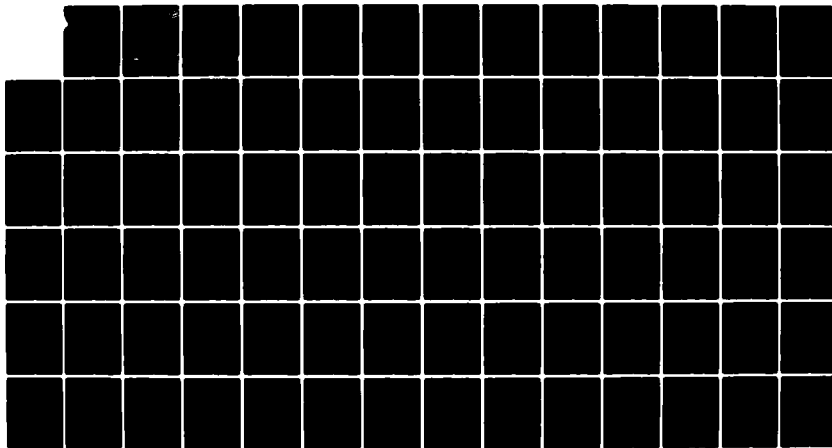


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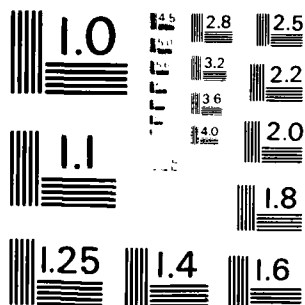
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This document contains a description of a series of wind tunnel tests conducted in the NASA-Ames 12-foot pressurized wind tunnel. Experiments were conducted on smooth and rough cylinders at Reynolds numbers that ranged from 10^5 to 7×10^6 . Roughnesses were obtained by using four sizes of wire mesh to cover the smooth cylinder. Sample results are included, but the complete data set is the subject of a forthcoming report. 10000-75 75000-75		

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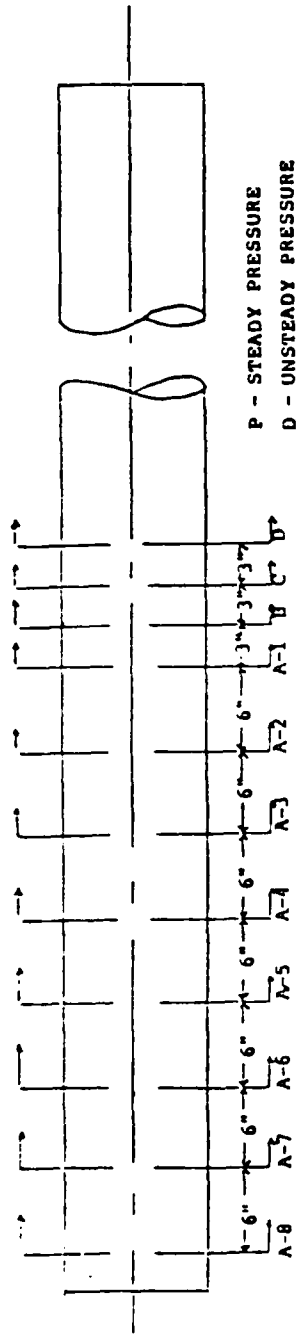
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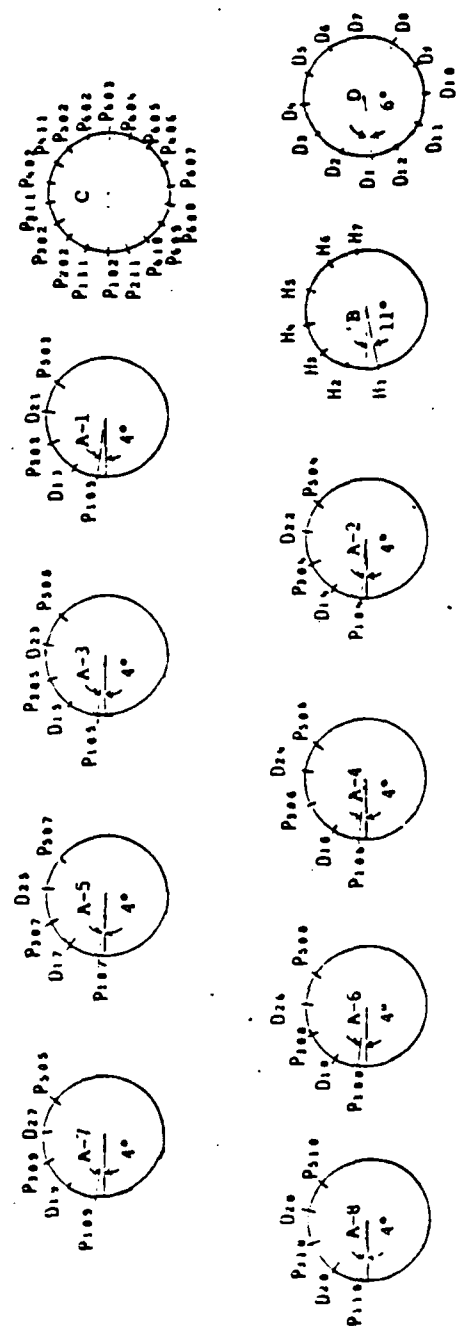
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CONTENTS

