18	122.0	5
14.0	14	43.0	4	73.0	5	98.0	7	123.0	3
15.0	15	44.0	1	74.0	5	99.0	12	124.0	6
16.0	15	45.0	6	75.0	9	100.0	9	125.0	3
17.0	15	46.0	1	76.0	7	101.0	13	126.0	7
18.0	5	47.0	6	77.0	13	102.0	6	127.0	5
19.0	6	48.0	9	78.0	7	103.0	9	129.0	3
20.0	9	49.0	4	79.0	8	104.0	12	130.0	2
21.0	11	50.0	5	80.0	8	105.0	10		
22.0	17	51.0	3	81.0	10	106.0	12		
23.0	11	53.0	1	82.0	5	107.0	7		
24.0	22	54.0	4	83.0	8	108.0	6		
25.0	32	57.0	2	84.0	9	109.0	7		
26.0	26	58.0	1	85.0	14	110.0	6		
27.0	43	60.0	2	86.0	10	111.0	7		
28.0	34	62.0	2	87.0	21	112.0	8		
29.0	57	63.0	5	88.0	13	113.0	7		
30.0	52	64.0	13	89.0	12	114.0	11		
31.0	40	65.0	4	90.0	16	115.0	12		
32.0	22	66.0	11	91.0	21	116.0	7		
33.0	12	67.0	1	92.0	9	117.0	6		

CREP COMPLIANCE AT 20 SEC., WITH 10 LB LOAD, TP-H101 A&B PROPELLANT

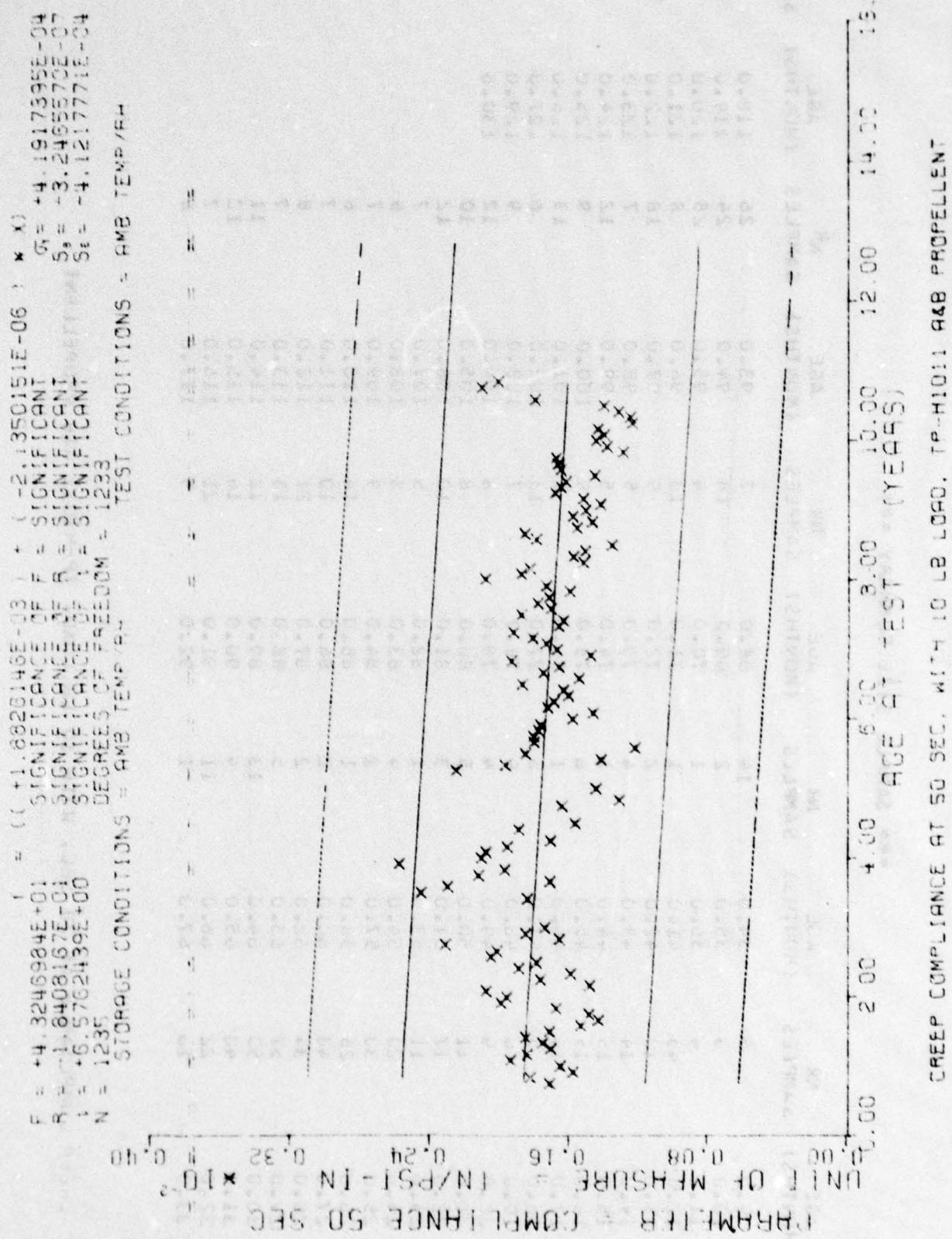


Figure 28

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES								
9.0	5	34.0	14	66.0	7	93.0	26	116.0	5
10.0	3	35.0	2	69.0	18	94.0	24	119.0	4
11.0	4	36.0	1	70.0	4	95.0	25	120.0	7
12.0	4	41.0	1	71.0	13	96.0	8	121.0	2
12.0	12	42.0	2	72.0	9	97.0	18	122.0	5
14.0	14	43.0	4	73.0	5	98.0	7	123.0	3
15.0	15	44.0	1	74.0	5	99.0	12	124.0	6
16.0	15	45.0	6	75.0	9	100.0	9	125.0	3
17.0	15	46.0	1	76.0	7	101.0	13	126.0	7
18.0	5	47.0	6	77.0	13	102.0	6	127.0	2
19.0	3	48.0	9	78.0	7	103.0	9	128.0	3
20.0	9	49.0	4	79.0	3	104.0	12	129.0	2
21.0	11	50.0	5	80.0	3	105.0	10		
22.0	17	51.0	3	81.0	10	106.0	12		
23.0	11	52.0	1	82.0	5	107.0	7		
24.0	42	54.0	4	83.0	3	108.0	6		
25.0	30	57.0	2	84.0	4	109.0	7		
26.0	26	58.0	1	85.0	14	110.0	6		
27.0	46	60.0	2	86.0	10	111.0	7		
28.0	34	62.0	2	87.0	21	112.0	8		
29.0	57	63.0	5	88.0	13	113.0	7		
30.0	53	64.0	13	89.0	12	114.0	11		
31.0	40	65.0	4	90.0	16	115.0	12		
32.0	24	66.0	11	91.0	21	116.0	7		
33.0	13	67.0	1	92.0	9	117.0	6		

CREEP COMPLIANCE AT 50 SEC., WITH 10 LR LUAU, IP-HIOLI AEB PROPELLANT

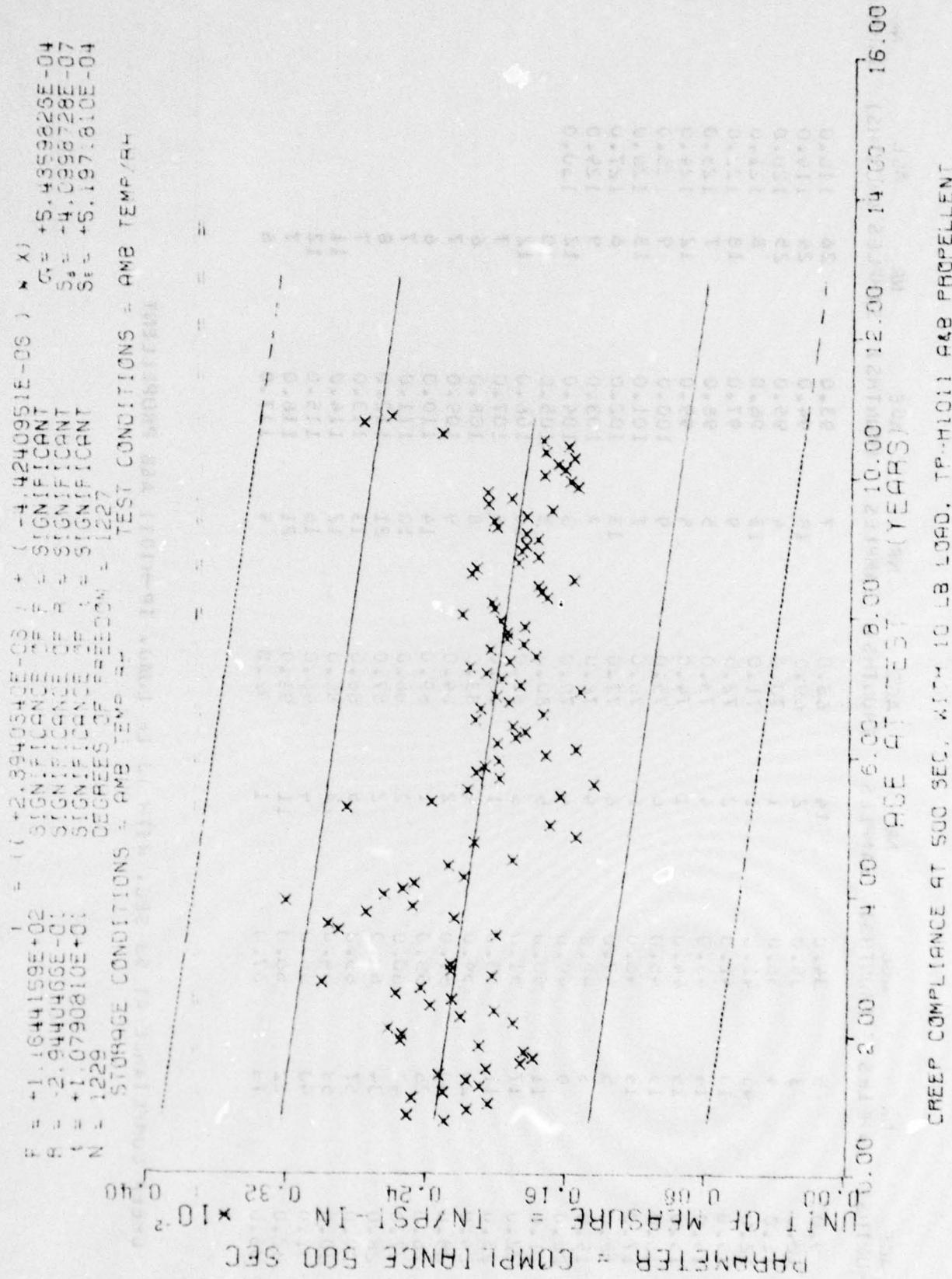


Figure 29

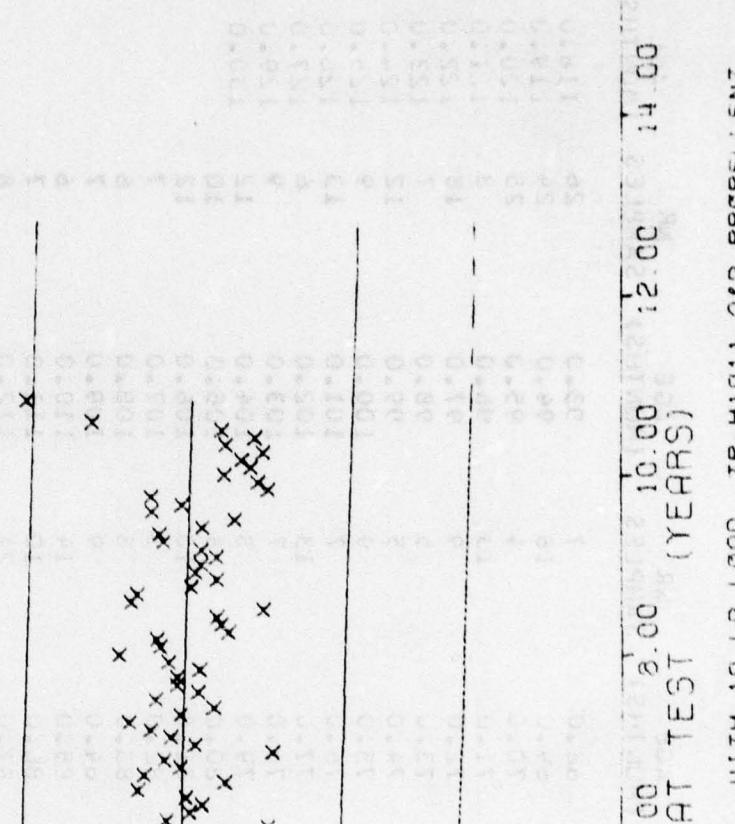
\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES										
9.0	5	34.0	14	68.0	7	93.0	26	118.0	3	118.0	3
10.0	3	35.0	2	69.0	18	94.0	24	119.0	4	119.0	4
11.0	4	36.0	1	70.0	4	95.0	25	120.0	7	120.0	7
12.0	45	41.0	1	71.0	13	96.0	8	121.0	2	121.0	2
13.0	10	42.0	2	72.0	9	97.0	18	122.0	5	122.0	5
14.0	14	43.0	4	73.0	2	98.0	7	123.0	3	123.0	3
15.0	15	44.0	1	74.0	5	99.0	12	124.0	3	124.0	3
16.0	15	45.0	6	75.0	9	100.0	9	125.0	9	125.0	9
17.0	12	46.0	1	76.0	7	101.0	13	126.0	1	126.0	1
18.0	5	47.0	6	77.0	13	102.0	6	127.0	5	127.0	5
19.0	6	48.0	2	78.0	7	103.0	9	129.0	3	129.0	3
20.0	9	49.0	4	79.0	8	104.0	12	130.0	2	130.0	2
21.0	11	50.0	5	80.0	3	105.0	10				
22.0	17	51.0	3	81.0	10	106.0	12				
23.0	11	53.0	1	82.0	5	107.0	7				
24.0	22	54.0	4	83.0	6	108.0	6				
25.0	30	57.0	2	84.0	9	109.0	7				
26.0	29	58.0	1	85.0	14	110.0	6				
27.0	43	60.0	2	86.0	10	111.0	7				
28.0	34	62.0	2	87.0	21	112.0	8				
29.0	57	63.0	5	88.0	13	113.0	7				
30.0	50	64.0	13	89.0	12	114.0	11				
31.0	38	65.0	4	90.0	16	115.0	12				
32.0	24	66.0	11	91.0	21	116.0	7				
33.0	12	67.0	1	92.0	9	117.0	6				

LICEL CAPTURE AT 500 SEC. WITH 10 LB LOAD. TP-HIOLI A&B PROPELLANT

$t = (( +2.0173749E-03) + (-9.4173407E-07)) * X_1$   
 $+ 5.9357231E-01 \quad \text{SIGNIFICANCE OF } F = \text{NOT SIGNIFICANT}$   
 $- 3.2933807E-02 \quad \text{SIGNIFICANCE OF } R = \text{NOT SIGNIFICANT}$   
 $+ 7.7043644E-01 \quad \text{SIGNIFICANCE OF } I = \text{NOT SIGNIFICANT}$   
 552 DEGREES OF FREEDOM = 550  
 STORAGE CONDITIONS = SAME TEMP/RH TEST CONDITIONS = AMB TEMP/RH

UNIT OF MEASURE = IN/PSI-IN  $\times 10^{-2}$   
 0.00 0.08 0.16 0.24 0.32 0.40  
 0.00 2.00 4.00 6.00 8.00 10.00  
 INCLUDED FOR COMPARISON ONLY  
 AGE AT TEST (YEARS)



CREEP COMPLIANCE AT 500 SEC. WITH 10 LB LOAD, TP-H1011 A&E PROPELLENT

Figure 29A

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	2	97.0	18	122.0	5
73.0	2	98.0	7	123.0	3
74.0	2	99.0	12	124.0	6
75.0	9	100.0	9	125.0	9
76.0	7	101.0	13	126.0	7
77.0	12	102.0	6	127.0	5
78.0	7	103.0	9	129.0	3
79.0	8	104.0	12	130.0	2
80.0	6	105.0	10		
81.0	12	106.0	12		
82.0	5	107.0	7		
83.0	8	108.0	6		
84.0	9	109.0	7		
85.0	14	110.0	6		
86.0	10	111.0	7		
87.0	21	112.0	8		
- 95 -					
88.0	13	113.0	7		
89.0	12	114.0	11		
90.0	16	115.0	12		
91.0	21	116.0	7		
92.0	9	117.0	6		
93.0	25	118.0	5		
94.0	24	119.0	4		
95.0	25	120.0	7		
96.0	3	121.0	2		

- 95 -

CREEP COMPLIANCE AT 500 SEC. WITH 10 LB LOAD. TP-H101 ALB PROPELLANT

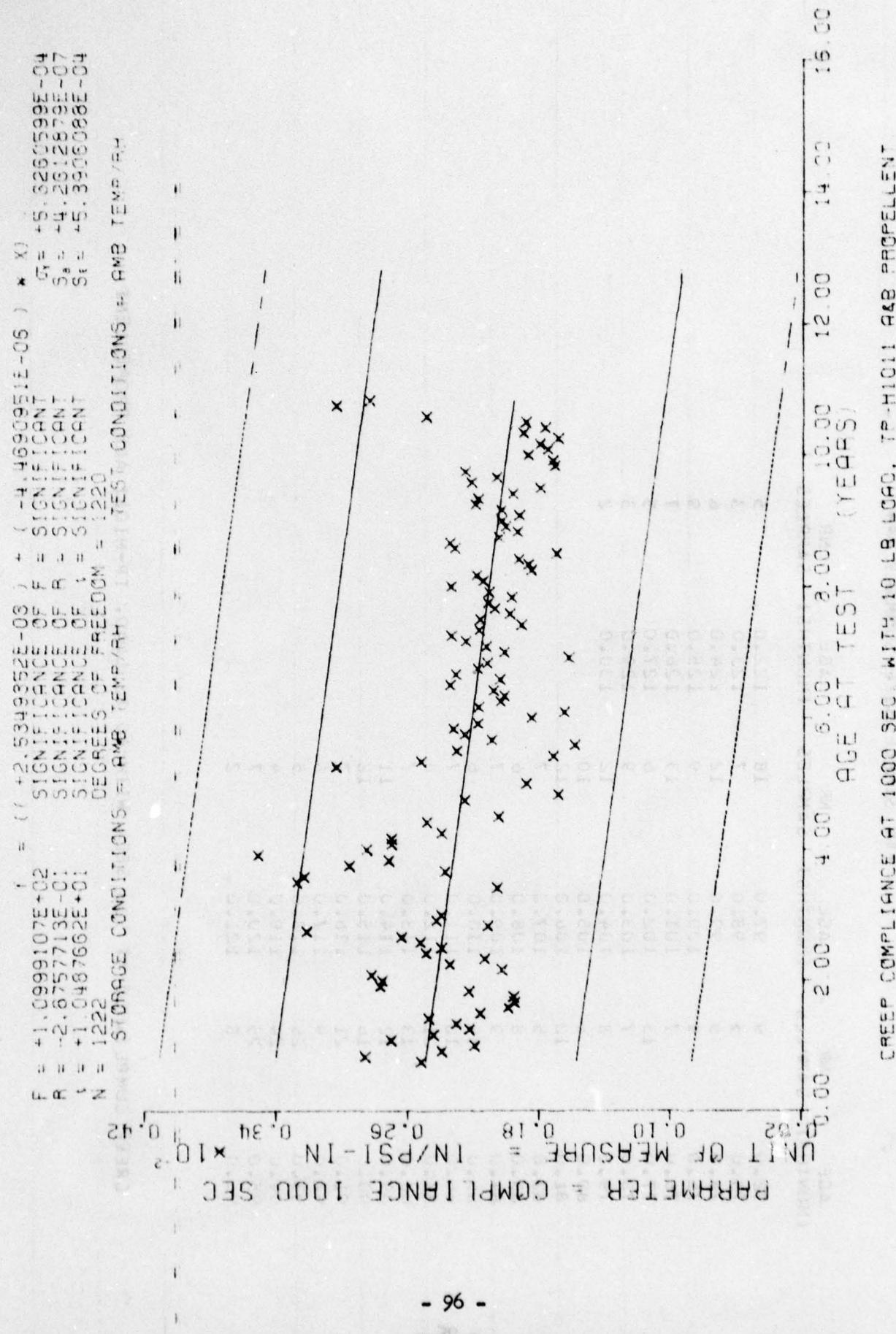


Figure 30

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES								
9.0	5	34.0	14	68.0	7	93.0	26	118.0	5
10.0	2	35.0	2	69.0	18	94.0	24	119.0	4
11.0	4	36.0	1	70.0	4	95.0	25	120.0	7
12.0	45	41.0	1	71.0	13	96.0	8	121.0	4
13.0	10	42.0	2	72.0	9	97.0	18	122.0	5
14.0	14	43.0	4	73.0	5	98.0	7	123.0	3
15.0	15	44.0	4	74.0	5	99.0	12	124.0	6
16.0	12	45.0	6	75.0	9	100.0	9	125.0	3
17.0	12	46.0	1	76.0	7	101.0	13	126.0	7
18.0	2	47.0	6	77.0	13	102.0	6	127.0	5
19.0	3	48.0	9	78.0	7	103.0	9	129.0	3
20.0	7	49.0	4	79.0	8	104.0	12	130.0	2
21.0	11	50.0	5	80.0	8	105.0	10		
22.0	17	51.0	3	81.0	10	106.0	12		
23.0	11	52.0	1	82.0	5	107.0	7		
24.0	20	54.0	4	83.0	3	108.0	6		
25.0	30	57.0	2	84.0	9	109.0	7		
26.0	46	58.0	1	85.0	14	110.0	6		
27.0	40	60.0	2	86.0	10	111.0	7		
28.0	34	62.0	2	87.0	21	112.0	8		
29.0	54	63.0	5	88.0	13	113.0	7		
30.0	53	64.0	13	89.0	12	114.0	11		
31.0	24	65.0	4	90.0	16	115.0	12		
32.0	21	66.0	11	91.0	21	116.0	7		
33.0	13	67.0	1	92.0	9	117.0	6		

URLEP SURPLIANCE AT 1000 SEC. WITH 10 LB LIAD. TP-H1011 A&B PROPELLENT

$\frac{1}{\sigma} = (( +2.1946649E-03 ) + ( -1.3519237E-06 ) \times X) \quad \sigma_1 = +4.4030153E-04$   
 SIGNIFICANCE OF  $\sigma_1$  = NOT SIGNIFICANT  
 $\sigma_2 = +1.3140457E-06$   
 SIGNIFICANCE OF  $\sigma_2$  = NOT SIGNIFICANT  
 $\frac{1}{\sigma} = (( +4.3827111E-02 ) + ( -1.0288254E+00 ) \times X) \quad \sigma_3 = +4.4027817E-04$   
 SIGNIFICANCE OF  $\sigma_3$  = NOT SIGNIFICANT  
 DEGREES OF FREEDOM = 550  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH

PHRAMETER = COMPLIANCE 1000 SEC.  
 UNIT OF MEASURE = IN/PSI-IN  
 0.00 0.08 0.15 0.24 0.32 0.40  
 0.00 2.00 4.00 6.00 8.00 10.00 12.00 14.00 16.00

INCLUDED FOR COMPARISON ONLY

AGE AT TEST (YEARS)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00
CREEP COMPLIANCE AT 1000 SEC WITH 10 LB LOAD, TP-H1011 A&B PROPELLANT	-	-	-	-	-	-	-	-	-

Figure 30A

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	9	97.0	18	122.0	5
73.0	2	98.0	7	123.0	3
74.0	5	99.0	12	124.0	6
75.0	9	100.0	9	125.0	9
76.0	7	101.0	13	126.0	7
77.0	13	102.0	0	127.0	5
78.0	7	103.0	9	129.0	3
79.0	3	104.0	12	130.0	2
80.0	8	105.0	10		
81.0	10	106.0	14		
82.0	5	107.0	7		
83.0	8	108.0	6		
84.0	9	109.0	7		
85.0	14	110.0	6		
86.0	13	111.0	7		
87.0	41	112.0	8		
88.0	13	113.0	7		
89.0	14	114.0	11		
90.0	16	115.0	12		
91.0	21	116.0	7		
92.0	9	117.0	6		
93.0	26	118.0	5		
94.0	24	119.0	4		
95.0	25	120.0	7		
96.0	2	121.0	2		

CREEP COMPLIANCE AT 1000 SEC. WITH 10 LB LOAD, TP-H1011 A&B PROPELLANT

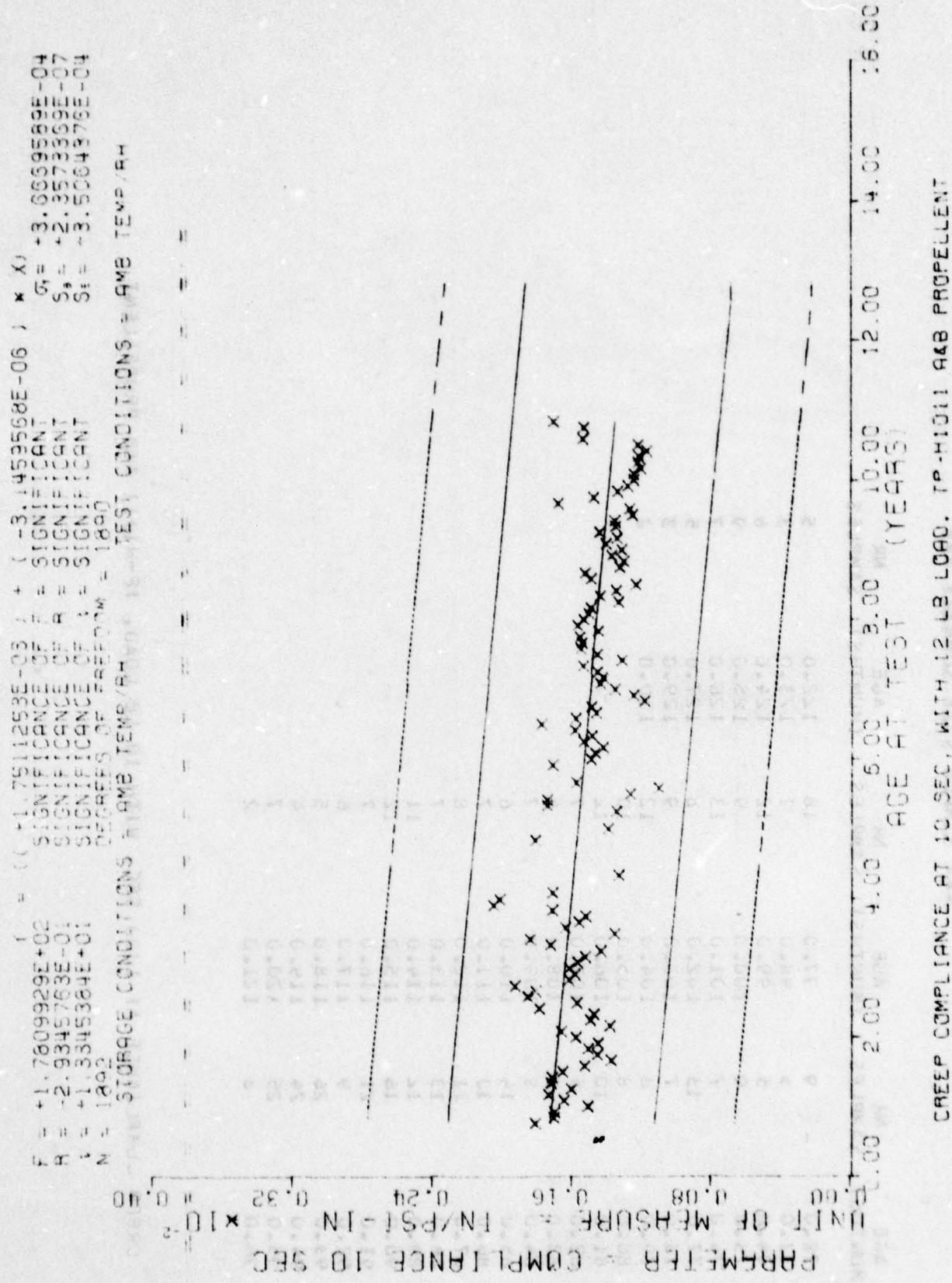


Figure 31

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES										
5.0	2	34.0	19	67.0	2	94.0	51	119.0	9		
10.0	3	35.0	7	68.0	2	95.0	65	120.0	14		
11.0	4	36.0	7	71.0	2	96.0	27	121.0	6		
12.0	45	37.0	4	72.0	15	97.0	36	122.0	8		
13.0	10	38.0	6	73.0	10	98.0	30	123.0	6		
14.0	14	39.0	18	74.0	12	99.0	31	124.0	12		
15.0	15	40.0	10	75.0	12	100.0	23	125.0	12		
16.0	14	41.0	10	76.0	10	101.0	32	126.0	12		
17.0	15	42.0	4	77.0	18	102.0	12	127.0	10		
18.0	+	43.0	16	78.0	14	103.0	16	129.0	6		
19.0	6	44.0	24	79.0	8	104.0	16	130.0	4		
20.0	9	45.0	33	80.0	23	105.0	25				
21.0	11	46.0	30	81.0	21	106.0	16				
22.0	17	47.0	36	82.0	10	107.0	12				
23.0	3	48.0	33	83.0	26	108.0	18				
24.0	11	49.0	18	84.0	8	109.0	11				
25.0	13	50.0	3	85.0	18	110.0	12				
26.0	23	51.0	1	86.0	38	111.0	12				
27.0	32	52.0	1	87.0	21	112.0	10				
28.0	13	53.0	2	88.0	35	113.0	18				
29.0	27	54.0	4	89.0	20	114.0	16				
30.0	29	53.0	2	90.0	22	115.0	20				
31.0	32	64.0	6	91.0	68	116.0	18				
32.0	29	65.0	4	92.0	35	117.0	14				
33.0	21	66.0	2	93.0	55	118.0	17				

CHEMICAL COMPLIANCE AT 10 SEC. WITH 12 LB LOAD, TP-1101 A&B PROPELLANT

F = +1.5731484E+02      R = -2.7726728E-01      I = +1.2542521E+01  
 N = 1891      DEGREES OF FREEDOM = 1889

TEST CONDITIONS = AMB TEMP/RH  
 STORAGE CONDITIONS = AMB TEMP/RH

PARAMETER = COMPLIANCE 20 SEC  
UNIT OF MEASURE = IN/PSI-IN  $\times 10^{-2}$   
0.08 0.16 0.24 0.32 0.40

PARAMETER = COMPLIANCE 20 SEC



CREEP COMPLIANCE AT 20 SEC. I-18 LOGO. RE-HILLAGE PROFICIENT

Figure 32

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES								
9.0	5	34.0	19	67.0	2	94.0	51	119.0	9
10.0	3	35.0	7	68.0	2	95.0	65	120.0	14
11.0	4	36.0	7	71.0	2	96.0	27	121.0	3
12.0	42	37.0	4	72.0	15	97.0	36	122.0	3
13.0	10	38.0	6	73.0	10	98.0	30	123.0	0
14.0	44	39.0	18	74.0	12	99.0	31	124.0	12
15.0	45	40.0	10	75.0	12	100.0	23	125.0	15
16.0	14	41.0	10	76.0	10	101.0	32	126.0	12
17.0	15	42.0	4	77.0	18	102.0	12	127.0	13
18.0	4	43.0	16	78.0	14	103.0	16	128.0	0
19.0	6	44.0	24	79.0	3	104.0	16	130.0	4
20.0	9	45.0	33	80.0	23	105.0	25		
21.0	11	46.0	30	81.0	21	106.0	16		
22.0	17	47.0	37	82.0	10	107.0	12		
23.0	3	48.0	33	83.0	25	108.0	18		
24.0	11	49.0	18	84.0	3	109.0	11		
25.0	15	50.0	3	85.0	18	110.0	12		
26.0	23	51.0	1	86.0	38	111.0	12		
27.0	32	52.0	1	87.0	21	112.0	10		
28.0	19	53.0	2	88.0	38	113.0	18		
29.0	27	54.0	4	89.0	20	114.0	16		
30.0	29	55.0	2	90.0	22	115.0	20		
31.0	32	56.0	6	91.0	68	116.0	18		
32.0	29	57.0	4	92.0	35	117.0	14		
33.0	21	58.0	2	93.0	55	118.0	17		

CREEP COMPLIANCE AT 20 SEC. WITH 12 LB LOAD. TP-H1011 AEB PROPELLANT

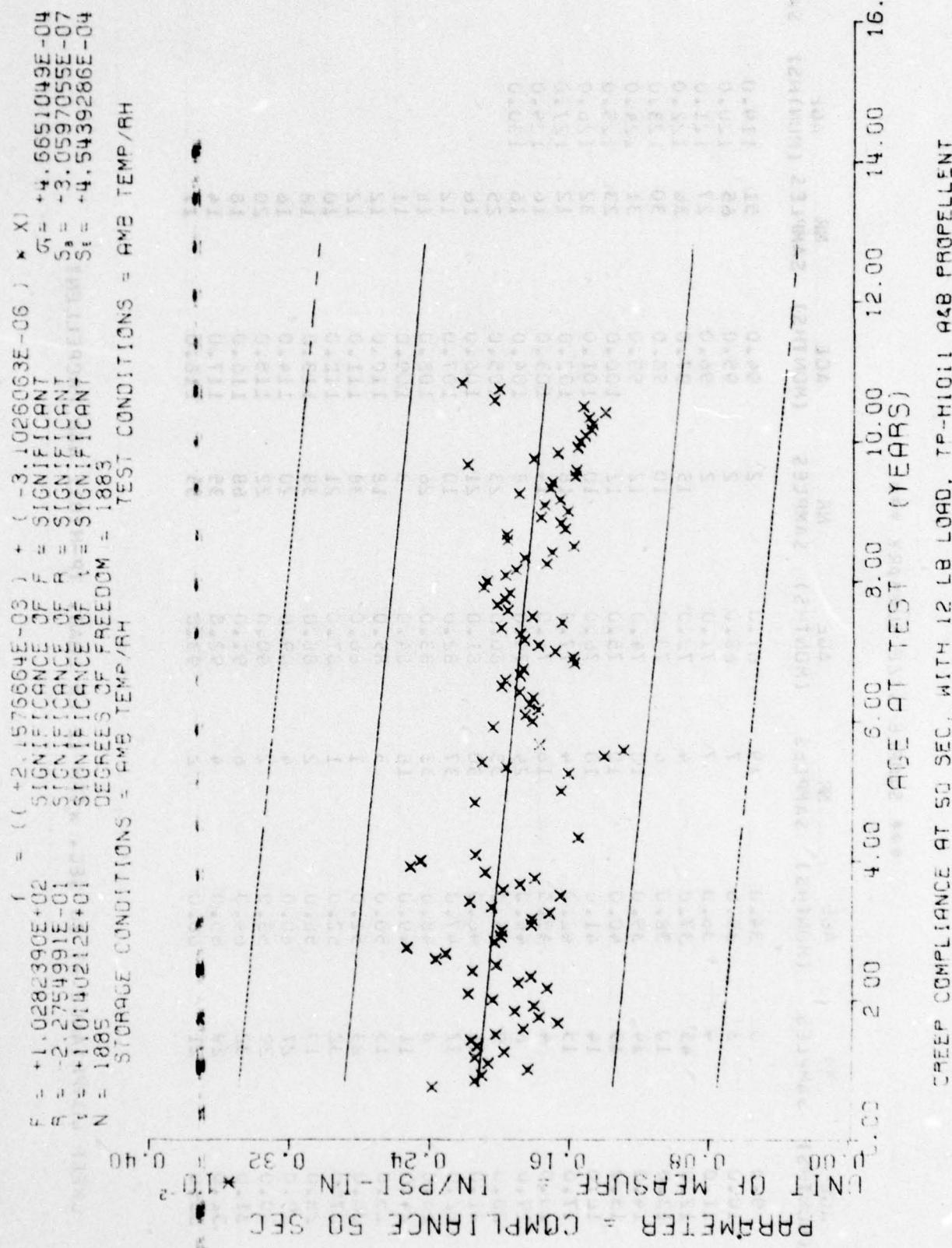


Figure 33

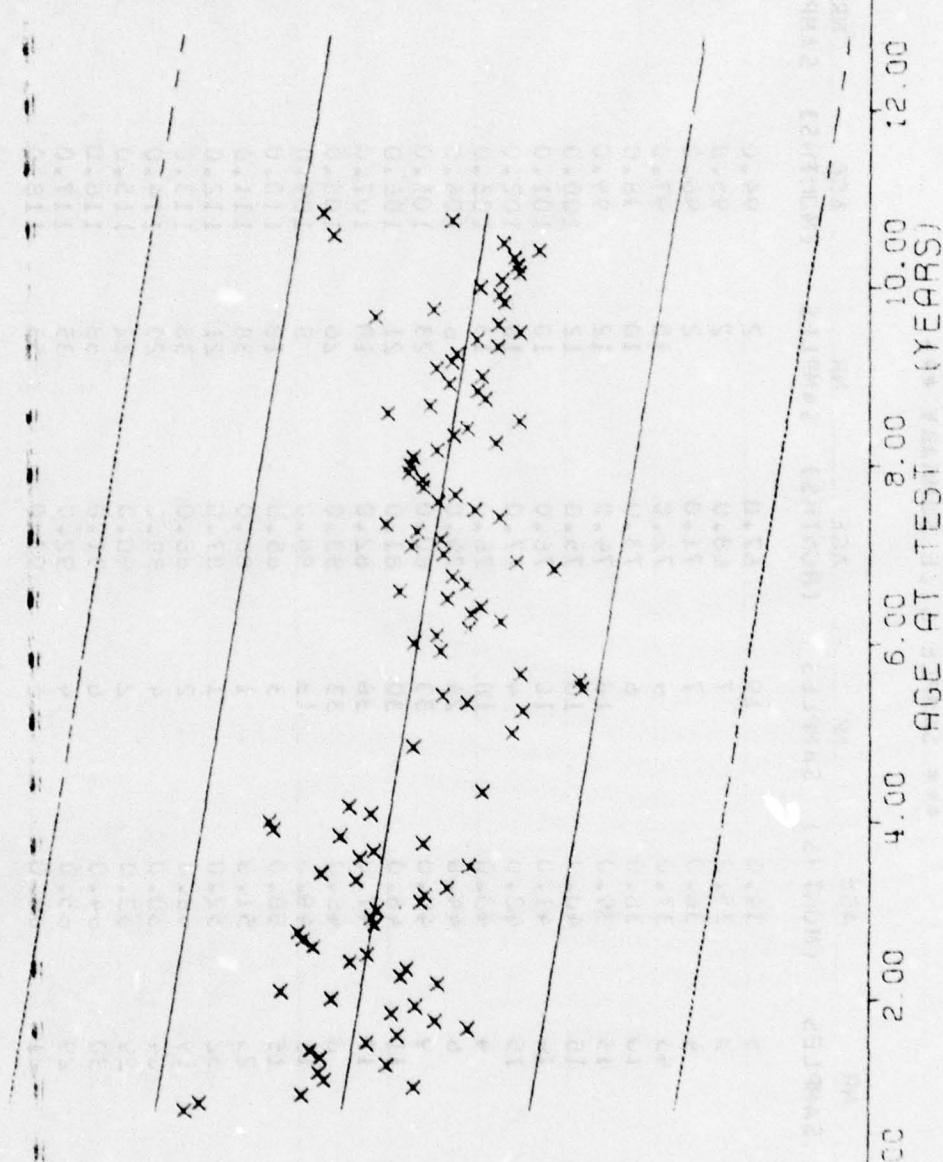
\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES								
9.0	5	34.0	19	67.0	2	94.0	51	119.0	9
10.0	1	35.0	7	68.0	2	95.0	65	120.0	14
11.0	4	36.0	7	71.0	2	96.0	27	121.0	2
12.0	42	37.0	4	72.0	15	97.0	36	122.0	6
13.0	12	38.0	6	73.0	10	98.0	30	123.0	5
14.0	15	39.0	16	74.0	12	99.0	31	124.0	12
15.0	15	40.0	10	75.0	12	100.0	23	125.0	13
16.0	14	41.0	10	76.0	10	101.0	32	126.0	13
17.0	15	42.0	4	77.0	13	102.0	12	127.0	13
18.0	4	43.0	18	78.0	13	103.0	16	128.0	6
19.0	6	44.0	24	79.0	6	104.0	16	129.0	4
20.0	9	45.0	33	80.0	23	105.0	25		
21.0	11	46.0	30	81.0	21	106.0	16		
22.0	17	47.0	30	82.0	10	107.0	12		
23.0	3	48.0	33	83.0	26	108.0	18		
24.0	11	49.0	14	84.0	8	109.0	11		
25.0	15	50.0	3	85.0	18	110.0	12		
26.0	22	51.0	1	86.0	38	111.0	12		
27.0	32	52.0	1	87.0	21	112.0	10		
28.0	19	53.0	2	88.0	36	113.0	18		
29.0	24	54.0	4	89.0	20	114.0	16		
30.0	29	55.0	2	90.0	22	115.0	20		
31.0	30	56.0	6	91.0	58	116.0	18		
32.0	29	55.0	4	92.0	35	117.0	14		
33.0	21	56.0	2	93.0	55	118.0	17		

$F = +2.4757679E+02$   
 $R = -3.4587226E-01$   
 $t = +1.5734636E+01$   
 $N = 1824$   
 STORAGE CONDITIONS = AMB TEMP/RH

$\text{SIGNIFICANCE OF } F = +5.3596645E-06$   
 $\text{SIGNIFICANCE OF } F = +5.2861685E-04$   
 $\text{SIGNIFICANCE OF } F = +3.4062842E-07$   
 $\text{SIGNIFICANCE OF } F = +4.9612756E-04$   
 DEGREES OF FREEDOM = 1822  
 TEST CONDITIONS = AMB TEMP/RH

UNIT OF MEASURE = IN/PSI-IN  
 PARMETER = COMPLIANCE 500 SEC  
 $0.03 \times 10^{-2}$   
 $0.11 \times 10^{-2}$   
 $0.19 \times 10^{-2}$   
 $0.27 \times 10^{-2}$   
 $0.35 \times 10^{-2}$   
 $0.43 \times 10^{-2}$



CREEP COMPLIANCE AT 500 SEC, WITH 12 LB LOAD, TP-HIC11 & 8 PROPELLANT

Figure 34

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES										
4.0	5	34.0	17	68.0	2	95.0	65	120.0	14		
10.0	3	35.0	7	71.0	2	96.0	27	121.0	2		
11.0	4	36.0	7	72.0	15	97.0	36	122.0	3		
12.0	45	37.0	4	73.0	10	98.0	30	123.0	6		
12.0	10	38.0	6	74.0	12	99.0	31	124.0	12		
12.0	15	39.0	18	75.0	12	100.0	23	125.0	16		
14.0	15	40.0	10	76.0	10	101.0	32	126.0	13		
15.0	15	41.0	10	77.0	13	102.0	12	127.0	8		
16.0	14	42.0	4	78.0	12	103.0	16	129.0	4		
17.0	15	43.0	18	79.0	3	104.0	16	130.0	3		
18.0	4	44.0	24	80.0	23	105.0	25				
19.0	9	45.0	33	81.0	21	106.0	16				
20.0	9	46.0	29	82.0	15	107.0	12				
21.0	11	47.0	26	83.0	26	108.0	18				
22.0	17	48.0	28	84.0	8	109.0	11				
23.0	3	49.0	15	85.0	13	110.0	12				
24.0	11	50.0	1	86.0	38	111.0	10				
25.0	14	52.0	1	87.0	21	112.0	9				
26.0	23	58.0	2	88.0	37	113.0	18				
27.0	32	60.0	4	89.0	20	114.0	16				
28.0	19	63.0	2	90.0	22	115.0	20				
29.0	20	64.0	6	91.0	63	116.0	14				
30.0	28	65.0	4	92.0	33	117.0	14				
31.0	28	66.0	2	93.0	55	118.0	15				
32.0	24	67.0	2	94.0	51	119.0	9				