- TEST SETUP
- RUN MATRIX
- MEAN PRESSURE DATA
- INTEGRATED RESULTS
- BOUNDARY LAYER SURVEYS
- DYNAMIC DATA
- TRANSITION EXPERIMENTS
- CONCLUDING REMARKS



P - STEADY PRESSURE
 D - UNSTEADY PRESSURE
 H - HOT WIRE

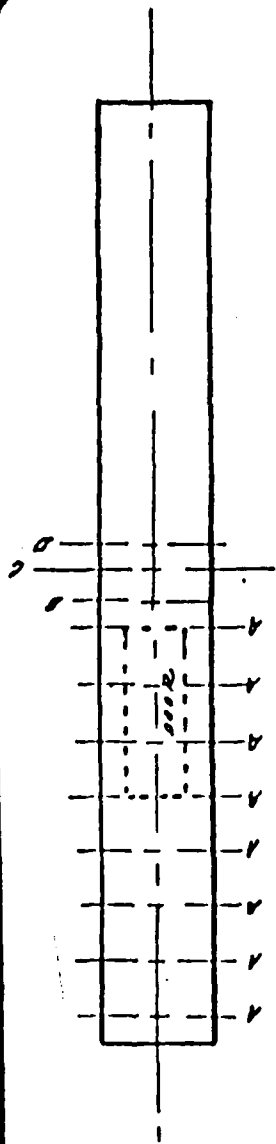


SECTION A-1 to A-8, B, D: ORIFICES LOCATED 30° APART

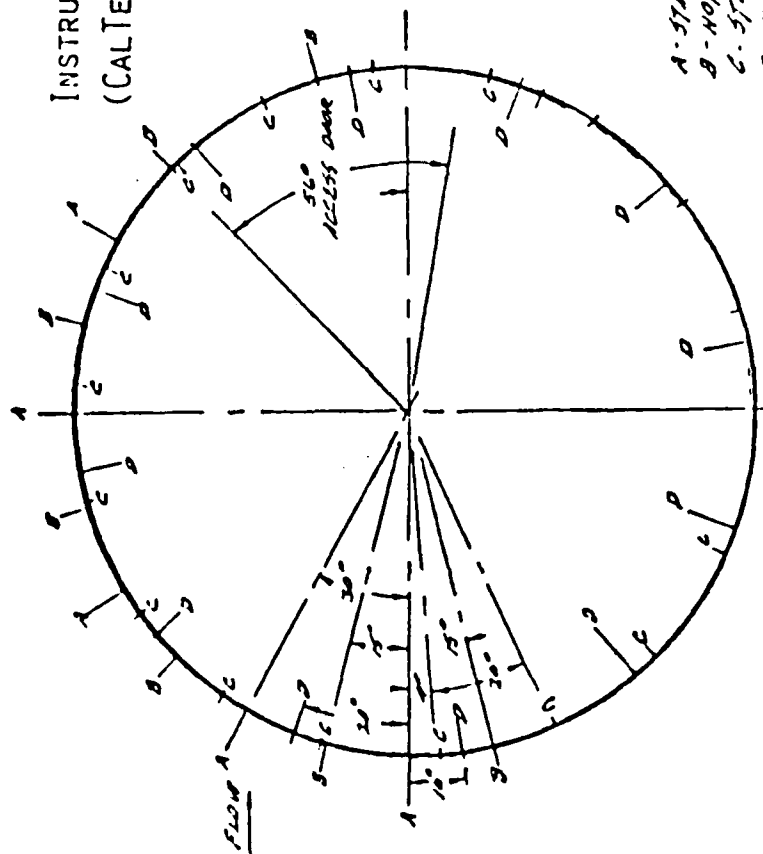
SECTION C: ORIFICES LOCATED 20° APART

Model Instrumentation at 0 Degrees Roll Angle