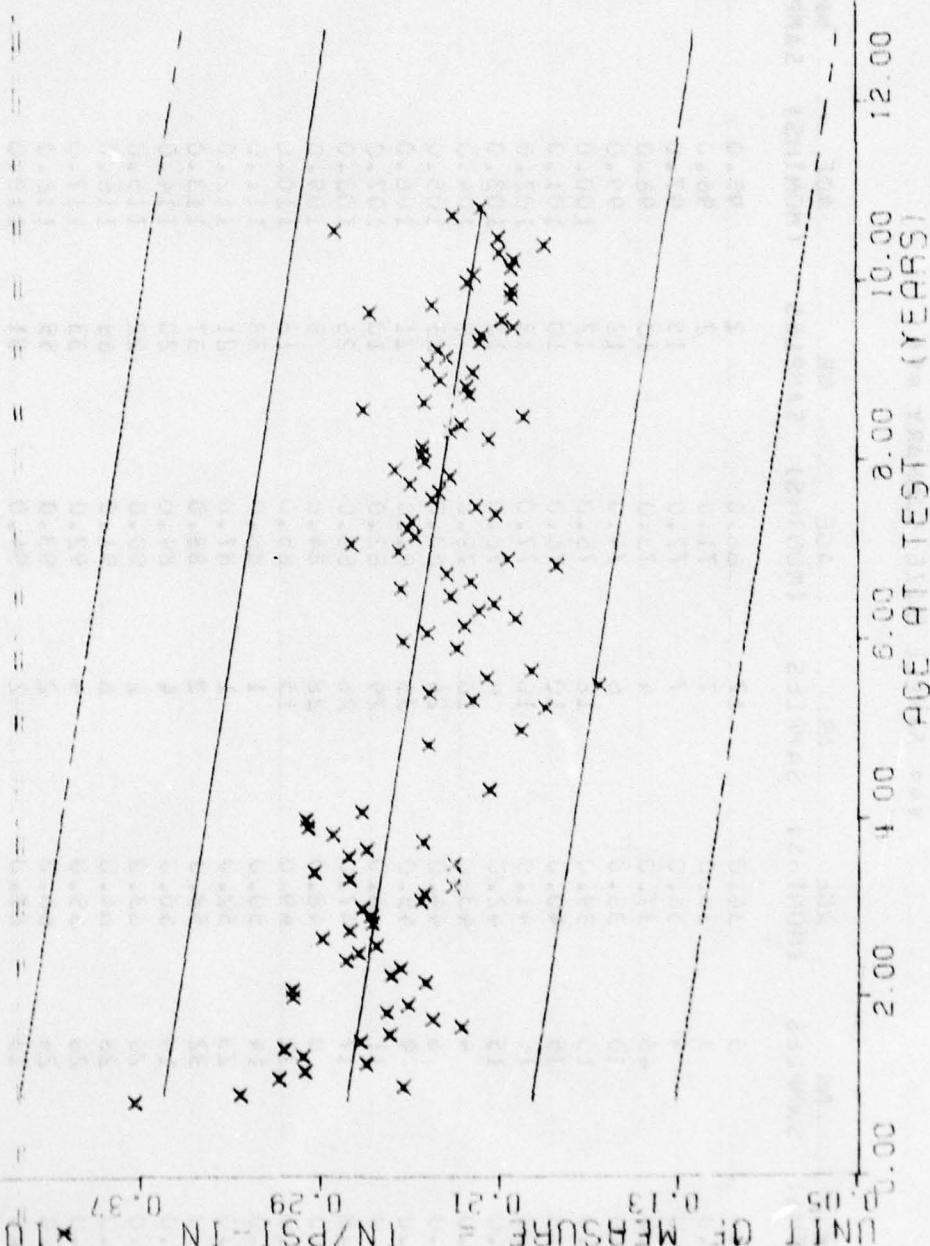


Figure 35

CREEP COMPLIANCE AT 1000 SEC., WITH 12 LB LOAD. TP-H1011 ASB PROPELLANT

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES								
10.0	1	35.0	7	72.0	15	97.0	34	122.0	3
11.0	4	36.0	7	73.0	10	98.0	30	123.0	2
12.0	45	37.0	4	74.0	12	99.0	29	124.0	14
13.0	10	38.0	6	75.0	12	100.0	23	125.0	15
14.0	14	39.0	18	76.0	10	101.0	32	126.0	13
14.0	15	40.0	10	77.0	18	102.0	12	127.0	7
15.0	14	41.0	10	78.0	12	103.0	16	129.0	4
16.0	15	42.0	4	79.0	8	104.0	16	130.0	2
17.0	15	43.0	17	80.0	23	105.0	25		
18.0	4	44.0	22	81.0	21	106.0	16		
19.0	5	45.0	33	82.0	10	107.0	12		
20.0	9	46.0	29	83.0	26	108.0	18		
21.0	11	47.0	24	84.0	8	109.0	11		
22.0	17	48.0	25	85.0	18	110.0	12		
23.0	3	49.0	15	86.0	36	111.0	10		
24.0	11	52.0	1	87.0	21	112.0	9		
25.0	11	53.0	2	88.0	33	113.0	18		
26.0	23	54.0	4	89.0	20	114.0	16		
27.0	32	55.0	2	90.0	22	115.0	20		
28.0	19	56.0	2	91.0	68	116.0	14		
29.0	13	57.0	6	92.0	33	117.0	14		
30.0	26	58.0	4	93.0	54	118.0	15		
31.0	22	59.0	2	94.0	47	119.0	9		
32.0	14	60.0	2	95.0	65	120.0	14		
33.0	11	61.0	2	96.0	25	121.0	6		
34.0	15	62.0							

$\text{E}_1 = 1.1772683 \times 10^4$   
 $\text{E}_2 = 2.9692790 \times 10^4$   
 $\text{E}_3 = 1.7824893 \times 10^4$   
 $N = 3288$   
 SIGNIFICANCE OF TEST = 0.01  
 DEGREES OF FREEDOM = 3285  
 TEST CONDITIONS = AMB TEMP/RH  
 SIGNIFICANCE OF MEASURE = 0.02  
 SIGNIFICANCE OF TEST = 0.02  
 SIGNIFICANCE OF MEASURE = 0.02  
 TEST CONDITIONS = AMB TEMP/RH

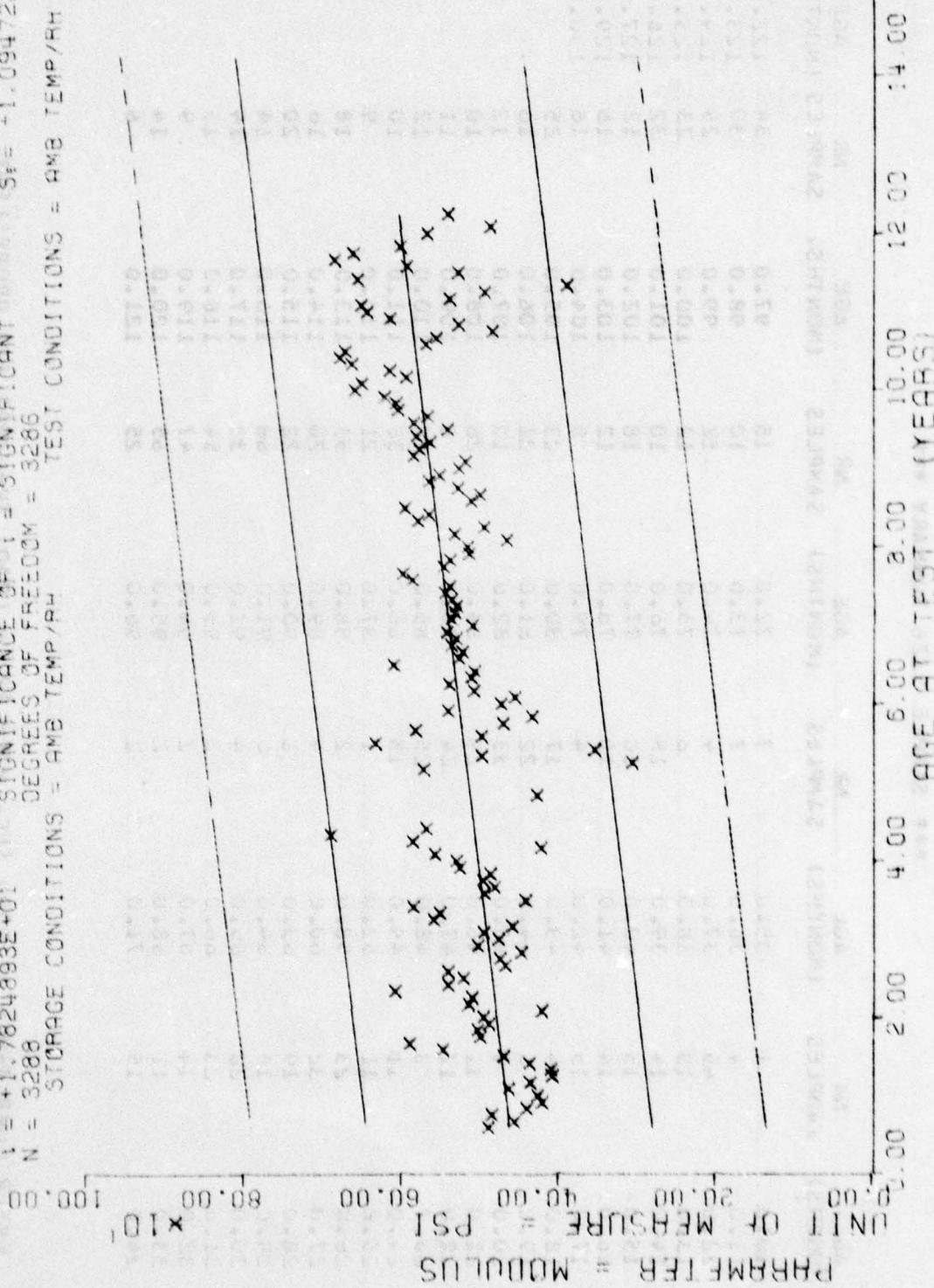


Figure 36

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES										
7.0	4	32.0	35	64.0	9	89.0	66	114.0	33		
8.0	2	33.0	38	65.0	12	90.0	72	115.0	35		
9.0	2	34.0	30	66.0	12	91.0	113	116.0	23		
10.0	4	35.0	29	67.0	24	92.0	63	117.0	29		
11.0	5	36.0	29	68.0	6	93.0	93	118.0	18		
12.0	7	37.0	23	69.0	17	94.0	60	119.0	32		
13.0	6	38.0	20	70.0	27	95.0	39	120.0	36		
14.0	12	39.0	12	71.0	24	96.0	30	121.0	12		
15.0	12	40.0	28	72.0	24	97.0	23	122.0	2		
16.0	9	41.0	36	73.0	24	98.0	30	123.0	12		
17.0	8	42.0	84	74.0	21	99.0	15	124.0	24		
18.0	3	43.0	63	75.0	21	100.0	48	125.0	15		
19.0	7	44.0	50	76.0	30	101.0	36	126.0	44		
20.0	11	45.0	35	77.0	15	102.0	27	127.0	24		
21.0	12	46.0	46	78.0	27	103.0	43	128.0	13		
22.0	9	47.0	36	79.0	27	104.0	34	129.0	30		
23.0	4	48.0	15	80.0	20	105.0	27	130.0	12		
24.0	3	49.0	17	81.0	18	106.0	33	131.0	24		
25.0	12	50.0	5	82.0	36	107.0	24	132.0	23		
26.0	13	51.0	4	83.0	27	108.0	42	133.0	0		
27.0	17	52.0	3	84.0	27	109.0	27	134.0	9		
28.0	17	53.0	5	85.0	33	110.0	21	135.0	15		
29.0	29	54.0	3	86.0	33	111.0	18	136.0	9		
30.0	29	55.0	3	87.0	69	112.0	36	137.0	24		
31.0	51	56.0	3	88.0	59	113.0	21	138.0	6		
								139.0	21		
								140.0	9		
								141.0	12		
								142.0	9		
								144.0	3		
								145.0	3		
								147.0	6		

STRESS RELAXATION 5% STRAIN, MODULUS AT 10 SEC. TP-H1011 AGE

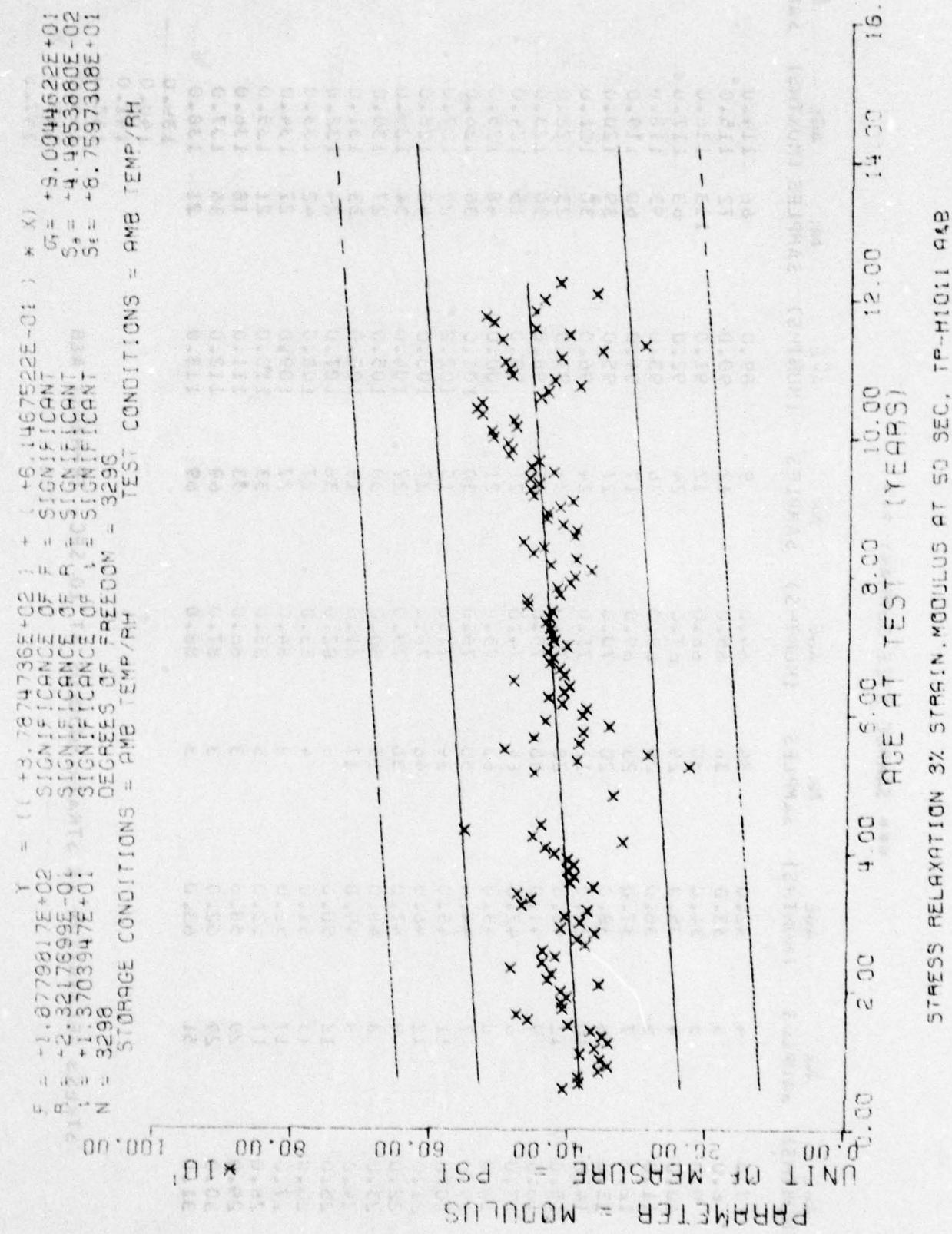


Figure 37

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES										
7.0	4	32.0	39	64.0	9	89.0	66	114.0	22		
8.0	3	33.0	38	65.0	12	90.0	72	115.0	36		
9.0	5	34.0	30	66.0	12	91.0	113	116.0	21		
10.0	4	35.0	29	67.0	24	92.0	63	117.0	29		
11.0	5	36.0	29	68.0	6	93.0	93	118.0	13		
12.0	7	37.0	23	69.0	17	94.0	60	119.0	33		
13.0	6	38.0	24	70.0	27	95.0	39	120.0	36		
14.0	10	39.0	22	71.0	24	96.0	30	121.0	15		
15.0	12	40.0	26	72.0	24	97.0	23	122.0	6		
16.0	9	41.0	36	73.0	21	98.0	30	123.0	12		
17.0	6	42.0	84	74.0	21	99.0	15	124.0	24		
18.0	3	43.0	c3	75.0	21	100.0	48	125.0	12		
19.0	7	44.0	50	76.0	30	101.0	36	126.0	44		
20.0	11	45.0	39	77.0	15	102.0	27	127.0	54		
21.0	12	46.0	48	78.0	27	103.0	43	128.0	16		
22.0	9	47.0	36	79.0	27	104.0	34	129.0	32		
23.0	6	48.0	15	80.0	30	105.0	27	130.0	12		
24.0	3	49.0	17	81.0	18	106.0	33	131.0	21		
25.0	18	50.0	5	82.0	36	107.0	24	132.0	23		
26.0	13	51.0	4	83.0	27	108.0	42	133.0	0		
27.0	17	52.0	3	84.0	27	109.0	27	134.0	9		
28.0	17	52.0	5	85.0	33	110.0	21	135.0	15		
29.	29	58.0	3	86.0	23	111.0	18	136.0	9		
30.0	29	62.0	3	87.0	69	112.0	36	137.0	24		
31.0	51	63.0	3	88.0	69	113.0	21	138.0	6		
								139.0	21		
								140.0	9		
								141.0	12		
								142.0	9		
								144.0	3		
								145.0	3		
								147.0	6		

$F = +2.1658154E+02$        $\gamma = (( +3.7682813E+02 ) + ( +4.3009353E+01 ) \times X) / 61 = +8.2058683E+01$   
 $a = +1.7774139E-01$       SIGNIFICANT  
 $b = +1.4716709E+01$       SIGNIFICANT  
 $N = 6641$       SIGNIFICANT  
 $S^2 = 6639$       DEGREES OF FREEDOM  
 $S_1 = 11$       TEST CONDITIONS - AMBIENT TEMP/RH  
 $S_2 = 11$       TEST CONDITIONS - SAME TEMP/RH

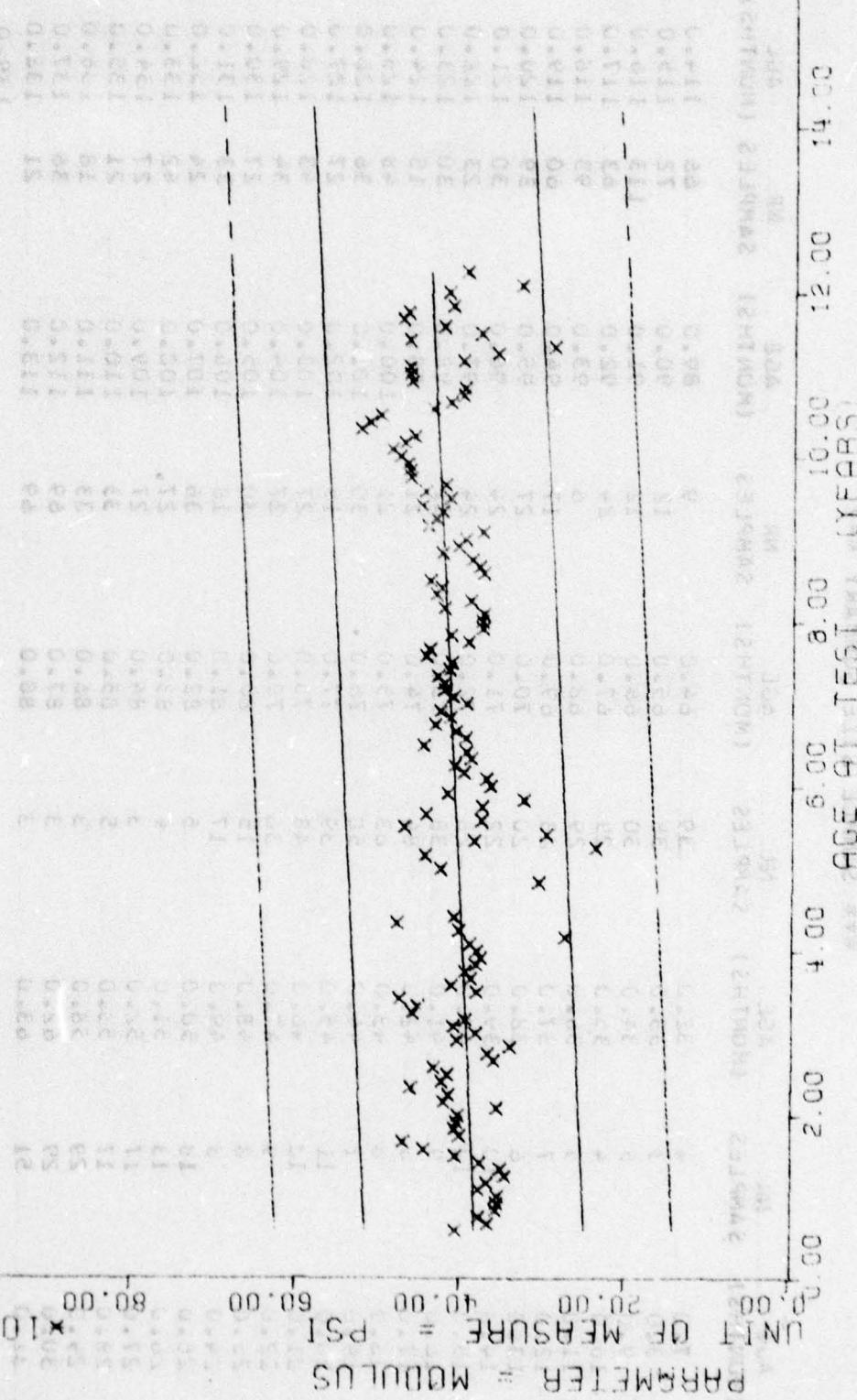


Figure 38

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES								
7.0	6	32.0	79	63.0	0	88.0	135	113.0	39
8.0	6	33.0	76	64.0	18	89.0	135	114.0	63
9.0	12	34.0	60	65.0	24	90.0	153	115.0	56
10.0	6	35.0	59	66.0	24	91.0	212	116.0	47
11.0	12	36.0	56	67.0	48	92.0	132	117.0	62
12.0	14	37.0	45	68.0	12	93.0	183	118.0	39
13.0	12	38.0	40	69.0	35	94.0	120	119.0	60
14.0	20	39.0	45	70.0	54	95.0	75	120.0	72
15.0	24	40.0	55	71.0	51	96.0	60	121.0	33
16.0	43	41.0	76	72.0	50	97.0	50	122.0	42
17.0	12	42.0	164	73.0	42	98.0	60	123.0	24
18.0	16	43.0	124	74.0	42	99.0	33	124.0	45
19.0	14	44.0	94	75.0	48	100.0	87	125.0	36
20.0	22	45.0	79	76.0	63	101.0	75	126.0	77
21.0	24	46.0	96	77.0	30	102.0	57	127.0	95
22.0	12	47.0	72	78.0	54	103.0	79	128.0	22
23.0	10	48.0	30	79.0	54	104.0	61	129.0	42
24.0	10	49.0	34	80.0	60	105.0	65	130.0	33
25.0	36	50.0	10	81.0	38	106.0	69	131.0	42
26.0	17	51.0	17	82.0	67	107.0	48	132.0	61
27.0	34	52.0	7	83.0	54	108.0	111	133.0	15
28.0	34	53.0	10	84.0	54	109.0	54	134.0	12
29.0	26	58.0	6	85.0	66	110.0	45	135.0	27
30.0	23	59.0	3	86.0	65	111.0	36	136.0	13
31.0	102	62.0	6	87.0	136	112.0	72	137.0	42
								138.0	12

STRESS RELAXATION 3% STRAIN MODULUS AT 100 SEC. TP-H1011 AEB

140.0	42
141.0	16
142.0	24
144.0	6
145.0	6
147.0	12

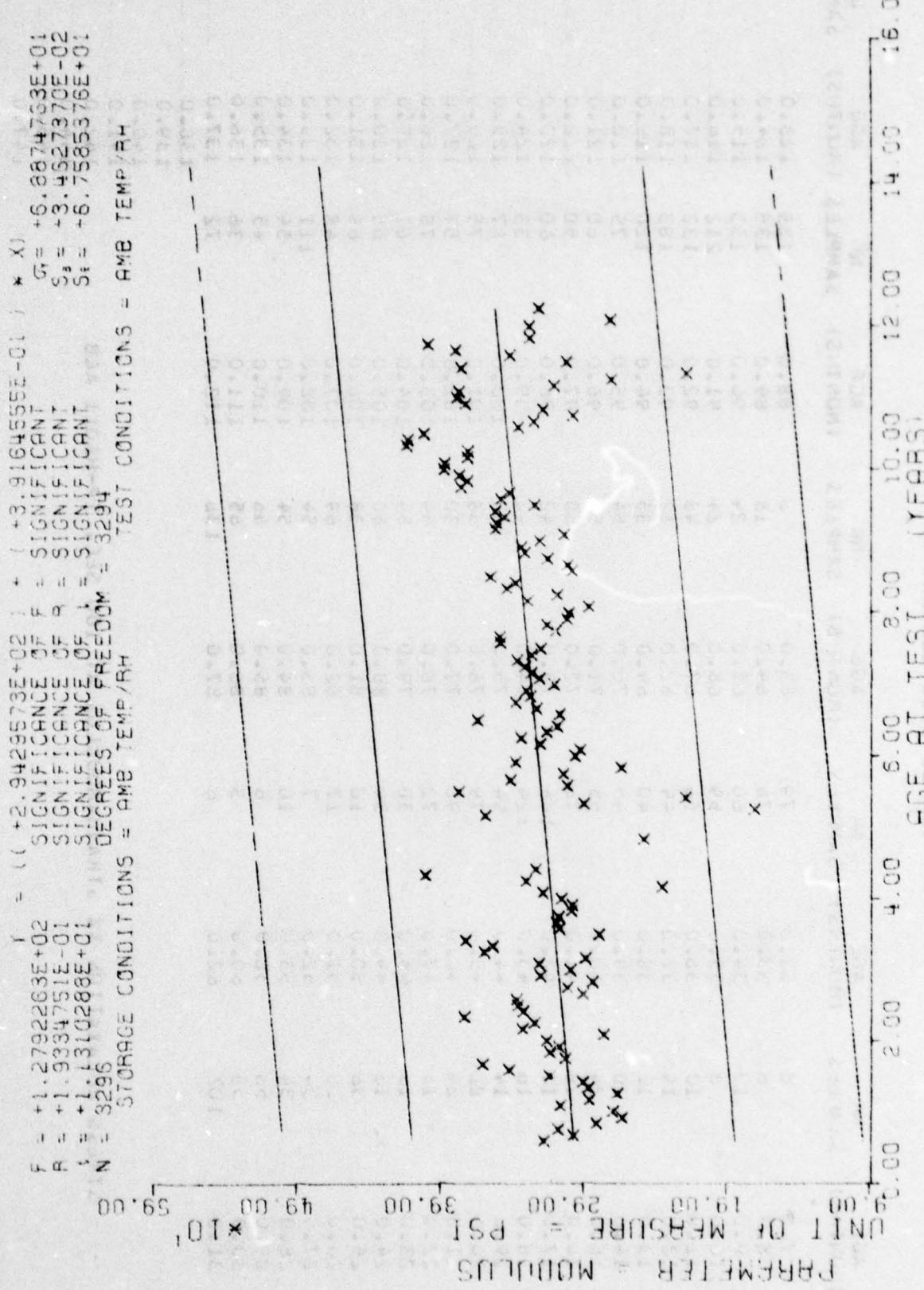


Figure 39

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES										
7.0	4	32.0	39	64.0	9	89.0	66	114.0	22		
8.0	3	33.0	38	65.0	12	90.0	72	115.0	35		
9.0	5	34.0	30	66.0	12	91.0	113	116.0	20		
10.0	4	35.0	29	67.0	24	92.0	63	117.0	29		
11.0	5	36.0	28	68.0	6	93.0	93	118.0	43		
12.0	7	37.0	23	69.0	17	94.0	60	119.0	33		
13.0	6	38.0	20	70.0	27	95.0	39	120.0	26		
14.0	10	39.0	22	71.0	24	96.0	30	121.0	15		
15.0	12	40.0	28	72.0	24	97.0	23	122.0	9		
16.0	3	41.0	38	73.0	21	98.0	30	123.0	12		
17.0	6	42.0	84	74.0	21	99.0	15	124.0	24		
18.0	8	43.0	63	75.0	21	100.0	46	125.0	15		
19.0	7	44.0	50	76.0	30	101.0	36	126.0	44		
20.0	11	45.0	39	77.0	15	102.0	27	127.0	54		
21.0	12	46.0	48	78.0	27	103.0	43	128.0	13		
22.0	9	47.0	36	79.0	27	104.0	34	129.0	30		
23.0	9	48.0	15	80.0	30	105.0	27	130.0	44		
24.0	3	49.0	17	81.0	18	106.0	33	131.0	21		
25.0	16	50.0	5	82.0	36	107.0	24	132.0	26		
26.0	13	51.0	4	83.0	27	108.0	42	133.0	9		
27.0	17	52.0	2	84.0	27	109.0	27	134.0	9		
28.0	17	53.0	5	85.0	55	110.0	21	135.0	15		
29.0	29	54.0	3	86.0	33	111.0	18	136.0	9		
30.0	29	55.0	3	87.0	69	112.0	36	137.0	24		
31.0	50	56.0	3	88.0	69	113.0	21	138.0	6		

STRESS RELAXATION 3% STRAIN, MODULUS AT 1000 SEC., TP-H1011 A&B

$F_R = +2.2106113E+02$   
 $R_R = +2.4911823E+01$   
 $t_R = +1.4868124E+01$   
 $N_R = 334.3$   
 SIGNIFICANT DEGREES OF FREEDOM = 334.  
 TEST CONDITIONS = AMB TEMP/RH  
 $\sigma_{\text{ST}} = (+5.3642280E+02) + (+8.3987406E-01) \times X_1$   
 SIGNIFICANT DEGREES OF FREEDOM = 334.  
 $S_a = +5.6488231E+02$   
 $S_t = +1.1043436E+02$

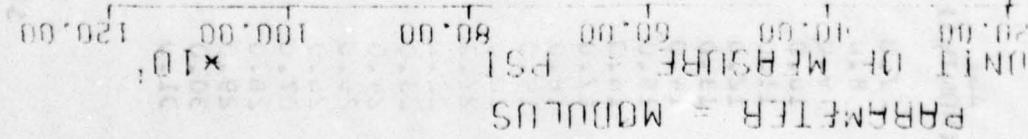


Figure 40

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES										
7.0	4	32.0	40	63.0	3	88.0	66	113.0	18		
8.0	3	33.0	38	64.0	9	89.0	69	114.0	33		
9.0	2	34.0	30	65.0	12	90.0	81	115.0	30		
10.0	4	32.0	30	66.0	12	91.0	99	116.0	27		
11.0	3	36.0	27	67.0	24	92.0	69	117.0	33		
12.0	7	37.0	26	68.0	6	92.0	90	118.0	18		
13.0	6	38.0	20	69.0	18	94.0	60	119.0	33		
14.0	10	39.0	23	70.0	27	95.0	36	120.0	36		
15.0	12	40.0	27	71.0	27	96.0	30	121.0	15		
16.0	9	41.0	30	72.0	26	97.0	27	122.0	9		
17.0	3	42.0	60	73.0	21	98.0	30	123.0	12		
18.0	3	43.0	61	74.0	21	99.0	18	124.0	21		
19.0	7	44.0	44	75.0	27	100.0	39	125.0	24		
20.0	11	45.0	40	76.0	38	101.0	29	126.0	31		
21.0	12	46.0	48	77.0	15	102.0	30	127.0	41		
22.0	3	47.0	36	78.0	27	103.0	34	128.0	37		
23.0	6	48.0	15	79.0	27	104.0	27	129.0	12		
24.0	8	49.0	17	80.0	30	105.0	38	130.0	21		
25.0	13	50.0	5	81.0	20	106.0	36	131.0	24		
26.0	12	51.0	12	82.0	33	107.0	24	132.0	33		
27.0	17	52.0	4	83.0	27	108.0	69	133.0	9		
28.0	17	53.0	5	84.0	27	109.0	27	134.0	3		
29.0	29	52.0	3	85.0	35	110.0	24	135.0	12		
30.0	29	60.0	3	86.0	32	111.0	18	136.0	9		
31.0	21	62.0	3	87.0	69	112.0	36	137.0	16		
								138.0	6		
								139.0	21		
								140.0	9		
								141.0	12		
								142.0	9		
								144.0	3		
								145.0	3		
								147.0	6		

STRESS RELAXATION 5% STRAIN, MODULUS AT 10 SEC., TP-HIOL AGE

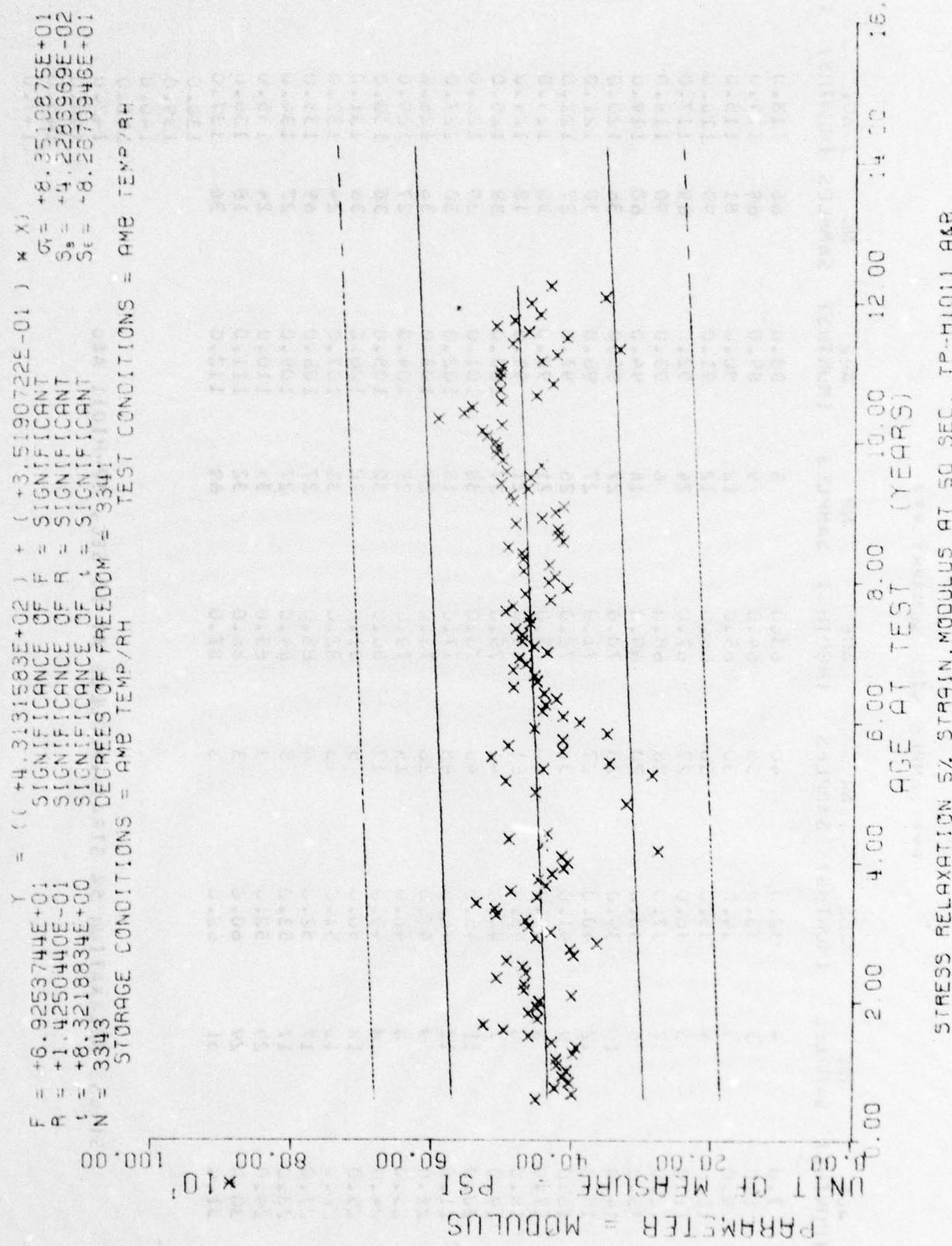


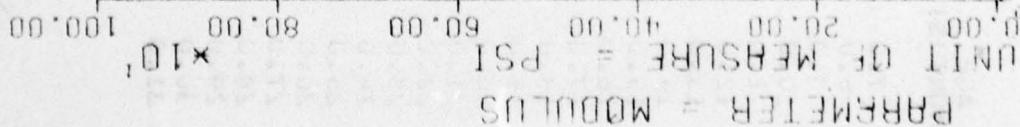
Figure 41

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES										
7.0	4	32.0	42	63.0	3	88.0	66	113.0	65		
8.0	3	33.0	26	64.0	9	89.0	69	114.0	35		
9.0	5	34.0	30	65.0	12	90.0	81	115.0	30		
10.0	4	35.0	30	66.0	12	91.0	99	116.0	27		
11.0	5	36.0	27	67.0	24	92.0	69	117.0	33		
12.0	7	37.0	26	68.0	6	93.0	90	118.0	18		
13.0	5	38.0	20	69.0	18	94.0	60	119.0	33		
14.0	10	39.0	22	70.0	27	95.0	36	120.0	36		
15.0	12	40.0	27	71.0	27	96.0	20	121.0	12		
16.0	9	41.0	38	72.0	26	97.0	27	122.0	9		
17.0	6	42.0	30	73.0	21	98.0	30	123.0	12		
18.0	3	43.0	61	74.0	21	99.0	18	124.0	21		
19.0	7	44.0	44	75.0	27	100.0	39	125.0	21		
20.0	11	45.0	40	76.0	36	101.0	39	126.0	33		
21.0	12	46.0	48	77.0	15	102.0	30	127.0	41		
22.0	9	47.0	32	78.0	27	103.0	36	128.0	37		
23.0	8	48.0	15	79.0	27	104.0	27	129.0	15		
24.0	3	49.0	17	80.0	30	105.0	38	130.0	21		
25.0	18	50.0	5	81.0	20	106.0	36	131.0	21		
26.0	13	51.0	12	82.0	33	107.0	24	132.0	33		
27.0	17	52.0	4	83.0	27	108.0	69	133.0	3		
28.0	17	53.0	5	84.0	27	109.0	27	134.0	9		
29.0	29	54.0	3	85.0	33	110.0	24	135.0	12		
30.0	29	55.0	3	86.0	32	111.0	18	136.0	9		
31.0	51	56.0	3	87.0	69	112.0	36	137.0	10		

$F = 5.8075157E+01$   
 $R = 1.3071180E-01$   
 $N = 3343$   
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF  $\epsilon$  = SIGNIFICANT  
 DEGREES OF FREEDOM = 3341  
 STORAGE CONDITIONS = AMB TEMP/RH

$\gamma_1 = (( +4.0343934E+02) + (+2.9928766E-01)) * X$   
 $S_{\gamma_1} = +7.7431404E+01$   
 $S_a = +3.9272958E-02$   
 $S_{\epsilon} = +7.6778561E+01$   
 TEST CONDITIONS = AMB TEMP/RH



STRESS RELAXATION  $5\% \text{ STRAIN}$ , MODULUS AT 100 SEC, TP-H1011 At2

Figure 42

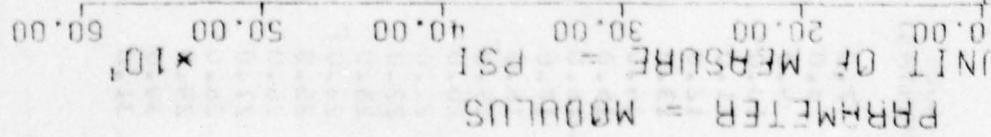
\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	SAMPLES	AGE (MONTHS)	SAMPLES	NR. SAMPLES	AGE (MONTHS)	SAMPLES	NR. SAMPLES	AGE (MONTHS)	SAMPLES
7.0	4	32.0	40	3	38.0	66	66	113.0	16
8.0	3	33.0	38	2	29.0	69	114.0	33	33
9.0	5	34.0	30	05.0	20.0	81	115.0	30	30
10.0	4	35.0	30	66.0	12	91.0	99	116.0	21
11.0	5	36.0	27	67.0	24	92.0	69	117.0	33
12.0	7	37.0	26	68.0	6	93.0	90	118.0	13
13.0	6	38.0	20	69.0	13	94.0	60	119.0	33
14.0	12	39.0	23	70.0	27	95.0	36	120.0	30
15.0	12	40.0	27	71.0	27	96.0	30	121.0	12
16.0	9	41.0	28	72.0	26	97.0	27	122.0	6
17.0	8	42.0	60	73.0	21	98.0	30	123.0	12
18.0	3	43.0	61	74.0	21	99.0	18	124.0	21
19.0	7	44.0	44	75.0	27	100.0	39	125.0	24
20.0	4	45.0	40	76.0	38	101.0	39	126.0	33
21.0	12	46.0	48	77.0	15	102.0	30	127.0	12
22.0	9	47.0	36	78.0	27	103.0	36	128.0	37
23.0	8	48.0	15	79.0	27	104.0	27	129.0	15
24.0	8	49.0	17	80.0	30	105.0	38	130.0	21
25.0	13	50.0	5	81.0	20	106.0	26	131.0	21
26.0	12	51.0	13	82.0	33	107.0	24	132.0	33
27.0	17	52.0	4	83.0	27	108.0	69	133.0	3
28.0	17	53.0	5	84.0	27	109.0	27	134.0	3
29.0	22	54.0	3	85.0	33	110.0	24	135.0	12
30.0	24	56.0	3	86.0	32	111.0	18	136.0	9
31.0	24	62.0	3	87.0	69	112.0	36	137.0	18
								138.0	4

STRESS RELAXATION % STRAIN, MODULUS AT 100 SEC. TP-H1011 AEB

142.0	9
141.0	12
144.0	3
145.0	3
147.0	6

$\gamma = (( +3.3320512E+01 + 1.6741013E-01) * X)$   
 SIGNIFICANT DEGREE OF FREEDOM = 1  
 SIGNIFICANT DEGREE OF FREEDOM = 1  
 SIGNIFICANT DEGREE OF FREEDOM = 1  
 DEGREES OF FREEDOM = 3335  
 STORAGE CONDITIONS = AMB TEMP/RH  
 $G_f = +6.3786812E+01$   
 $S_a = +3.250714E-02$   
 $S_e = +6.3544203E+01$   
 TEST CONDITIONS = AMB TEMP/RH



PRRAMETER = MODULUS

STRESS RELAXATION % STRAIN, MODULUS AT 1000 SEC, TP-HIGH AGE

Figure 43

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES								
7.0	4	32.0	40	63.0	3	38.0	66	113.0	16
8.0	3	32.0	38	64.0	9	89.0	69	114.0	32
9.0	5	34.0	30	65.0	12	90.0	81	115.0	30
10.0	4	35.0	30	66.0	12	91.0	99	116.0	27
11.0	5	36.0	27	67.0	24	92.0	69	117.0	32
12.0	7	37.0	26	68.0	6	93.0	84	118.0	16
13.0	6	38.0	20	69.0	18	94.0	60	119.0	33
14.0	10	39.0	23	70.0	27	95.0	36	120.0	20
15.0	12	40.0	27	71.0	27	96.0	30	121.0	15
16.0	9	41.0	32	72.0	26	97.0	27	122.0	3
17.0	9	42.0	60	73.0	21	98.0	30	123.0	12
18.0	8	43.0	64	74.0	21	99.0	18	124.0	21
19.0	7	44.0	44	75.0	27	100.0	39	125.0	21
20.0	11	45.0	45	76.0	36	101.0	39	126.0	33
21.0	12	46.0	48	77.0	15	102.0	30	127.0	41
22.0	9	47.0	36	78.0	27	103.0	36	128.0	27
23.0	8	48.0	15	79.0	27	104.0	27	129.0	15
24.0	3	49.0	17	80.0	30	105.0	38	130.0	21
25.0	12	50.0	5	81.0	20	106.0	36	131.0	21
26.0	13	51.0	13	82.0	33	107.0	24	132.0	33
27.0	17	52.0	4	83.0	27	108.0	69	133.0	9
28.0	17	53.0	5	84.0	27	109.0	27	134.0	9
29.0	29	58.0	3	85.0	33	110.0	24	135.0	12
30.0	29	60.0	3	86.0	32	111.0	18	136.0	9
31.0	51	62.0	3	87.0	69	112.0	36	137.0	13
								138.0	6
								139.0	21
								140.0	9
								141.0	12
								142.0	9
								144.0	3
								145.0	3
								147.0	6