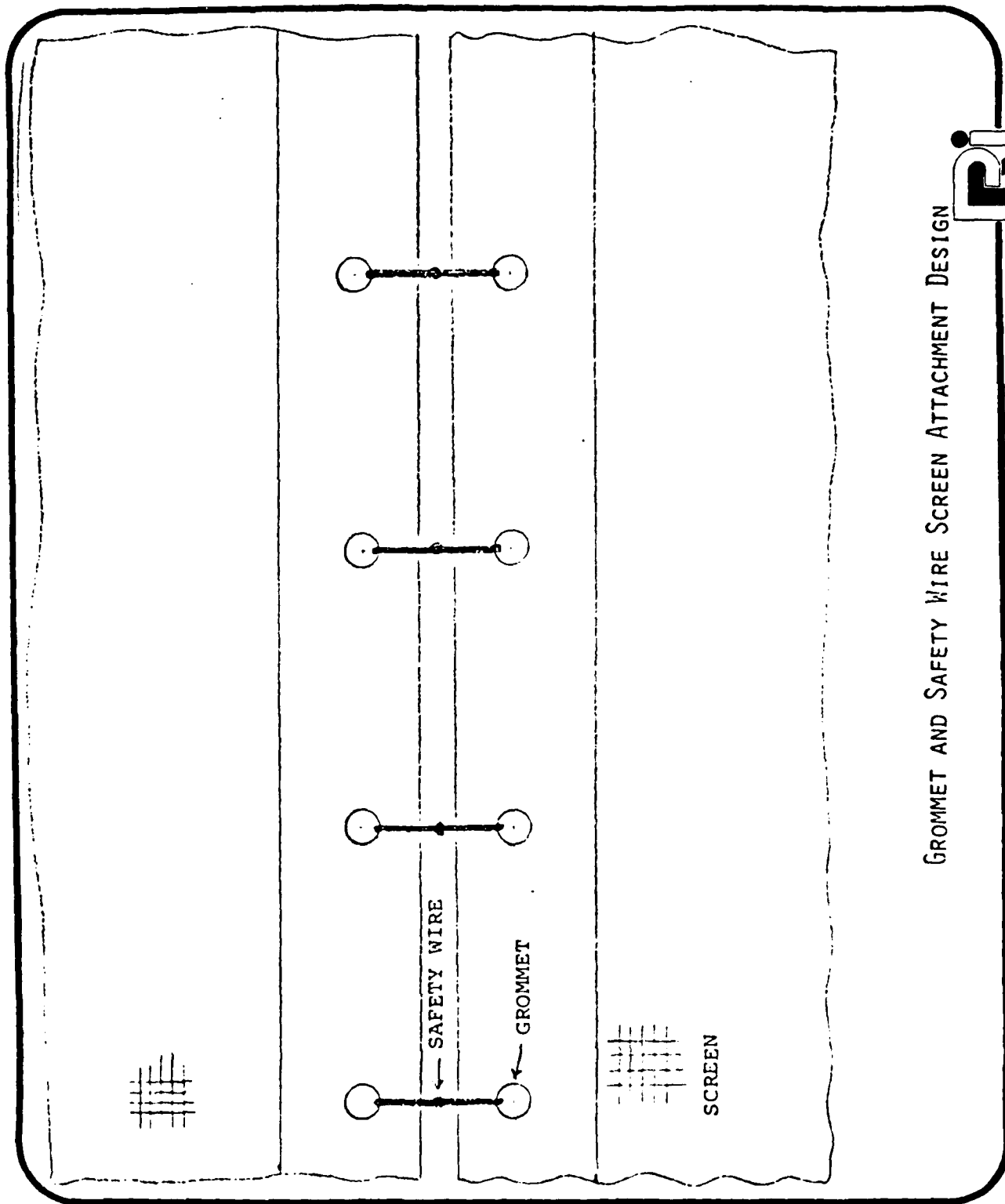
INSTRUMENTATION LOCATION-REAR VIEW
(CALTECH TEST)



- A-STATIC TAPS
- B-HOT WIRES
- C-STATIC TAPS
- D-UNSTEADY TAPS

INSTRUMENTATION LOCATION-END VIEW
(CALTECH TEST)





GROMMET AND SAFETY WIRE SCREEN ATTACHMENT DESIGN



WIRE DIAMETER (INCH)	MESH	% OPEN	k/d
0.0016	250	36	3×10^{-4}
0.0065	60	37.5	10^{-3}
~~.0075~~	~~60~~	~~30.5~~	1.2×10^{-3}
0.063	6	38.9	10^{-2}
~~0.063~~	~~8~~	~~24.6~~	~~10^{-2}~~