STRESS RELAXATION 5% STRAIN, MODULUS AT 1000 SEC. TP-H1011 AEB

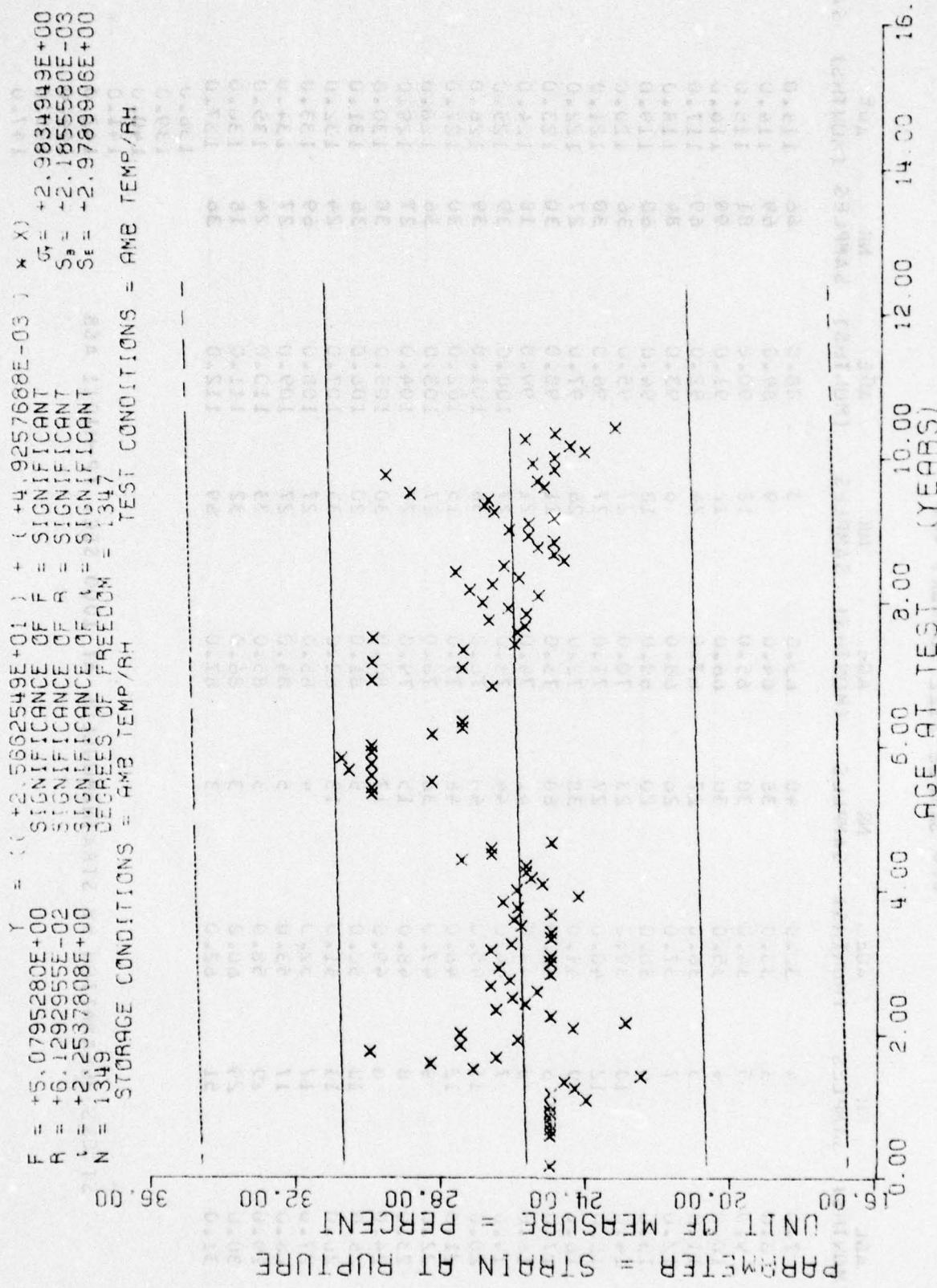


Figure 44

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

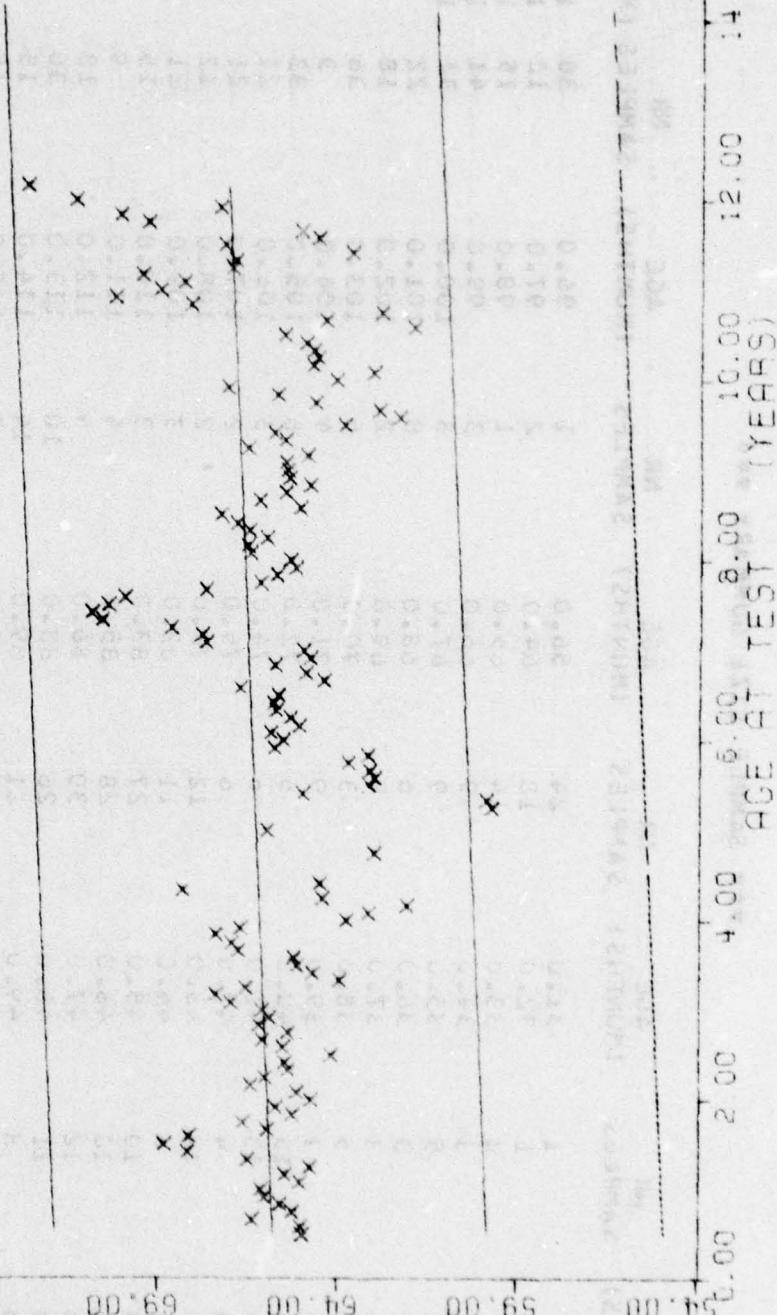
AGE (MONTHS)	NR SAMPLES								
2.0	4	31.0	24	56.0	1	96.0	38	124.0	18
7.0	1	32.0	18	64.0	2	97.0	12	122.0	12
8.0	1	33.0	14	65.0	1	98.0	15	123.0	5
9.0	2	34.0	9	66.0	3	99.0	41	124.0	6
10.0	5	35.0	9	67.0	3	100.0	31	125.0	3
11.0	3	36.0	6	68.0	8	101.0	22		
12.0	3	37.0	9	69.0	2	102.0	18		
13.0	2	38.0	3	70.0	6	103.0	36		
14.0	3	39.0	9	71.0	4	104.0	3		
15.0	12	40.0	2	72.0	6	105.0	33		
16.0	13	41.0	6	74.0	3	106.0	21		
17.0	4	42.0	6	75.0	2	107.0	21		
18.0	47	43.0	12	76.0	2	108.0	22		
19.0	2	44.0	11	78.0	3	109.0	21		
20.0	12	45.0	27	83.0	3	110.0	15		
21.0	12	46.0	28	85.0	4	111.0	9		
22.0	12	47.0	30	86.0	6	112.0	18		
23.0	11	48.0	26	88.0	10	113.0	30		
24.0	3	49.0	21	89.0	14	114.0	15		
25.0	16	50.0	18	90.0	3	115.0	18		
26.0	24	51.0	14	91.0	5	116.0	21		
27.0	23	52.0	7	92.0	19	117.0	15		
28.0	21	53.0	2	93.0	14	118.0	18		
29.0	28	54.0	3	94.0	20	119.0	33		
30.0	27	55.0	3	95.0	16	120.0	21		

FP-H1011 PROPELLANT, CONSTANT STRAIN

STORAGE CONDITIONS = SAME TEMP AS TEST CONDITIONS  
 TEST CONDITIONS = 40°C / 84°F  
 FIVE TEMPS / BULK  
 15696 DEGREES OF FREEDOM = 15894  
 SIGNIFICANT = +1.0245854E+01  
 SIGNIFICANT = +1.0031612E+02  
 SIGNIFICANT = +1.04977535E+02  
 SIGNIFICANT = +1.05781377E+02  
 SIGNIFICANT = +1.3456388E-03  
 SIGNIFICANT = +3.6409363E+00  
 SIGNIFICANT = +3.6409363E+00  
 SIGNIFICANT = +3.6409363E+00  
 SIGNIFICANT = +3.6409363E+00  
 SIGNIFICANT = +3.6409363E+00

PROGRAM = 10 SECOND HARDNESS

79.00 69.00 64.00 69.00 74.00 79.00



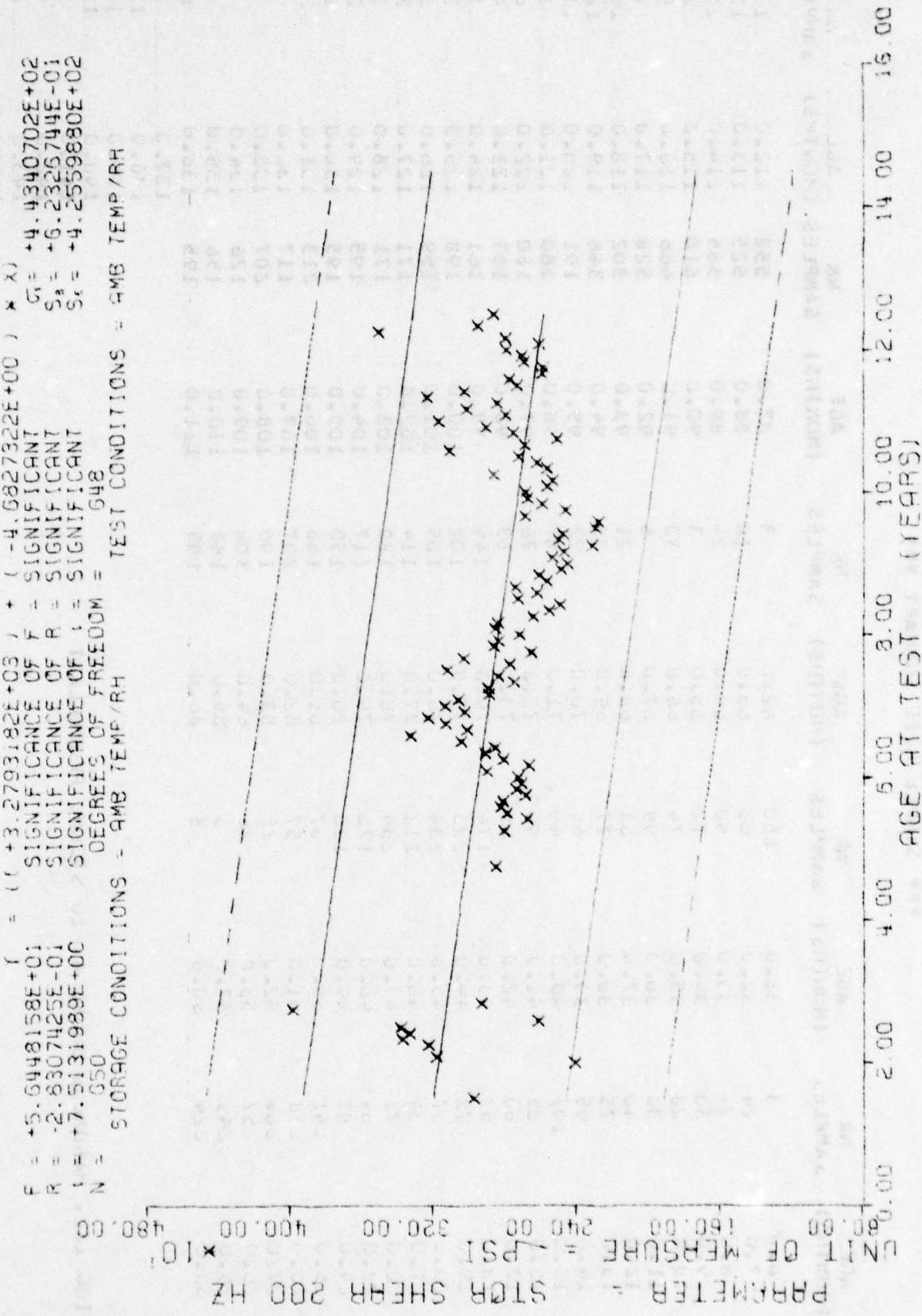
WING 142, HARDNESS SHORE A, 10 SECOND PROPELLANT

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES										
6.0	3	31.0	150	62.0	3	87.0	552	112.0	171		
7.0	24	32.0	63	63.0	18	88.0	525	113.0	135		
8.0	74	33.0	50	64.0	24	89.0	565	114.0	152		
9.0	30	34.0	72	65.0	3	90.0	610	115.0	87		
10.0	23	35.0	74	66.0	30	91.0	466	116.0	93		
11.0	30	36.0	99	67.0	6	92.0	528	117.0	75		
12.0	40	37.0	61	68.0	21	93.0	302	118.0	40		
13.0	75	38.0	77	69.0	35	94.0	346	119.0	21		
14.0	95	39.0	68	70.0	22	95.0	191	120.0	117		
15.0	105	40.0	49	71.0	87	96.0	180	121.0	15		
16.0	22	41.0	99	72.0	78	97.0	160	122.0	63		
17.0	60	42.0	95	73.0	63	98.0	183	123.0	42		
18.0	57	43.0	174	74.0	144	99.0	161	124.0	18		
19.0	72	44.0	222	75.0	102	100.0	198	125.0	36		
20.0	27	45.0	234	76.0	105	101.0	159	126.0	33		
21.0	34	46.0	212	77.0	114	102.0	171	127.0	33		
22.0	73	47.0	234	78.0	120	103.0	171	128.0	15		
23.0	5*	48.0	176	79.0	117	104.0	195	129.0	24		
24.0	87	49.0	138	80.0	150	105.0	195	130.0	15		
25.0	41	50.0	67	61.0	160	106.0	213	131.0	24		
26.0	18	51.0	57	82.0	207	107.0	117	132.0	9		
27.0	20*	52.0	25	83.0	190	108.0	207	133.0	3		
28.0	257	53.0	26	84.0	308	109.0	126	134.0	6		
29.0	242	57.0	2	85.0	180	110.0	156	135.0	9		
30.0	224	50.0	3	86.0	195	111.0	195	136.0	12		
							131.1	b			
							136.0	15			
							139.0	18			
							140.0	12			
							141.0	3			
							142.0	9			
							143.0	6			
							144.0	3			
							146.0	3			

WING & LEE, HAKUNESS SHURE A, 10 SECUND PROPELLANT

TEST CONDITIONS = QMB TEMP/RH  
 STORAGE CONDITIONS = QMB TEMP/RH  
 N = 650  
 DEGREES OF FREEDOM = 648  
 SIGNIFICANCE OF F = 0.05  
 SIGNIFICANCE OF R = 0.05  
 SIGNIFICANCE OF S<sup>2</sup> = 0.05  
 SIGNIFICANCE OF T = 0.05  
 F = 45.6448158E+01  
 R = -2.6307425E-01  
 S<sup>2</sup> = +7.5131989E+00  
 T = +5.2793482E+03



TP-HIGH DYNAMIC RESPONSE CENTER-WT 70 GM. STOP SHEAR AT 200 Hz

Figure 16

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
10.0	1	17.0	9	102.0	7	127.0	3
24.0	1	18.0	5	103.0	11	128.0	1
25.0	3	19.0	5	104.0	6	129.0	4
27.0	7	20.0	5	105.0	5	130.0	6
27.0	7	21.0	9	106.0	13	131.0	5
28.0	6	22.0	9	107.0	3	132.0	4
29.0	8	23.0	11	108.0	6	133.0	2
30.0	41	24.0	6	109.0	7	134.0	4
31.0	3	25.0	9	110.0	7	135.0	5
32.0	1	26.0	9	111.0	6	136.0	6
33.0	2	27.0	14	112.0	4	137.0	8
34.0	3	28.0	14	113.0	3	138.0	7
37.0	1	29.0	13	114.0	6	139.0	4
42.0	1	30.0	45	115.0	3	140.0	4
45.0	1	31.0	32	116.0	6	141.0	4
46.0	2	32.0	25	117.0	8	142.0	2
47.0	4	33.0	23	118.0	6	143.0	3
46.0	3	34.0	10	119.0	4	144.0	2
49.0	4	35.0	7	120.0	7	145.0	4
70.0	7	36.0	7	121.0	10	146.0	2
71.0	3	37.0	2	122.0	6	147.0	2
72.0	7	38.0	4	123.0	5	148.0	2
73.0	7	39.0	4	124.0	4	150.0	1
74.0	2	40.0	9	125.0	4		
75.0	7	41.0	7	126.0	5		
76.0	9						

FIG. 162 - 1 TP-HILL DYNAMIC RESPONSE CENTER-MT TO GM. STOR SHEAR AT 200 H

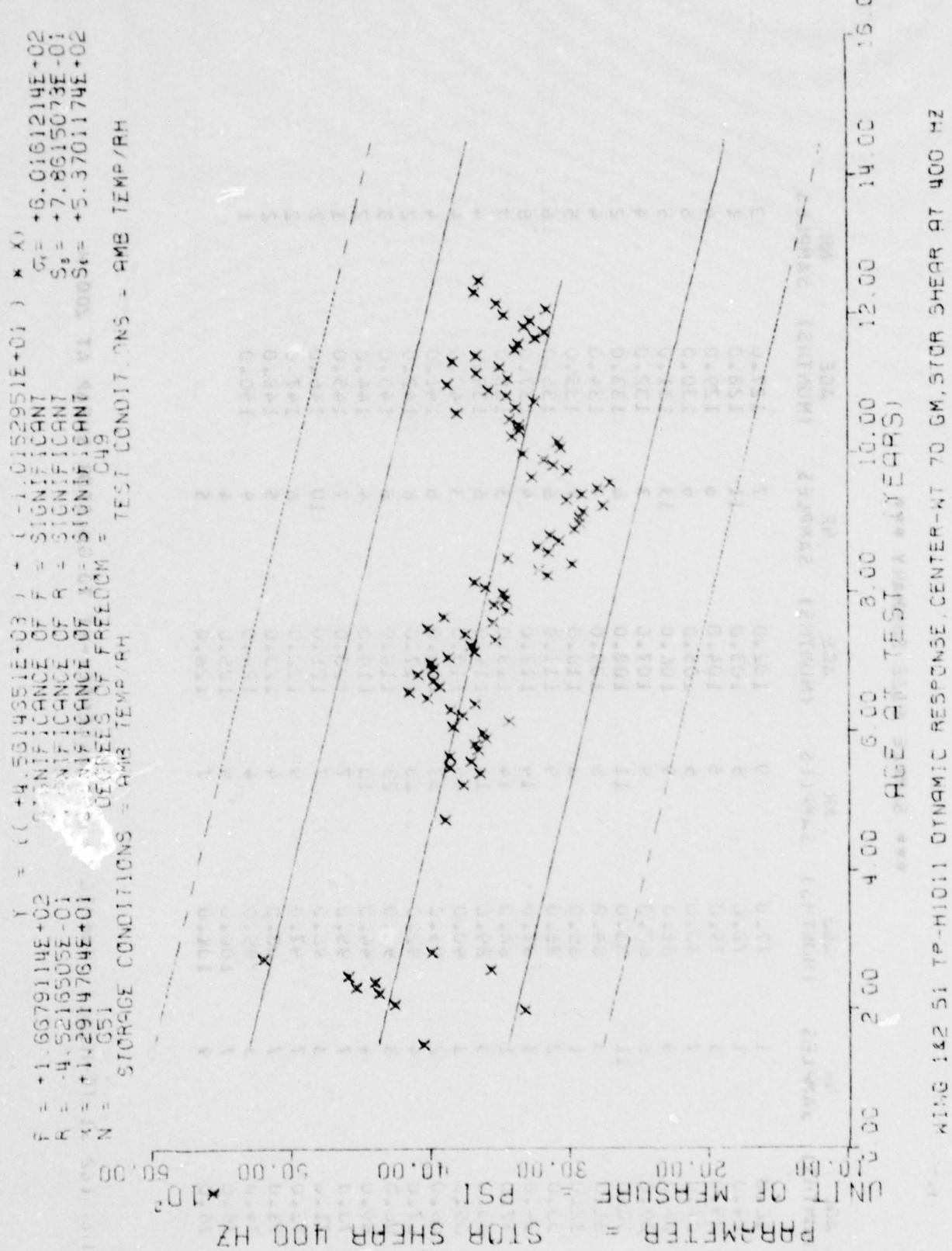


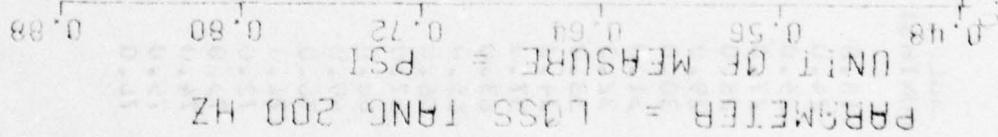
Figure 47

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES
18.0	1	77.0	2	102.0	7	127.0	3
24.0	1	76.0	5	103.0	11	128.0	1
25.0	3	79.0	5	104.0	6	129.0	4
27.0	7	80.0	3	105.0	6	130.0	6
28.0	6	81.0	9	106.0	13	131.0	5
29.0	8	82.0	9	107.0	3	132.0	4
30.0	11	83.0	11	108.0	6	133.0	2
31.0	3	84.0	8	109.0	7	134.0	4
32.0	1	85.0	6	110.0	7	135.0	5
33.0	2	86.0	9	111.0	6	136.0	6
34.0	5	87.0	14	112.0	4	137.0	8
57.0	1	88.0	14	113.0	4	138.0	7
63.0	2	89.0	13	114.0	6	139.0	4
65.0	3	90.0	45	115.0	3	140.0	4
66.0	2	91.0	33	116.0	6	141.0	4
67.0	4	92.0	28	117.0	3	142.0	2
68.0	3	93.0	23	118.0	8	143.0	3
69.0	4	94.0	10	119.0	4	144.0	2
70.0	7	95.0	7	120.0	7	145.0	1
71.0	3	96.0	7	121.0	10	146.0	2
72.0	7	97.0	9	122.0	6	147.0	2
73.0	7	98.0	4	123.0	3	148.0	2
74.0	3	99.0	4	124.0	4	150.0	1
75.0	7	100.0	9	125.0	4		
76.0	9	101.0	7	126.0	5		

WING 162, 1 TP-4111 DYNAMIC RESPONSE. CENTER-WI 70 CM. STOR SHEAR AT 400 H

$\text{P} = 1.4354786E+01$      $\text{C} = (( +6.1081512E+01 ) + ( +2.0696202E-04 ) \times X)$   
 SIGNIFICANCE OF P = SIGNIFICANT  
 SIGNIFICANCE OF C = SIGNIFICANT  
 SIGNIFICANCE OF X = SIGNIFICANT  
 DEGREES OF FREEDOM = 649  
 STORAGE CONDITIONS = AMB TEMP/RH



WING 142 S1 TP-H1011 DYNAMIC RESPONSE, CENTER-WT 70 GM, LOSS TANGENT AT 200 Hz

Figure 48

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
18.0	1	17.0	9	102.0	7	127.0	3
24.0	1	78.0	5	103.0	11	128.0	1
25.0	3	79.0	5	104.0	6	129.0	4
27.0	7	80.0	5	105.0	6	130.0	6
28.0	9	81.0	9	106.0	13	131.0	5
29.0	6	82.0	9	107.0	3	132.0	4
30.0	11	83.0	11	108.0	6	133.0	2
31.0	3	84.0	8	109.0	7	134.0	4
32.0	1	85.0	9	110.0	7	135.0	5
33.0	2	86.0	9	111.0	6	136.0	6
34.0	3	87.0	14	112.0	4	137.0	8
37.0	1	88.0	14	113.0	3	138.0	7
63.0	3	89.0	13	114.0	6	139.0	4
65.0	2	90.0	45	115.0	3	140.0	4
66.0	2	91.0	33	116.0	6	141.0	4
67.0	4	92.0	28	117.0	3	142.0	2
68.0	1	93.0	22	118.0	8	143.0	3
69.0	4	94.0	10	119.0	4	144.0	2
70.0	7	95.0	7	120.0	7	145.0	1
71.0	1	96.0	7	121.0	10	146.0	2
72.0	7	97.0	9	122.0	3	147.0	2
73.0	7	98.0	4	123.0	5	148.0	2
74.0	3	99.0	4	124.0	4	150.0	1
75.0	7	100.0	9	125.0	4		
76.0	9	101.0	7	126.0	5		

FIG. 16.1 TP-HU1 DYNAMIC RESPONSE CENTER-WT 70 GM. LOSS TANGENT AT 200 Hz

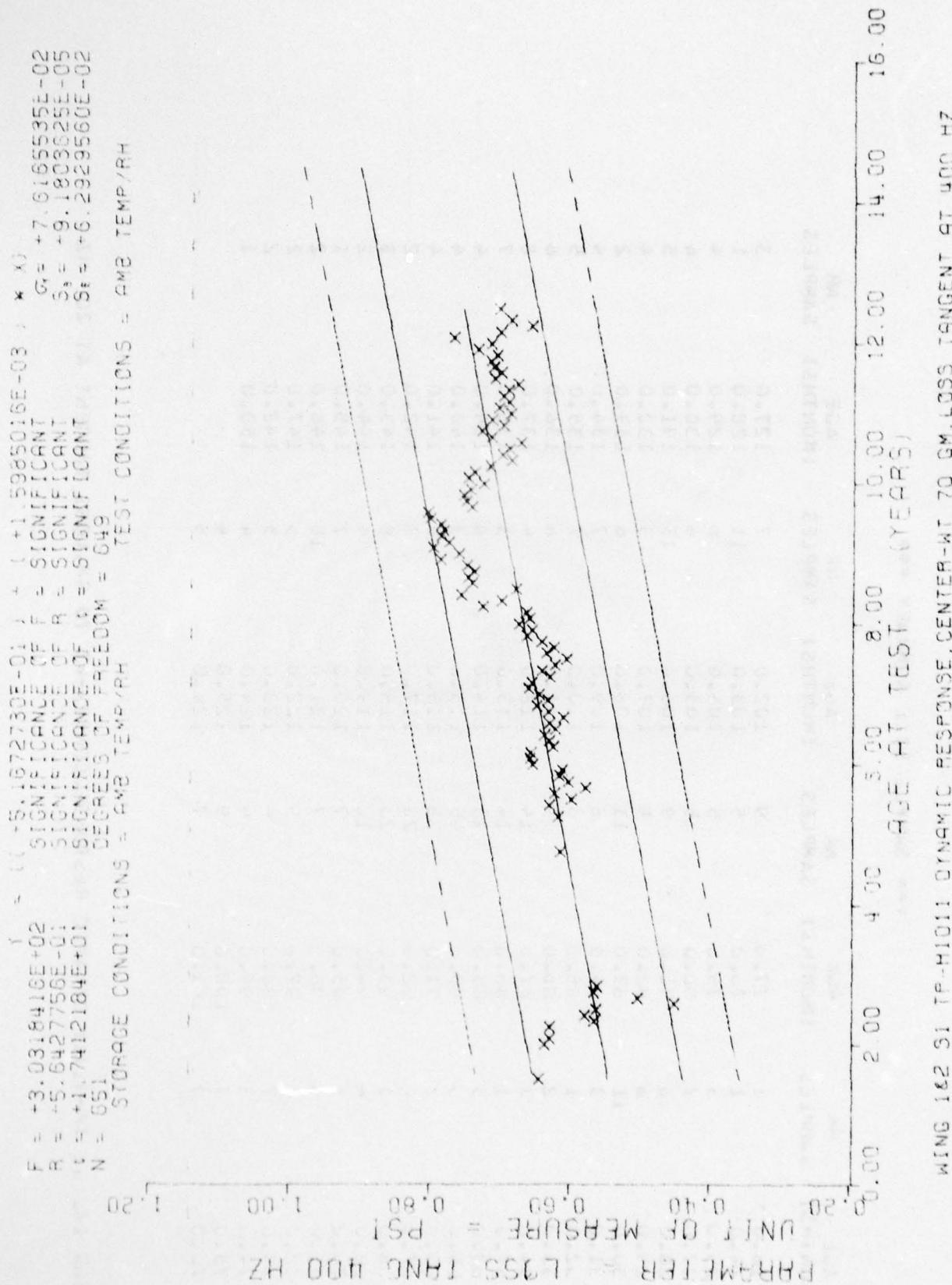


Figure 49

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
16.0	4	77.0	9	102.0	7	127.0	3
24.0	1	78.0	5	103.0	11	128.0	1
25.0	3	79.0	5	104.0	6	129.0	4
27.0	7	80.0	5	105.0	6	130.0	6
28.0	8	81.0	9	106.0	13	131.0	5
29.0	9	82.0	9	107.0	3	132.0	4
30.0	11	83.0	11	108.0	6	133.0	2
31.0	3	84.0	6	109.0	7	134.0	4
32.0	1	85.0	6	110.0	7	135.0	5
33.0	2	86.0	9	111.0	6	136.0	6
34.0	3	87.0	14	112.0	4	137.0	8
57.0	1	88.0	14	113.0	4	138.0	7
63.0	3	89.0	13	114.0	6	139.0	4
65.0	3	90.0	45	115.0	3	140.0	4
66.0	2	91.0	35	116.0	6	141.0	4
67.0	4	92.0	28	117.0	8	142.0	2
68.0	3	92.0	23	118.0	6	143.0	3
69.0	4	94.0	10	119.0	4	144.0	2
70.0	7	95.0	7	120.0	7	145.0	1
71.0	3	96.0	7	121.0	9	146.0	2
72.0	7	97.0	9	122.0	6	147.0	2
73.0	7	98.0	4	123.0	5	148.0	2
74.0	3	99.0	4	124.0	4	150.0	1
75.0	7	100.0	9	125.0	4		
76.0	9	101.0	7	126.0	5		

WING LAG AT TRAILING DYNAMIC RESPONSE, CENTER-WI TO GM, LOSS TANGENT AT 400 Hz

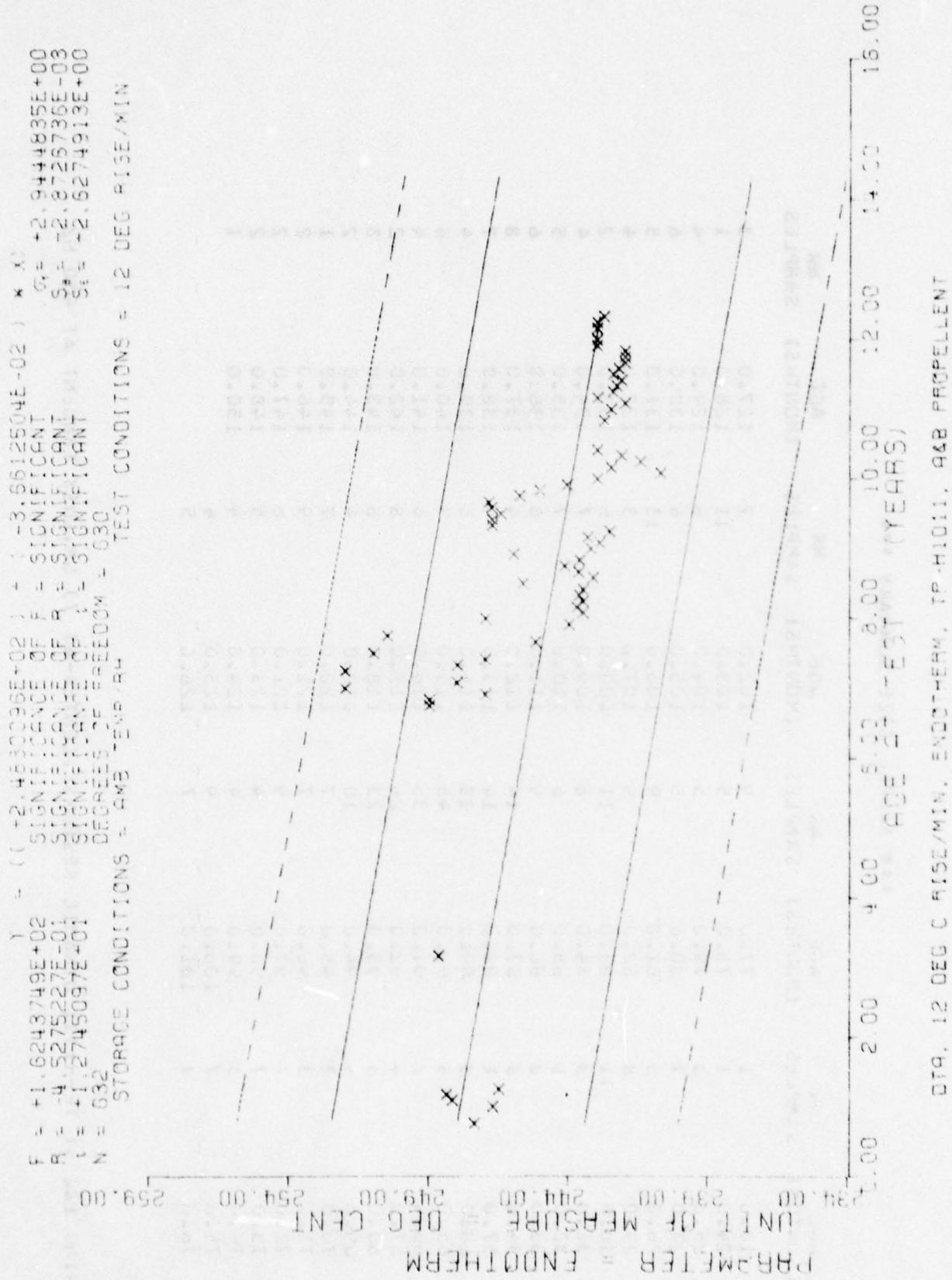


Figure 50

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	16	103.0	21	133.0	4
12.0	24	104.0	12	134.0	4
13.0	12	105.0	6	135.0	16
14.0	13	106.0	27	136.0	10
15.0	3	107.0	9	137.0	3
36.0	3	108.0	9	138.0	7
81.0	1	109.0	11	139.0	17
82.0	1	110.0	23	140.0	6
63.0	1	111.0	11	141.0	2
84.0	4	112.0	17	142.0	2
65.0	2	113.0	34	143.0	4
87.0	1	114.0	11	144.0	2
33.0	1	115.0	19	145.0	5
69.0	1	116.0	18	146.0	6
90.0	2	117.0	14	147.0	8
22.0	5	118.0	17		
93.0	4	119.0	24		
95.0	4	120.0	12		
96.0	2	121.0	18		
97.0	10	122.0	6		
98.0	15	123.0	9		
99.0	2	124.0	8		
100.0	14	125.0	8		
101.0	14	130.0	4		
102.0	9	132.0	2		

DTA, 12 DEG C RISE/MIN. ENTHERM. TP-H1011, AEB PROPELLENT

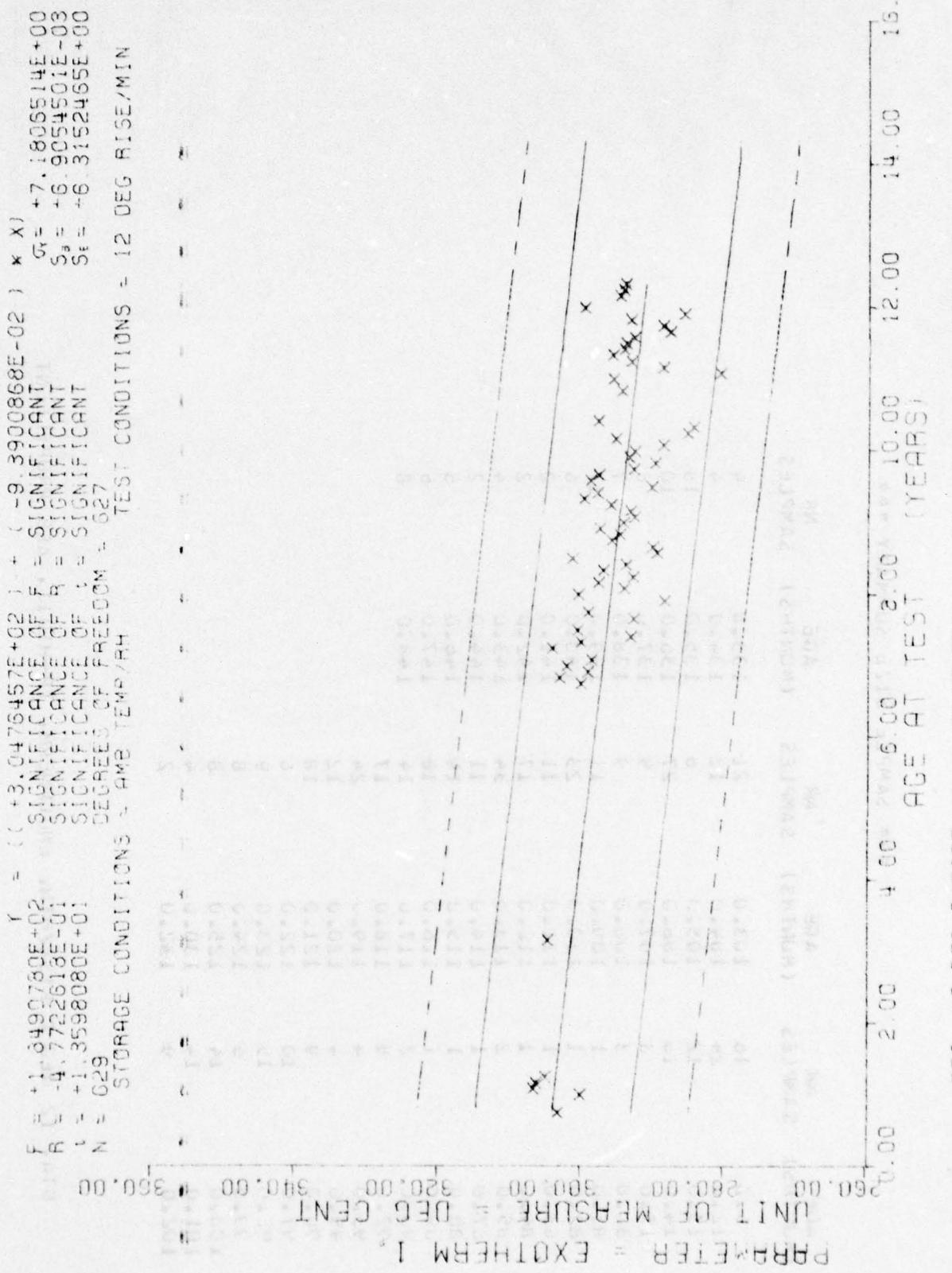


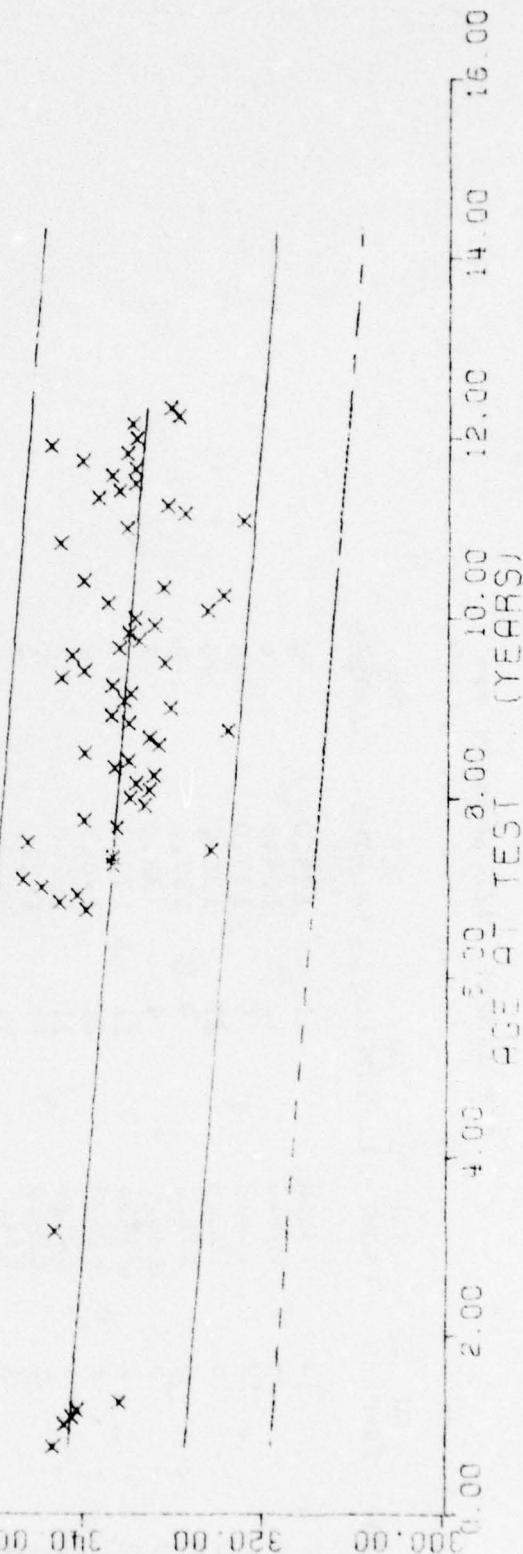
Figure 51

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	10	105.0	21	133.0	4
12.0	24	104.0	12	134.0	4
13.0	12	105.0	6	135.0	16
14.0	12	106.0	27	136.0	19
15.0	3	107.0	9	137.0	8
36.0	3	106.0	9	138.0	7
31.0	4	109.0	11	139.0	17
82.0	4	110.0	21	140.0	6
83.0	4	111.0	11	141.0	2
34.0	4	112.0	17	142.0	2
35.0	2	113.0	33	143.0	4
67.0	4	114.0	11	144.0	2
63.0	1	115.0	19	146.0	6
89.0	1	116.0	16	147.0	6
90.0	2	117.0	14	148.0	8
92.0	3	118.0	17		
93.0	4	119.0	24		
95.0	4	120.0	12		
96.0	2	121.0	18		
97.0	12	122.0	6		
98.0	15	123.0	9		
29.0	2	124.0	2		
100.0	14	125.0	8		
101.0	14	130.0	4		
102.0	2	132.0	2		

UNIT OF MEASURE = DEG CENT

PARHMETR = EXOTHEM 2.