Table 1. Simulated Roughnesses

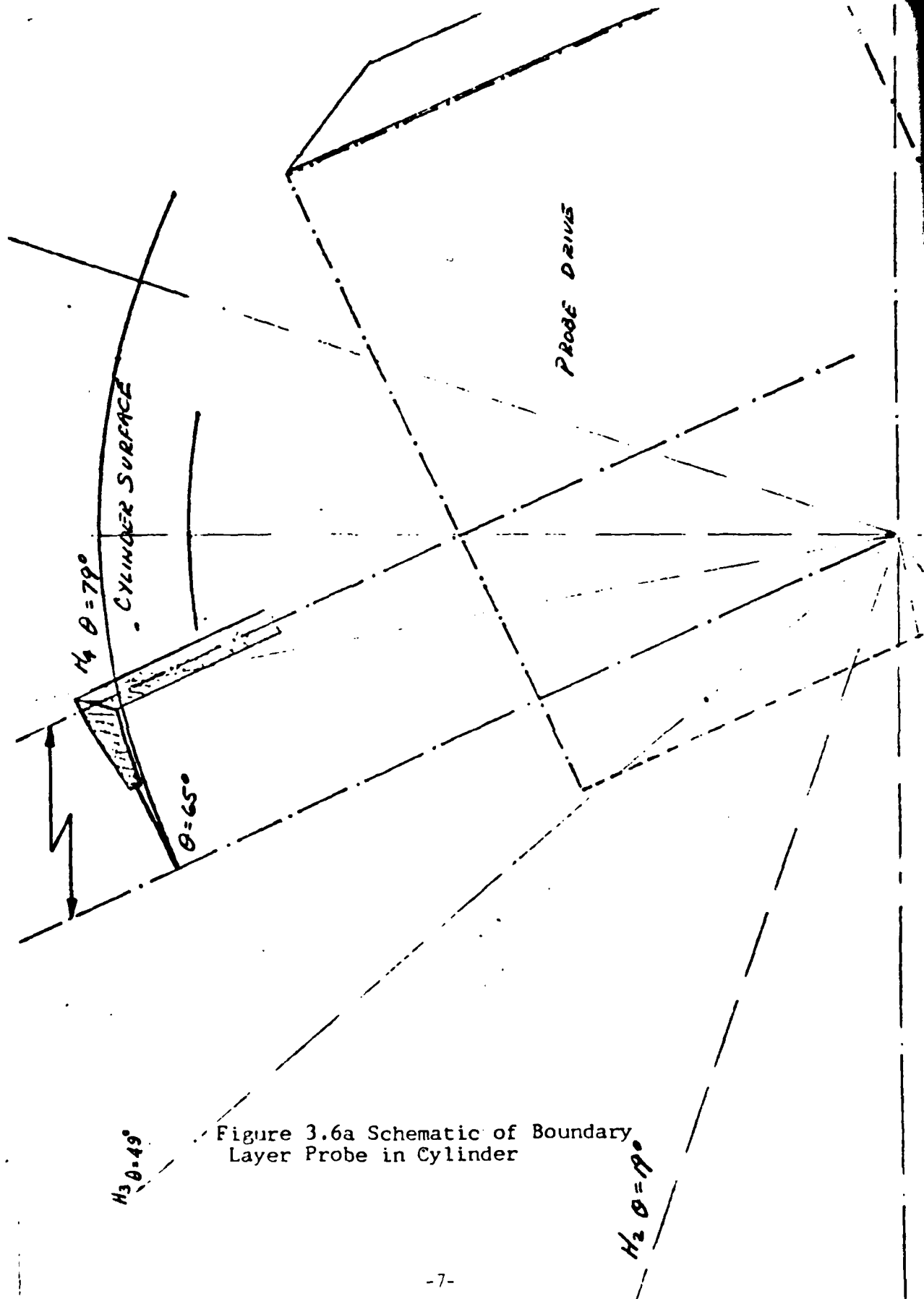


Figure 3.6a Schematic of Boundary Layer Probe in Cylinder

Assembled Unit

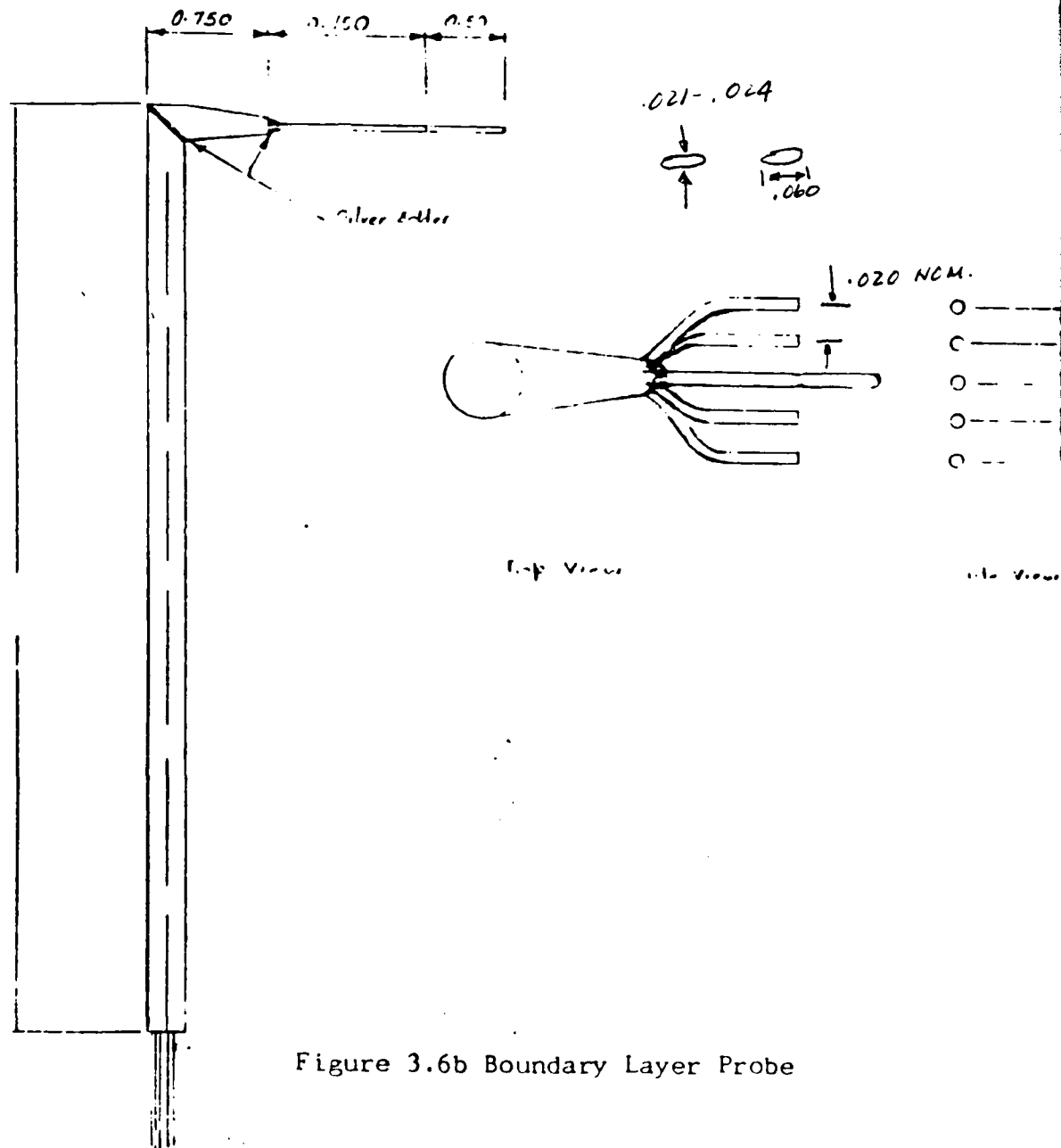


Figure 3.6b Boundary Layer Probe

**Aeronautics Division
Experimental Investigations Branch**

Test No. 226-12

[illegible]