BT9, 12 DEG C RISE/MIN.  
EXOTHERM #2, TP-H1G11, #2 PROPELLENT

Figure 52

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
5.0	16	103.0	16	133.0	4
12.0	24	104.0	10	134.0	4
12.0	12	105.0	4	135.0	15
14.0	10	106.0	23	136.0	10
15.0	6	107.0	8	137.0	8
18.0	3	108.0	9	138.0	7
21.0	1	109.0	8	139.0	16
22.0	1	110.0	16	140.0	5
23.0	1	111.0	11	141.0	2
24.0	4	112.0	15	142.0	2
25.0	2	113.0	34	143.0	2
27.0	1	114.0	10	144.0	2
28.0	1	115.0	19	146.0	6
29.0	1	116.0	13	147.0	5
30.0	2	117.0	13	148.0	8
32.0	2	118.0	13		
33.0	4	119.0	22		
35.0	*	120.0	12		
36.0	0	121.0	18		
37.0	7	122.0	6		
38.0	12	123.0	8		
39.0	*	124.0	7		
40.0	14	125.0	8		
41.0	13	130.0	4		
42.0	9	132.0	2		

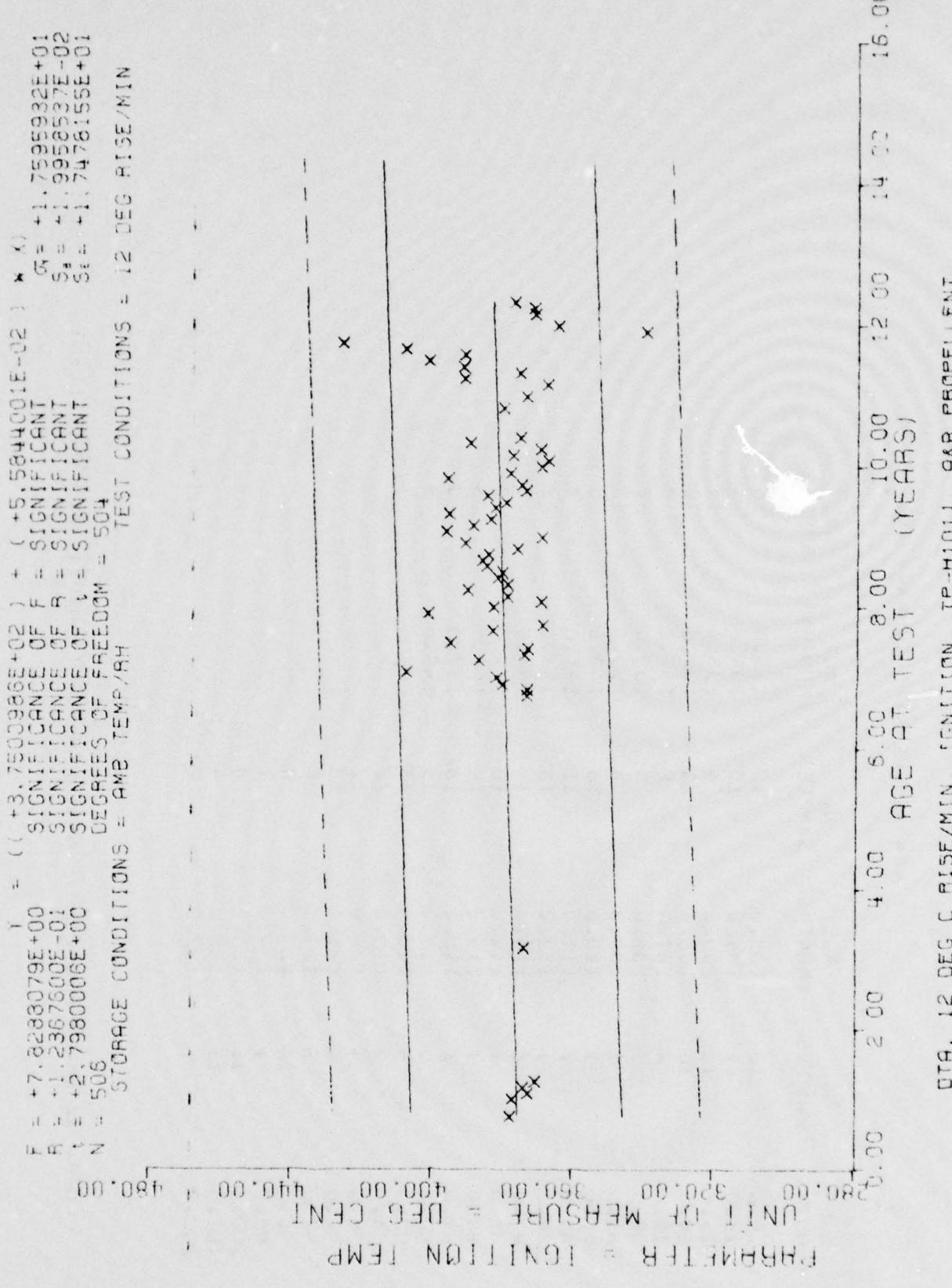
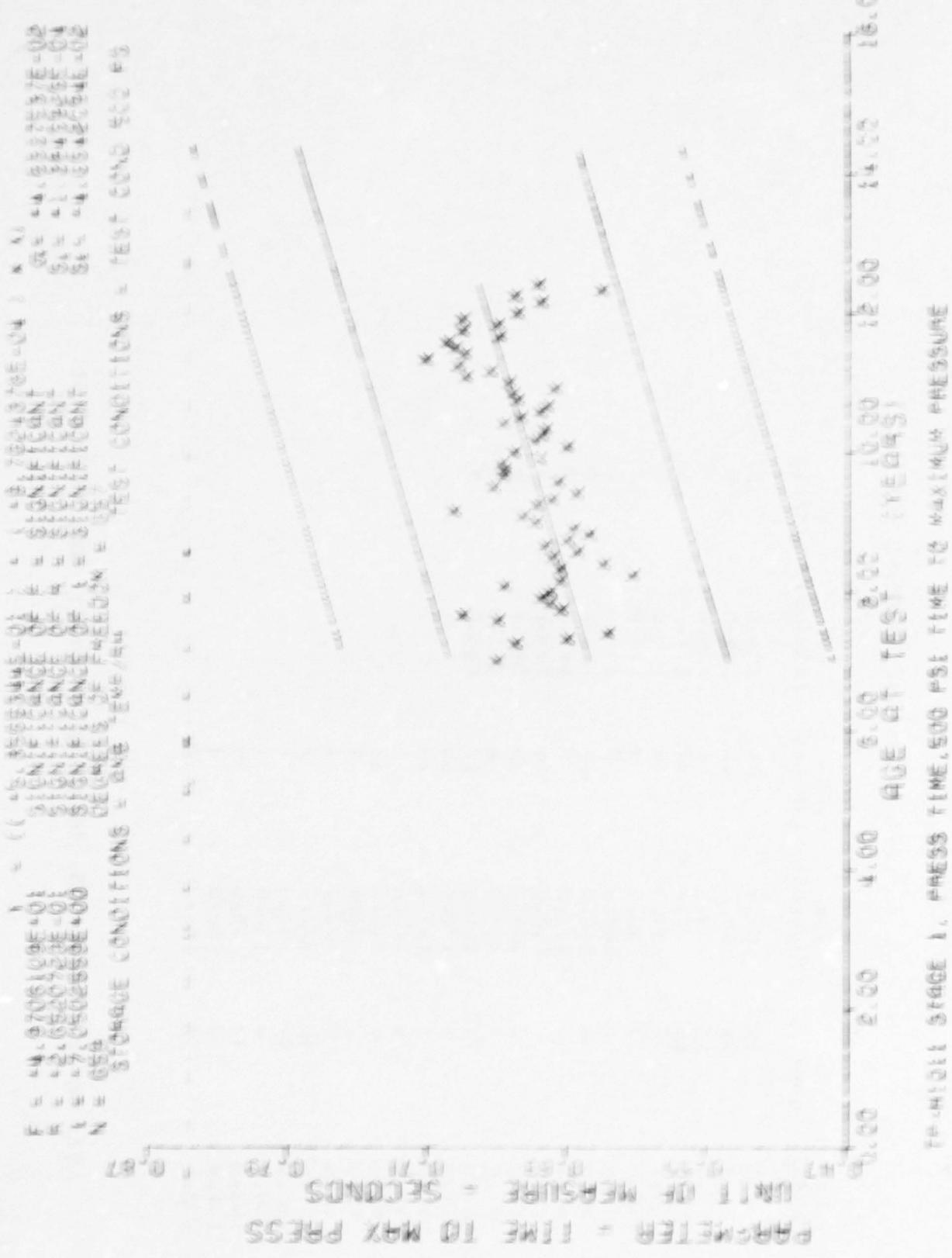


Figure 53

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
6.0	16	103.0	20	134.0	2
12.0	24	104.0	11	135.0	9
13.0	12	105.0	6	136.0	7
14.0	16	106.0	23	137.0	5
15.0	3	107.0	9	138.0	5
33.0	3	108.0	9	139.0	12
81.0	1	109.0	7	140.0	3
92.0	4	110.0	15	141.0	2
63.0	1	111.0	7	142.0	2
34.0	1	112.0	14	144.0	2
85.0	2	113.0	23	146.0	4
87.0	1	114.0	8	147.0	5
63.0	1	115.0	17	148.0	8
69.0	1	116.0	19		
90.0	2	117.0	10		
92.0	4	118.0	14		
93.0	4	119.0	18		
95.0	2	120.0	5		
96.0	9	121.0	17		
97.0	10	122.0	3		
98.0	15	123.0	7		
99.0	4	124.0	5		
100.0	12	125.0	8		
101.0	8	130.0	2		
102.0	9	132.0	2		

DATA • 12 DEG C RISE/MIN. IGNITION. TP-H1011. AEB PROPELLANT



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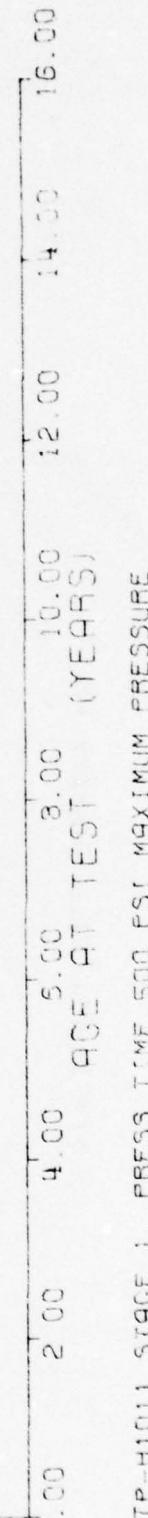
\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
64.0	2	112.0	9	137.0	26
67.0	4	113.0	11	138.0	9
68.0	2	114.0	4	139.0	11
69.0	3	115.0	25	140.0	14
71.0	3	116.0	15	141.0	12
92.0	4	117.0	17	142.0	6
93.0	3	118.0	23	143.0	10
94.0	2	119.0	13	144.0	7
95.0	2	120.0	16	146.0	4
96.0	4	121.0	12	147.0	2
97.0	5	122.0	7	148.0	2
98.0	3	123.0	24	149.0	3
99.0	2	124.0	15		
100.0	7	125.0	30		
101.0	10	126.0	15		
102.0	8	127.0	24		
103.0	2	128.0	30		
104.0	12	129.0	21		
105.0	6	130.0	21		
106.0	7	131.0	16		
107.0	14	132.0	12		
108.0	16	133.0	10		
109.0	10	134.0	5		
110.0	4	135.0	4		
111.0	4	136.0	10		

$\gamma = 1.17180117E+00$  ;  $x(x)$   
 $+ 3.65782289E+03$   
 $\text{SIGNIFICANT}$   
 $+ 1.0149405E+02$   
 $S^2 = 1.23884340E-01$   
 $\text{SIGNIFICANT}$   
 $+ 2.9031324E+01$   
 $\text{SIGNIFICANT}$   
 $+ 5.9031324E+01$   
 $\text{DEGREES OF FREEDOM} = 658$   
 $\text{TEST CONDITIONS} = \text{TEST COND 500 PS}$   
 $560$   
 $\text{STORAGE CONDITIONS} = \text{STORAGE TEMP/RH}$

UNIT OF MEASURE = PSI  
 $\times 10^3$   
 320.00 340.00 360.00 380.00 400.00 420.00

PRESSURE = MAXIMUM PRESSURE



TP-H101 STAGE I, PRESSURE, 500 PSI, MAXIMUM PRESSURE

Figure 55

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	N.R. SAMPLES	AGE (MONTHS)	N.R. SAMPLES	AGE (MONTHS)	N.R. SAMPLES
34.0	2	112.0	9	137.0	26
87.0	1	143.0	14	138.0	9
88.0	2	144.0	4	139.0	11
89.0	3	145.0	25	140.0	14
91.0	3	146.0	15	141.0	12
92.0	4	147.0	17	142.0	6
93.0	3	148.0	23	143.0	10
94.0	2	149.0	16	144.0	7
95.0	2	120.0	46	146.0	4
96.0	4	121.0	42	147.0	2
97.0	2	122.0	7	148.0	2
98.0	2	123.0	24	149.0	3
99.0	3	124.0	15		
100.0	7	125.0	30		
101.0	10	126.0	12		
102.0	3	127.0	39		
103.0	2	128.0	30		
104.0	10	129.0	21		
105.0	2	130.0	24		
106.0	7	131.0	18		
107.0	11	132.0	12		
108.0	12	133.0	11		
109.0	16	134.0	5		
110.0	4	135.0	4		
111.0	4	136.0	10		

TP-HIOLI STAGE 1, PRESS TIME,500 PSI MAXIMUM PRESSURE

Figure 56

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	PER SAMPLES	AGE (MONTHS)	NK SAMPLES
83.0	1	109.0	14
84.0	1	110.0	7
85.0	1	111.0	8
87.0	2	112.0	11
88.0	1	113.0	11
89.0	2	114.0	7
90.0	2	115.0	14
91.0	3	116.0	11
92.0	2	117.0	16
93.0	2	118.0	12
94.0	2	119.0	11
95.0	3	120.0	8
96.0	3	121.0	4
97.0	2	122.0	7
98.0	2	123.0	3
99.0	7		
100.0	9		
101.0	10		
102.0	9		
103.0	7		
104.0	3		
105.0	2		
106.0	2		
107.0	12		
108.0	17		

FIG. 162. NEAR UF EXPLOSION. IPH-1011

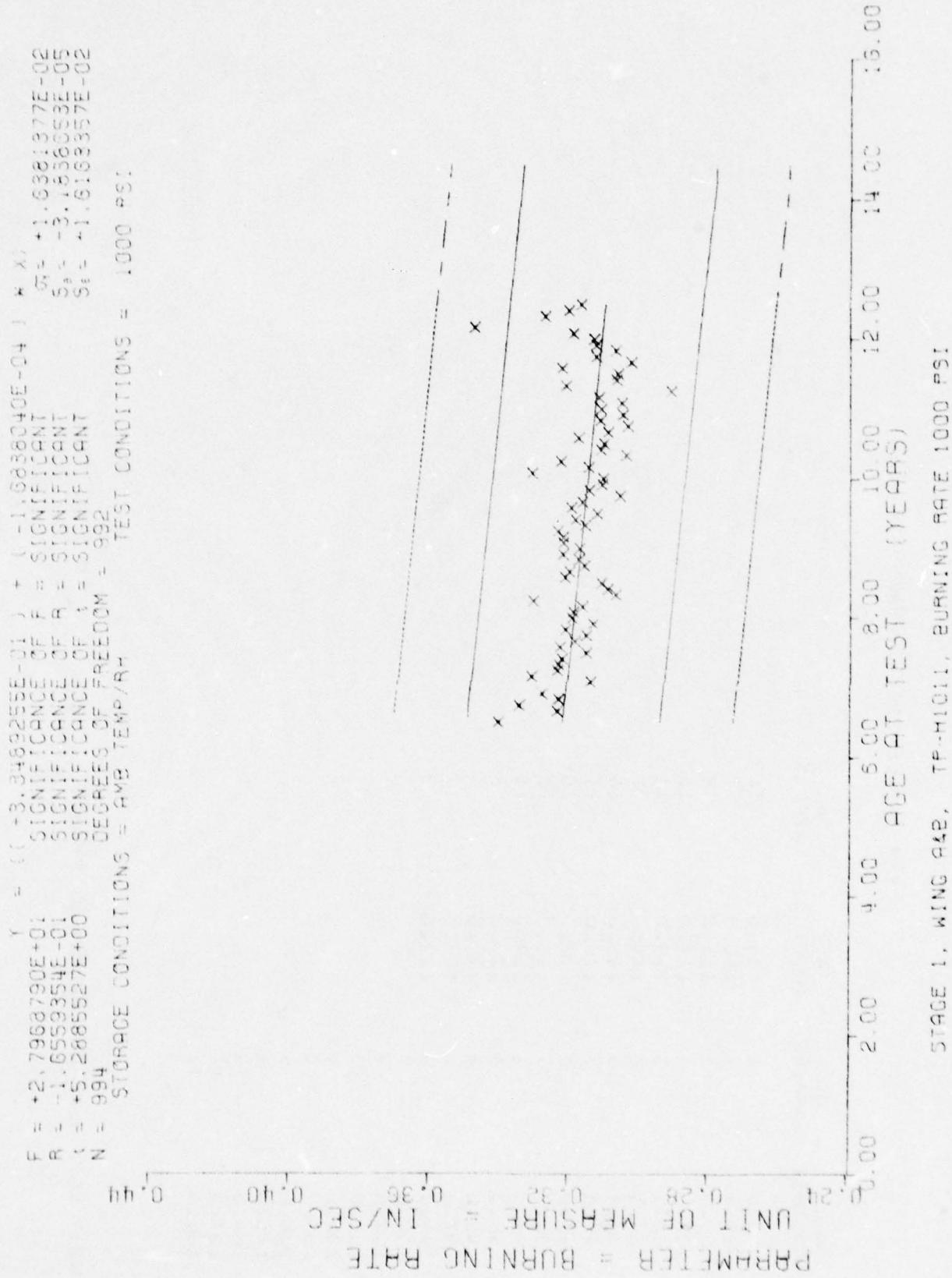


Figure 57

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
78.0	3	105.0	21	130.0	24
80.0	8	106.0	18	131.0	15
81.0	2	107.0	21	132.0	12
82.0	3	108.0	16	133.0	17
83.0	9	109.0	15	134.0	9
85.0	3	110.0	9	135.0	3
86.0	3	111.0	24	136.0	21
87.0	9	112.0	27	137.0	27
88.0	12	113.0	21	138.0	13
89.0	6	114.0	21	139.0	24
90.0	3	115.0	18	140.0	12
91.0	17	116.0	18	141.0	15
92.0	15	117.0	45	142.0	3
93.0	2	118.0	21	143.0	9
94.0	2	119.0	18	144.0	6
95.0	12	120.0	21	145.0	6
96.0	9	121.0	18	146.0	3
97.0	3	122.0	18	147.0	3
98.0	9	123.0	15	148.0	9
99.0	2	124.0	21	149.0	3
100.0	6	125.0	24	150.0	3
101.0	15	126.0	29		
102.0	18	127.0	20		
103.0	18	128.0	26		
104.0	15	129.0	21		

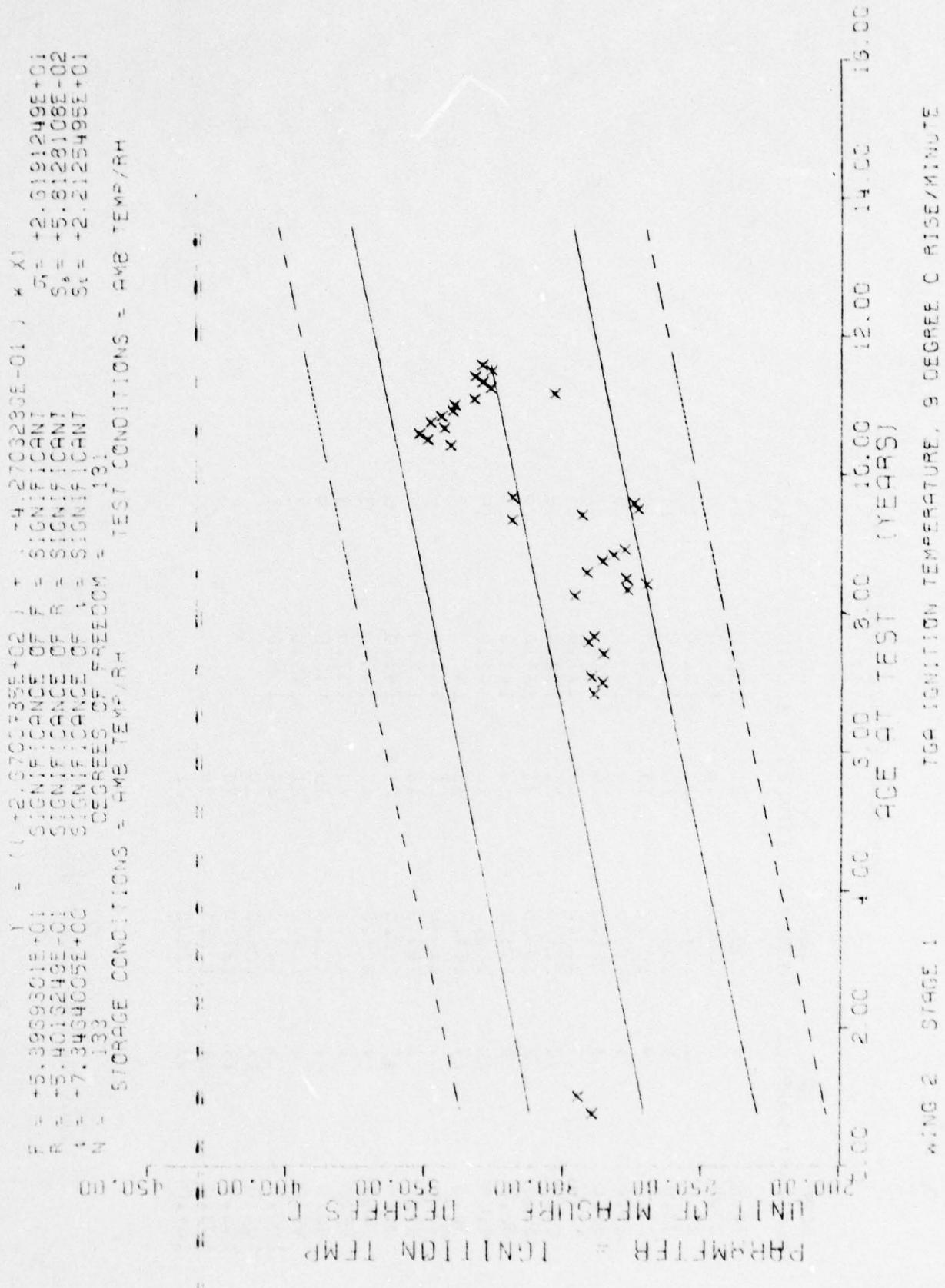


Figure 58

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NO. SAMPLES	AGE (MONTHS)	NO. SAMPLES
9.0	6	129.0	5
12.0	7	130.0	3
32.0	4	131.0	6
64.0	4	132.0	5
32.0	4	133.0	4
89.0	2	134.0	6
91.0	1	135.0	8
92.0	4	136.0	11
99.0	4	137.0	8
106.0	2	138.0	2
101.0	4	139.0	5
102.0	3		
103.0	3		
105.0	3		
106.0	4		
107.0	2		
112.0	2		
113.0	3		
114.0	4		
115.0	3		
116.0	3		
125.0	3		
126.0	1		
127.0	1		
128.0	9		
<b>155</b>			

WING 2 STAGE 1

TGA IGNITION TEMPERATURE, 9 DEGREE C RISE/MINUTE

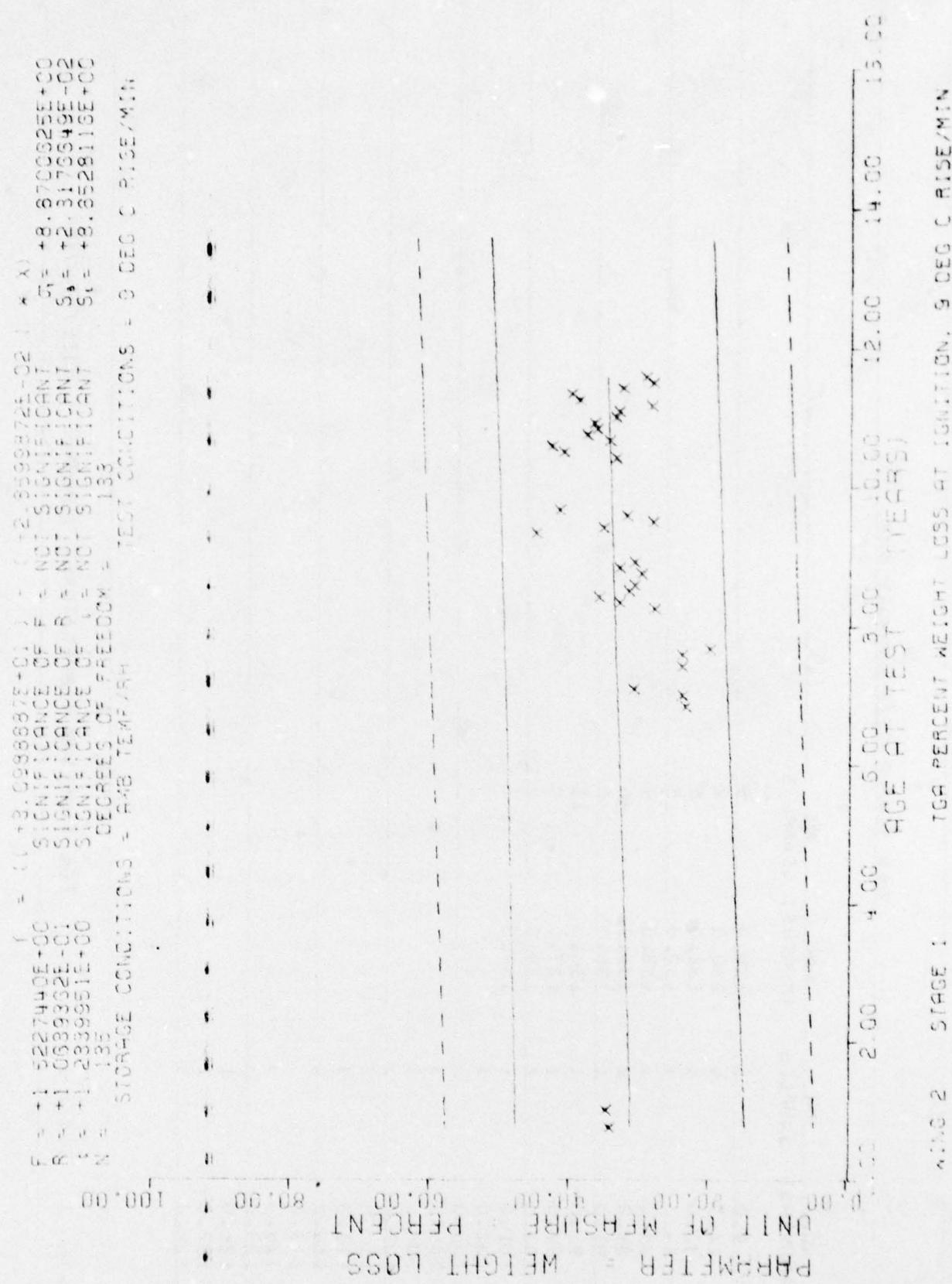


Figure 59

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES
9.0	2	129.0	5
12.0	4	130.0	8
32.0	1	131.0	6
34.0	1	132.0	5
35.0	1	133.0	4
39.0	2	134.0	3
91.0	1	135.0	10
92.0	1	136.0	14
99.0	4	137.0	3
100.0	2	138.0	2
101.0	1	139.0	5
102.0	2		
103.0	3		
105.0	2		
106.0	1		
107.0	2		
112.0	2		
113.0	3		
114.0	2		
115.0	3		
116.0	3		
117.0	2		
126.0	1		
127.0	1		
128.0	2		

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WING 2 STAGE 4 TGA PERCENT WEIGHT LOSS AT IGNITION, 9 DEG C RISE/MIN

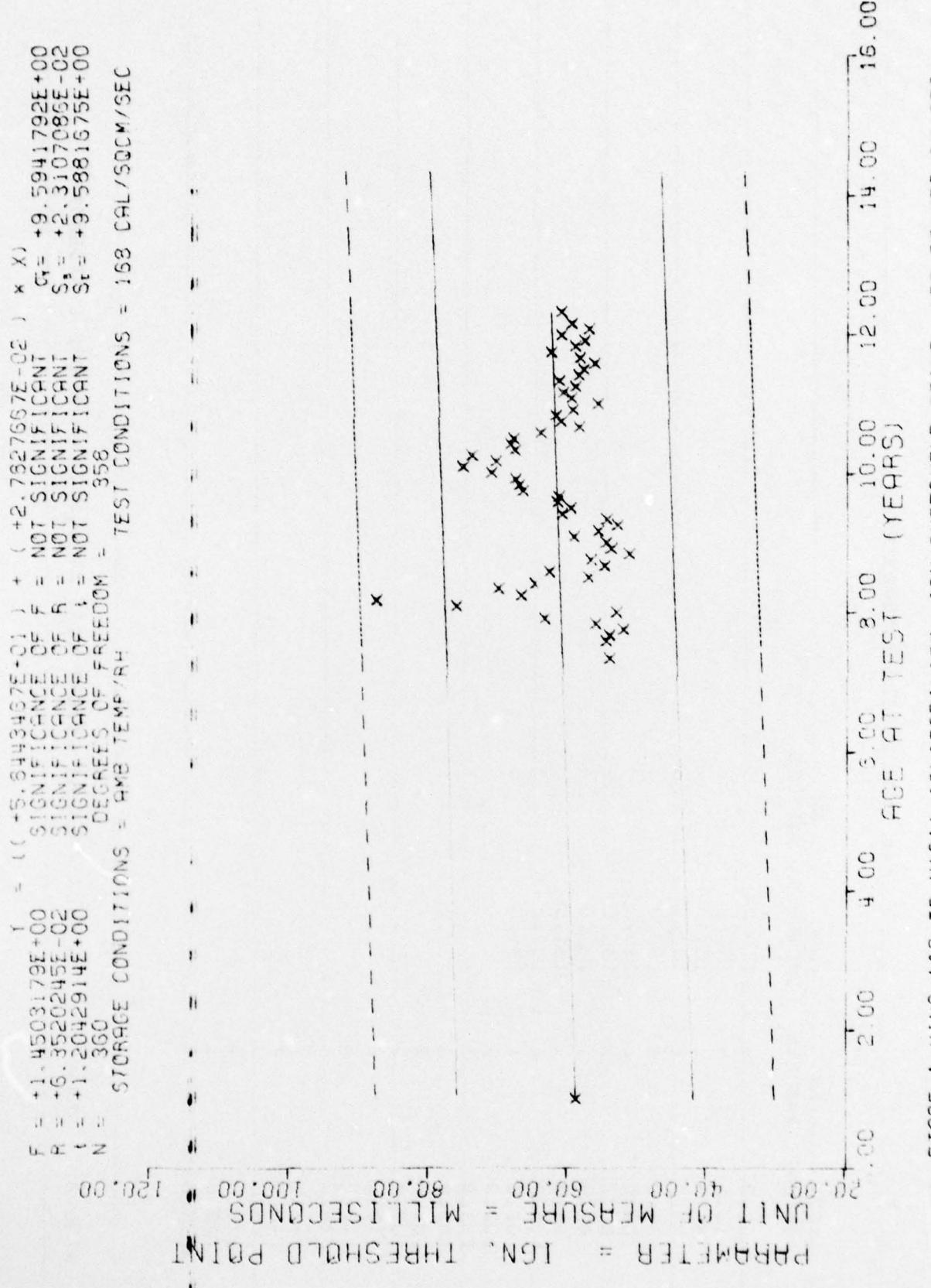


Figure 60

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
12.0	10	114.0	12	139.0	5
88.0	1	115.0	6	140.0	3
91.0	2	116.0	10	141.0	2
92.0	4	117.0	6	142.0	5
93.0	1	118.0	6	143.0	6
94.0	3	119.0	11	144.0	1
95.0	3	120.0	6	145.0	1
96.0	3	121.0	8	146.0	2
97.0	4	122.0	8	148.0	2
98.0	4	123.0	9		
99.0	10	124.0	5		
100.0	7	125.0	11		
101.0	10	126.0	7		
102.0	6	127.0	10		
103.0	9	128.0	8		
104.0	9	129.0	1		
105.0	6	130.0	6		
106.0	10	131.0	5		
107.0	7	132.0	4		
108.0	12	133.0	8		
109.0	6	134.0	11		
110.0	3	135.0	4		
111.0	6	136.0	3		
112.0	12	137.0	2		
113.0	7	138.0	5		

Figure 61

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
62.0	*	91.0	72	117.0	12
63.0	8	92.0	103	118.0	32
66.0	4	93.0	104	119.0	16
67.0	8	94.0	130	120.0	24
68.0	12	95.0	84	121.0	20
70.0	4	96.0	59	122.0	48
71.0	4	98.0	24	123.0	40
72.0	3	99.0	12	124.0	28
74.0	36	100.0	16	125.0	40
75.0	8	101.0	32	126.0	23
76.0	16	102.0	16	127.0	40
77.0	20	103.0	8	128.0	12
78.0	36	104.0	12	129.0	17
79.0	20	105.0	12	131.0	16
80.0	36	106.0	20	132.0	4
81.0	56	107.0	32	136.0	4
82.0	40	108.0	24	137.0	8
83.0	24	109.0	32	140.0	8
84.0	24	110.0	16	142.0	4
85.0	24	111.0	24	143.0	8
86.0	32	112.0	20	144.0	12
87.0	20	113.0	20	145.0	12
88.0	4	114.0	20	148.0	4
89.0	72	115.0	16		
90.0	68	116.0	40		

STAGE 1, WING ADD. SOL GEL. & EXTRACTABLE, TPH-1011

PARMETER = WEIGHT SMELL  
UNIT OF MEASURE = RATIO  
3.20 4.00 4.80 5.60 6.40

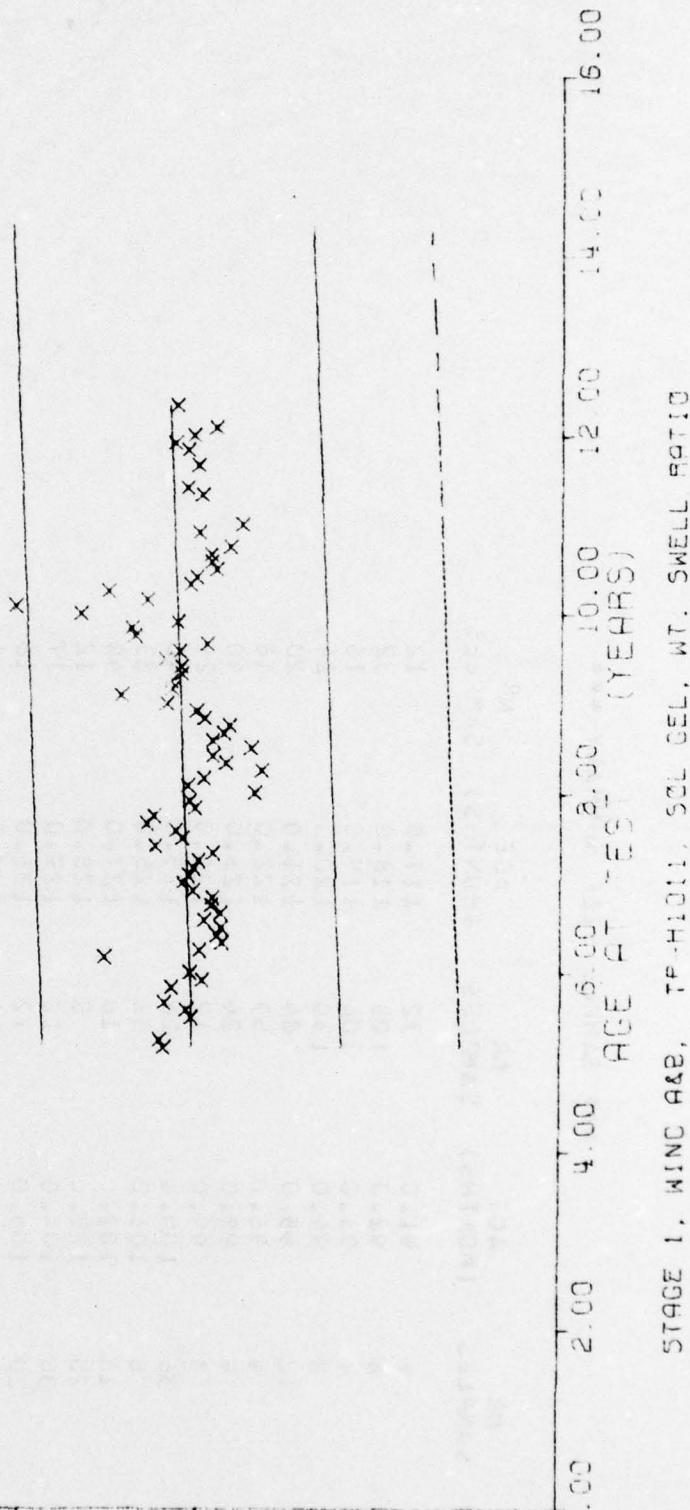


Figure 62

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES
62.0	4	91.0	72	116.0	48
63.0	3	92.0	103	117.0	12
66.0	4	93.0	108	118.0	32
67.0	3	94.0	130	119.0	16
68.0	12	95.0	84	120.0	24
70.0	4	96.0	59	121.0	20
71.0	*	97.0	24	122.0	48
72.0	3	98.0	24	123.0	40
74.0	35	99.0	12	124.0	28
75.0	3	100.0	16	125.0	40
76.0	13	101.0	32	126.0	23
77.0	20	102.0	16	127.0	40
78.0	36	103.0	3	128.0	12
79.0	23	104.0	12	129.0	17
80.0	30	105.0	12	131.0	16
81.0	56	106.0	24	132.0	4
82.0	40	107.0	32	136.0	4
83.0	24	108.0	24	137.0	3
84.0	24	109.0	36	140.0	3
85.0	24	110.0	28	142.0	4
86.0	32	111.0	40	143.0	5
87.0	22	112.0	32	144.0	12
88.0	4	113.0	35	145.0	12
89.0	72	114.0	40	146.0	4
90.0	53	115.0	28		

STAGE I, MING A&B, TP-HLUL, SOL CEL, AT. SWELL RATIO

Figure 63

\*\*\* 54 APRIL 1945 SUMMARY \*\*\*

TEST NUMBER	TEST	SAMPLES	AGE (MONTHS)	AGE (MONTHS)		SAMPLES
				456	457	
400-3	1	1	117.0	19	142.0	24
412-0	1	1	148.0	24	144.0	3
414-2	1	1	149.0	43	145.0	3
415-0	1	1	149.0	29	148.0	3
416-0	1	1	121.0	20	147.0	3
417-0	1	1	122.0	15	146.0	3
417-2	1	1	123.0	12		
418-0	1	1	124.0	16		
419-0	1	1	125.0	17		
421-0	1	1	126.0	21		
422-0	1	1	127.0	25		
423-0	1	1	128.0	24		
424-0	1	1	129.0	30		
425-0	1	1	130.0	20		
426-0	1	1	131.0	24		
427-0	1	1	132.0	9		
428-0	1	1	133.0	12		
429-0	1	1	134.0	15		
430-0	1	1	136.0	10		
431-0	1	1	137.0	6		
432-0	1	1	138.0	11		
433-0	1	1	139.0	35		
434-0	1	1	140.0	6		
435-0	1	1	141.0	15		
436-0	1	1	142.0	16		

TEST 162 TEST 1 TR-10011 THERMAL COEFFICIENT OF LINEAR EXPANSION, BELOW TG

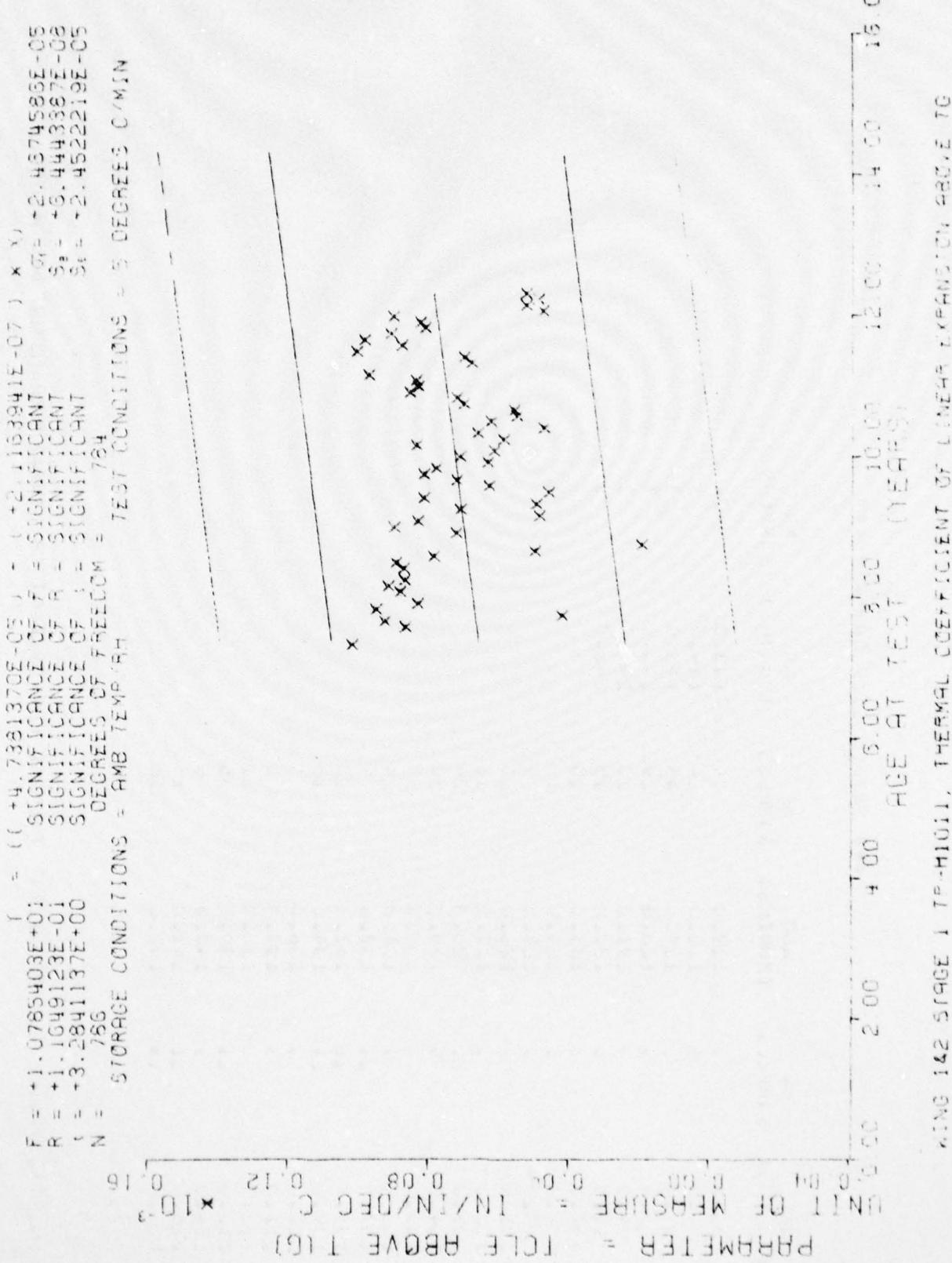


Figure 64

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	SAMPLES	AGE (MONTHS)	SAMPLES	AGE (MONTHS)	SAMPLES	NR.
53.0	2	117.0	19	143.0	24	
62.0	2	118.0	24	144.0	2	
92.0	2	119.0	42	145.0	3	
22.0	2	120.0	24	146.0	3	
94.0	2	121.0	20	147.0	3	
75.0	2	122.0	15	148.0	3	
97.0	2	123.0	15			
98.0	2	124.0	18			
99.0	2	125.0	9			
101.0	2	126.0	21			
106.0	2	127.0	16			
105.0	24	128.0	24			
104.0	2	129.0	30			
105.0	5	130.0	30			
106.0	2	131.0	24			
107.0	2	132.0	9			
108.0	44	132.0	14			
109.0	2	134.0	15			
110.0	2	136.0	6			
111.0	2	137.0	6			
112.0	2	138.0	21			
113.0	2	139.0	35			
114.0	2	140.0	6			
115.0	4	141.0	15			
116.0	13	142.0	18			

FIG. 162 TABLE I IPMOLI, THERMAL COEFFICIENT OF LINEAR EXPANSION ABOVE 76

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## 13. ABSTRACT

This report contains propellant test results from cartons of TP-H1011 bulk propellant representing LGM-30A and B First Stage Minuteman Motors. This report is the ninth time that a statistical approach has been used to analyze First Stage bulk carton propellant. Testing was accomplished in accordance with MMEMP Project M62413M 4MP068P.

The purpose of testing was to determine and provide early warning of any serious degradation trends occurring in the propellant for service life predictions.

An analysis of all parameters indicate that no potential problems are expected in the propellant for at least two years past the oldest data point.

Data stored in the G085 System were plotted utilizing the IBM 360-65 Computer and CAL-COMP Plotter. The data range at any age can be found by suitable inquiry of the G085 System.

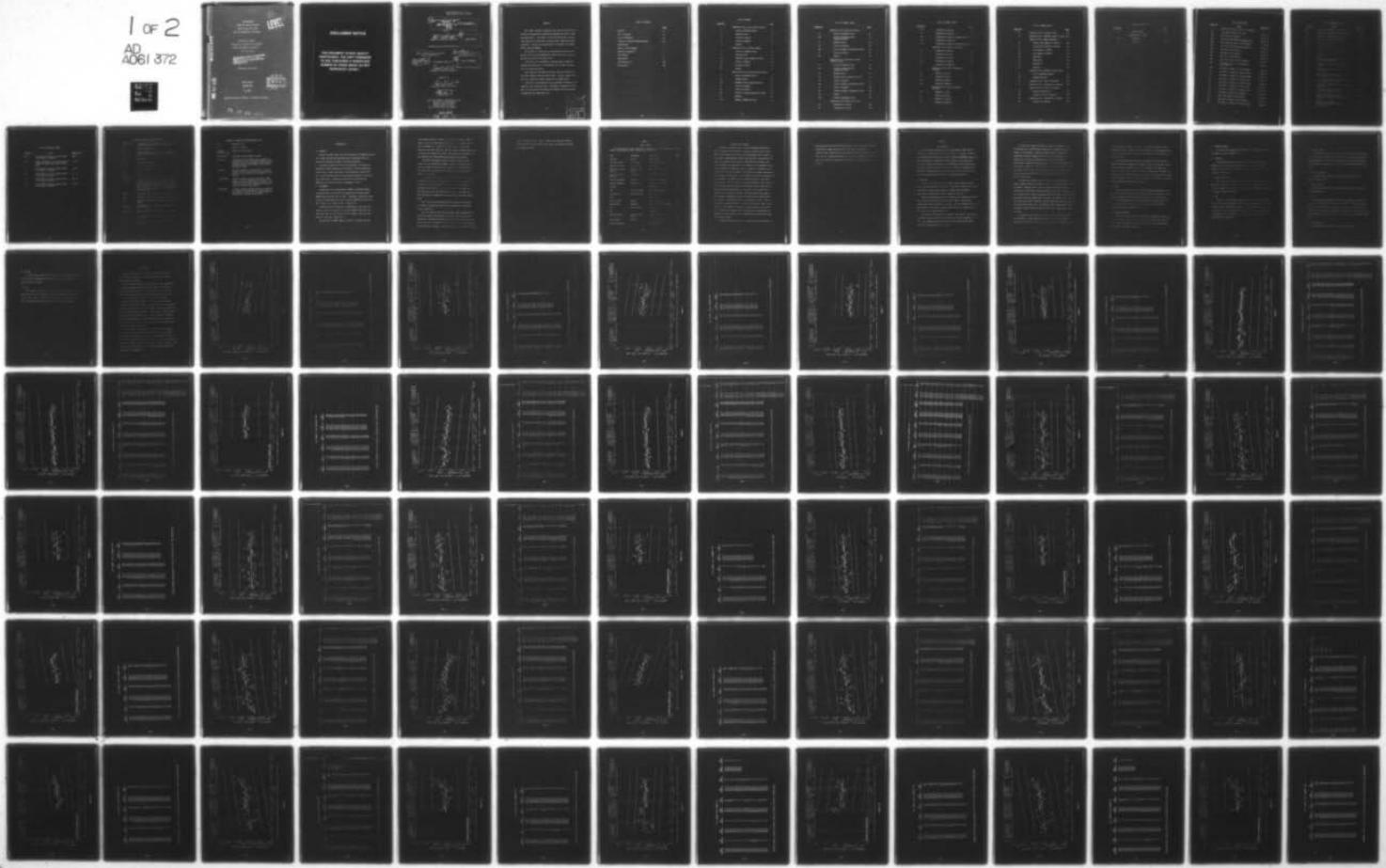
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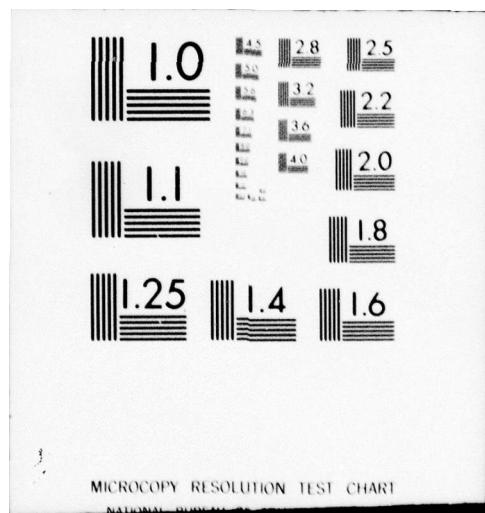
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⑥ PROPELLANT SURVEILLANCE REPORT

LGM-3 A & B STAGE I

and

TP-H1021

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Each point on the regression plot represents the mean of all samples at that particular age. The number of specimens at each point is indicated on the sample size summary sheet on the page accompanying each regression plot.

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271	Surveillance Report LGM-30F & C Stage I, Phase A Series II, (TP-H1011)	Jul 73
277	Surveillance Report LGM-30F & G Stage I, Phase A Series III, (TP-H1011)	Oct 73
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300	Minuteman Stage 1 Motor Reliability Improvement Program Surveillance	May 74

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316	Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011	Feb 75
321	Propellant Surveillance Report LGM-30 F & G Stage 1, TP-H1011	Apr 75
325	Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011	June 75

### GLOSSARY OF TERMS AND ABBREVIATIONS

Aging Trend	A change in properties or performance resulting from aging of material or component
CSA	Cross Sectional Area
E	Modulus (psi), defined as stress divided by strain along the initial linear portion of the curve
EB	End Bonded
EGL	Effective Gage Length
em	Strain at maximum stress
er	Strain at rupture
DB	Dogbone
Degradation	Gradual deterioration of properties or performance
"F" ratio	The ratio of the variance accounted for by the regression function to the random unexplained variance. The regression function having the most significant "F" ratio is used for plotting data. The ratio is also used in detecting significant changes in random variation between succeeding time points.
JANNAF	Joint Army, Navy, NASA, Air Force Committee
MANCP	Propellant Lab Section at Ogden Air Logistics Center
OOALC	Ogden Air Logistics Center, Air Force Logistics Command
Regression Equation	The general form of the regression equation is $Y = a + bx$
Regression Line	Line representing mean test values with respect to time
$s_b$	Standard error of estimate of the regression coefficient
$s_e$ or $s_{Y,x}$	Standard Deviation of the data about the regression line

GLOSSARY OF TERMS AND ABBREVIATIONS (cont)

Sm	Maximum Stress
Sr	Stress at rupture
Standard Deviation ( $S_Y$ )	Square root of variance
Strain Rate	Crosshead speed divided by the EGL
"t" test	A statistical test used to detect significant differences between a measured parameter and an expected value of the parameter (determines if regression slope differs from zero at the 95% confidence level)
Variance	The sum of squares of deviations of the test results from the mean of the series after division by one less than the total number of test results
3 Sigma Band	The area between the upper and lower 3 sigma limit. It can be expected that 99.73% of the inventory represented by the test samples would fall within this range assuming that the population is normally distributed.
90-90 Band	It can be stated with 90% confidence that 90% of the inventory represented by the test samples would fall within this range assuming that the population is normally distributed.

## INTRODUCTION

### A. PURPOSE:

Quality assurance tests have been conducted for thirteen years on First Stage LGM-30A and B Minuteman Motor Propellant blocks to evaluate the effects of aging on TP-H1011 propellant.

Statistical analysis of the tests performed, as directed by Engineering, should provide early warning if serious degradation trends occur. Annual evaluation of the propellant provide data that can be directly input into engineering reliability and service life predictions. Testing was performed in accordance with MMEMP Directive GTD-1C and GTD-1C Amendments 1 and 2.

### B. BACKGROUND:

Testing was first accomplished at MANCP on LGM-3CA TP-H1011 propellant blocks in 1963 and was designated Zero-Time Testing (MAGCP Report Nrs 29B, 29C and 29F). Subsequent testing was accomplished at approximately 24 month intervals (MAGCP Report Nrs 29G, 29H - Phase I; 76 - Phase II; 181 - Phase III).

LGM-30B Zero-Time testing was accomplished in 1964 with subsequent testing at intervals of 24 months (MAGCP Report Nrs 32A - Zero-Time; 32C, 49, 53, 55, 58, 61, 66 - Phase I; 118, 126, 130 - Phase II; 195, 268 - Phase III).

Reports prior to MAGCP Report Nr 223(72) contained raw data

using sigma relation to compare to Zero-Time variance. MANCP Report Nr 259 (72) published in April of 1972 contained all the data on LGM-30A, B, F and G in the G085 System at that time. Report Nrs 258 (72), 268 (73), 280 (73) reported LGM-30A and B data in statistical analysis by itself. This report is the fifth time that LGM-30A and B data have been reported in this manner.

Zero-Time testing was started as soon as possible after receipt of the propellant by MANCP. Data from these tests were used to establish a base line for each test to which subsequent test data (ATP - Accelerated Test Plan) were compared in the reports listed above.

The LGM-30A and B propellant test matrix (Table 1) was used to determine the number of specimens to be taken from each propellant loaf and the specific test or tests to which these specimens were subjected. Low rate tensile and hardness specimens were taken from all LGM-30A and B blocks. Specimens for other physical and combustion tests were taken from every seventh block.

Some tests were not conducted at the earlier test periods (0-6 years) and therefore data are not available for inclusion in the regressions.

Post cure data for the first few years after casting usually shows more change in data results. To see how this affects the regressions, analyses were performed on data starting at six years after zero time to determine if the regression curves were significantly different. Separate regressions were run on all but the very

low rate tensile tests. Where a significant change was evident, the regressions are included in this report and labeled "included for comparison only".

Table 1

## Test Program

The test matrix is taken from GTD-1C, Amendment 2, and the tests, conditions, number of specimens and test methods are listed below.

<u>Test</u>	<u>Conditions</u>	<u>Description</u>	<u>Per Cond</u>
Hardness	10 Sec	Dogbone Ends	3
Low Rate Tensile	2.0 in/min	1/2" JANNAF Dogbone	3
High Rate Tensile	1750 in/min	3/4" Dogbone	3
High Rate Triaxial Tensile	600 psi, 1750 in/min	3/4" GL Rail End Bonded	1
Low Rate Biaxial Tensile	0.2 in/min	3/4" GL Rail End Bond	1
Stress Relaxation	3% & 5%	1/2" x 1/2" x 4" EB	3
Dynamic Response	70 gm ct wt	3.3" dia x .33" disc	1
Sol Gel		1/2" x 1/2"	8
VLR	$2 \times 10^{-3}$ in/min	1/2" JANNAF Dogbone	3
Ignitability	168 cal/cm <sup>2</sup> sec	.050" wafer	3
TCLE		.200" wafer	3
Pressure Time	500 psi	1/2" x 3/8" x 1"	3
Burning Rate	1000 psi	.156" x .156" x 5" Strand	3
DTA	12°C Rise/min	.040" wafer	3
DSC		.040" wafer	3
Poisson's Ratio	$77^{\circ}\text{F} \pm 2^{\circ}$ 15% Strain	.50" x .50" x 4"	6
Tear Energy	$70^{\circ}\text{F} \pm 2^{\circ}$	.01" x 1.18" x 3"	6
Failure Envelope		JANNAF Dogbone	3

#### STATISTICAL APPROACH

The linear regression model is used throughout this report. Where data trends and variances appeared to deviate from a linear model, other models were tried but no improvement over a linear fit was found. Individual data points from different time periods were used to establish a least squares trend line for the data. The variance about the regression line, obtained using individual values of the dependent variable, was used to compute a tolerance interval such that at the 90% confidence level 90% of the sample distribution falls within this interval. This tolerance interval was extrapolated to a maximum of 24 months into the future from age of the oldest motor tested. The "t" values and the significance of this statistic, which are reported for each regression model, give an indication of the "statistical significance" of the slope of the trend line as compared to a line of zero slope. Data were plotted by computer. The "y" axis is computed so that the values at one inch intervals are peculiar to the data spread of the parameter tested. Plotted data points represent means at the particular ages at which testing occurred. The number of specimens at each age point is indicated on the sample size summary sheet accompanying each regression plot. Variance at each test age can be determined by consulting the G085 data storage system.

In addition, after analyzing the regressions which included the

**data generated over the total time period, some of the tests indicated considerable change during the first few years of testing. A separate linear regression was calculated starting at six years after zero time for comparison purposes only. Where a significant difference was observed, the comparison only data were included in this report.**

DRAFT #2

TEST RESULTS

From the general appearance of the regressions, more variation in data were evident over the first few years of testing. In order to determine how the data were affected, Service Engineering requested that an analysis be performed on data starting at six years after zero time testing to determine if the regressions were significantly different. Where a significant change was evident, regressions were included for comparison only. This was done to see if a post cure effect was significantly affecting the regression curves.

A. TENSILE:

Very low rate tensile testing started approximately six years after the test program was initiated. The strains show a statistically significant decrease, the stresses no change, and the modulus a statistically significant increase (Figures 1 thru 5).

The low rate regressions show a statistically significant decrease for strains while the stresses and modulus show a statistically significant increase (Figures 6 thru 10). For the comparison regression, only maximum stress shows a change which went from a significant to a non-significant change (Figure 7A).

The biaxial testing shows no change in the strains. The stresses and modulus show a statistically significant increase (Figures 11 thru 15). The comparison only regressions for this time period shows no significant change (Figure 14A & 15A).

For high rate tensile testing, the strain at maximum stress and modulus show a statistically significant increase, however, the change is very gradual. Strain at rupture shows a statistically significant decrease (Figures 16 thru 20). The comparison only regression for strain at maximum stress (Figure 16A) shows a statistically significant increase with the slope being steeper than that shown in Figure 16. The comparison only regression for strain at rupture shows a statistically significant decrease (Figure 18A) which is noticeably greater than for the regression showing all of the data (Figure 18).

For high rate triaxial tensile testing, strain at maximum stress shows a gradual statistical increase with the strain at rupture showing a decrease. Maximum stress, stress at rupture and modulus show a statistically significant increase (Figures 21 thru 25). The comparison only regression for strain at maximum stress also shows a statistically significant increase (Figure 21A). However, the slope of the comparison only regression curve is greater than the regression curve which covers all of the data (Figure 21). For maximum stress (Figure 22A) stress at rupture (Figure 24A) and modulus (Figure 25A), significant changes are shown.

It should be noted that the strain at maximum stress for high rate testing is increasing gradually while the strain at maximum stress for low rate testing is decreasing slowly. This appears to be

anomalous behavior except that these same trends are seen in other propellants tested. However, from the analysis of the propellant data, it does not appear that significant degradation will occur within the next two years.

For the overall tensile tests, the slope of the curves show a gradual change or no change with respect to age. The low rate tensile regressions show a gradual decrease or no change for strains and a gradual increase or no change for stresses and modules. The high rate testing does not follow this pattern for strain at maximum stress which shows a gradual increase. However, the slope of the curves are gradual, and no operational problems are expected.

#### B. CREEP:

The test results show a statistically significant decrease for both the 10 and 12 pound load regressions (Figures 26 thru 35). These results correlate well with the strain results for tensile testing.

For the comparison only regressions, the 10 pound load at 500 and 1000 second regression show a change in trend which are not significant (Figures 20A and 30A).

#### C. STRESS RELAXATION:

Modulus at 3 and 5% show a statistically significant increase at all time periods, 10, 50, 100 and 1,000 seconds (Figures 36 thru 43). In all cases, the slope of the regression curves are gradual and no operational problems are expected.

D. CONSTANT STRAIN:

A statistically significant increase is shown. This increase is gradual as seen in Figure 44.

E. HARDNESS:

The propellant shows a statistically significant increase in hardness. This increase is gradual and correlates well with the tensile tests which show a decrease in strain and increase in stress properties (Figure 45).

F. DYNAMIC RESPONSE:

The storage shear modulus at 200 and 400 Hz shows a statistically significant decrease. The decrease is gradual (Figures 46 and 47). The loss tangent shows statistically significant increase. This increase is gradual (Figures 48 and 49)

G. DTA:

There is a statistically significant decrease in the endotherm and first and second exotherms while the ignition temperature is showing a statistically significant increase. In all cases, the slope of the regressions curves are gradual which indicates that propellant combustion properties are changing very little and are not a problem at this time (Figures 50 thru 53).

H. PRESSURE TIME:

A statistically significant increase is shown in time to maximum pressure with the maximum pressure showing a statistically significant decrease (Figures 54 and 55). In both cases the slopes are gradual and no problems are expected for at least two years past the last data point.

I. HEAT OF EXPLOSION:

A statistically significant increase is shown for heat of explosion (Figure 56).

J. BURNING RATE:

The burning rate data shows a gradual statistically significant decrease (Figure 57).

K. TGA:

The TGA ignition temperature shows a statistically significant increase. It will be noted that the data after 10 years is noticeably higher than previous data. This may be caused by a change in instruments and will be further investigated to determine if this is instrument caused (Figure 58). The weight loss at ignition shows no change (Figure 59).

L. IGNITABILITY:

The ignitability data shows no change (Figure 60).

M. SOL GEL:

A statistically significant increase for weight swell ratio and a statistically significant decrease for percent extractables is shown (Figures 61 and 62).

N. TCLE:

The thermal coefficient of linear expansion below and above the glass transition point shows a statistically significant increase. However, this increase is gradual and no problems are expected for at least two years beyond the last data point (Figures 63 and 64).

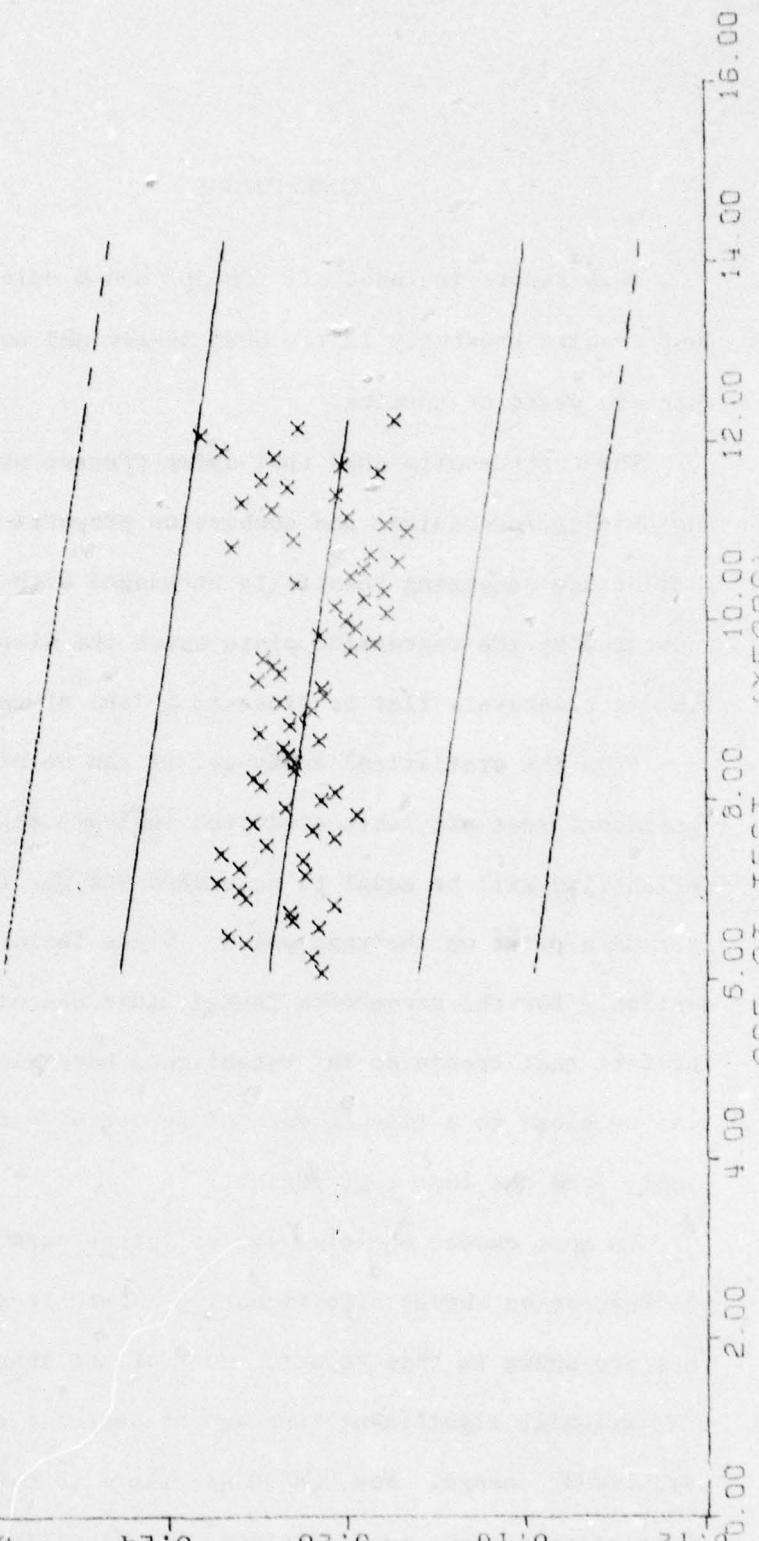
## CONCLUSIONS

This report includes all LGM-30A and B bulk propellant test results presently in the 6085 System and covers the past thirteen years of testing.

The test results show that under present storage conditions the physical/mechanical and combustion properties of the propellant are remaining relatively unchanged with age. This is indicated by the regression plots where the slope of the trend line is relatively flat or close to a line of zero slope.

From the statistical analyses, it can be stated with 90% confidence that all tests conducted indicate that motor propellant reliability will be equal to or exceed 90% for two years past the last data point on the regression. Since failure limits are not available for the parameters tested, this statement is based on the fact that trends so far established have slopes relatively flat or close to a line of zero slope and have not changed appreciably from the last test period.

In most cases, the six year to latest data did not change the regression curves significantly. Where there were changes, they are shown in this report. Most of the changes went from a statistically significant increase or decrease to no statistically significant change. For LGM-30 A&B, there is sufficient data so that elimination of post cure data does not significantly affect the validity of the regressions.



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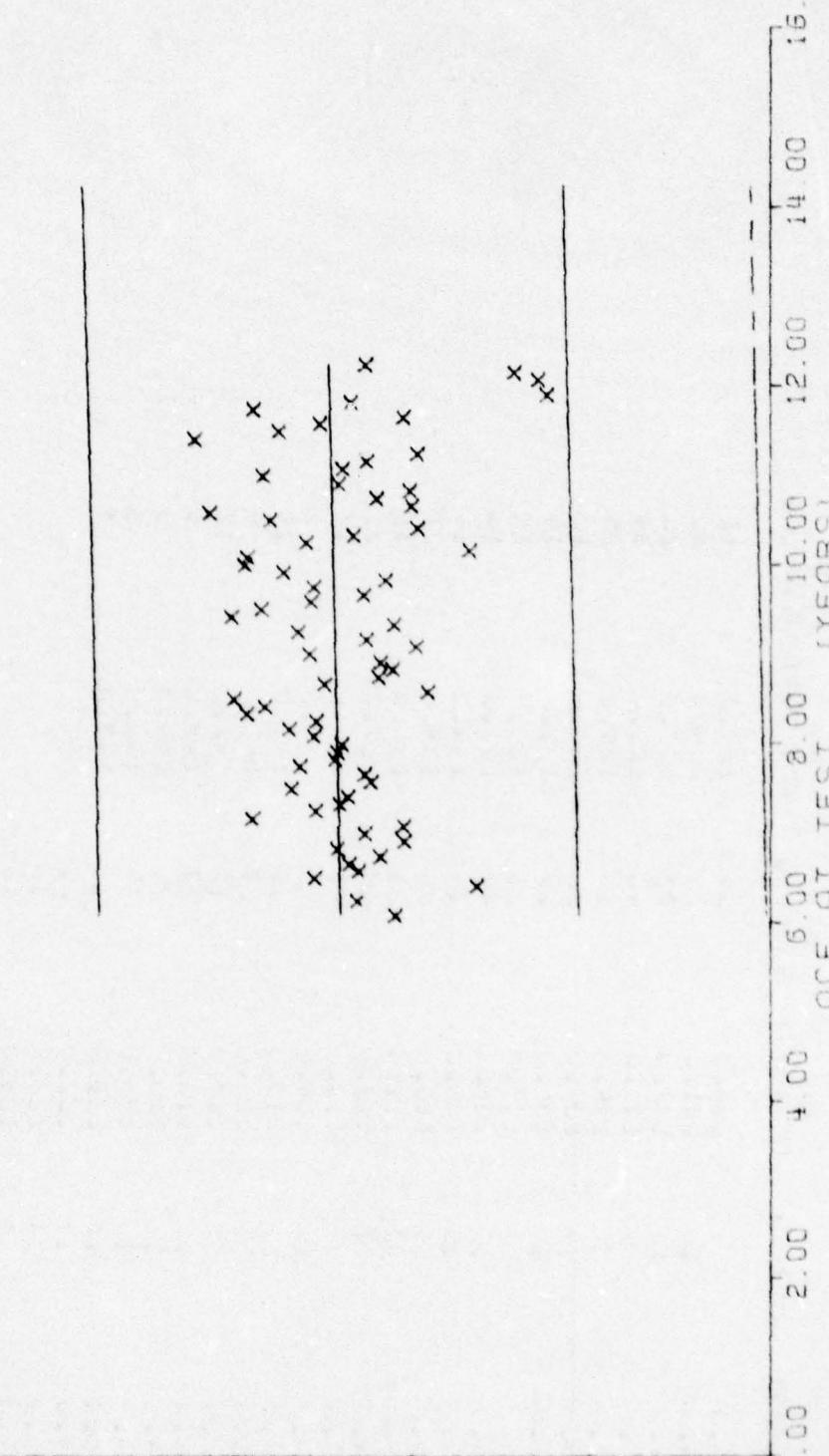
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Age	Sexe	Spécimen	Localité	Altitude	Distance	Préparation	Nombre	Spécimens supplémentaires
1-2 ans	♂	100	Montagne de la Côte	1000 m.	1000 m.	100	145	11
1-2 ans	♂	101	Montagne de la Côte	1000 m.	1000 m.	101	146	26
1-2 ans	♂	102	Montagne de la Côte	1000 m.	1000 m.	102	127	26
1-2 ans	♂	103	Montagne de la Côte	1000 m.	1000 m.	103	128	23
1-2 ans	♂	104	Montagne de la Côte	1000 m.	1000 m.	104	129	25
1-2 ans	♂	105	Montagne de la Côte	1000 m.	1000 m.	105	129	12
1-2 ans	♂	106	Montagne de la Côte	1000 m.	1000 m.	106	130	19
1-2 ans	♂	107	Montagne de la Côte	1000 m.	1000 m.	107	131	18
1-2 ans	♂	108	Montagne de la Côte	1000 m.	1000 m.	108	132	14
1-2 ans	♂	109	Montagne de la Côte	1000 m.	1000 m.	109	133	13
1-2 ans	♂	110	Montagne de la Côte	1000 m.	1000 m.	110	134	21
1-2 ans	♂	111	Montagne de la Côte	1000 m.	1000 m.	111	135	15
1-2 ans	♂	112	Montagne de la Côte	1000 m.	1000 m.	112	136	15
1-2 ans	♂	113	Montagne de la Côte	1000 m.	1000 m.	113	137	21
1-2 ans	♂	114	Montagne de la Côte	1000 m.	1000 m.	114	138	12
1-2 ans	♂	115	Montagne de la Côte	1000 m.	1000 m.	115	139	5
1-2 ans	♂	116	Montagne de la Côte	1000 m.	1000 m.	116	140	14
1-2 ans	♂	117	Montagne de la Côte	1000 m.	1000 m.	117	141	9
1-2 ans	♂	118	Montagne de la Côte	1000 m.	1000 m.	118	142	12
1-2 ans	♂	119	Montagne de la Côte	1000 m.	1000 m.	119	143	6
1-2 ans	♂	120	Montagne de la Côte	1000 m.	1000 m.	120	144	2
1-2 ans	♂	121	Montagne de la Côte	1000 m.	1000 m.	121	145	3
1-2 ans	♂	122	Montagne de la Côte	1000 m.	1000 m.	122	146	3
1-2 ans	♂	123	Montagne de la Côte	1000 m.	1000 m.	123	147	3
1-2 ans	♂	124	Montagne de la Côte	1000 m.	1000 m.	124	148	12

RECOMMENDED FOR USE AS AN INSECTICIDE AND MITICIDE.

$F = +5.644443E-01$   
 $F_R = +2.0227376E-02$   
 $S_R = +7.5129516E-01$   
 $N = 1381$   
 $F = +8.2430334E+01$   
 $SIGNIFICANCE OF F = NOT SIGNIFICANT$   
 $SIGNIFICANCE OF F_R = SIGNIFICANT$   
 $SIGNIFICANCE OF S_R = NOT SIGNIFICANT$   
 $DEGREES OF FREEDOM = 1379$   
 $STORAGE CONDITIONS = AMB TEMP/RH$

UNIT OF MEASURE = PSI  
 PARAMETER = MAXIMUM STRESS



TENSILE MAXIMUM STRESS, CHS=0.002 IN/MIN, TP-HICII A&B PROPELLANT

Figure 2

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
15.0	9	100.0	24	125.0	11
15.0	16	101.0	24	126.0	38
15.0	16	102.0	22	127.0	25
15.0	2	103.0	40	128.0	36
15.0	2	104.0	20	129.0	25
15.0	30	105.0	36	130.0	12
15.0	13	106.0	23	131.0	19
15.0	2	107.0	26	132.0	16
15.0	16	108.0	44	133.0	14
15.0	16	109.0	19	134.0	18
15.0	6	110.0	26	135.0	21
15.0	40	111.0	24	137.0	21
15.0	27	112.0	29	138.0	12
15.0	27	113.0	41	139.0	3
15.0	14	114.0	15	140.0	13
15.0	7	115.0	16	141.0	9
15.0	12	116.0	27	142.0	12
15.0	7	117.0	12	143.0	5
15.0	12	118.0	27	145.0	3
15.0	12	119.0	24	146.0	3
15.0	13	120.0	22	147.0	3
15.0	14	121.0	42		
15.0	17	122.0	21		
15.0	22	123.0	16		
15.0	22	124.0	16		

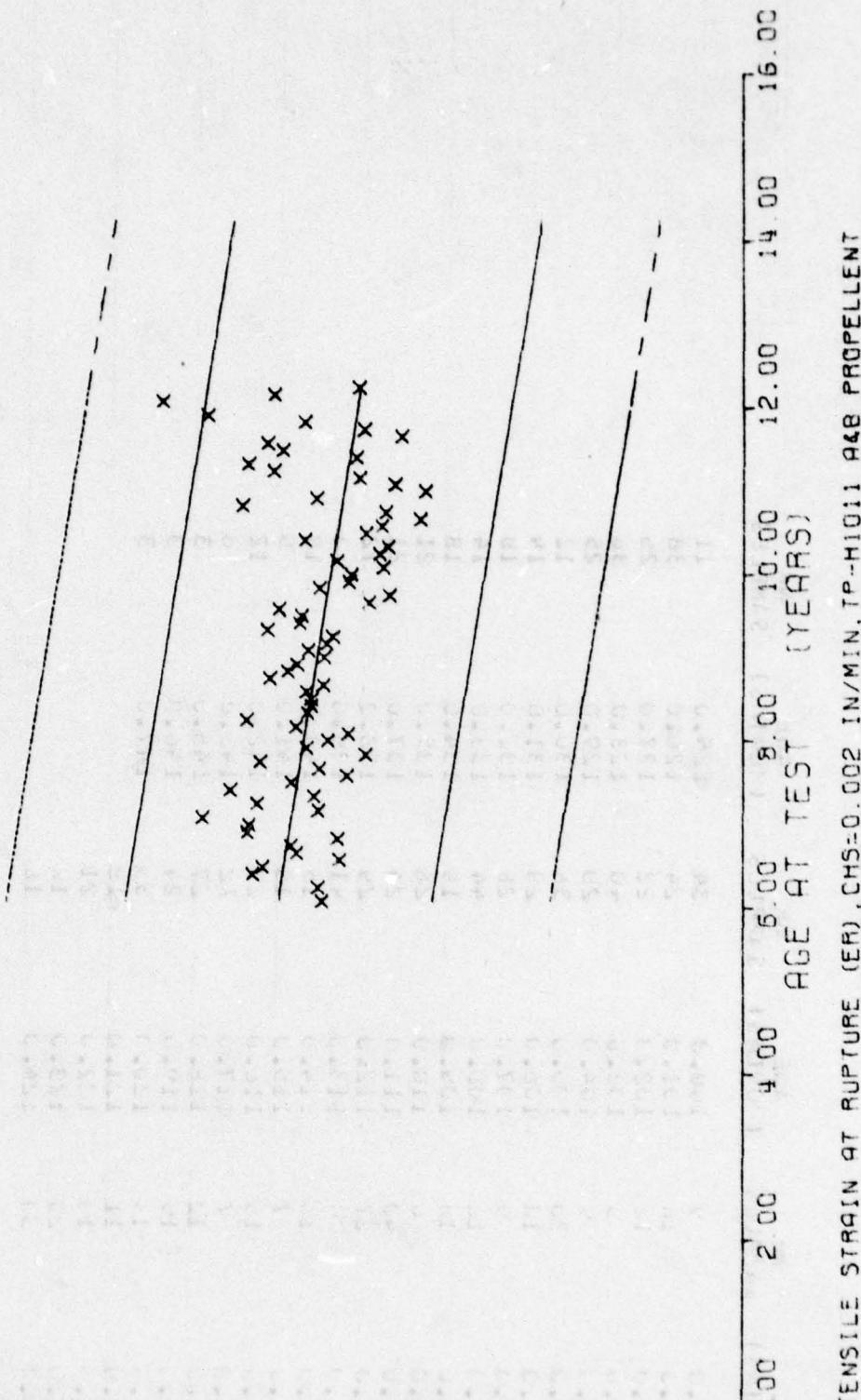
THIS PAGE IS FOR INFORMATION ONLY. IT IS NOT TO BE USED AS A PROPELLANT

$F = +6.9200253E+01$   
 $R = -2.1747130E-01$   
 $t^4 = +8.3186689E+00$   
 $N = 1396$   
 STORAGE CONDITIONS = AMB TEMP/RH

$\gamma = (( +2.5074717E-01 ) + (-2.6865495E-04) ) * X$   
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF  $t^4$  = SIGNIFICANT  
 DEGREES OF FREEDOM = 1394

TEST CONDITIONS = AMB TEMP/RH

UNIT OF MEASURE = PSI  
 PARAMETER = STRAIN AT RUPTURE  
 0.00 0.12 0.16 0.20 0.24 0.28 0.32



TENSILE STRAIN AT RUPTURE (ER), CHS=0.002 IN/MIN, TP-HIGH A&B PROPELLANT

Figure 3

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

NO. SAMPLES)	NO. SAMPLES	NO. SAMPLES	NO. SAMPLES	NO. SAMPLES	NO. SAMPLES	NO. SAMPLES
(MONTHS)	(MONTHS)	(MONTHS)	(MONTHS)	(MONTHS)	(MONTHS)	(MONTHS)
73.0	9	100.0	24	125.0	11	
75.0	16	101.0	24	126.0	33	
77.0	48	102.0	24	127.0	26	
78.0	5	103.0	43	128.0	38	
79.0	9	104.0	20	129.0	25	
80.0	35	105.0	36	130.0	12	
81.0	46	106.0	22	131.0	19	
82.0	9	107.0	28	132.0	18	
83.0	16	108.0	44	133.0	14	
84.0	16	109.0	19	134.0	18	
85.0	6	110.0	26	135.0	21	
86.0	40	111.0	24	136.0	15	
87.0	27	112.0	22	137.0	21	
88.0	23	113.0	41	138.0	12	
89.0	16	114.0	15	139.0	6	
90.0	7	115.0	16	140.0	12	
91.0	15	116.0	27	141.0	9	
92.0	7	117.0	12	142.0	12	
93.0	12	118.0	27	143.0	6	
94.0	19	119.0	24	145.0	3	
95.0	12	120.0	33	146.0	3	
96.0	11	121.0	12	147.0	3	
97.0	15	122.0	21			
98.0	23	123.0	12			
99.0	20	124.0	15			

TABLE 37 - AT 10' DEPTH (E2) • CDS = 0.002 IN/MIN, IP-HIOL A&B PROPELLENT

$\gamma = (( +8.0698213E+01) + (-2.4719063E-02)) \times X$   
 SIGNIFICANCE OF F = NOT SIGNIFICANT       $S_t = +9.4703564E+00$   
 SIGNIFICANCE OF R = SIGNIFICANT       $S_a = +1.4266692E-02$   
 SIGNIFICANCE OF t = NOT SIGNIFICANT       $S_e = +9.4634943E+00$   
 DEGREES OF FREEDOM = 1379  
 TEST CONDITIONS = AMB TEMP/RH

UNIT OF MEASURE = PSI  
 PARAMETER = STRESS AT RUPTURE  
 0.00 60.00 80.00 100.00 120.00 140.00

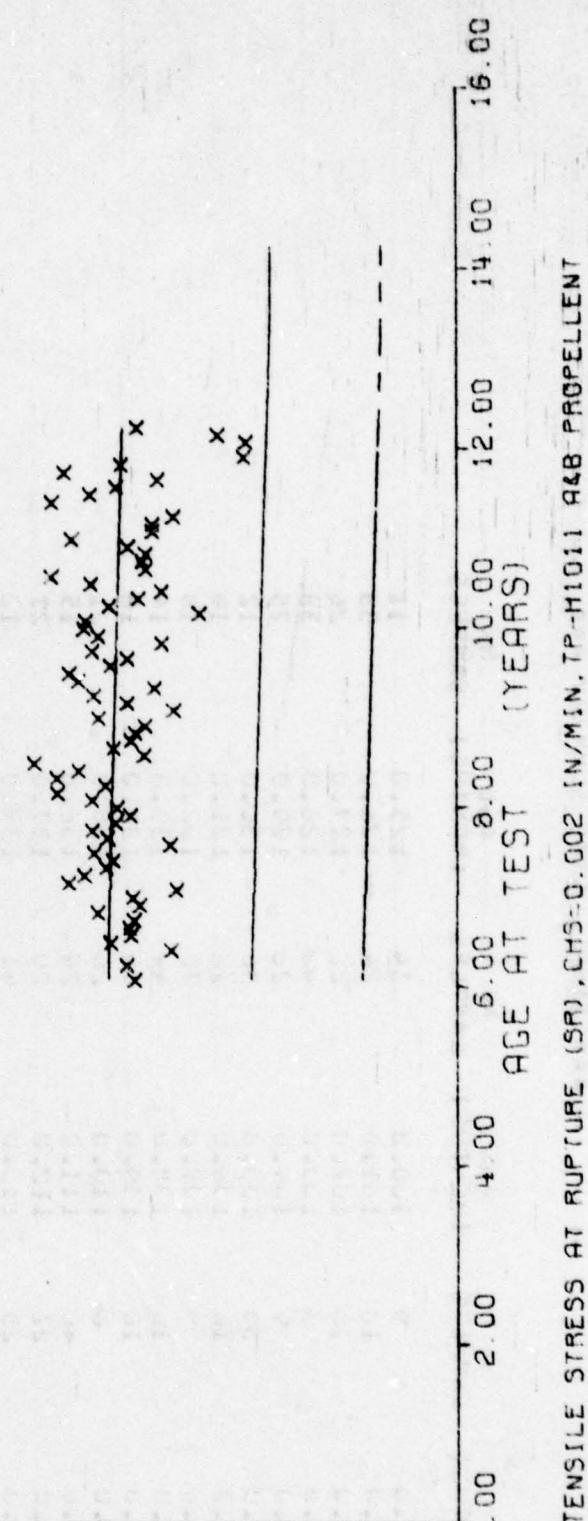


Figure 4

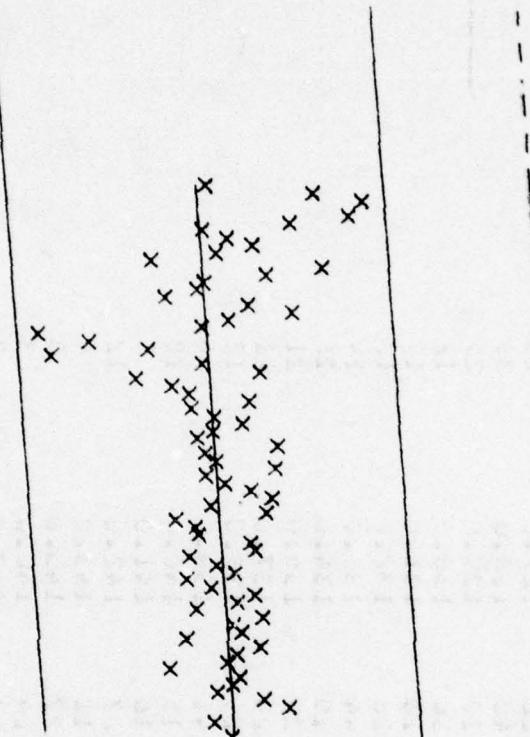
\*\*\* SAMPLE SIZE SUMMARY \*\*\*

Age (days)	Ex- amples	Age (months)	NK SAMPLES	Age (months)	NK SAMPLES
75.0	9	100.0	34	125.0	11
76.0	13	101.0	24	126.0	33
77.0	13	102.0	42	127.0	25
78.0	2	103.0	40	128.0	33
79.0	2	104.0	20	129.0	25
80.0	30	105.0	26	130.0	12
81.0	43	106.0	43	131.0	19
82.0	2	107.0	26	132.0	13
83.0	17	108.0	44	133.0	14
84.0	16	109.0	49	134.0	16
85.0	2	110.0	26	135.0	21
86.0	42	111.0	24	137.0	21
87.0	27	112.0	26	138.0	12
88.0	72	113.0	41	139.0	6
89.0	12	114.0	15	140.0	19
90.0	7	115.0	16	141.0	5
91.0	15	116.0	17	142.0	12
92.0	7	117.0	12	143.0	6
93.0	12	118.0	27	144.0	3
94.0	19	119.0	24	145.0	3
95.0	12	120.0	22	147.0	3
96.0	14	121.0	16		
97.0	12	122.0	21		
98.0	23	123.0	12		
99.0	22	124.0	16		

TESTS AT 50% OF SR (C.15±0.002 IN/P.L., TP-H101 AGE PROPELLANT

$\gamma = \left( \left( +5.2042141E+02 \right) + \left( +6.4963145E-01 \right) \times X \right)$   
 $F_F = \text{SIGNIFICANT}$   
 $S_F = +1.2562762E+02$   
 $R_R = \text{SIGNIFICANT}$   
 $S_R = +1.8638118E-01$   
 $t_t = \text{SIGNIFICANT}$   
 $S_t = +1.2512860E+02$   
 $\text{DEGREES OF FREEDOM} = 1394$   
 $\text{STORAGE CONDITIONS} = \text{AMB TEMP/RH}$

UNIT OF MEASURE = PSI  
 $\times 10^3$   
 10.00 30.00 50.00 70.00 90.00 110.00  
 PARAMETER = MODULUS



TENSILE MODULUS (E), CHS=0.002 IN/MIN, TP-H1011 A&B PROPELLANT

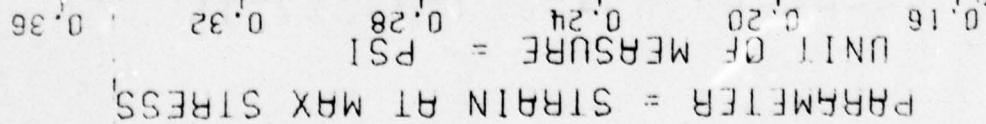
Figure 5

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

Age (CHS)	No. SAMPLES	Age (CHS)	No. SAMPLES	Age (CHS)	No. SAMPLES
43.0	2	125.0	24	125.0	11
45.0	12	121.0	24	126.0	38
47.0	12	122.0	22	127.0	26
48.0	2	125.0	45	126.0	36
49.0	9	124.0	23	126.0	25
50.0	30	125.0	26	126.0	12
51.0	16	126.0	24	121.0	19
52.0	9	127.0	22	122.0	15
53.0	12	123.0	44	122.0	14
54.0	12	124.0	19	124.0	16
55.0	6	110.0	26	135.0	21
56.0	40	111.0	24	126.0	15
57.0	27	112.0	29	137.0	21
58.0	22	113.0	44	136.0	12
59.0	12	114.0	15	136.0	6
60.0	7	115.0	16	140.0	13
61.0	12	116.0	27	141.0	9
62.0	7	117.0	14	142.0	12
63.0	12	118.0	27	143.0	6
64.0	19	119.0	24	145.0	3
65.0	13	120.0	33	146.0	3
66.0	14	121.0	14	147.0	3
67.0	19	122.0	21		
68.0	22	123.0	12		
69.0	33	124.0	16		

TABLE II. (CONT'D) (E) CHS = 100% IN/MIN, TP-HIGH AER PROPELLENT

$\gamma = (( +2.5954782E-01) + (-6.3809150E-05) * X)$   
 $F = \text{SIGNIFICANCE OF } F$   
 $R = \text{SIGNIFICANCE OF } R$   
 $t = \text{SIGNIFICANCE OF } t$   
 $\epsilon = \text{DEGREES OF FREEDOM} = 21335$   
 $N = 21337$   
 STORAGE CONDITIONS = AMB TEMP/RH



TENSILE STRAIN AT MAX STRESS (EMI), CHS=2.0 IN/MIN, TP-H1011 AND PROPELLANT

Figure 6

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

Age (MONTHS)	Ex- amples (MATERIAL)										
1.0	31.0	207	59.0	18	85.0	237	110.0	171	110.0	144	111.0
1.0	32.0	213	60.0	42	86.0	144	111.0	171	111.0	470	112.0
1.0	33.0	214	62.0	24	97.0	682	112.0	152	112.0	502	112.0
1.0	34.0	214	63.0	51	98.0	783	114.0	213	114.0	506	115.0
1.0	35.0	57	64.0	61	89.0	506	115.0	199	115.0	558	116.0
1.0	36.0	63	65.0	42	90.0	294	116.0	211	116.0	527	117.0
1.0	37.0	56	66.0	96	91.0	359	115.0	153	116.0	302	117.0
1.0	38.0	75	67.0	39	92.0	235	120.0	171	121.0	212	121.0
1.0	39.0	63	68.0	59	93.0	140	122.0	207	122.0	219	123.0
1.0	40.0	54	59.0	91	94.0	186	120.0	152	123.0	235	123.0
1.0	41.0	84	70.0	39	95.0	186	120.0	171	121.0	219	121.0
1.0	42.0	216	71.0	165	96.0	151	120.0	152	121.0	212	121.0
1.0	43.0	241	72.0	142	97.0	217	120.0	152	122.0	235	122.0
1.0	44.0	153	73.0	99	98.0	186	120.0	152	123.0	219	123.0
1.0	45.0	194	74.0	133	99.0	151	120.0	152	123.0	219	123.0
1.0	46.0	130	75.0	252	100.0	186	120.0	152	123.0	219	123.0
1.0	47.0	53	76.0	147	101.0	151	120.0	152	123.0	217	123.0
1.0	48.0	36	77.0	157	102.0	174	121.0	147	123.0	219	123.0
1.0	49.0	27	78.0	153	103.0	186	123.0	152	123.0	219	123.0
1.0	50.0	17	79.0	134	104.0	151	120.0	152	123.0	217	123.0
1.0	51.0	16	80.0	194	105.0	186	120.0	152	123.0	217	123.0
1.0	52.0	21	81.0	153	106.0	274	121.0	147	123.0	219	123.0
1.0	53.0	52.0	82.0	260	107.0	153	122.0	151	123.0	219	123.0
1.0	54.0	6	83.0	166	108.0	254	133.0	73	133.0	217	133.0
1.0	55.0	517	57.0	8	109.0	157	134.0	73	134.0	217	134.0
1.0	56.0	13	84.0	183	109.0	135.0	94	135.0	94	136.0	135
1.0	57.0	592	58.0	21	106.0	135.0	94	137.0	66	136.0	96
1.0	58.0	554	59.0	6	107.0	153	122.0	151	123.0	141.0	49
1.0	59.0	517	57.0	8	108.0	254	133.0	73	133.0	142.0	52
1.0	60.0	582	58.0	13	109.0	157	134.0	73	134.0	143.0	59
1.0	61.0	592	59.0	21	106.0	135.0	94	136.0	49	144.0	30
1.0	62.0	517	57.0	8	107.0	153	122.0	151	123.0	142.0	27
1.0	63.0	592	58.0	13	108.0	254	133.0	73	133.0	143.0	27