SUN	MON	TUES	WED	THURS	FRI	SAT
9 MAY	10 ¹²⁹	11 ¹³⁰	12 ¹³¹	13 ¹³²	14 ¹³³	15 ¹³⁴
		MODEL CHECKOUT	INSTALLATION CHECKOUT	SHAKE DOWN	SMOOTH MODEL	
16	17 ¹³⁶	18 ¹³⁷	19 ¹³⁸	20 ¹³⁹	21 ¹⁴⁰	22 ¹⁴¹
	SMOOTH HYSTERESIS Ran 3/8-9	SMOOTH BL SURVEY Smooth 5-9	ROUGH K/D=BE-4 Smooth 12-25	MODEL Smooth 28	VARY TUNNEL SPEED Smooth 31-49	
23	24 ¹⁴³	25 ¹⁴⁴	26 ¹⁴⁵	27 ¹⁴⁶	28 ¹⁴⁷	29 ¹⁴⁸
30	31 ¹⁵⁰	Flow Visuali- station	MODEL K/D Smooth	Smooth BL Survey	4/11 = 10 ⁻² Rough Model	
		HOLIDAY				
JUNE		1 ¹⁵²	2 ¹⁵³	3 ¹⁵⁴	4 ¹⁵⁵	5 ¹⁵⁶
		ROUGH k/d = 10 ⁻² Const press. vary 14e; BL	MODEL K/D = 10 ⁻² BL Survey	10 ⁻³ - 10 ⁻⁴ 3x10 ⁻⁹	3x10 ⁻⁴ MODEL DISASSEMBLY	
60	7 ¹⁵⁷	8 ¹⁵⁸	9 ¹⁵⁹	10 ¹⁶⁰	11 ¹⁶¹	12 ¹⁶²
	3x10 ⁻⁴	3x10 ⁻⁴ BL Survey	12x10 ⁻³ Rotation; Dynamics	1.2x10 ⁻³ BL Probe last; Surveys	Continue 162 1.2x10 ⁻³ BL Model MIN Disassembly 2nd Shift	

FIGURE 6.1 TWELVE-FOOT PRESSURE TUNNEL TEST SCHEDULE

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TABLE IV - RUN SCHEDULE (AVERAGE VALUES FOR A RUN)

RUN	SEQ FROM	SEQ TO	CONF	ALPHA	MACHU	RN/FT	PT	QIU	PLU	TTF	PROBE	DATE	FMT
5	1	5	1	VARY	0.235	7.474	VARY	387.8	VARY	87.7		518	1
6	1	5	1	VARY	0.237	6.547	VARY	VARY	VARY	50.9		518	1
7	1	5	1	VARY	0.240	5.498	7858.9	305.1	7549.4	93.5		518	1
8	1	5	1	VARY	0.239	4.747	6589.1	254.0	8331.4	94.0		518	1
9	1	5	1	VARY	0.235	3.788	5223.8	200.8	VARY	90.5		518	1
12	1	5	1	VARY	0.240	2.877	3890.3	151.2	3736.9	84.5		519	1
13	1	5	1	VARY	0.240	2.430	3299.8	127.6	3170.4	85.2		519	1
14	1	5	1	VARY	0.241	1.917	2587.3	100.9	2484.9	84.3		519	1
15	1	5	1	VARY	0.242	1.454	1950.6	77.1	1872.5	84.4		519	1
16	1	5	1	VARY	0.243	1.220	1632.2	64.6	1566.7	83.7		519	1
17	1	5	1	VARY	0.239	0.967	1306.9	50.4	1255.8	82.6		519	1
18	1	5	1	VARY	0.239	0.858	1161.1	44.7	1115.7	82.7		519	1
19	1	5	1	VARY	0.241	0.777	1041.9	40.7	1000.6	82.0		519	1
20	1	5	1	VARY	0.243	0.669	891.3	35.2	855.5	81.5		519	1
21	1	5	1	VARY	0.244	0.392	516.6	20.7	495.6	79.1		519	1
22	1	5	1	VARY	0.243	0.489	647.7	25.8	621.6	81.1		519	1
23	1	5	1	VARY	0.242	0.584	780.3	30.7	749.1	81.9		519	1
25	1	81	1	9.96	0.247	VARY	VARY	VARY	VARY	VARY		519	2
28	1	33	1	9.95	0.054	0.205	VARY	2.4	VARY	VARY		520	2
29	1	24	1	9.95	0.145	0.380	VARY	11.6	VARY	63.4		520	2
31	2	214	1	9.97	VARY	0.438	VARY	VARY	VARY	VARY		521	2
33	1	5	1	VARY	0.145	0.292	623.0	9.0	613.9	68.3		521	1
34	1	5	1	VARY	0.145	0.297	632.3	9.1	623.1	68.0		521	1
35	1	5	1	VARY	0.147	0.314	658.5	9.8	648.6	68.2		521	1
36	1	5	1	VARY	0.147	0.341	715.5	10.7	704.8	68.9		521	1
37	1	5	1	VARY	0.147	0.361	757.1	11.3	745.7	68.9		521	1
38	1	5	1	VARY	0.147	0.372	781.7	11.6	770.0	68.7		521	1
39	1	5	1	VARY	0.148	0.385	804.3	12.1	792.2	68.6		521	1
40	1	5	1	VARY	0.147	0.393	823.8	12.3	811.5	68.5		521	1
41	1	5	1	VARY	0.147	0.398	833.0	12.5	820.5	68.4		521	1
42	1	5	1	VARY	0.148	0.405	843.5	12.7	830.7	68.3		521	1
43	1	5	1	VARY	0.147	0.413	862.7	12.9	849.7	68.4		521	1
44	1	5	1	VARY	0.149	0.454	942.5	14.4	928.1	69.4		521	1