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TABLE III. STRESS AT MAX STRESS (EM), CHS=2.0 LB/IN, TP-41011 A&B PROPELLANT

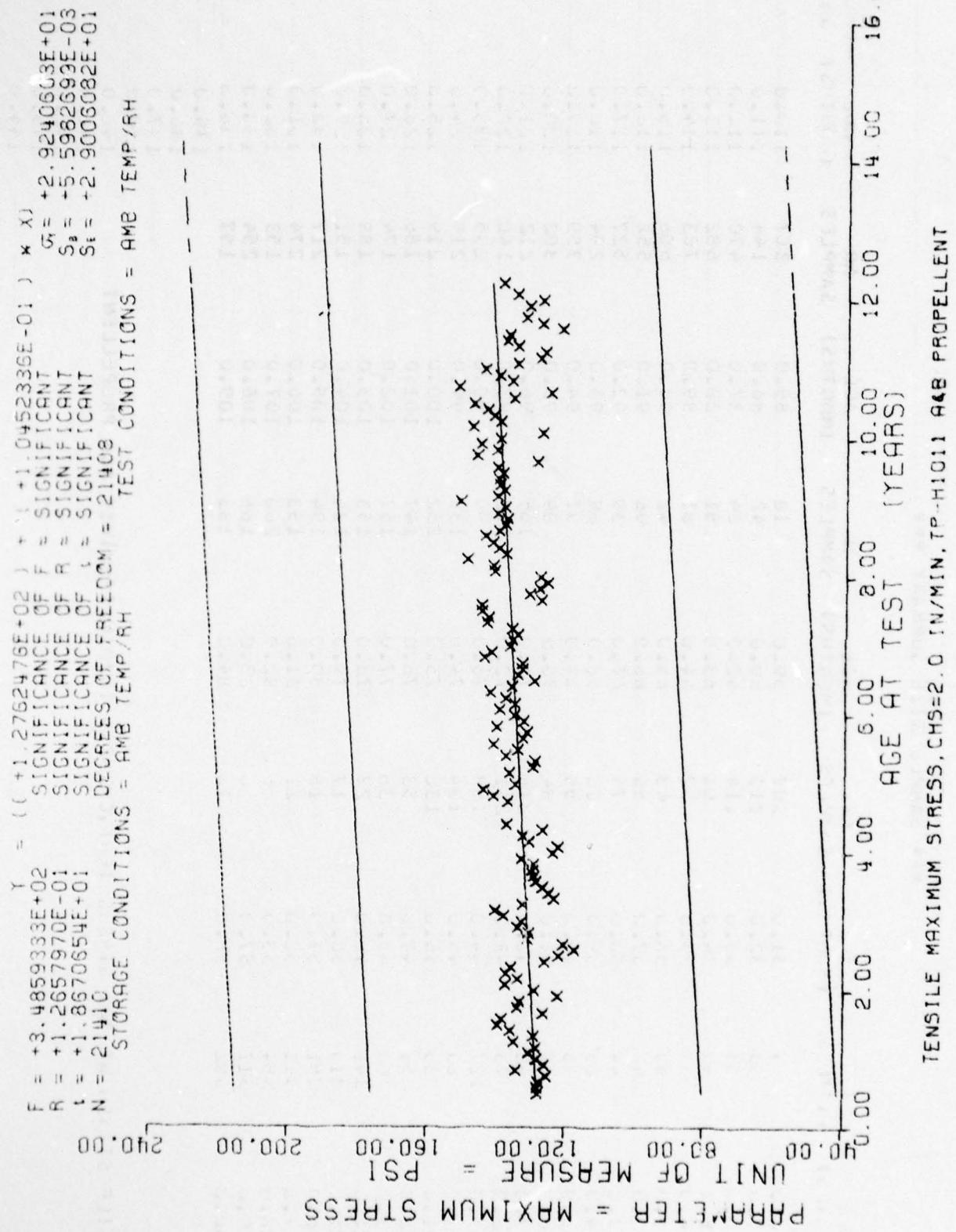


Figure 7

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

Age (MONTHS)	NR SAMPLES										
0.0	1	31.0	307	59.0	13	85.0	307	115.0	171		
1.0	23	32.0	215	60.0	42	86.0	144	111.0	174		
2.0	53	33.0	114	62.0	24	87.0	470	113.0	161		
3.0	34	34.0	91	63.0	51	88.0	683	113.0	152		
4.0	62	35.0	57	64.0	31	89.0	783	114.0	212		
5.0	36.0	36.0	63	65.0	42	90.0	506	115.0	153		
6.0	43	37.0	56	66.0	96	91.0	558	116.0	264		
7.0	49	38.0	75	57.0	39	92.0	527	117.0	214		
8.0	44	39.0	66	58.0	69	93.0	294	118.0	410		
9.0	55	40.0	54	59.0	97	94.0	361	119.0	155		
10.0	42	41.0	64	70.0	89	95.0	362	120.0	170		
11.0	63	42.0	215	71.0	165	96.0	212	121.0	157		
12.0	42	43.0	241	72.0	142	97.0	140	122.0	156		
13.0	75	44.0	150	73.0	99	98.0	235	123.0	156		
14.0	43	45.0	194	74.0	133	99.0	219	124.0	157		
15.0	62	46.0	136	75.0	252	100.0	219	125.0	158		
16.0	42	47.0	52	76.0	147	101.0	186	126.0	152		
17.0	75	48.0	23	77.0	157	102.0	174	127.0	147		
18.0	42	49.0	27	78.0	153	103.0	189	128.0	153		
19.0	55	50.0	17	79.0	134	104.0	151	129.0	157		
20.0	54	47.0	16	80.0	194	105.0	217	130.0	163		
21.0	51	48.0	21	81.0	153	106.0	272	141.0	152		
22.0	50	49.0	241	82.0	260	107.0	153	132.0	161		
23.0	51	50.0	17	82.0	166	108.0	254	129.0	155		
24.0	51	51.0	15	84.0	164	109.0	197	134.0	2		
25.0	52	52.0						135.0	99		
								136.0	135		
								137.0	60		
								138.0	12		
								141.0	49		
								142.0	52		
								143.0	39		
								144.0	26		
								145.0	27		
								147.0	27		

$\gamma = ( +1.364049E-03 + ( +1.2159318E-03 / \star ) )$   
 $+ SIGNIFICANT DEGREES OF FREEDOM = NOT SIGNIFICANT$   
 $S^2 = SIGNIFICANT$   
 $S^2 = NOT SIGNIFICANT$   
 $S^2 = NOT SIGNIFICANT$   
 $S^2 = NOT SIGNIFICANT$   
 $Degrees of Freedom = 14682$   
 $STORAGE CONDITIONS = AMB TEMP/RH$

UNIT OF MEASURE = PSI  
 PARAMETER = MAXIMUM STRESS

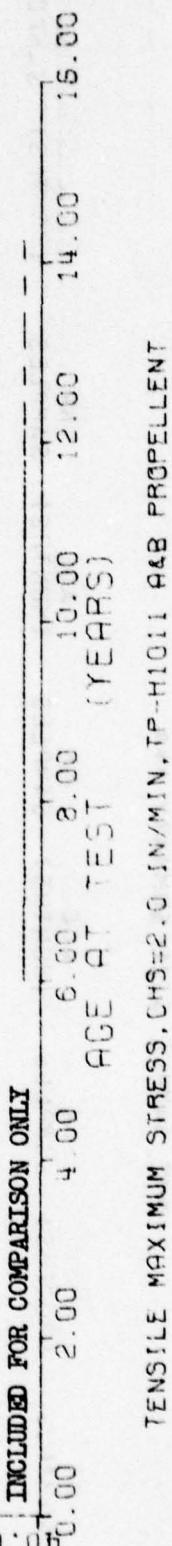


Figure 7A

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	142	97.0	140	122.0	66
73.0	99	98.0	235	123.0	156
74.0	133	99.0	219	124.0	124
75.0	252	100.0	219	125.0	171
76.0	147	101.0	186	126.0	152
77.0	157	102.0	174	127.0	147
78.0	153	103.0	189	128.0	138
79.0	134	104.0	151	129.0	157
80.0	194	105.0	217	130.0	123
81.0	153	106.0	272	131.0	159
82.0	260	107.0	153	132.0	161
83.0	166	108.0	254	133.0	75
84.0	183	109.0	197	134.0	75
85.0	307	110.0	171	135.0	99
86.0	144	111.0	171	136.0	135
87.0	470	112.0	302	137.0	66
88.0	683	113.0	155	138.0	72
89.0	763	114.0	213	139.0	96
90.0	506	115.0	199	140.0	49
91.0	258	116.0	201	141.0	49
92.0	527	117.0	214	143.0	39
93.0	294	118.0	210	144.0	36
94.0	361	119.0	153	145.0	27
95.0	302	120.0	170	147.0	27
96.0	212	121.0	207		

$\gamma = (+3.2363148E-01) + (-1.6819005E-04) \times x$   
 $F = +9.5023090E+02$  SIGNIFICANCE OF F = SIGNIFICANT  
 $R = -2.0649331E-01$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +3.0825815E+01$  SIGNIFICANCE OF T = SIGNIFICANT  
 $N = 21337$  DEGREES OF FREEDOM = 21335  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH

PRARMETER = STRAIN AT RUPTURE  
 UNIT OF MEASURE = PSI

TENSILE STRAIN AT RUPTURE (ER), CMS=2.0 IN/MIN, TP-H1011 A&B PROPELLANT

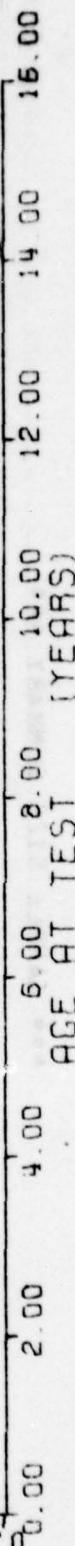


Figure 8

THE SILENT GUARDIAN

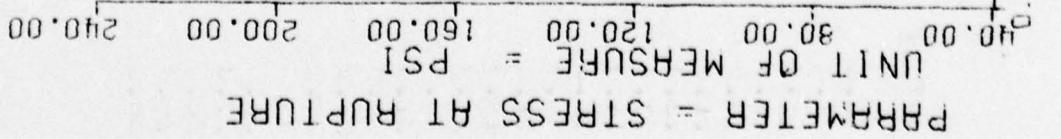
AGE (MONTHS)	MR.	AGE (MONTHS)	MR.	AGE (MONTHS)	MR.	AGE (MONTHS)	MR.
11.0	+	31.0	3.61	59.0	14	35.0	307
7.0	+	21.0	4.15	60.0	42	37.0	144
11.0	+	22.0	4.14	62.0	24	37.0	470
11.0	+	22.0	4.14	62.0	51	38.0	682
11.0	+	24.0	5.7	64.0	81	39.0	783
11.0	+	25.0	5.7	64.0	42	90.0	506
11.0	+	36.0	6.2	65.0	96	91.0	558
11.0	+	36.0	6.2	65.0	91.0	116.0	204
11.0	+	37.0	6.2	65.0	97	117.0	527
11.0	+	38.0	7.5	67.0	39	92.0	117.0
11.0	+	39.0	6.0	68.0	69	93.0	294
11.0	+	40.0	6.0	69.0	97	94.0	259
11.0	+	41.0	6.4	70.0	39	95.0	302
11.0	+	41.0	6.4	70.0	39	129.0	170
11.0	+	42.0	6.4	71.0	165	96.0	212
11.0	+	43.0	6.4	72.0	142	97.0	140
11.0	+	44.0	6.5	73.0	99	98.0	235
11.0	+	45.0	6.5	74.0	133	99.0	219
11.0	+	46.0	6.5	75.0	124	100.0	215
11.0	+	47.0	5.2	76.0	124	100.0	125.0
11.0	+	48.0	5.2	76.0	147	101.0	186
11.0	+	49.0	5.6	77.0	157	102.0	174
11.0	+	50.0	5.6	78.0	153	103.0	189
11.0	+	51.0	5.6	79.0	134	104.0	151
11.0	+	52.0	5.6	80.0	194	105.0	217
11.0	+	53.0	5.6	81.0	153	106.0	274
11.0	+	53.0	5.6	82.0	260	107.0	153
11.0	+	54.0	5.6	83.0	166	108.0	254
11.0	+	55.0	5.7	83.0	163	109.0	197
11.0	+	56.0	5.7	84.0	24.0	134.0	155.0
11.0	+	57.0	6.0	85.0	16	134.0	126.0
11.0	+	58.0	6.0	86.0	16	134.0	137.0
11.0	+	59.0	6.0	87.0	16	134.0	142.0
11.0	+	60.0	6.0	88.0	16	134.0	149.0
11.0	+	61.0	6.0	89.0	16	134.0	157.0
11.0	+	62.0	6.0	90.0	16	134.0	164.0
11.0	+	63.0	6.0	91.0	16	134.0	171.0
11.0	+	64.0	6.0	92.0	16	134.0	178.0
11.0	+	65.0	6.0	93.0	16	134.0	185.0
11.0	+	66.0	6.0	94.0	16	134.0	192.0
11.0	+	67.0	6.0	95.0	16	134.0	199.0
11.0	+	68.0	6.0	96.0	16	134.0	206.0
11.0	+	69.0	6.0	97.0	16	134.0	213.0
11.0	+	70.0	6.0	98.0	16	134.0	220.0
11.0	+	71.0	6.0	99.0	16	134.0	227.0
11.0	+	72.0	6.0	100.0	16	134.0	234.0
11.0	+	73.0	6.0	101.0	16	134.0	241.0
11.0	+	74.0	6.0	102.0	16	134.0	248.0
11.0	+	75.0	6.0	103.0	16	134.0	255.0
11.0	+	76.0	6.0	104.0	16	134.0	262.0
11.0	+	77.0	6.0	105.0	16	134.0	269.0
11.0	+	78.0	6.0	106.0	16	134.0	276.0
11.0	+	79.0	6.0	107.0	16	134.0	283.0
11.0	+	80.0	6.0	108.0	16	134.0	290.0
11.0	+	81.0	6.0	109.0	16	134.0	297.0
11.0	+	82.0	6.0	110.0	16	134.0	304.0
11.0	+	83.0	6.0	111.0	16	134.0	311.0
11.0	+	84.0	6.0	112.0	16	134.0	318.0
11.0	+	85.0	6.0	113.0	16	134.0	325.0
11.0	+	86.0	6.0	114.0	16	134.0	332.0
11.0	+	87.0	6.0	115.0	16	134.0	339.0
11.0	+	88.0	6.0	116.0	16	134.0	346.0
11.0	+	89.0	6.0	117.0	16	134.0	353.0
11.0	+	90.0	6.0	118.0	16	134.0	360.0
11.0	+	91.0	6.0	119.0	16	134.0	367.0
11.0	+	92.0	6.0	120.0	16	134.0	374.0
11.0	+	93.0	6.0	121.0	16	134.0	381.0
11.0	+	94.0	6.0	122.0	16	134.0	388.0
11.0	+	95.0	6.0	123.0	16	134.0	395.0
11.0	+	96.0	6.0	124.0	16	134.0	402.0
11.0	+	97.0	6.0	125.0	16	134.0	409.0
11.0	+	98.0	6.0	126.0	16	134.0	416.0
11.0	+	99.0	6.0	127.0	16	134.0	423.0
11.0	+	100.0	6.0	128.0	16	134.0	430.0
11.0	+	101.0	6.0	129.0	16	134.0	437.0
11.0	+	102.0	6.0	130.0	16	134.0	444.0
11.0	+	103.0	6.0	131.0	16	134.0	451.0
11.0	+	104.0	6.0	132.0	16	134.0	458.0
11.0	+	105.0	6.0	133.0	16	134.0	465.0
11.0	+	106.0	6.0	134.0	16	134.0	472.0
11.0	+	107.0	6.0	135.0	16	134.0	479.0
11.0	+	108.0	6.0	136.0	16	134.0	486.0
11.0	+	109.0	6.0	137.0	16	134.0	493.0
11.0	+	110.0	6.0	138.0	16	134.0	500.0
11.0	+	111.0	6.0	139.0	16	134.0	507.0
11.0	+	112.0	6.0	140.0	16	134.0	514.0
11.0	+	113.0	6.0	141.0	16	134.0	521.0
11.0	+	114.0	6.0	142.0	16	134.0	528.0
11.0	+	115.0	6.0	143.0	16	134.0	535.0
11.0	+	116.0	6.0	144.0	16	134.0	542.0
11.0	+	117.0	6.0	145.0	16	134.0	549.0
11.0	+	118.0	6.0	146.0	16	134.0	556.0
11.0	+	119.0	6.0	147.0	16	134.0	563.0
11.0	+	120.0	6.0	148.0	16	134.0	570.0
11.0	+	121.0	6.0	149.0	16	134.0	577.0
11.0	+	122.0	6.0	150.0	16	134.0	584.0
11.0	+	123.0	6.0	151.0	16	134.0	591.0
11.0	+	124.0	6.0	152.0	16	134.0	598.0
11.0	+	125.0	6.0	153.0	16	134.0	605.0
11.0	+	126.0	6.0	154.0	16	134.0	612.0
11.0	+	127.0	6.0	155.0	16	134.0	619.0
11.0	+	128.0	6.0	156.0	16	134.0	626.0
11.0	+	129.0	6.0	157.0	16	134.0	633.0
11.0	+	130.0	6.0	158.0	16	134.0	640.0
11.0	+	131.0	6.0	159.0	16	134.0	647.0
11.0	+	132.0	6.0	160.0	16	134.0	654.0
11.0	+	133.0	6.0	161.0	16	134.0	661.0
11.0	+	134.0	6.0	162.0	16	134.0	668.0
11.0	+	135.0	6.0	163.0	16	134.0	675.0
11.0	+	136.0	6.0	164.0	16	134.0	682.0
11.0	+	137.0	6.0	165.0	16	134.0	689.0
11.0	+	138.0	6.0	166.0	16	134.0	696.0
11.0	+	139.0	6.0	167.0	16	134.0	703.0
11.0	+	140.0	6.0	168.0	16	134.0	710.0
11.0	+	141.0	6.0	169.0	16	134.0	717.0
11.0	+	142.0	6.0	170.0	16	134.0	724.0
11.0	+	143.0	6.0	171.0	16	134.0	731.0
11.0	+	144.0	6.0	172.0	16	134.0	738.0
11.0	+	145.0	6.0	173.0	16	134.0	745.0
11.0	+	146.0	6.0	174.0	16	134.0	752.0
11.0	+	147.0	6.0	175.0	16	134.0	759.0
11.0	+	148.0	6.0	176.0	16	134.0	766.0
11.0	+	149.0	6.0	177.0	16	134.0	773.0
11.0	+	150.0	6.0	178.0	16	134.0	780.0
11.0	+	151.0	6.0	179.0	16	134.0	787.0
11.0	+	152.0	6.0	180.0	16	134.0	794.0
11.0	+	153.0	6.0	181.0	16	134.0	801.0
11.0	+	154.0	6.0	182.0	16	134.0	808.0
11.0	+	155.0	6.0	183.0	16	134.0	815.0
11.0	+	156.0	6.0	184.0	16	134.0	822.0
11.0	+	157.0	6.0	185.0	16	134.0	829.0
11.0	+	158.0	6.0	186.0	16	134.0	836.0
11.0	+	159.0	6.0	187.0	16	134.0	843.0
11.0	+	160.0	6.0	188.0	16	134.0	850.0
11.0	+	161.0	6.0	189.0	16	134.0	857.0
11.0	+	162.0	6.0	190.0	16	134.0	864.0
11.0	+	163.0	6.0	191.0	16	134.0	871.0
11.0	+	164.0	6.0	192.0	16	134.0	878.0
11.0	+	165.0	6.0	193.0	16	134.0	885.0
11.0	+	166.0	6.0	194.0	16	134.0	892.0
11.0	+	167.0	6.0	195.0	16	134.0	899.0
11.0	+	168.0	6.0	196.0	16	134.0	906.0
11.0	+	169.0	6.0	197.0	16	134.0	913.0
11.0	+	170.0	6.0	198.0	16	134.0	920.0
11.0	+	171.0	6.0	199.0	16	134.0	927.0
11.0	+	172.0	6.0	200.0	16	134.0	934.0
11.0	+	173.0	6.0	201.0	16	134.0	941.0
11.0	+	174.0	6.0	202.0	16	134.0	948.0
11.0	+	175.0	6.0	203.0	16	134.0	955.0
11.0	+	176.0	6.0	204.0	16	134.0	962.0
11.0	+	177.0	6.0	205.0	16	134.0	969.0
11.0	+	178.0	6.0	206.0	16	134.0	976.0
11.0	+	179.0	6.0	207.0	16	134.0	983.0
11.0	+	180.0	6.0	208.0	16	134.0	990.0
11.0	+	181.0	6.0	209.0	16	134.0	997.0
11.0	+	182.0	6.0	210.0	16	134.0	1004.0
11.0	+	183.0	6.0	211.0	16	134.0	1011.0
11.0	+	184.0	6.0	212.0	16	134.0	1018.0
11.0	+	185.0	6.0	213.0	16	134.0	1025.0
11.0	+	186.0	6.0	214.0	16	134.0	1032.0
11.0	+	187.0	6.0	215.0	16	134.0	1039.0
11.0	+	188.0	6.0	216.0	16	134.0	1046.0
11.0	+	189.0	6.0	217.0	16	134.0	1053.0
11.0	+	190.0	6.0	218.0	16	134.0	1060.0
11.0	+	191.0	6.0	219.0	16	134.0	1067.0
11.0	+	192.0	6.0	220.0	16	134.0	1074.0
11.0	+	193.0	6.0	221.0	16	134.	

INTERVIEW WITH DR. JAMES L. HILL, JR., DIRECTOR OF THE TEXAS DEPARTMENT OF CRIMINAL JUSTICE

$F = +1.2121429E+02$   
 $R = +7.5033073E-02$   
 $t = +1.1009736E+01$   
 $N = 21411$   
 STORAGE CONDITIONS = AMB TEMP/RH

$\gamma = (( +1.2190903E+02 ) + ( +5.8183785E-02 )) * X$   
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF t = SIGNIFICANT  
 DEGREES OF FREEDOM = 21409  
 TEST CONDITIONS = AMB TEMP/RH

$C_F = +2.7461428E+01$   
 $S_F = +5.2847574E-03$   
 $S_t = +2.7384655E+01$



TENSILE STRESS AT RUPTURE (PSI), CHS=2.0 IN/MIN, TP-H1011 AGB PROPELLANT

Figure 9

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	SAMPLES	AGE (MONTHS)	SAMPLES	AGE (MONTHS)	SAMPLES	AGE (MONTHS)	SAMPLES	MEAN SAMPLES (N.CUTS)
0.0	4	31.0	307	59.0	18	85.0	307	110.0
7.0	33	32.0	215	60.0	42	66.0	144	111.0
14.0	53	33.0	114	62.0	24	37.0	470	412.0
21.0	49	34.0	91	63.0	51	88.0	683	114.0
28.0	89	35.0	57	64.0	81	69.0	783	114.0
35.0	41	36.0	63	65.0	42	90.0	506	115.0
42.0	45	37.0	50	66.0	96	91.0	556	116.0
49.0	44	38.0	75	67.0	39	92.0	527	117.0
56.0	65	39.0	68	68.0	69	93.0	294	118.0
63.0	43	40.0	54	69.0	97	94.0	361	119.0
70.0	70	41.0	84	70.0	89	95.0	302	120.0
- 16.0	-	-	-	-	-	-	-	-
- 17.0	-	42	42.0	71.0	165	96.0	212	121.0
- 18.0	-	75	43.0	72.0	142	97.0	140	122.0
- 19.0	-	42.7	44.0	73.0	99	98.0	235	123.0
- 20.0	-	65	45.0	74.0	123	99.0	219	124.0
- 21.0	-	65	45.0	75.0	252	100.0	219	125.0
- 22.0	-	51	47.0	52	76.0	147	101.0	186
- 23.0	-	90	48.0	36	77.0	157	102.0	174
- 24.0	-	341	49.0	27	78.0	153	103.0	189
- 25.0	-	210	50.0	17	79.0	134	104.0	151
- 26.0	-	251	51.0	16	80.0	194	105.0	217
- 27.0	-	391	52.0	21	81.0	153	106.0	272
- 28.0	-	354	53.0	6	82.0	260	107.0	153
- 29.0	-	317	57.0	6	83.0	166	108.0	254
- 30.0	-	391	58.0	18	84.0	183	109.0	197
								135.0

INSTANT STRESS AT RUPTURE (SR), CHS=2.0 IN/MIN, TP-H1011 A&B PROPELLANT

139.0	96
140.0	49
141.0	49
142.0	52
143.0	39
144.0	36
145.0	27
147.0	27

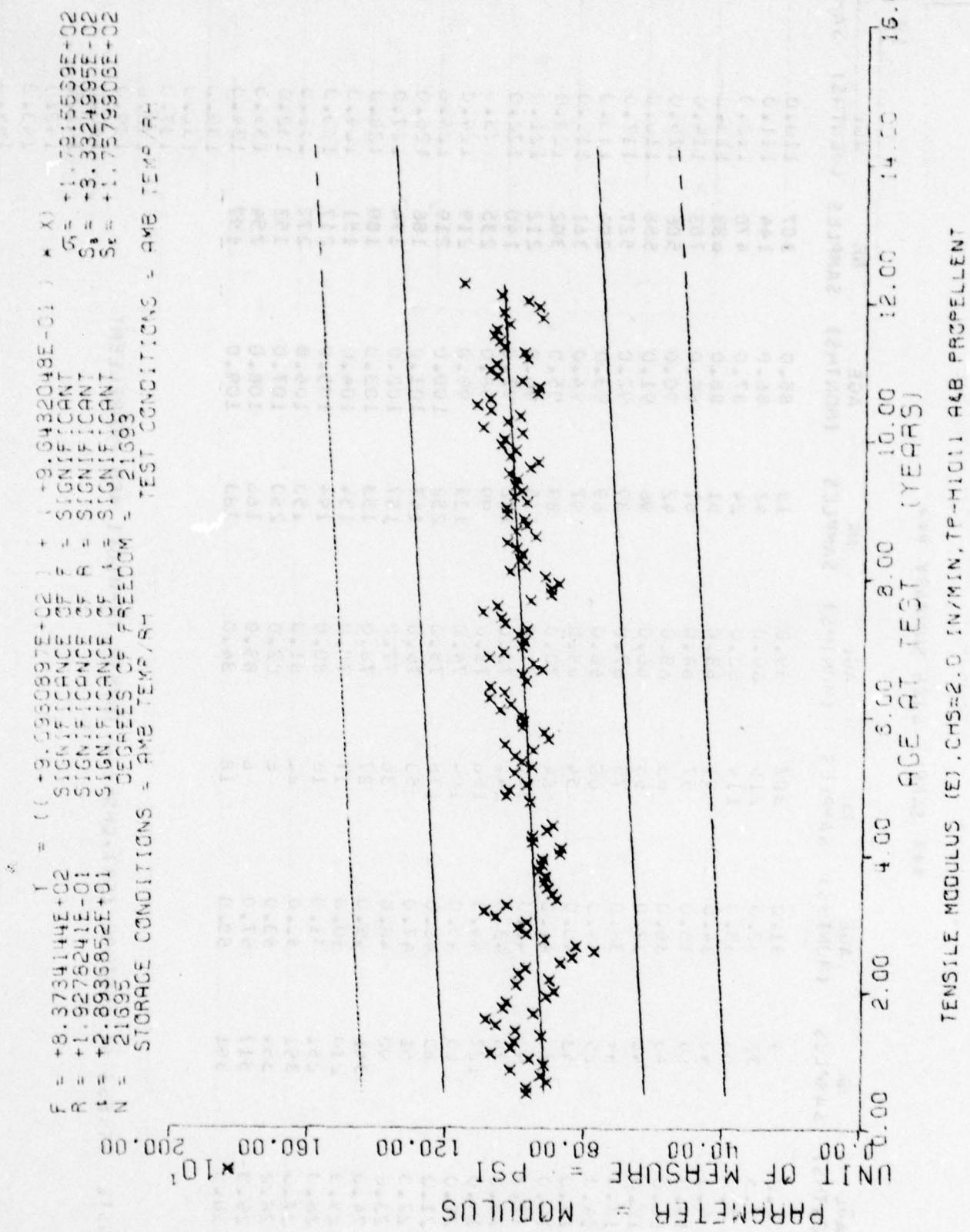


Figure 10

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES								
6.0	4	31.0	307	59.0	18	85.0	307	110.0	166
7.0	33	32.0	245	60.0	42	86.0	144	111.0	171
8.0	23	33.0	114	62.0	24	87.0	470	112.0	302
9.0	49	34.0	91	63.0	51	88.0	682	113.0	125
10.0	89	35.0	57	64.0	81	89.0	783	114.0	213
11.0	43	36.0	63	65.0	42	90.0	506	115.0	193
12.0	26	37.0	56	66.0	96	91.0	558	116.0	244
13.0	44	38.0	75	67.0	39	92.0	527	117.0	208
14.0	55	39.0	68	68.0	69	93.0	294	118.0	240
15.0	42	40.0	54	69.0	97	94.0	360	119.0	153
16.0	70	41.0	84	70.0	89	95.0	302	120.0	173
17.0	42	42.0	216	71.0	165	96.0	212	121.0	207
18.0	12	43.0	241	72.0	142	97.0	140	122.0	60
19.0	127	44.0	158	73.0	99	98.0	235	123.0	150
20.0	65	45.0	194	74.0	133	99.0	216	124.0	127
21.0	35	46.0	136	75.0	252	100.0	219	125.0	173
22.0	51	47.0	53	76.0	147	101.0	186	126.0	152
23.0	79	48.0	36	77.0	157	102.0	174	127.0	150
24.0	336	49.0	27	78.0	154	103.0	183	128.0	136
25.0	413	50.0	17	79.0	134	104.0	151	129.0	120
26.0	252	51.0	16	80.0	194	105.0	217	130.0	145
27.0	121	52.0	21	81.0	153	106.0	272	131.0	162
28.0	354	53.0	6	82.0	260	107.0	153	132.0	161
29.0	517	57.0	6	83.0	166	108.0	253	133.0	90
30.0	391	58.0	18	84.0	183	109.0	182	134.0	92
							135.0	141	
							136.0	165	
							137.0	123	
							138.0	129	
							139.0	168	
							140.0	67	
							141.0	67	
							142.0	43	
							143.0	39	
							144.0	45	
							145.0	27	
							147.0	27	

TENSILE MODULUS (E), CHS=2.0 IN/HIN, TP-H1011 A&B PROPELLANT

$F_R = +6.0241282E-01$   
 $R_F = +2.1190206E-02$   
 $t = +7.7615257E-01$   
 $N = 1343$   
 STORAGE CONDITIONS = AMB TEMP/RH

$\text{SIGNIFICANCE OF } F_R = +1.150388E-01$   
 $\text{NOT SIGNIFICANT}$   
 $\text{SIGNIFICANCE OF } R_F = +1.0751395E-05$   
 $\text{NOT SIGNIFICANT}$   
 $\text{SIGNIFICANCE OF } t = +1.38521375E-05$   
 $\text{NOT SIGNIFICANT}$   
 $\text{FREES OF FREEDOM} = 1341$   
 TEST CONDITIONS = AMB TEMP/RH

UNIT OF MEASURE = PSI  
 PARAMETER = STRAIN AT MAX STRESS

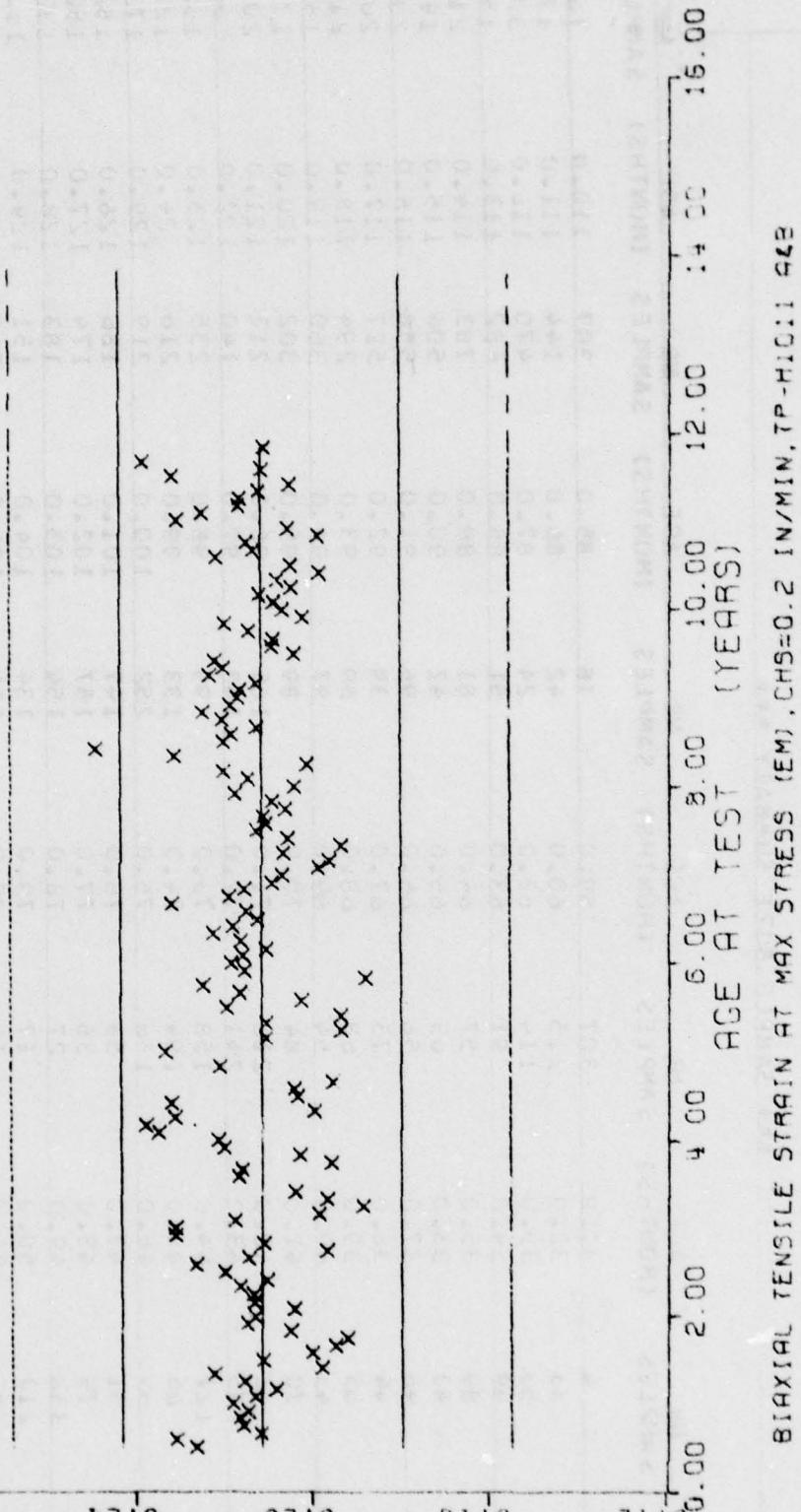


Figure 11

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

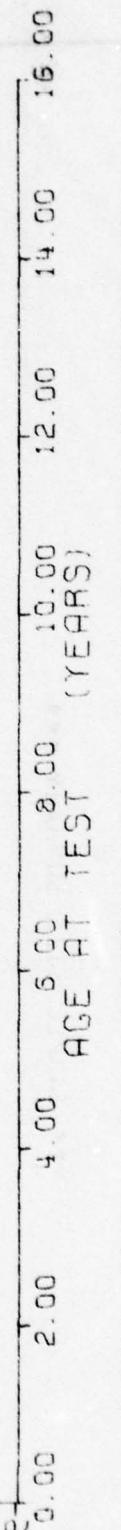
AGE (MONTHS)	NR. SAMPLES								
2.0	1	31.0	12	53.0	2	65.0	11	113.0	3
7.0	1	32.0	6	60.0	1	86.0	18	144.0	12
8.0	1	33.0	7	62.0	2	87.0	11	141.0	12
9.0	2	34.0	12	64.0	1	88.0	14	142.0	2
10.0	1	35.0	11	64.0	1	89.0	26	144.0	2
11.0	1	36.0	10	65.0	1	90.0	34	145.0	11
12.0	1	37.0	4	66.0	2	91.0	23	146.0	5
13.0	1	38.0	10	67.0	2	92.0	37	147.0	3
14.0	1	39.0	5	68.0	1	93.0	30	148.0	2
15.0	1	40.0	11	69.0	2	94.0	20	149.0	4
16.0	1	41.0	3	70.0	2	95.0	11	150.0	12
17.0	1	42.0	5	72.0	4	96.0	10	152.0	12
18.0	1	43.0	22	72.0	3	97.0	9	152.0	12
19.0	1	44.0	29	72.0	9	98.0	1	152.0	6
20.0	1	45.0	32	74.0	4	99.0	3	152.0	4
21.0	1	46.0	31	72.0	5	100.0	5	153.0	2
22.0	1	47.0	12	48.0	8	76.0	9	101.0	2
23.0	1	48.0	12	49.0	9	77.0	12	102.0	4
24.0	1	49.0	12	50.0	7	78.0	7	103.0	4
25.0	1	50.0	12	51.0	3	79.0	16	104.0	9
26.0	1	51.0	12	52.0	1	80.0	5	105.0	6
27.0	1	52.0	2	53.0	10	81.0	106.0	9	106.0
28.0	1	53.0	7	54.0	7	82.0	15	107.0	10
29.0	1	54.0	7	55.0	7	83.0	13	108.0	11
30.0	1	55.0	7	56.0	4	84.0	11	109.0	12
31.0	1	56.0	7					135.0	4
32.0	1							156.0	4
33.0	1							177.0	6
34.0	1							188.0	3
35.0	1							199.0	1
36.0	1							142.0	1

$F = +1.0510079E+02$   
 $R = +2.7033876E-01$   
 $t = +1.0251867E+01$   
 $N = 1335$   
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF t = SIGNIFICANT  
 DEGREES OF FREEDOM = 1333  
 STORAGE CONDITIONS = AMB TEMP/RH

TEST CONDITIONS = AMB TEMP/RH

UNIT OF MEASURE = PSI

PARAMETER = MAXIMUM STRESS



UNIAXIAL TENSILE MAXIMUM STRESS, CHS=0.2 IN/MIN, TP-HIGH A&B PROPELLENT

Figure 12

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

NR. (NO. TESTS)	SAMPLES (MONTHS)	AGE (MONTHS)	NR. SAMPLES								
2•1	2	31.0	4•6	58.0	2	35.0	12	112.0	1	112.0	1
7•1	4	32.0	8	60.0	1	86.0	16	111.0	1	112.0	1
2•0	2	33.0	7	62.0	2	87.0	11	112.0	1	112.0	1
2•0	2	34.0	12	63.0	1	88.0	14	113.0	1	113.0	1
10•0	4	35.0	11	64.0	1	89.0	26	114.0	1	114.0	1
11•0	7	36.0	10	65.0	1	90.0	36	115.0	11	115.0	11
12•0	7	37.0	4	66.0	2	91.0	23	116.0	2	116.0	2
12•0	7	38.0	10	67.0	2	92.0	37	117.0	1	117.0	1
13•0	7	39.0	5	68.0	1	93.0	30	118.0	2	118.0	2
12•0	12	40.0	11	69.0	2	94.0	20	119.0	1	119.0	1
16•0	7	41.0	3	70.0	2	95.0	11	120.0	12	120.0	12
17•0	7	42.0	5	71.0	4	96.0	10	121.0	11	121.0	11
12•0	7	44.0	20	72.0	3	97.0	9	122.0	12	122.0	12
12•0	12	45.0	29	73.0	3	98.0	1	123.0	2	123.0	2
20•0	22	46.0	32	74.0	4	99.0	3	124.0	12	124.0	12
21•0	22	47.0	21	75.0	5	100.0	5	125.0	2	125.0	2
22•0	22	48.0	8	76.0	9	101.0	2	126.0	14	126.0	14
22•0	22	49.0	9	77.0	12	102.0	4	127.0	3	127.0	3
24•0	22	50.0	7	78.0	7	103.0	4	128.0	2	128.0	2
21•0	22	51.0	3	79.0	16	104.0	2	129.0	7	129.0	7
46•0	32	52.0	1	80.0	5	105.0	2	131.0	2	131.0	2
27•0	27	53.0	2	81.0	10	106.0	9	132.0	2	132.0	2
26•0	49	54.0	9	82.0	15	107.0	10	134.0	3	134.0	3
29•0	30	55.0	7	83.0	13	108.0	11	135.0	4	135.0	4
33•0	37	56.0	4	84.0	11	109.0	12	136.0	4	136.0	4
								137.0	5	137.0	5
								138.0	2	138.0	2
								139.0	1	139.0	1
								140.0	1	140.0	1

MAXIMUM STRESS, CHS=0.2 IN/MIN, THERMAL A&B PROPELLANT

$\gamma = ( +1.1992297E+01 + 1.4593701E-02 ) \times X$   
 SIGNIFICANCE OF R = NOT SIGNIFICANT  
 SIGNIFICANCE OF R = NOT SIGNIFICANT  
 SIGNIFICANCE OF R = NOT SIGNIFICANT  
 DEGREES OF FREEDOM = 659 TEST CONDITIONS = AMB TEMP/RH  
 STORAGE CONDITIONS = AMB TEMP/RH  
 N = 661

UNIT OF MEASURE = PSI  
 PROGRAMETER = MAXIMUM STRESS  
 INCLUDED FOR COMPARISON ONLY

	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00
AGE AT TEST (YEARS)	80.00	100.00	120.00	140.00	160.00	180.00		

BIAXIAL TENSILE MAXIMUM STRESS, CHS=0.2 IN/MIN, TP-H1011 A&B PROPELLENT

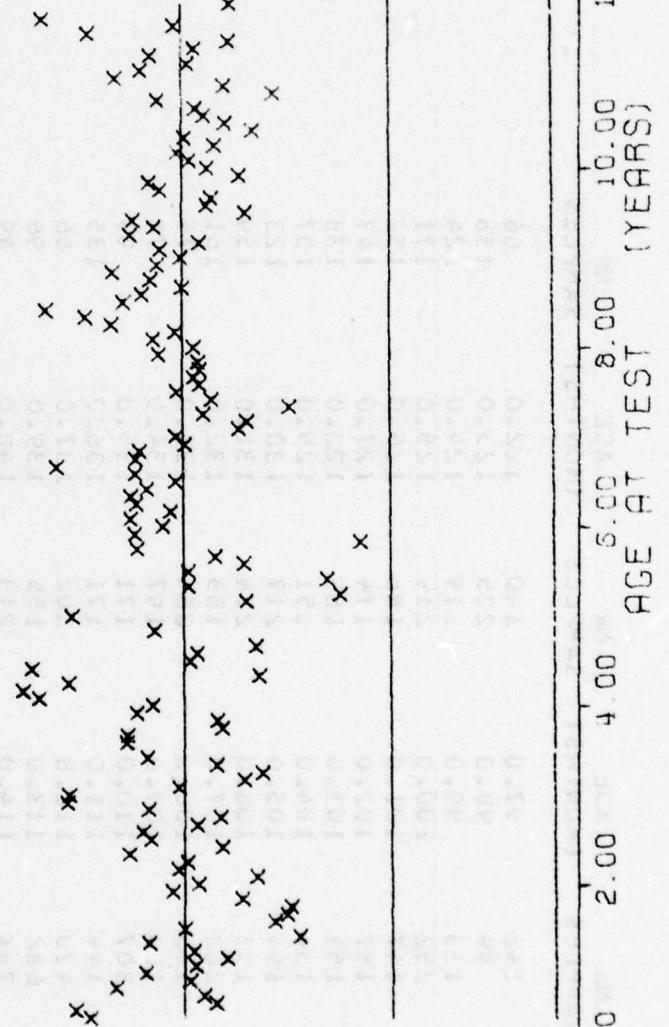
Figure 124

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	142	97.0	140	122.0	66
73.0	99	98.0	235	123.0	156
74.0	133	99.0	219	124.0	124
75.0	252	100.0	215	125.0	171
76.0	147	101.0	186	126.0	152
77.0	157	102.0	174	127.0	147
78.0	153	103.0	189	128.0	138
79.0	154	104.0	151	129.0	157
80.0	194	105.0	217	130.0	123
81.0	153	106.0	274	131.0	159
82.0	260	107.0	153	132.0	161
83.0	166	108.0	254	133.0	75
84.0	183	109.0	197	134.0	75
85.0	307	110.0	171	135.0	99
86.0	144	111.0	171	136.0	135
87.0	472	112.0	302	137.0	66
88.0	682	113.0	155	139.0	96
89.0	763	114.0	213	140.0	49
90.0	206	115.0	199	141.0	49
91.0	526	116.0	201	143.0	39
92.0	527	117.0	214	144.0	36
93.0	294	118.0	210	145.0	27
94.0	359	119.0	153	147.0	27
95.0	302	120.0	170		
96.0	212	121.0	207		

$F = +3.8210204E-01$        $\gamma = ((+2.3742360E-01) + (+1.2540250E-05)) * X$   
 $R = +1.6877706E-02$       SIGNIFICANCE OF  $F$  = NOT SIGNIFICANT  
 $S^a = +2.7710246E-02$       SIGNIFICANCE OF  $R$  = NOT SIGNIFICANT  
 $S^b = +2.0286939E-05$       SIGNIFICANCE OF  $\gamma$  = SIGNIFICANT  
 $S^c = +2.7716627E-02$       DEGREES OF FREEDOM = NOT SIGNIFICANT  
 $t = +6.1814403E-01$       DEGREES OF FREEDOM = 1341  
 $N = 1343$       TEST CONDITIONS = AMB TEMP/RH  
 $S$  STORAGE CONDITIONS = AMB TEMP/RH

PARAMETER = STRAIN AT RUPUTURE  
 UNIT OF MEASURE = PSI  
 0.00 0.15 0.19 0.23 0.27 0.31 0.35



BIAXIAL TENSILE STRAIN AT RUPTURE (ER), CHS=0.2 IN/MIN, TP-HIGH, A&B

Figure 13

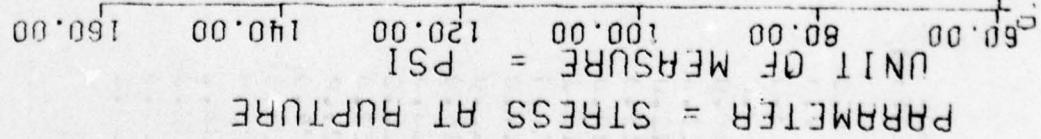
\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	SAMPLES (NBRHS)	AGE (MONTHS)	SAMPLES (NBRHS)	AGE (MONTHS)	SAMPLES (NBRHS)	AGE (MONTHS)	SAMPLES (NBRHS)
6.0	31.0	18	55.0	2	85.0	11	119.0
7.0	24.0	2	60.0	1	86.0	16	114.0
8.0	23.0	7	62.0	2	87.0	11	112.0
9.0	24.0	12	63.0	1	88.0	14	113.0
10.0	25.0	11	64.0	1	89.0	26	114.0
11.0	26.0	10	65.0	1	90.0	34	115.0
12.0	27.0	4	66.0	2	91.0	23	116.0
13.0	28.0	10	67.0	2	92.0	37	117.0
14.0	29.0	5	68.0	1	93.0	30	118.0
15.0	30.0	11	69.0	2	94.0	20	119.0
16.0	31.0	3	70.0	2	95.0	11	120.0
17.0	32.0	5	71.0	4	96.0	10	121.0
18.0	33.0	5	72.0	3	97.0	9	122.0
19.0	34.0	20	73.0	2	98.0	1	123.0
20.0	35.0	39	74.0	4	99.0	3	124.0
21.0	36.0	32	75.0	5	100.0	5	125.0
22.0	37.0	21	76.0	9	101.0	2	126.0
23.0	38.0	8	77.0	12	102.0	4	127.0
24.0	39.0	9	78.0	7	103.0	4	128.0
25.0	40.0	7	79.0	16	104.0	9	129.0
26.0	41.0	2	80.0	5	105.0	9	130.0
27.0	42.0	1	81.0	16	106.0	9	131.0
28.0	43.0	2	82.0	15	107.0	10	132.0
29.0	44.0	9	83.0	13	108.0	11	133.0
30.0	45.0	7	84.0	11	109.0	12	134.0
31.0	46.0	4	85.0				135.0

$F_R = +6.0554821E+01$   
 $R = +2.0845500E-01$   
 $t = +7.7816978E+00$   
 $N = 1335$   
 STORAGE CONDITIONS = AMB TEMP/RH

$\gamma = (( +1.1039822E+02 ) + ( +7.0426751E-02 ) * \sigma) / 1.2487375E+01$   
 SIGNIFICANCE OF  $F_R$  = SIGNIFICANT  
 SIGNIFICANCE OF  $R$  = SIGNIFICANT  
 SIGNIFICANCE OF  $t$  = SIGNIFICANT  
 DEGREES OF FREEDOM = 1333

TEST CONDITIONS = AMB TEMP/RH



BIAXIAL TENSILE STRESS AT RUPTURE (SR),  $CHS=0.2$  IN/MIN, TP-HIGH A&B

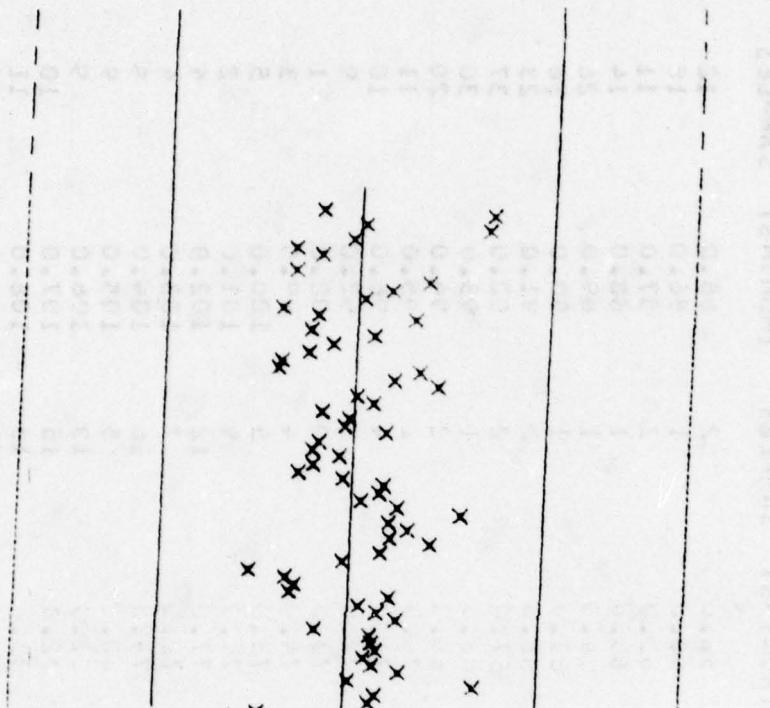
Figure 14.