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MODEL: FAR CYLINDER TABLE IV - RUN SCHEDULE (AVERAGE VALUES FOR A RUN)

PIJN	SFQ FROM	SFQ TO	CONF	ALPHA	MACHU	RN/FT	PT	QTU	PIU	TTF	PROBE	DATE	FMT
45	1	5	1	VARY	0.146	0.407	854.5	12.5	841.9	66.3		521	1
46	1	5	1	VARY	0.146	0.369	841.2	12.3	828.9	67.0		521	1
47	1	5	1	VARY	0.145	0.389	819.4	11.9	807.5	66.7		521	1
48	1	5	1	VARY	0.146	0.381	797.5	11.8	785.7	66.5		521	1
49	1	5	1	VARY	0.146	0.370	778.7	11.4	767.2	66.4		521	1
51	1	100	1	10.0	0.061	0.415	2101.0	VARY	2095.3	74.9		524	2
52	1	5	1	VARY	0.076	0.514	2100.6	8.4	2092.2	73.6		524	1
53	1	5	1	VARY	0.067	0.452	2100.6	6.5	2094.1	73.5		524	1
54	1	5	1	VARY	0.063	0.427	2100.6	5.8	2094.8	73.4		524	1
55	1	5	1	VARY	0.060	0.411	2100.6	5.4	2095.2	73.2		524	1
56	1	5	1	VARY	0.060	0.408	2100.6	5.3	2095.3	73.0		524	1
57	1	5	1	VARY	0.057	0.390	2100.6	4.8	2095.8	72.8		524	1
58	1	5	1	VARY	0.057	0.389	2100.6	4.8	2095.8	72.6		524	1
59	1	5	1	VARY	0.056	0.381	2100.6	4.6	2096.0	72.4		524	1
60	1	5	1	VARY	0.054	0.368	2100.6	4.3	2096.3	72.3		524	1
61	1	5	1	VARY	0.053	0.358	2100.6	4.1	2096.5	72.2		524	1
62	1	5	1	VARY	0.047	0.318	2099.9	3.2	2096.7	71.9		524	1
63	1	5	1	VARY	0.052	0.358	2099.9	4.0	2095.8	71.7		524	1
64	1	5	1	VARY	0.054	0.369	2099.9	4.3	2095.6	71.6		524	1
65	1	5	1	VARY	0.055	0.378	2099.9	4.5	2095.4	71.4		524	1
66	1	5	1	VARY	0.057	0.388	2099.9	4.7	2095.1	71.2		524	1
67	1	5	1	VARY	0.057	0.391	2099.9	4.8	2095.1	71.0		524	1
68	1	5	1	VARY	0.060	0.410	2099.9	5.3	2094.6	70.8		524	1
69	1	5	1	VARY	0.061	0.416	2100.0	5.4	2094.6	70.7		524	1
70	1	5	1	VARY	0.063	0.430	2100.6	5.8	2094.8	70.5		524	1
71	1	5	1	VARY	0.067	0.461	2100.6	6.6	2093.9	70.3		524	1
72	1	5	1	VARY	0.076	0.519	2100.7	8.4	2092.3	70.2		524	1
73	1	5	1	VARY	0.055	0.380	2101.3	4.5	2096.8	69.8		524	1
74	1	5	1	VARY	0.054	0.370	2101.3	4.3	2097.0	69.5		524	1
75	1	5	1	VARY	0.053	0.361	2102.0	4.1	2098.0	69.2		524	1
76	1	5	1	VARY	0.052	0.358	2102.0	4.0	2098.0	69.0		524	1
77	1	5	1	VARY	0.051	0.351	2102.0	3.8	2098.2	68.7		524	1
78	1	5	1	VARY	0.051	0.350	2102.0	3.8	2098.2	68.5		524	1

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MODEL: FAP CYLINDER TABLE IV - RUN SCHEDULE (AVERAGE VALUES FOR A RUN)

RUN	SEQ FROM	SEQ TO	CONF	ALPHA	MACHU	RN/FT	PT	CIU	PLU	TTF	PROBE DATE	FMT
79	1	5	1	VARY	0.049	0.227	2102.0	3.5	2098.5	68.2	524	1
80	1	5	1	VARY	0.049	0.337	2102.6	3.5	2099.1	68.0	524	1
81	1	5	1	VARY	0.047	0.226	2102.7	3.3	2099.4	67.7	524	1
82	1	5	1	VARY	0.047	0.221	2102.7	3.2	2099.5	67.5	524	1
83	1	196	1	9.99 VARY	0.384	VARY	VARY	VARY	VARY	66.2	524	2
84	2	18	1	-0.00	0.054	0.369	2102.7	4.2	2098.5	68.5	524	2
85	1	4	1	-0.00	0.059	0.405	2102.7	5.2	2097.5	69.7	524	2
86	1	3	1	0.00	0.071	0.489	2102.7	7.5	2095.2	70.4	524	2
87	1	5	1	0.00	0.052	0.358	2102.7	4.0	2098.7	70.8	524	2
88	4	26	1	VARY	0.041	0.277	2101.7	2.6	2099.1	VARY	524	2
89	1	114	1	0.01	0.052	0.356	2100.8	4.1	2096.7	73.4	525	2
91	1	5	1	VARY	0.248	7.765	10468.9	431.4	10030.8	95.7	526	1
92	1	5	1	VARY	0.248	6.882	9288.1	382.5	8894.8	96.0	526	1
93	1	5	1	VARY	0.247	5.902	8018.7	329.2	7684.5	98.2	526	1
94	1	5	1	VARY	0.247	4.510	6640.0	272.1	6363.7	95.8	526	1
95	1	5	1	VARY	0.248	3.977	5327.0	219.0	5104.6	92.4	526	1
96	1	5	1	VARY	0.248	2.953	3920.7	161.3	3756.9	88.6	526	1
97	1	5	1	VARY	0.248	2.474	3279.0	135.2	3141.8	88.3	526	1
98	1	5	1	VARY	0.248	1.974	2606.9	107.4	2497.8	86.6	526	1
99	1	5	1	VARY	0.249	1.478	1938.5	80.3	1857.0	84.8	526	1
100	1	5	1	VARY	0.249	1.232	1608.8	67.1	1540.7	84.1	526	1
101	1	5	1	VARY	0.248	1.002	1307.5	54.0	1252.6	82.2	526	1
102	1	5	1	VARY	0.250	0.894	1159.4	48.5	1110.1	81.9	526	1
103	1	5	1	VARY	0.249	0.788	1023.0	42.5	979.8	81.0	526	1
104	1	5	1	VARY	0.248	0.689	895.7	37.0	858.1	80.4	526	1
105	2	5	1	VARY	0.247	0.594	773.6	31.7	741.4	79.5	526	1
106	1	5	1	VARY	0.247	0.496	644.5	26.4	617.6	78.6	526	1
108	1	5	1	VARY	0.249	0.397	511.6	21.2	490.1	78.3	526	1
109	3	57	1	VARY	0.248	VARY	VARY	VARY	VARY	89.3	526	2
112	1	5	11	VARY	0.248	7.791	10470.3	430.8	10032.9	94.0 *****	527	1
113	1	5	11	VARY	0.247	7.682	10450.1	427.3	10016.2	98.0 0.033	527	1
114	1	5	11	VARY	0.247	7.650	10457.6	428.1	10022.9	100.3 VARY	527	1
115	1	12	11	0.03	0.247	7.559	10461.2	428.5	10026.1	105.9 0.011	527	2

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MODEL: FAF CYLINDER TABLE IV - RUN SCHEDULE (AVERAGE VALUES FOR A RUN)

RUN	SEQ FROM	SEQ TC	CONF	ALPHA	MACHU	RN/FT	PT	CIU	PLU	TIF	PROBE DATE	FMT
116	1	20	11	20.1	0.247	7.502	10451.3	427.1	10017.6	108.4	0.017	527 2
117	1	20	11	25.2	VARY	VARY	VARY	VARY	VARY	110.5	0.023	527 2
118	1	20	11	25.2	0.248	5.923	9176.3	327.6	7833.4	106.6	0.024	527 2
119	1	20	11	20.1	0.248	5.890	8153.6	325.8	7812.6	108.0	0.023	527 2
120	1	19	11	10.0	0.249	5.878	8130.5	327.6	7787.7	108.7	0.017	527 2
121	1	17	11	0.03	0.248	5.922	8223.5	340.0	7878.3	109.6	0.014	527 2
122	1	16	11	0.02	0.248	4.782	6581.1	271.7	6305.2	105.3	0.011	527 2
123	1	19	11	20.1	0.249	4.769	6562.6	272.5	6285.9	106.4	0.022	527 2
124	1	22	11	25.2	0.249	4.739	6532.6	270.7	6257.8	106.7	0.023	527 2
125	1	10	11	0.02	0.248	2.984	4057.6	166.8	3888.2	98.9	0.005	527 2
126	1	22	11	20.1	0.248	2.980	4047.6	167.2	3877.8	99.4	0.018	527 2
127	1	22	11	10.0	0.248	2.968	4029.0	166.6	3859.8	99.4	0.017	527 2
128	1	22	11	25.3	0.248	2.958	4010.9	165.9	3842.4	99.0	0.022	527 2
129	1	1	11	25.0	0.249	2.957	3998.9	166.1	3830.2	98.7	0.019	527 2
130	1	5	11	VARY	0.249	2.951	3990.6	165.5	3822.5	98.4	0.019	527 1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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MODEL: FAP CYLINDER TABLE IV - RUN SCHEDULE (AVERAGE VALUES FOR A RUN)