## Age &amp; Sample Size Summary #3

AGE (MONTHS)	NR SAMPLES								
1	1	31.0	16	56.0	2	65.0	12	116.0	5
2	4	32.0	6	59.0	1	86.0	18	111.0	12
3	5	33.0	7	62.0	2	37.0	11	112.0	10
4	2	34.0	4	63.0	1	88.0	14	113.0	3
5	1	35.0	11	64.0	1	89.0	26	114.0	6
6	10	36.0	10	65.0	1	90.0	36	115.0	11
7	1	37.0	5	66.0	2	91.0	23	116.0	2
8	2	38.0	12	67.0	2	92.0	37	117.0	2
9	3	39.0	5	68.0	1	93.0	30	118.0	2
10	4	40.0	14	69.0	2	94.0	20	119.0	4
11	12	41.0	7	70.0	2	95.0	11	120.0	12
12	2	42.0	5	71.0	4	96.0	10	121.0	11
13	4	43.0	20	72.0	3	97.0	9	122.0	16
14	3	44.0	31	73.0	3	98.0	1	123.0	6
15	1	45.0	32	74.0	4	99.0	3	124.0	12
16	10	46.0	17	75.0	5	100.0	5	125.0	3
17	1	47.0	34	76.0	9	101.0	2	126.0	11
18	4	48.0	3	77.0	12	102.0	4	127.0	6
19	12	49.0	6	78.0	7	103.0	4	128.0	3
20	10	50.0	7	79.0	16	104.0	9	129.0	7
21	14	51.0	3	80.0	5	105.0	9	130.0	4
22	13	52.0	4	81.0	10	106.0	9	131.0	4
23	17	53.0	2	82.0	15	107.0	10	134.0	3
24	40	54.0	5	83.0	13	108.0	11	135.0	4
25	39	55.0	7	84.0	11	109.0	12	136.0	4
26	37	56.0	4					137.0	6

PHRAMEETER = STRESS HI ROPITUDE  
UNIT OF MEASURE = PSI  
50.00 80.00 100.00 120.00 140.00 160.00

PROGRAM = STRESS AT RUPTURE



ENCLUSED FOR COMPARISON ONLY

AXIAL TENSILE STRESS AT RUPTURE (S<sub>R</sub>) - C<sub>MS</sub>=0.2 IN/MM. TR-HIGH AGE

Figure 11A

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES
72.0	3	97.0	9	122.0	16
73.0	9	98.0	1	123.0	6
74.0	4	99.0	3	124.0	12
75.0	5	100.0	5	125.0	9
76.0	9	101.0	2	126.0	11
77.0	12	102.0	4	127.0	6
78.0	7	103.0	4	128.0	8
79.0	16	104.0	9	129.0	7
80.0	5	105.0	9	131.0	4
81.0	10	106.0	9	133.0	4
82.0	15	107.0	10	134.0	3
83.0	13	108.0	11	135.0	4
84.0	11	109.0	12	136.0	4
85.0	12	110.0	6	137.0	6
86.0	16	111.0	12	138.0	3
87.0	11	112.0	10	139.0	1
88.0	14	113.0	8	140.0	1
89.0	26	114.0	6	142.0	1
90.0	36	115.0	11		
91.0	24	116.0	5		
92.0	27	117.0	8		
93.0	30	118.0	5		
94.0	20	119.0	4		
95.0	11	120.0	12		
96.0	10	121.0	11		

$F = +1.0363625E+02$   
 $R = +2.6765550E-01$   
 $N = +1.0180189E+01$   
 $t = 1345$   
 $\text{STORAGE CONDITIONS} = \text{AMB TEMP/RH}$   
 $Y = (( +8.3177191E+02 ) * X) + +1.505913E+00$   
 $\text{SIGNIFICANCE OF } F = \text{SIGNIFICANT}$   
 $\text{SIGNIFICANCE OF } R = \text{SIGNIFICANT}$   
 $\text{SIGNIFICANCE OF } N = \text{SIGNIFICANT}$   
 $\text{DEGREES OF FREEDOM} = 1343$   
 $G = +1.6024952E+02$   
 $S_a = +1.1302259E-01$   
 $S_t = +1.5446023E+01$   
 $\text{TEST CONDITIONS} = \text{AMB TEMP/RH}$

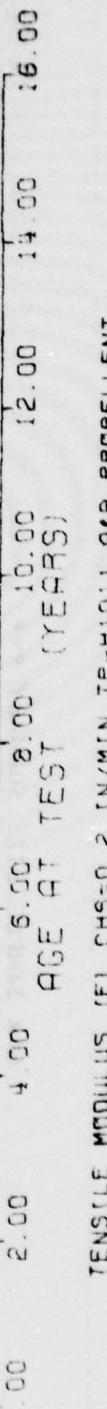
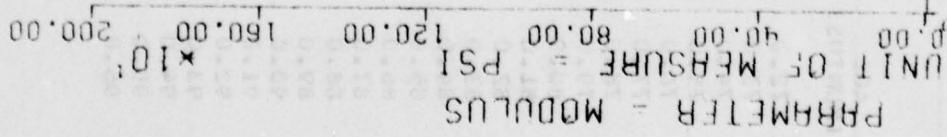


Figure 15

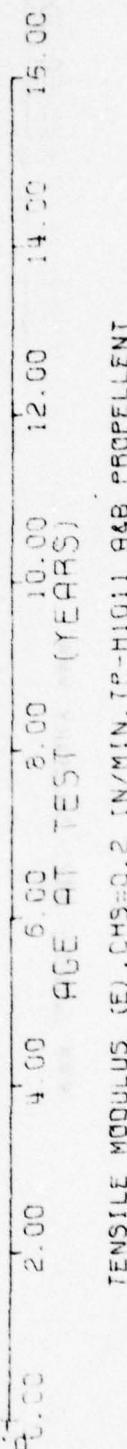
\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	SAMPLES (COUNTS)								
26	1	31.0	10	53.0	2	85.0	11	112.0	8
27	1	32.0	6	60.0	1	86.0	18	114.0	12
28	1	33.0	7	62.0	2	87.0	11	112.0	13
29	1	34.0	12	63.0	1	88.0	14	112.0	3
30	4	35.0	11	64.0	1	89.0	26	114.0	5
31	7	36.0	10	65.0	1	90.0	36	115.0	11
32	7	37.0	9	66.0	2	91.0	23	116.0	5
33	5	38.0	10	67.0	2	92.0	37	117.0	6
34	5	39.0	5	68.0	1	93.0	30	118.0	5
35	10	40.0	11	69.0	2	94.0	20	119.0	4
36	7	41.0	3	70.0	2	95.0	11	120.0	12
37	5	42.0	5	71.0	4	96.0	10	121.0	11
38	7	43.0	40	72.0	3	97.0	9	122.0	16
39	10	44.0	40	73.0	9	98.0	1	123.0	5
40	10	45.0	36	74.0	4	99.0	3	124.0	14
41	10	46.0	32	75.0	5	100.0	5	125.0	6
42	12	47.0	31	76.0	9	101.0	2	126.0	14
43	12	48.0	6	77.0	12	102.0	4	127.0	5
44	13	49.0	9	78.0	7	103.0	4	128.0	2
45	13	50.0	7	79.0	16	104.0	9	129.0	7
46	13	51.0	3	80.0	5	105.0	9	130.0	7
47	12	52.0	1	81.0	10	106.0	9	131.0	4
48	12	53.0	2	82.0	15	107.0	10	132.0	4
49	12	54.0	9	83.0	13	108.0	11	133.0	5
50	12	55.0	7	84.0	11	109.0	12	134.0	1
51	12	56.0	37						

$F = +1.9044707E+00$       SIGNIFICANCE OF F = NOT SIGNIFICANT  
 $R = +5.3279091E-02$       SIGNIFICANCE OF R = SIGNIFICANT  
 $S = +1.3800256E+00$       SIGNIFICANCE OF S = NOT SIGNIFICANT  
 $N = 671$       DEGREES OF FREEDOM = 669  
 STORAGE CONDITIONS = AMBIENT TEMP/RH      TEST CONDITIONS = AMBIENT TEMP/RH

UNIT OF MEASURE = PSI       $\times 10^3$   
 PARAMETER = MODULUS

INCLUDED FOR COMPARISON ONLY



TENSILE MODULUS (E), CHS=0.2 IN/MIN, TP-HIGH R&B PROPELLANT

Figure 15A

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	3	97.0	9	122.0	16
73.0	9	98.0	1	123.0	6
74.0	4	99.0	3	124.0	12
75.0	5	100.0	5	125.0	9
76.0	9	101.0	2	126.0	11
77.0	12	102.0	4	127.0	6
78.0	7	103.0	4	128.0	8
79.0	16	104.0	9	129.0	7
80.0	5	105.0	9	130.0	7
81.0	10	106.0	9	131.0	4
82.0	15	107.0	10	132.0	4
83.0	13	108.0	11	133.0	4
84.0	11	109.0	12	134.0	3
85.0	11	110.0	8	135.0	4
86.0	18	111.0	12	136.0	4
87.0	11	112.0	10	137.0	6
88.0	14	113.0	8	138.0	3
89.0	26	114.0	6	139.0	1
90.0	36	115.0	11	140.0	1
91.0	23	116.0	5	142.0	1
92.0	37	117.0	6		
93.0	30	118.0	5		
94.0	20	119.0	4		
95.0	11	120.0	12		
96.0	10	121.0	11		

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TENSILE MODULUS (E), CHS=0.2 IN/MIN, TP-H1011 AEB PROPELLANT

$F = +3.5197714E+01$   
 $R = +1.1001331E-01$   
 $t = +5.9327661E+00$   
 $N = 2875$   
 $F = (+2.1613083E-01) + (+1.6861216E-04) \times X_1$   
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF t = SIGNIFICANT  
 DEGREES OF FREEDOM = 2873  
 STORAGE CONDITIONS = AMB TEMP/RH

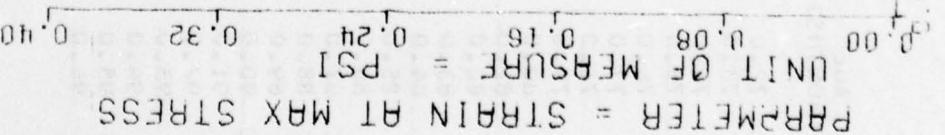


Figure 16

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

Age (MONTHS)	No. SAMPLES								
32.0	22	64.0	13	99.0	75	119.0	22	22.0	22
34.0	11	65.0	5	90.0	85	115.0	13	13.0	13
35.0	14	66.0	12	91.0	66	116.0	25	25.0	25
36.0	4	67.0	9	92.0	96	117.0	22	22.0	22
37.0	5	68.0	12	93.0	49	118.0	23	23.0	23
38.0	0	69.0	15	94.0	60	119.0	41	41.0	41
39.0	2	70.0	14	95.0	42	120.0	42	42.0	42
40.0	8	71.0	21	96.0	30	121.0	13	13.0	13
41.0	5	72.0	21	97.0	26	122.0	36	36.0	36
42.0	0	73.0	24	98.0	24	123.0	24	24.0	24
43.0	7	74.0	12	99.0	20	124.0	9	9.0	9
44.0	10	75.0	18	100.0	15	125.0	24	24.0	24
45.0	4	76.0	9	101.0	18	126.0	18	18.0	18
46.0	5	77.0	45	102.0	16	127.0	19	19.0	19
47.0	19	78.0	18	103.0	20	128.0	8	8.0	8
48.0	2	79.0	50	104.0	42	129.0	13	13.0	13
49.0	10	80.0	27	105.0	27	130.0	9	9.0	9
50.0	2	81.0	21	106.0	33	131.0	12	12.0	12
51.0	7	82.0	63	107.0	18	132.0	24	24.0	24
52.0	1	83.0	24	108.0	18	133.0	15	15.0	15
53.0	1	84.0	53	109.0	23	134.0	14	14.0	14
54.0	1	85.0	22	110.0	30	135.0	20	20.0	20
55.0	1	86.0	18	111.0	52	136.0	21	21.0	21
56.0	3	87.0	69	112.0	20	137.0	12	12.0	12
57.0	1	88.0	14	113.0	48	138.0	17	17.0	17
						139.0	16	16.0	16
						140.0	14	14.0	14
						141.0	11	11.0	11
						142.0	6	6.0	6
						143.0	9	9.0	9
						144.0	12	12.0	12
						145.0	5	5.0	5

TEST SITE SURFACE AT DAY 52000, C.I.S=1750.0 IN/MM, IP-HIOLI A&B PROPELLER

PARAMETER = STRAIN AT MAX STRESS      UNIT OF MEASURE = PSI      0.06      0.14      0.22      0.30      0.38      0.46

PARAMETER = STRAIN AT MAX STRESS



INCLUDED FOR COMPARISON ONLY

THE JOURNAL OF CLIMATE

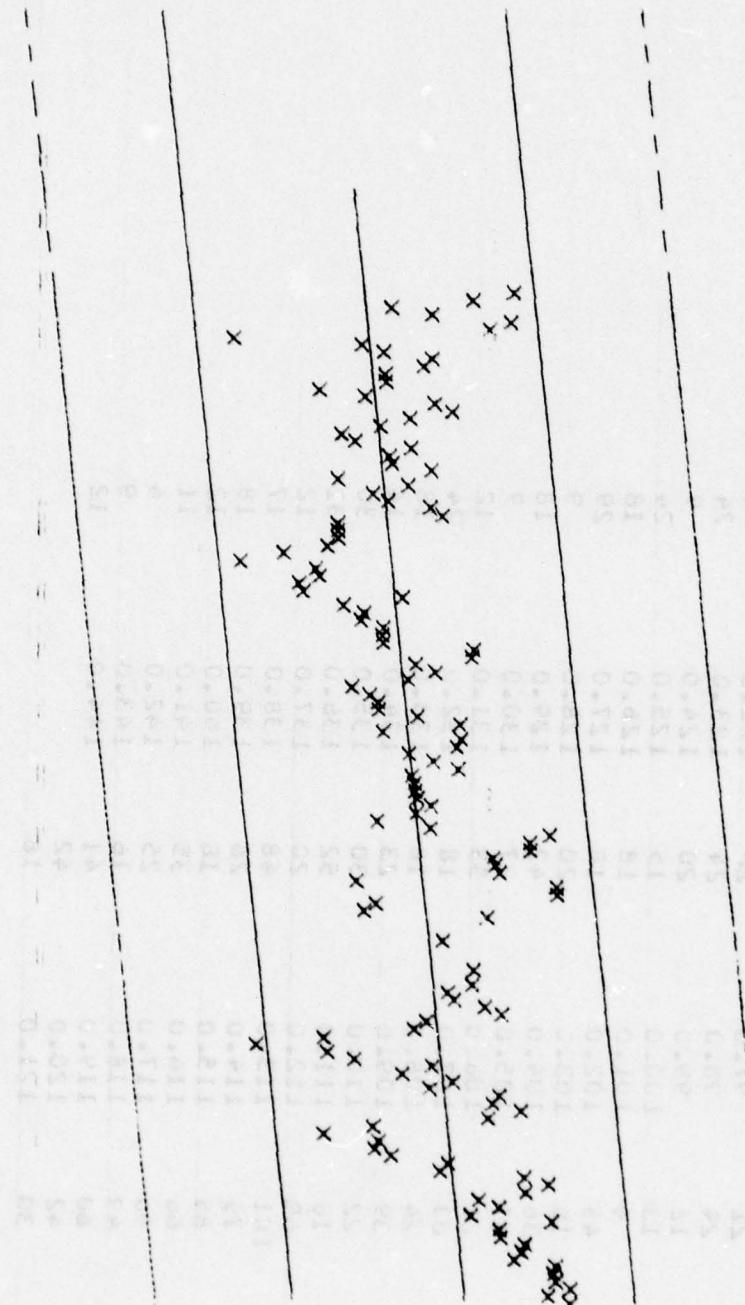
Figure 16A

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES
72.0	21	97.0	26	122.0	36
72.0	24	98.0	24	123.0	24
74.0	12	99.0	20	124.0	9
75.0	13	100.0	15	125.0	24
76.0	9	101.0	18	126.0	18
77.0	45	102.0	18	127.0	29
78.0	18	103.0	20	128.0	9
79.0	36	104.0	42	129.0	18
80.0	27	105.0	27	130.0	9
81.0	21	106.0	33	131.0	12
82.0	63	107.0	18	132.0	24
83.0	24	108.0	18	133.0	18
84.0	39	109.0	23	134.0	14
85.0	22	110.0	30	135.0	30
86.0	18	111.0	52	136.0	31
87.0	69	112.0	20	137.0	12
88.0	101	113.0	48	138.0	17
89.0	75	114.0	26	139.0	18
90.0	85	115.0	18	140.0	12
91.0	68	116.0	35	141.0	11
92.0	93	117.0	25	142.0	6
93.0	69	118.0	16	143.0	9
94.0	60	119.0	41	144.0	12
95.0	42	120.0	42		
96.0	30	121.0	18		

$y = ( ( +3.5114193E+02 ) + ( +3.3180857E-01 ) \times x )$   
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF S = SIGNIFICANT  
 DEGREES OF FREEDOM = 2872  
 STORAGE CONDITIONS = AMB TEMP/RH

UNIT OF MEASURE = PSI  
 PARAMETER = MAXIMUM STRESS  
 160.00 240.00 320.00 400.00 480.00 560.00



0.00 2.00 4.00 6.00 TEST 8.00 10.00 12.00 14.00 16.00  
 AGE AT TEST (YEARS)

TENSILE MAXIMUM STRESS, CHS=175C.0 IN/MIN, TP-H1011 A&B PROPELLANT

Figure 17

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

CHRONOLOGICAL AGE	NUMBER OF SAMPLES	AGE	NUMBER OF SAMPLES	AGE	NUMBER OF SAMPLES	AGE	NUMBER OF SAMPLES	AGE	NUMBER OF SAMPLES	AGE	NUMBER OF SAMPLES	AGE	NUMBER OF SAMPLES	AGE	NUMBER OF SAMPLES	
4.0	4	43.0	4	64.0	13	89.0	75	114.0	24	90.0	85	115.0	13	90.0	85	115.0
6.0	2	34.0	11	65.0	6	90.0	66	115.0	35	91.0	66	115.0	35	92.0	96	117.0
10.0	4	35.0	14	66.0	12	91.0	96	117.0	25	92.0	96	117.0	25	93.0	96	117.0
11.0	2	36.0	16	67.0	9	93.0	49	118.0	10	94.0	60	119.0	41	95.0	42	120.0
12.0	1	37.0	9	68.0	12	93.0	49	118.0	10	94.0	60	119.0	41	95.0	42	120.0
12.0	0	38.0	1	69.0	15	94.0	60	119.0	41	95.0	42	120.0	42	96.0	30	121.0
14.0	2	39.0	4	70.0	14	95.0	42	120.0	42	96.0	30	121.0	13	97.0	26	122.0
15.0	2	40.0	3	71.0	21	96.0	30	121.0	13	97.0	26	122.0	37	98.0	24	123.0
16.0	1	41.0	5	72.0	21	97.0	26	122.0	37	98.0	24	123.0	2*	99.0	20	124.0
17.0	1	42.0	14	73.0	24	98.0	24	123.0	2*	99.0	20	124.0	7	100.0	15	125.0
18.0	1	43.0	34	74.0	12	99.0	20	124.0	7	100.0	15	125.0	24	101.0	18	126.0
19.0	0	44.0	31	75.0	16	100.0	18	126.0	16	101.0	18	126.0	16	102.0	18	127.0
20.0	0	45.0	31	76.0	9	101.0	18	126.0	16	102.0	18	127.0	20	103.0	20	128.0
21.0	0	46.0	32	77.0	45	102.0	18	127.0	20	103.0	20	128.0	19	104.0	42	129.0
22.0	0	47.0	30	78.0	18	103.0	20	128.0	19	104.0	42	129.0	12	105.0	27	130.0
23.0	0	48.0	3	79.0	36	104.0	42	129.0	12	105.0	27	130.0	9	106.0	33	131.0
24.0	0	49.0	10	80.0	27	105.0	27	130.0	12	106.0	33	131.0	12	107.0	18	132.0
25.0	0	50.0	8	81.0	21	106.0	33	131.0	12	107.0	18	132.0	24	108.0	18	133.0
26.0	0	51.0	7	82.0	53	107.0	18	133.0	12	108.0	18	134.0	14	109.0	23	135.0
27.0	0	52.0	5	83.0	24	108.0	18	134.0	14	109.0	23	135.0	14	110.0	30	136.0
28.0	0	53.0	4	84.0	29	109.0	23	134.0	14	110.0	30	136.0	30	111.0	52	137.0
29.0	0	54.0	2	85.0	22	110.0	30	136.0	30	111.0	52	137.0	24	112.0	20	138.0
30.0	0	55.0	9	86.0	18	111.0	52	137.0	24	112.0	20	138.0	12	87.0	48	139.0
31.0	0	56.0	9	87.0	69	112.0	20	137.0	12	88.0	48	139.0	12	89.0	12	138.0
32.0	0	57.0	14	88.0	101	113.0	48	139.0	12	90.0	12	138.0	12	91.0	12	139.0

TABLE I: MAXIMUM STRESS, CPS = 1750.0 IN/min, TP-HIGH AGE PROPELLANT

$F = ( ( +3.5151274E+01 ) + ( -1.4540717E-04 ) \times X )$   
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF T = SIGNIFICANT  
 DEGREES OF FREEDOM = 2872  
 TEST CONDITIONS = AMB TEMP/RH  
 N = 2874  
 STORAGE CONDITIONS = AMB TEMP/RH

UNIT OF MEASURE = PSI  
 GAUGE AT TEST = 8.00  
 AGE AT RUPTURE = 6.00  
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TENSILE STRAIN AT RUPTURE, CHS=1750.0 IN/MIN, TP-H1011 A&B PROPELLANT

Figure 18

\*\*\* Sample Site Summary \*\*\*

Age (yr, 1953)	No. SAMPLES	Age (MONTHS)	No. SAMPLES	Age (MONTHS)	No. SAMPLES	Age (MONTHS)	No. SAMPLES	Age (MONTHS)	No. SAMPLES
1.0	23	64.0	13	39.0	75	114.0	25		
1.0	34.0	11	65.0	6	113.0	18			
1.0	35.0	14	66.0	12	91.0	66			
1.0	36.0	16	67.0	9	92.0	96			
1.0	37.0	9	68.0	12	93.0	49			
1.0	38.0	4	69.0	15	94.0	60			
1.0	39.0	4	70.0	14	95.0	42			
1.0	40.0	2	71.0	21	96.0	30			
1.0	41.0	5	72.0	21	97.0	26			
1.0	42.0	14	73.0	24	98.0	24			
1.0	43.0	34	74.0	42	99.0	20			
1.0	44.0	31	75.0	13	100.0	15			
1.0	45.0	31	76.0	9	101.0	18			
1.0	46.0	32	77.0	45	102.0	18			
1.0	47.0	30	78.0	18	103.0	20			
1.0	48.0	4	79.0	36	104.0	42			
1.0	49.0	10	80.0	27	105.0	27			
1.0	50.0	8	81.0	21	106.0	22			
1.0	51.0	7	82.0	63	107.0	18			
1.0	52.0	3	83.0	24	108.0	18			
1.0	53.0	4	84.0	33	109.0	23			
1.0	54.0	2	85.0	22	110.0	30			
1.0	55.0	2	86.0	16	111.0	52			
1.0	56.0	9	87.0	69	112.0	20			
1.0	57.0	14	88.0	121	113.0	48			
1.0	58.0	24							
1.0	59.0								

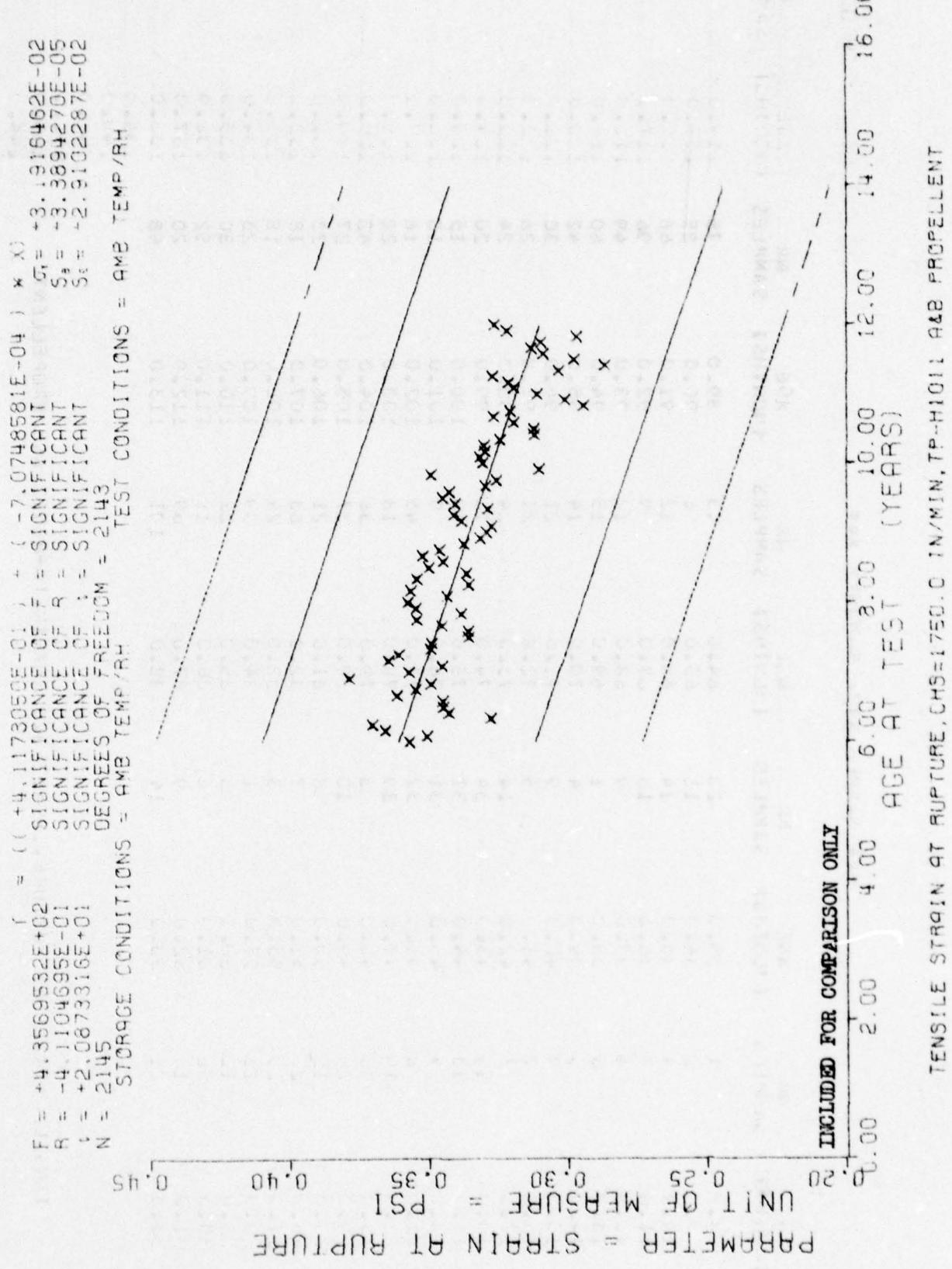


Figure 18A

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	21	97.0	26	122.0	36
73.0	24	98.0	24	123.0	24
74.0	12	99.0	20	124.0	9
75.0	18	100.0	15	125.0	24
76.0	9	101.0	18	126.0	18
77.0	45	102.0	18	127.0	29
78.0	18	103.0	20	128.0	9
79.0	30	104.0	42	129.0	18
80.0	27	105.0	27	130.0	9
81.0	21	106.0	33	131.0	12
82.0	63	107.0	18	132.0	24
83.0	24	108.0	18	133.0	18
84.0	39	109.0	25	134.0	14
85.0	22	110.0	30	135.0	30
86.0	18	111.0	52	136.0	31
87.0	69	112.0	20	137.0	12
88.0	104	113.0	48	138.0	17
89.0	75	114.0	26	139.0	18
90.0	65	115.0	18	140.0	12
91.0	66	116.0	35	141.0	11
92.0	96	117.0	25	142.0	6
93.0	49	118.0	16	143.0	9
94.0	60	119.0	41	144.0	12
95.0	42	120.0	42		
96.0	30	121.0	18		

TENSILE STRAIN AT RUPTURE, GHS=1750.0 IN/MIN, TP-HOLLOW AEB PROPELLANT

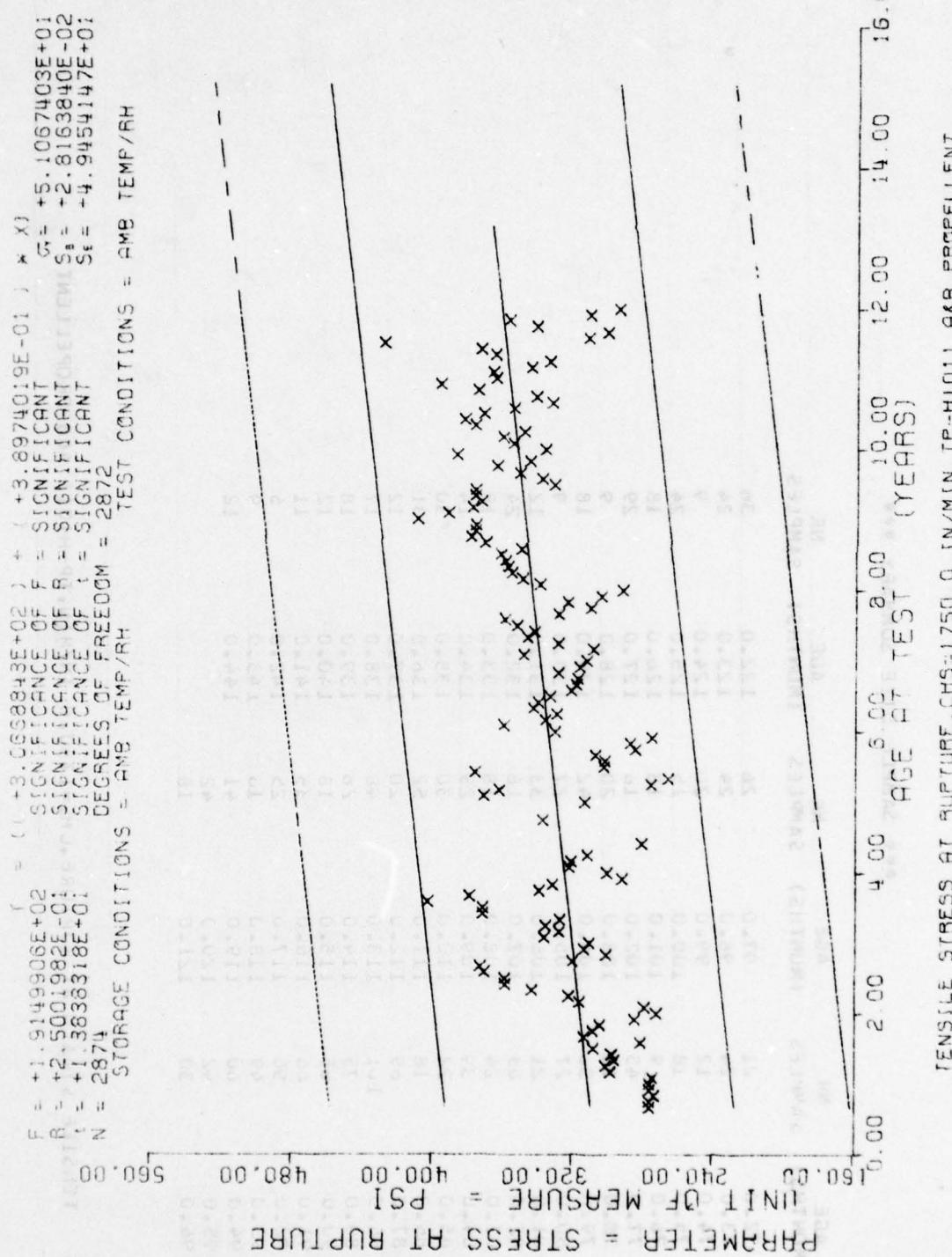


Figure 19

## \*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (IN MONTHS)	NUMBER (N)	AGE (MONTHS)	NUMBER (N)	AGE (MONTHS)	NUMBER (N)	AGE (MONTHS)	NUMBER (N)	AGE (MONTHS)	NUMBER (N)
34.0	1	35.0	2	36.0	13	37.0	25	38.0	26
34.0	1	34.0	14	35.0	6	36.0	85	37.0	11
35.0	1	35.0	11	36.0	12	37.0	66	38.0	23
35.0	1	35.0	17	36.0	9	37.0	92	38.0	17
36.0	2	36.0	11	37.0	9	38.0	96	39.0	22
36.0	2	37.0	9	36.0	12	37.0	93	38.0	11
36.0	2	37.0	4	36.0	12	37.0	49	38.0	16
36.0	2	38.0	1	37.0	15	38.0	60	39.0	11
36.0	2	39.0	4	37.0	14	38.0	95	39.0	41
36.0	2	39.0	3	37.0	14	38.0	42	39.0	42
36.0	2	40.0	5	37.0	21	38.0	96	39.0	30
36.0	2	40.0	5	37.0	21	38.0	121	39.0	16
36.0	2	41.0	5	37.0	21	38.0	26	39.0	26
37.0	7	37.0	4	38.0	24	39.0	24	40.0	24
37.0	7	38.0	14	39.0	24	40.0	24	41.0	24
37.0	7	39.0	54	40.0	12	41.0	20	42.0	9
37.0	7	40.0	54	41.0	12	42.0	15	43.0	24
37.0	7	41.0	54	42.0	18	43.0	15	44.0	11
37.0	7	42.0	54	43.0	18	44.0	18	45.0	11
37.0	7	43.0	54	44.0	18	45.0	18	46.0	11
37.0	7	44.0	54	45.0	18	46.0	18	47.0	11
37.0	7	45.0	54	46.0	18	47.0	18	48.0	11
37.0	7	46.0	54	47.0	18	48.0	18	49.0	11
37.0	7	47.0	54	48.0	18	49.0	18	50.0	11
37.0	7	48.0	54	49.0	18	50.0	18	51.0	11
37.0	7	49.0	54	50.0	18	51.0	18	52.0	11
37.0	7	50.0	54	51.0	18	52.0	18	53.0	11
37.0	7	51.0	54	52.0	18	53.0	18	54.0	11
37.0	7	52.0	54	53.0	18	54.0	18	55.0	11
37.0	7	53.0	54	54.0	18	55.0	18	56.0	11
37.0	7	54.0	54	55.0	18	56.0	18	57.0	11
37.0	7	55.0	54	56.0	18	57.0	18	58.0	11
37.0	7	56.0	54	57.0	18	58.0	18	59.0	11
37.0	7	57.0	54	58.0	18	59.0	18	60.0	11
37.0	7	58.0	54	59.0	18	60.0	18	61.0	11
37.0	7	59.0	54	60.0	18	61.0	18	62.0	11
37.0	7	60.0	54	61.0	18	62.0	18	63.0	11
37.0	7	61.0	54	62.0	18	63.0	18	64.0	11
37.0	7	62.0	54	63.0	18	64.0	18	65.0	11
37.0	7	63.0	54	64.0	18	65.0	18	66.0	11
37.0	7	64.0	54	65.0	18	66.0	18	67.0	11
37.0	7	65.0	54	66.0	18	67.0	18	68.0	11
37.0	7	66.0	54	67.0	18	68.0	18	69.0	11
37.0	7	67.0	54	68.0	18	69.0	18	70.0	11
37.0	7	68.0	54	69.0	18	70.0	18	71.0	11
37.0	7	69.0	54	70.0	18	71.0	18	72.0	11
37.0	7	70.0	54	71.0	18	72.0	18	73.0	11
37.0	7	71.0	54	72.0	18	73.0	18	74.0	11
37.0	7	72.0	54	73.0	18	74.0	18	75.0	11
37.0	7	73.0	54	74.0	18	75.0	18	76.0	11
37.0	7	74.0	54	75.0	18	76.0	18	77.0	11
37.0	7	75.0	54	76.0	18	77.0	18	78.0	11
37.0	7	76.0	54	77.0	18	78.0	18	79.0	11
37.0	7	77.0	54	78.0	18	79.0	18	80.0	11
37.0	7	78.0	54	79.0	18	80.0	18	81.0	11
37.0	7	79.0	54	80.0	18	81.0	18	82.0	11
37.0	7	80.0	54	81.0	18	82.0	18	83.0	11
37.0	7	81.0	54	82.0	18	83.0	18	84.0	11
37.0	7	82.0	54	83.0	18	84.0	18	85.0	11
37.0	7	83.0	54	84.0	18	85.0	18	86.0	11
37.0	7	84.0	54	85.0	18	86.0	18	87.0	11
37.0	7	85.0	54	86.0	18	87.0	18	88.0	11
37.0	7	86.0	54	87.0	18	88.0	18	89.0	11
37.0	7	87.0	54	88.0	18	89.0	18	90.0	11
37.0	7	88.0	54	89.0	18	90.0	18	91.0	11
37.0	7	89.0	54	90.0	18	91.0	18	92.0	11
37.0	7	90.0	54	91.0	18	92.0	18	93.0	11
37.0	7	91.0	54	92.0	18	93.0	18	94.0	11
37.0	7	92.0	54	93.0	18	94.0	18	95.0	11
37.0	7	93.0	54	94.0	18	95.0	18	96.0	11
37.0	7	94.0	54	95.0	18	96.0	18	97.0	11
37.0	7	95.0	54	96.0	18	97.0	18	98.0	11
37.0	7	96.0	54	97.0	18	98.0	18	99.0	11
37.0	7	97.0	54	98.0	18	99.0	18	100.0	11
37.0	7	98.0	54	99.0	18	100.0	18	101.0	11
37.0	7	99.0	54	100.0	18	101.0	18	102.0	11
37.0	7	100.0	54	101.0	18	102.0	18	103.0	11
37.0	7	101.0	54	102.0	18	103.0	18	104.0	11
37.0	7	102.0	54	103.0	18	104.0	18	105.0	11
37.0	7	103.0	54	104.0	18	105.0	18	106.0	11
37.0	7	104.0	54	105.0	18	106.0	18	107.0	11
37.0	7	105.0	54	106.0	18	107.0	18	108.0	11
37.0	7	106.0	54	107.0	18	108.0	18	109.0	11
37.0	7	107.0	54	108.0	18	109.0	18	110.0	11
37.0	7	108.0	54	109.0	18	110.0	18	111.0	11
37.0	7	109.0	54	110.0	18	111.0	18	112.0	11
37.0	7	110.0	54	111.0	18	112.0	18	113.0	11
37.0	7	111.0	54	112.0	18	113.0	18	114.0	11
37.0	7	112.0	54	113.0	18	114.0	18	115.0	11
37.0	7	113.0	54	114.0	18	115.0	18	116.0	11
37.0	7	114.0	54	115.0	18	116.0	18	117.0	11
37.0	7	115.0	54	116.0	18	117.0	18	118.0	11
37.0	7	116.0	54	117.0	18	118.0	18	119.0	11
37.0	7	117.0	54	118.0	18	119.0	18	120.0	11
37.0	7	118.0	54	119.0	18	120.0	18	121.0	11
37.0	7	119.0	54	120.0	18	121.0	18	122.0	11
37.0	7	120.0	54	121.0	18	122.0	18	123.0	11
37.0	7	121.0	54	122.0	18	123.0	18	124.0	11
37.0	7	122.0	54	123.0	18	124.0	18	125.0	11
37.0	7	123.0	54	124.0	18	125.0	18	126.0	11
37.0	7	124.0	54	125.0	18	126.0	18	127.0	11
37.0	7	125.0	54	126.0	18	127.0	18	128.0	11
37.0	7	126.0	54	127.0	18	128.0	18	129.0	11
37.0	7	127.0	54	128.0	18	129.0	18	130.0	11
37.0	7	128.0	54	129.0	18	130.0	18	131.0	11
37.0	7	129.0	54	130.0	18	131.0	18	132.0	11
37.0	7	130.0	54	131.0	18	132.0	18	133.0	11
37.0	7	131.0	54	132.0	18	133.0	18	134.0	11
37.0	7	132.0	54	133.0	18	134.0	18	135.0	11
37.0	7	133.0	54	134.0	18	135.0	18	136.0	11
37.0	7	134.0	54	135.0	18	136.0	18	137.0	11
37.0	7	135.0	54	136.0	18	137.0	18	138.0	11
37.0	7	136.0	54	137.0	18	138.0	18	139.0	11
37.0	7	137.0	54	138.0	18	139.0	18	140.0	11
37.0	7	138.0	54	139.0	18	140.0	18	141.0	11
37.0	7	139.0	54	140.0	18	141.0	18	142.0	11
37.0	7	140.0	54	141.0	18	142.0	18	143.0	11
37.0	7	141.0	54	142.0	18	143.0	18	144.0	11
37.0	7	142.0	54	143.0	18	144.0	18	145.0	11
37.0	7	143.0	54	144.0	18	145.0	18	146.0	11
37.0	7	144.0	54	145.0	18	146.0	18	147.0	11
37.0	7	145.0	54	146.0	18	147.0	18	148.0	11
37.0	7	146.0	54	147.0	18	148.0	18	149.0	11
37.0	7	147.0	54	148.0	18	149.0	18	150.0	11
37.0	7	148.0	54	149.0	18	150.0	18	151.0	11
37.0	7	149.0	54	150.0	18</td				

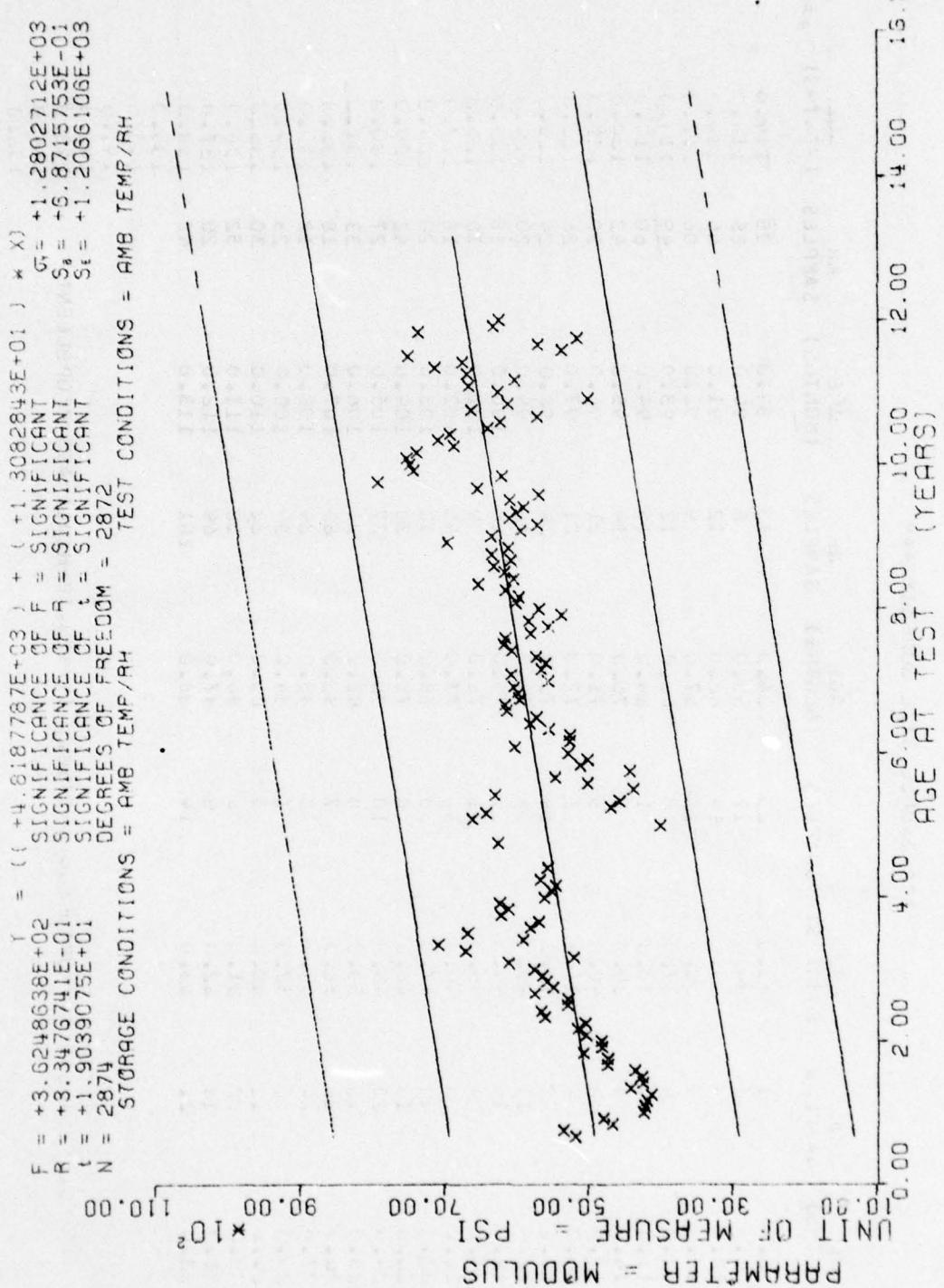


Figure 20

## \*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	SAMPLES								
3•0	4	30•0	22	64•0	13	89•0	76	114•0	24
9•0	4	34•0	11	65•0	6	90•0	95	115•0	47
10•0	7	35•0	14	66•0	12	91•0	66	116•0	35
11•0	12	36•0	10	67•0	9	92•0	96	117•0	22
12•0	4	37•0	9	68•0	12	93•0	49	118•0	46
12•0	6	38•0	1	69•0	15	94•0	60	119•0	44
14•0	3	39•0	4	70•0	14	95•0	42	120•0	42
15•0	2	40•0	5	71•0	21	96•0	30	121•0	16
16•0	3	41•0	5	72•0	21	97•0	26	122•0	36
17•0	7	42•0	14	73•0	24	98•0	24	123•0	24
17•0	7	42•0	34	74•0	12	99•0	20	124•0	9
18•0	12	43•0	31	75•0	19	100•0	15	125•0	24
18•0	12	44•0	31	76•0	9	101•0	12	126•0	16
19•0	4	45•0	31	76•0	45	102•0	18	127•0	29
21•0	2	46•0	32	77•0	18	103•0	20	128•0	4
22•0	12	47•0	30	78•0	2	104•0	42	129•0	12
24•0	12	48•0	26	79•0	27	105•0	27	130•0	4
24•0	12	49•0	10	80•0	21	106•0	33	131•0	42
25•0	12	50•0	8	81•0	7	107•0	18	132•0	24
26•0	22	51•0	7	82•0	63	108•0	18	133•0	16
26•0	22	52•0	2	82•0	24	109•0	23	134•0	14
27•0	14	53•0	2	83•0	36	110•0	30	135•0	30
27•0	14	54•0	1	84•0	22	111•0	52	136•0	31
28•0	12	55•0	3	85•0	13	112•0	20	137•0	12
31•0	12	56•0	9	86•0	69	113•0	48	138•0	12
32•0	12	53•0	14	88•0	101	114•0	13	139•0	12
32•0	22	54•0	3	85•0	22	115•0	14	140•0	12
32•0	22	55•0	3	86•0	13	116•0	30	141•0	11
32•0	22	56•0	9	87•0	69	117•0	6	142•0	9
32•0	22	57•0	14	88•0	101	118•0	12	143•0	12
32•0	22	58•0	14	89•0	101	119•0	15	152•0	5

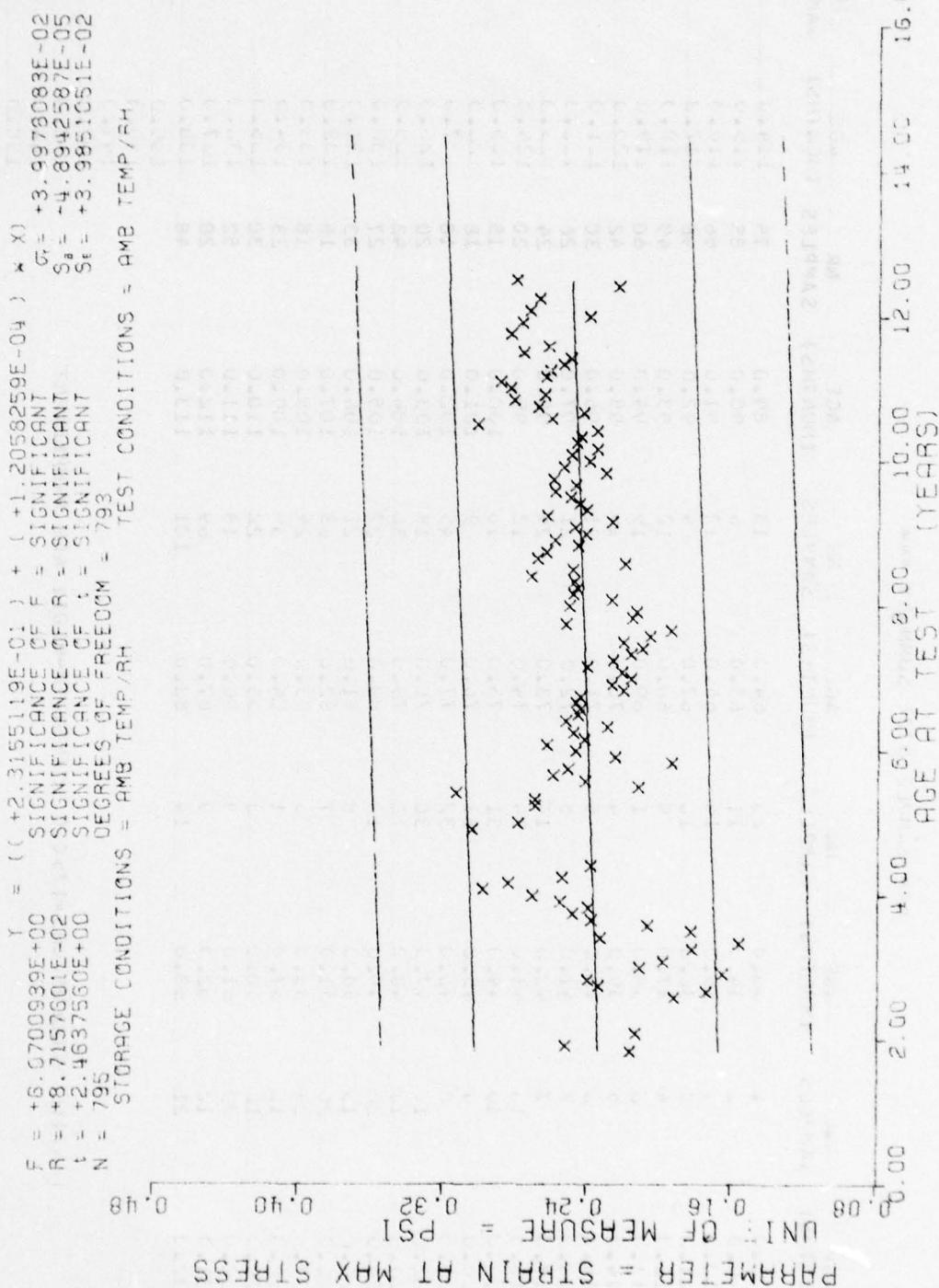


Figure 27

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	SAMPLES	AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES
24.0	1	50.0	3	87.0	14	122.0	14	142.0	1
25.0	1	63.0	4	86.0	21	113.0	7	157.0	3
25.0	2	54.0	4	94.0	25	114.0	5	157.0	3
26.0	1	55.0	5	90.0	23	115.0	6	158.0	2
26.0	1	56.0	3	91.0	13	116.0	9	149.0	3
27.0	1	67.0	2	92.0	5	117.0	8	144.0	4
28.0	2	68.0	2	93.0	6	118.0	7	145.0	4
29.0	2	59.0	2	94.0	9	119.0	9	147.0	4
30.0	2	70.0	3	95.0	7	120.0	11	149.0	2
30.0	2	71.0	6	96.0	7	121.0	8	152.0	1
31.0	2	72.0	9	97.0	3	122.0	10	153.0	1
32.0	1	73.0	4	98.0	12	123.0	6	154.0	1
32.0	5	74.0	7	99.0	10	124.0	9	155.0	1
33.0	2	75.0	17	100.0	10	125.0	15	156.0	1
33.0	5	76.0	5	101.0	8	126.0	2	157.0	1
34.0	12	77.0	9	102.0	10	127.0	7	158.0	1
35.0	29	78.0	10	103.0	5	128.0	7	159.0	1
36.0	25	79.0	5	104.0	7	129.0	8	160.0	1
37.0	35	80.0	11	105.0	7	130.0	5	161.0	1
38.0	7	81.0	4	106.0	12	131.0	2	162.0	1
39.0	12	82.0	13	107.0	13	132.0	6	163.0	1
39.0	4	83.0	7	108.0	14	133.0	9	164.0	1
41.0	3	84.0	4	109.0	8	134.0	5	165.0	1
53.0	2	85.0	15	110.0	12	135.0	2	166.0	1
53.0	1	86.0	5	111.0	7	136.0	2	167.0	1

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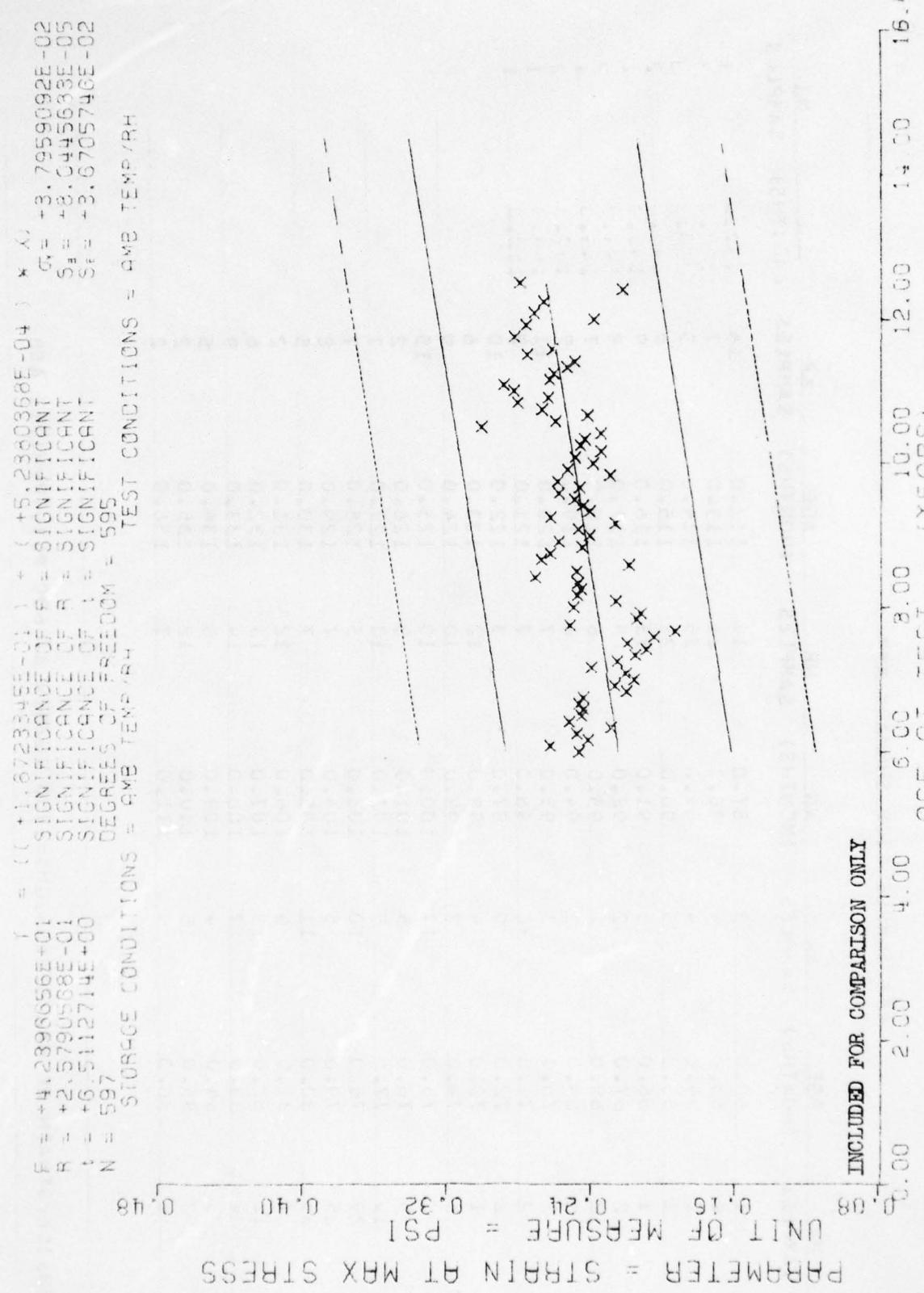


Figure 21A

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	9	97.0	3	122.0	10
73.0	+	98.0	12	123.0	6
74.0	7	99.0	10	124.0	9
75.0	17	100.0	10	125.0	15
76.0	5	101.0	8	126.0	2
77.0	9	102.0	10	127.0	7
78.0	10	103.0	5	128.0	7
79.0	5	104.0	7	129.0	8
80.0	11	105.0	7	130.0	5
81.0	4	106.0	12	131.0	2
82.0	13	107.0	13	132.0	6
83.0	7	108.0	14	133.0	9
84.0	4	109.0	8	134.0	5
85.0	15	110.0	12	135.0	2
86.0	5	111.0	7	136.0	2
87.0	14	112.0	14	137.0	1
88.0	21	113.0	7	138.0	3
89.0	25	114.0	5	139.0	3
90.0	23	115.0	6	141.0	2
91.0	13	116.0	9	143.0	2
92.0	5	117.0	8	144.0	5
93.0	6	118.0	4	145.0	1
94.0	8	119.0	9	147.0	2
95.0	7	120.0	11	149.0	1
96.0	7	121.0	8	150.0	1

$F = +6.7953251E+01$   
 $R = +2.8094113E-01$   
 $N = +8.2433762E+00$   
 $795$   
 STORAGE CONDITIONS = TEST CONDITIONS = AMB TEMP/RH

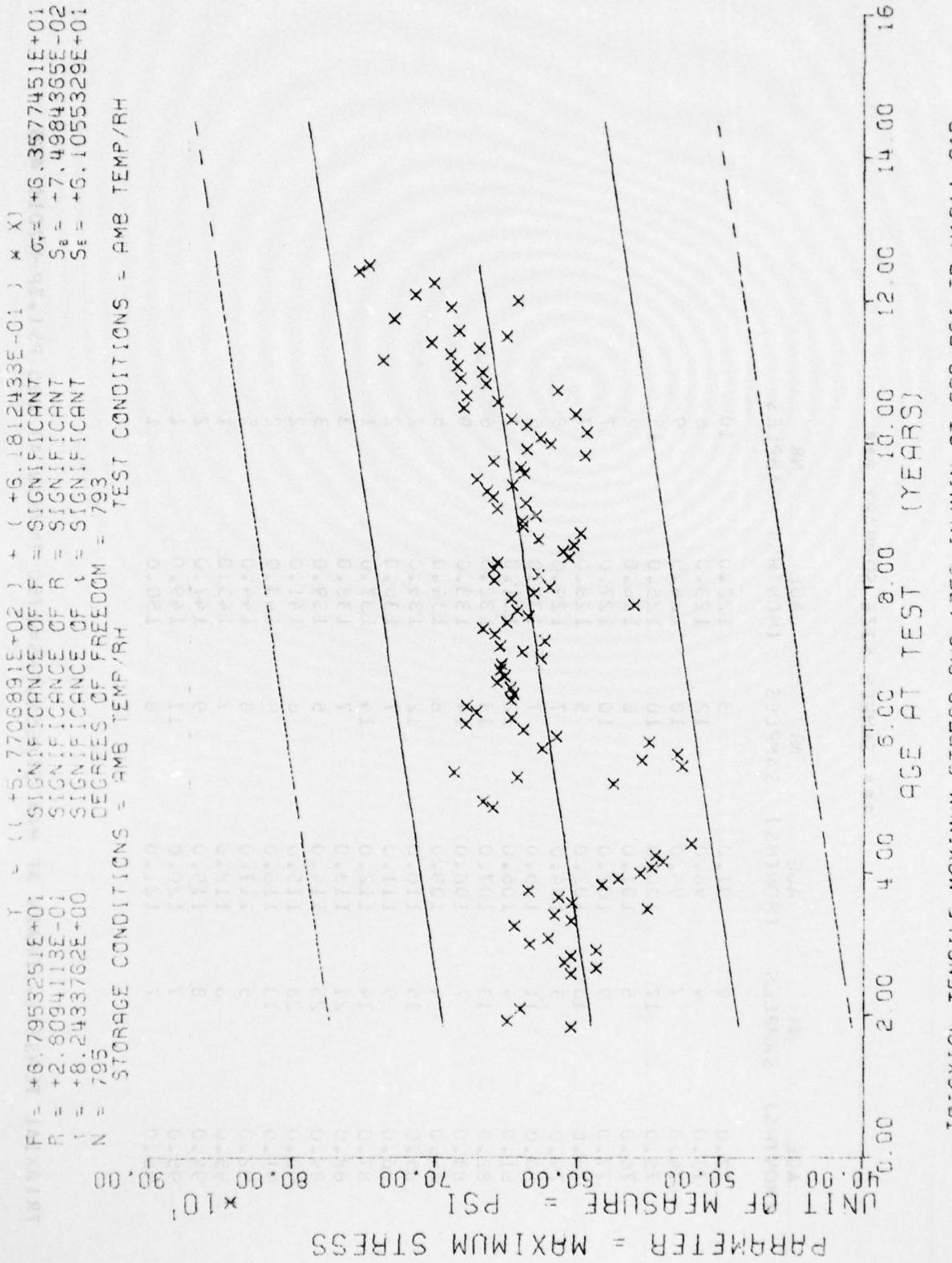


Figure 22

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES
24.0	24.0	3	37.0	14	127.0	1
25.0	25.0	4	38.0	21	113.0	2
26.0	26.0	4	39.0	25	114.0	3
27.0	27.0	3	40.0	22	115.0	4
28.0	28.0	5	41.0	13	116.0	5
29.0	29.0	2	42.0	5	117.0	6
30.0	30.0	2	43.0	6	118.0	7
31.0	31.0	2	44.0	3	119.0	8
32.0	32.0	3	45.0	7	120.0	9
33.0	33.0	3	46.0	7	121.0	10
34.0	34.0	1	47.0	3	122.0	11
35.0	35.0	1	48.0	12	123.0	12
36.0	36.0	5	49.0	10	124.0	13
37.0	37.0	1	50.0	10	125.0	14
38.0	38.0	2	51.0	5	126.0	15
39.0	39.0	2	52.0	9	127.0	16
40.0	40.0	10	53.0	10	128.0	17
41.0	41.0	5	54.0	5	129.0	18
42.0	42.0	2	55.0	7	130.0	19
43.0	43.0	2	56.0	7	131.0	20
44.0	44.0	12	57.0	12	132.0	21
45.0	45.0	10	58.0	5	133.0	22
46.0	46.0	5	59.0	7	134.0	23
47.0	47.0	11	60.0	7	135.0	24
48.0	48.0	4	61.0	12	136.0	25
49.0	49.0	1	62.0	5		
50.0	50.0	9				
51.0	51.0	5				
52.0	52.0	2				
53.0	53.0	4				
54.0	54.0	3				
55.0	55.0	5				
56.0	56.0	1				

TABLE I. TEST MAXIMUM STRESS, CPS = 1750 IN/min AT 600 PSI, TP-H1011 AEB

$\gamma_1 = ( ( +6.3612425E+02 ) + ( +6.3675192E-02 ) \times \lambda )$   
 SIGNIFICANT DIFFERENCE  
 SIGNIFICANT DIFFERENCE  
 DEGREES OF FREEDOM = 595  
 STORAGE CONDITIONS = AMBIENT TEMPERATURE

$S_a = +5.875285E+01$   
 $S_b = +1.266892E+01$   
 $S_c = +5.820362E+01$

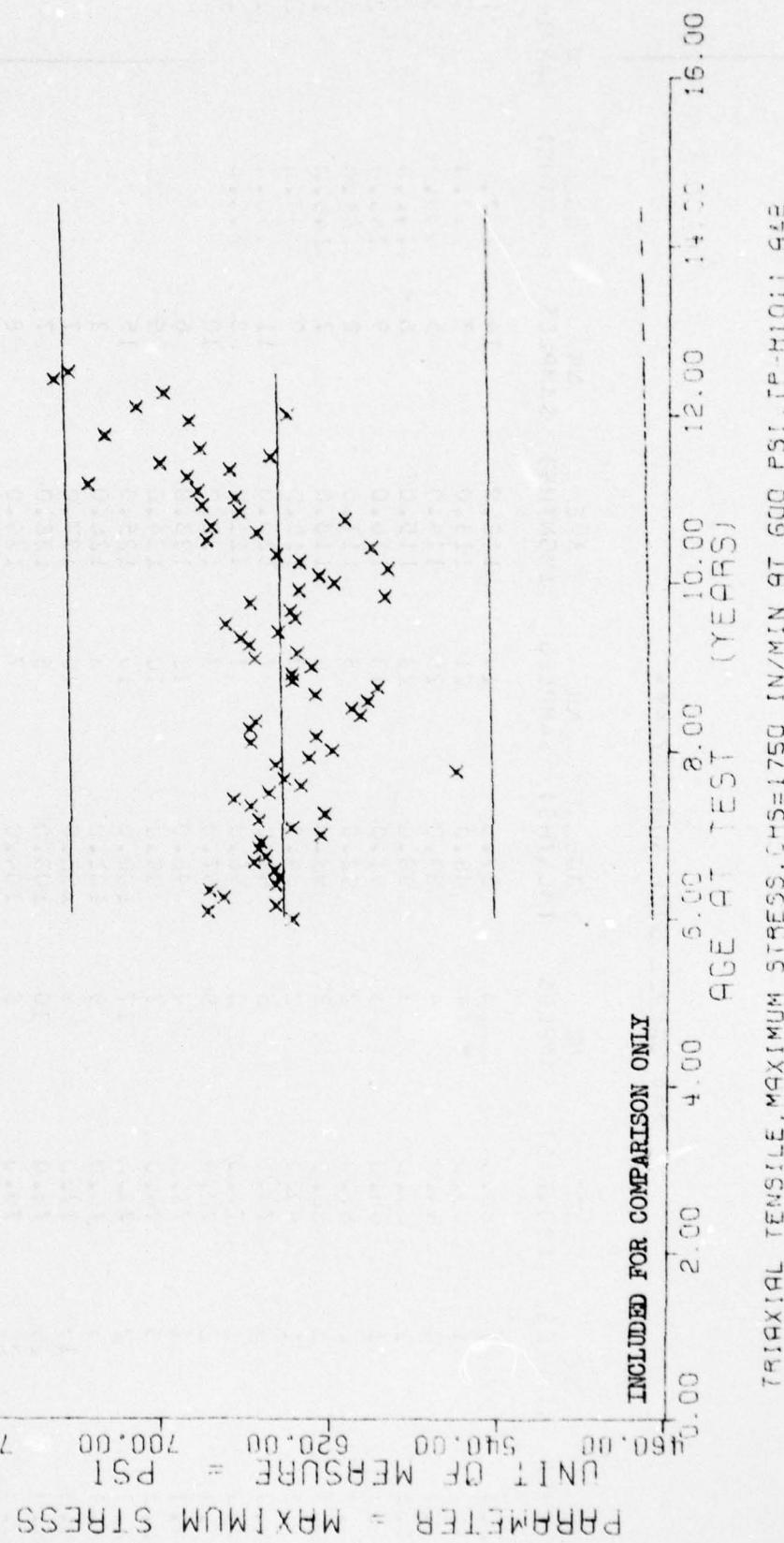


Figure 22A

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES
72.0	9	97.0	3	122.0	10
72.0	4	98.0	12	123.0	6
74.0	7	99.0	10	124.0	9
75.0	17	100.0	10	125.0	15
76.0	5	101.0	8	126.0	2
77.0	9	102.0	10	127.0	7
78.0	19	103.0	5	128.0	7
79.0	5	104.0	7	129.0	8
80.0	11	105.0	7	130.0	5
81.0	4	106.0	12	131.0	2
82.0	13	107.0	12	132.0	6
83.0	7	108.0	14	133.0	9
84.0	4	109.0	8	134.0	5
85.0	15	110.0	12	135.0	2
86.0	5	111.0	7	136.0	2
87.0	14	112.0	14	137.0	1
88.0	24	113.0	7	138.0	3
89.0	25	114.0	5	139.0	3
90.0	23	115.0	6	141.0	2
91.0	13	116.0	9	143.0	2
92.0	5	117.0	6	144.0	5
93.0	4	118.0	7	145.0	1
94.0	3	119.0	9	147.0	2
95.0	7	120.0	11	149.0	1
96.0	7	121.0	8	150.0	1

$F = \{ ( +2.9929229E+01 ) + (-1.8633335E-04 ) \} \times X$   
 $\sigma_f = +4.0969675E-02$   
 $S_a = +4.991428E-05$   
 $S_r = +4.0639921E-02$   
 SIGNIFICANT  
 SIGNIFICANT  
 SIGNIFICANT  
 DEGREES OF FREEDOM = 793  
 STORAGE CONDITIONS = AMB TEMP/RH

PARMETER = STRAIN AT RUPTURE  
 UNIT OF MEASURE = PSI

0.00 0.16 0.24 0.32 0.40 0.48

0.00 2.00 4.00 5.00 8.00 10.00 12.00 14.00 16.00

AGE AT TEST (YEARS)

TRIAXIAL TENSILE STRAIN AT RUPTURE, CHS=1750 IN/MIN AT 600 PSI, TP-HIGH ARE

Figure 23

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
22.0	1	60.0	3	87.0	14	112.0	14
23.0	1	63.0	4	88.0	21	113.0	7
25.0	2	64.0	4	89.0	25	114.0	5
31.0	1	65.0	3	90.0	28	115.0	6
32.0	1	66.0	3	91.0	13	116.0	9
33.0	2	67.0	2	92.0	5	117.0	8
34.0	2	68.0	2	93.0	6	118.0	7
35.0	1	69.0	2	94.0	8	119.0	9
36.0	3	70.0	3	95.0	7	120.0	11
37.0	2	71.0	8	96.0	7	121.0	8
39.0	2	72.0	9	97.0	3	122.0	10
40.0	1	73.0	4	98.0	12	123.0	6
41.0	5	74.0	7	99.0	10	124.0	9
42.0	2	75.0	17	100.0	10	125.0	15
43.0	5	76.0	5	101.0	8	126.0	2
44.0	15	77.0	9	102.0	10	127.0	7
45.0	29	78.0	10	103.0	5	128.0	7
46.0	25	79.0	5	104.0	7	129.0	8
47.0	35	80.0	11	105.0	7	130.0	5
48.0	7	81.0	4	106.0	12	131.0	2
49.0	12	82.0	13	107.0	13	132.0	6
50.0	4	83.0	7	108.0	14	133.0	9
51.0	3	84.0	4	109.0	8	134.0	5
53.0	2	85.0	15	110.0	12	135.0	2
59.0	1	86.0	5	111.0	7	136.0	2

TRIAXIAL TENSILE, STRAIN AT RUPTURE, CHS=1750 IN/MIN AT 600 PSI, TP-H1011 A&B

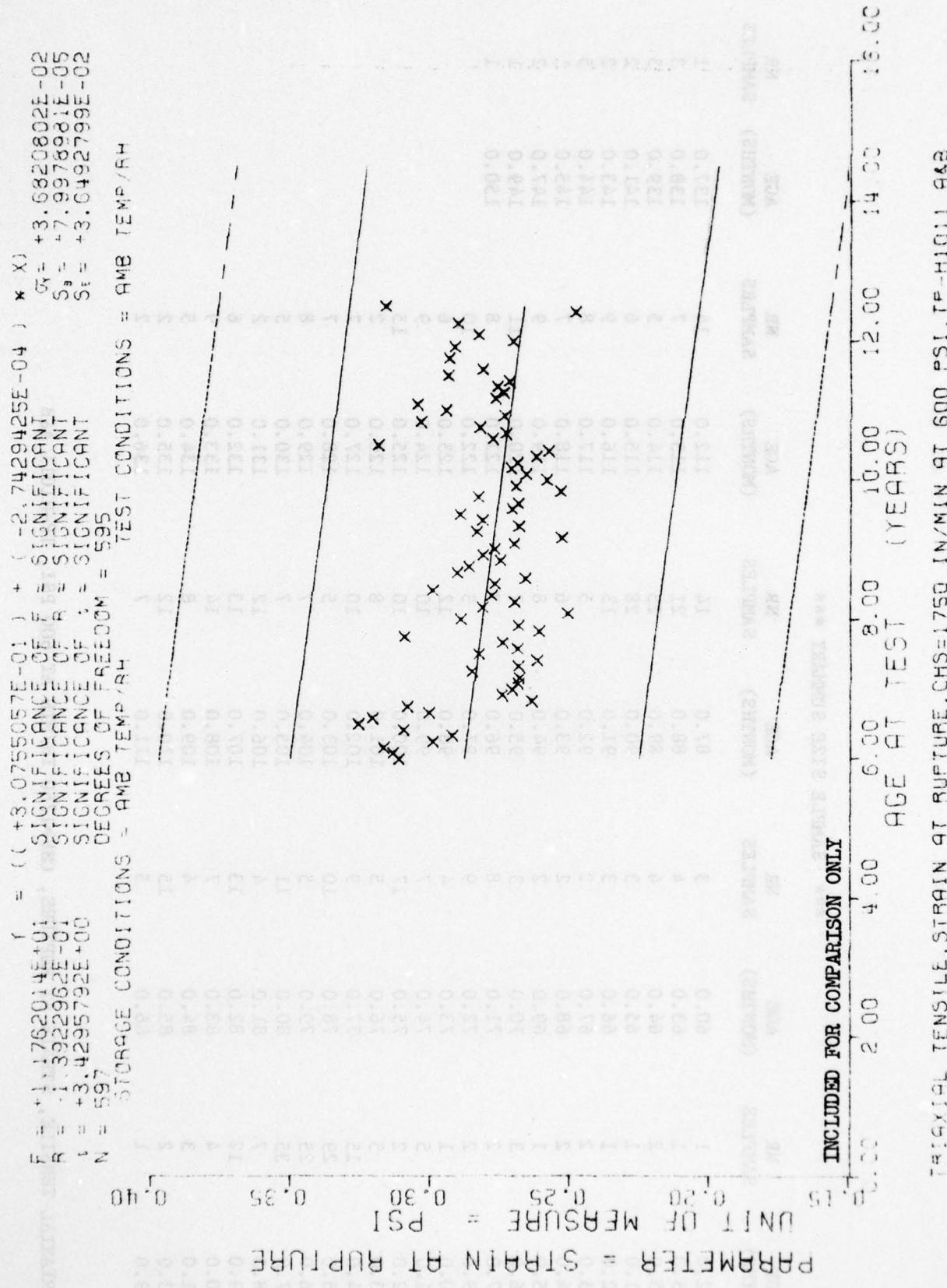


Figure 23A

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	21	91.0	26	122.0	36
73.0	24	92.0	24	123.0	24
74.0	12	99.0	20	124.0	9
75.0	18	100.0	15	125.0	24
76.0	9	101.0	16	126.0	18
77.0	45	102.0	13	127.0	29
78.0	18	103.0	20	128.0	9
79.0	36	104.0	42	129.0	18
80.0	27	105.0	27	130.0	9
81.0	21	106.0	33	131.0	12
82.0	63	107.0	18	132.0	24
83.0	24	108.0	14	133.0	18
84.0	39	109.0	23	134.0	14
85.0	22	110.0	20	135.0	30
86.0	18	111.0	52	136.0	31
87.0	69	112.0	20	137.0	12
88.0	101	113.0	48	138.0	16
89.0	75	114.0	26	139.0	18
90.0	85	115.0	18	140.0	12
91.0	65	116.0	35	141.0	11
92.0	95	117.0	25	142.0	6
93.0	49	118.0	16	143.0	9
94.0	60	119.0	41	144.0	12
95.0	42	120.0	42		
96.0	30	121.0	18		

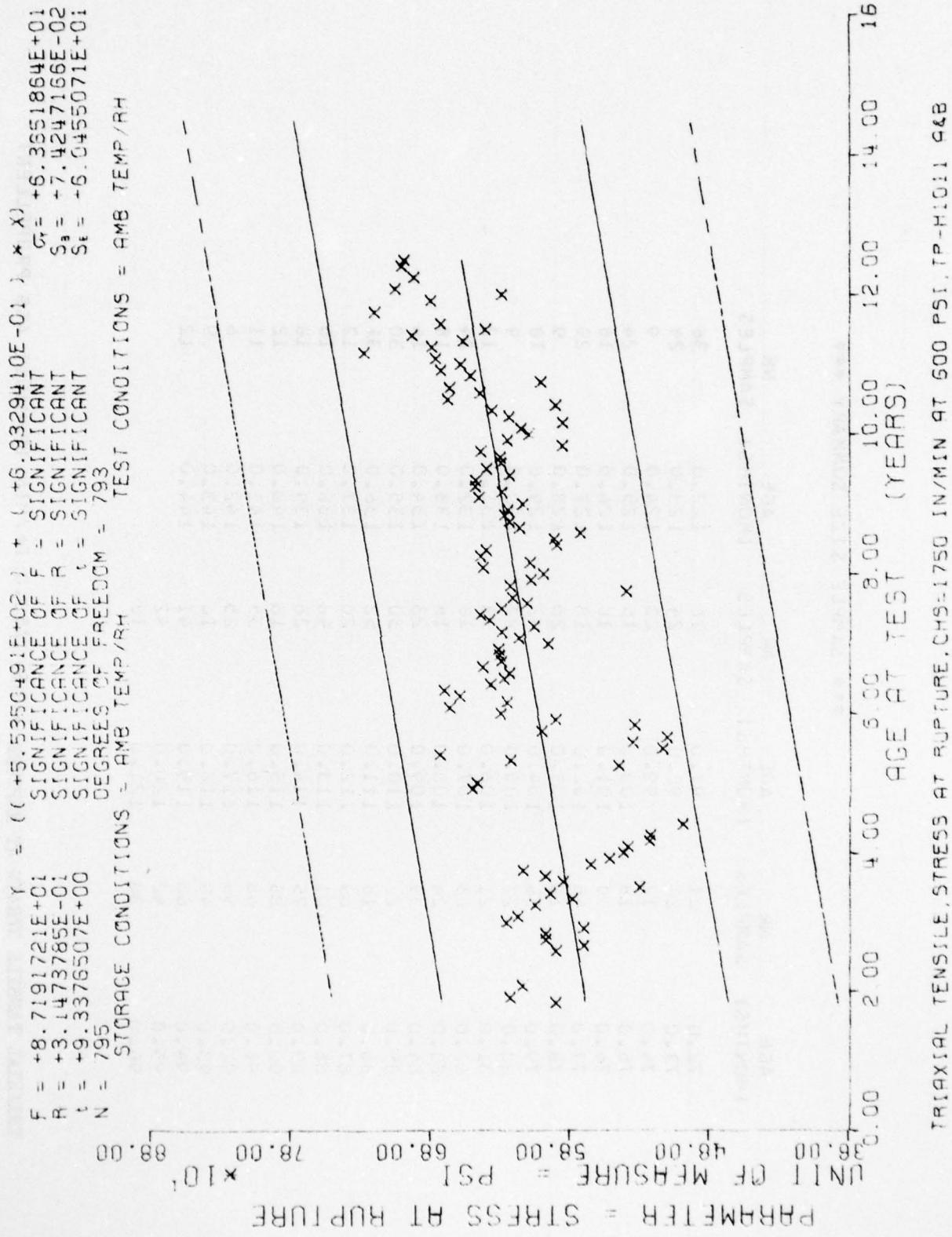


Figure 24

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES								
22.0	1	50.0	3	87.0	14	112.0	14	137.0	1
23.0	1	63.0	4	88.0	21	113.0	7	138.0	3
25.0	2	64.0	4	89.0	25	114.0	5	139.0	3
31.0	1	65.0	3	90.0	28	115.0	6	141.0	2
32.0	1	66.0	3	91.0	13	116.0	9	143.0	2
33.0	2	67.0	2	92.0	5	117.0	8	144.0	5
34.0	2	68.0	2	93.0	6	118.0	7	145.0	1
35.0	1	69.0	2	94.0	8	119.0	9	147.0	2
36.0	3	70.0	3	95.0	7	120.0	11	149.0	1
37.0	2	71.0	8	96.0	7	121.0	8	150.0	1
39.0	2	72.0	9	97.0	3	122.0	10		
40.0	1	73.0	4	98.0	12	123.0	6		
41.0	5	74.0	7	99.0	10	124.0	9		
42.0	2	75.0	17	100.0	10	125.0	15		
43.0	5	76.0	5	101.0	8	126.0	2		
44.0	15	77.0	9	102.0	10	127.0	7		
45.0	29	78.0	10	103.0	5	128.0	7		
46.0	25	79.0	5	104.0	7	129.0	8		
47.0	35	80.0	11	105.0	7	130.0	5		
48.0	7	81.0	4	106.0	12	131.0	2		
49.0	12	82.0	13	107.0	13	132.0	6		
50.0	4	83.0	7	108.0	14	133.0	9		
51.0	3	84.0	4	109.0	8	134.0	5		
53.0	2	85.0	15	110.0	12	135.0	2		
59.0	1	86.0	5	111.0	7	136.0	2		

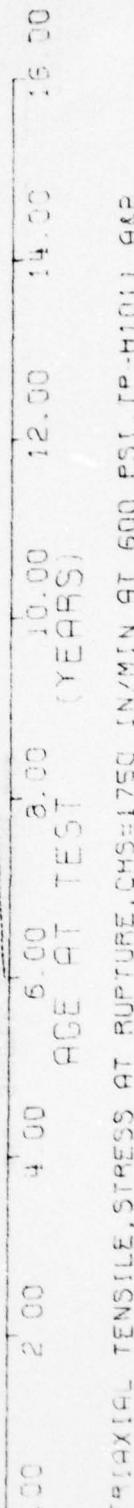
TRIAXIAL TENSILE, STRESS AT RUPTURE, CHS=1750 IN/MIN AT 600 PSI, TP-H1011 A&B

$\sigma_R = +2.5956180E+00$   
 $\sigma_a = +6.5904745E-02$   
 $\sigma_f = +1.6110921E+00$   
 $N = 597$   
 STORAGE CONDITIONS = AMB TEMP/RH  
 DEGREES OF FREEDOM = 595  
 TEST CONDITIONS = AMB TEMP/RH  
 SIGNIFICANCE LEVEL = NOT SIGNIFICANT  
 SIGNIFICANCE LEVEL = SIGNIFICANT  
 SIGNIFICANCE LEVEL = NOT SIGNIFICANT  
 SIGNIFICANCE LEVEL = NOT SIGNIFICANT  
 $\sigma_t = +6.0788430E+02$   
 $\sigma_{ta} = (+2.0150267E-01)$   
 $\sigma_{tf} = (+2.0150267E-01)$   
 $\sigma_{tt} = +5.7144220E+01$   
 $S_d = +1.2507209E-01$   
 $S_e = +5.7067880E+01$

PARMETER = STRESS AT RUPTURE

UNI OF MEASURE = PSI

INCLUDED FOR COMPARISON ONLY



TRIAXIAL TENSILE STRESS AT RUPTURE, CHS=1750 IN/MIN AT 600 PSI, TP-HIGH G&G

Figure 21A

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	21	97.0	26	122.0	36
73.0	24	98.0	24	123.0	24
74.0	12	99.0	20	124.0	9
75.0	13	100.0	15	125.0	24
76.0	9	101.0	18	126.0	18
77.0	45	102.0	18	127.0	29
78.0	18	103.0	20	128.0	9
79.0	36	104.0	42	129.0	18
80.0	27	105.0	27	130.0	9
81.0	21	106.0	33	131.0	12
82.0	63	107.0	18	132.0	24
83.0	24	108.0	18	133.0	18
84.0	39	109.0	23	134.0	14
85.0	22	110.0	30	135.0	30
86.0	18	111.0	32	136.0	31
87.0	69	112.0	20	137.0	12
88.0	101	113.0	48	138.0	16
89.0	75	114.0	26	139.0	18
90.0	85	115.0	18	140.0	12
91.0	66	116.0	35	141.0	11
92.0	56	117.0	25	142.0	6
93.0	49	118.0	16	143.0	9
94.0	60	119.0	41	144.0	12
95.0	42	120.0	42		
96.0	30	121.0	18		