RUN	SEQ FROM	SEQ TO	CONF	ALPHA	MACHU	RN/FT	PT	QIU	PIU	TTF	PROBE	DATE	FMT
131	5	7	4	0.07	0.168	5.453	10341.0	200.7	10143.2	82.2	*****	528	1
132	1	5	4	VARY	0.198	6.346	10348.2	276.9	10069.5	85.5	*****	528	1
133	1	5	4	VARY	0.198	4.916	7965.8	212.6	7751.1	87.2	*****	528	1
134	1	5	4	VARY	0.204	4.030	6318.7	178.0	6138.9	79.6	*****	528	1
135	1	5	4	VARY	0.198	2.936	4699.5	125.1	4573.2	76.3	*****	528	1
136	1	5	4	VARY	0.197	2.443	3920.3	103.2	3816.1	75.0	*****	528	1
137	1	5	4	VARY	0.203	1.588	3087.9	86.4	3000.7	74.2	*****	528	1
139	1	5	4	VARY	0.198	1.480	2293.8	61.3	2231.9	64.0	*****	601	1
140	1	5	4	VARY	0.197	1.239	1556.7	51.8	1904.4	69.4	*****	601	1
142	1	5	4	VARY	0.196	0.400	628.6	16.5	612.0	65.9	*****	601	1
143	1	5	4	VARY	0.197	0.455	782.9	20.8	762.0	70.6	*****	601	1
144	1	5	4	VARY	0.198	0.596	943.2	25.2	917.7	72.7	*****	601	1
145	1	5	4	VARY	0.199	0.701	1111.4	29.9	1081.3	74.5	*****	601	1
146	1	5	4	VARY	0.200	0.800	1267.0	34.5	1232.2	76.1	*****	601	1
147	1	5	4	VARY	0.202	0.912	1434.1	39.8	1393.8	77.8	*****	601	1
148	1	5	4	VARY	0.203	1.018	1598.4	44.8	1553.2	79.2	*****	601	1
150	1	5	4	VARY	0.031	1.052	10378.7	7.0	10321.7	67.9	*****	601	1
151	1	5	4	VARY	0.040	1.369	10328.3	11.7	10316.6	66.3	*****	601	1
152	1	5	4	VARY	0.060	2.048	10326.6	26.1	10300.5	65.4	*****	601	1
153	1	5	4	VARY	0.100	3.386	10326.1	71.5	10254.5	65.7	*****	601	1
154	1	5	4	VARY	0.120	4.054	10330.0	103.1	10226.5	66.8	*****	601	1
155	1	5	4	VARY	0.150	5.025	10326.4	160.7	10164.8	69.4	*****	601	1
156	1	5	4	VARY	0.179	5.909	10322.9	227.3	10093.7	73.6	*****	601	1
157	1	5	4	VARY	0.200	6.462	10328.4	281.3	10044.3	80.6	*****	601	1
158	3	42	41	0.00	0.204	6.048	VARY	274.1	VARY	90.0	0.060	602	2
159	1	47	41	16.4	0.205	6.014	VARY	274.6	VARY	91.6	VARY	602	2
160	1	51	41	20.0	0.204	5.949	VARY	272.5	VARY	93.3	VARY	602	2
161	1	60	41	35.2	0.204	6.048	VARY	278.7	VARY	96.4	VARY	602	2
162	1	47	41	15.0	0.205	6.006	VARY	277.9	VARY	97.1	VARY	VARY	7
163	1	41	41	25.0	0.204	6.068	VARY	280.0	VARY	97.2	VARY	602	2
164	2	28	41	-0.02	0.204	1.996	3142.5	88.6	3053.0	81.5	0.061	602	2
165	1	30	41	14.9	0.204	2.015	3184.7	90.3	3093.5	84.3	VARY	602	2
166	1	35	41	18.9	0.205	2.007	3150.5	90.2	3059.4	83.4	VARY	602	2

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MODEL: FAIR CYLINDER TABLE IV - RUN SCHEDULE (AVERAGE VALUES FOR A RUN)

RUN	SEQ FROM	SEQ TO	CONF	ALPHA	MACHU	RN/FT	PT	QIU	PIU	TTF	PROBE	DATE	FMT
167	1	28	41	0.00	0.060	2.004	10470.6	26.3	10444.3	78.9	0.060	602	2
168	1	22	41	15.0	0.060	2.047	10469.0	26.6	10442.5	72.3	0.069	602	2
169	1	34	41	25.0	0.060	2.026	VARY	25.6	VARY	66.5	VARY	602	2
171	1	5	2	VARY	0.242	0.393	498.6	19.7	478.7	60.8	*****	602	1
172	1	5	2	VARY	0.247	0.481	606.3	24.9	581.0	66.1	*****	603	1
173	1	5	2	VARY	0.247	0.592	753.7	30.7	722.5	69.2	*****	602	1
174	1	5	2	VARY	0.244	0.685	884.1	35.5	848.1	71.3	*****	602	1
175	1	5	2	VARY	0.247	0.785	1008.8	41.1	967.1	72.8	*****	603	1
176	1	5	2	VARY	0.245	0.879	1141.1	46.0	1094.5	74.4	*****	603	1
177	1	5	2	VARY	0.244	0.879	1277.5	51.2	1225.5	75.7	*****	602	1
178	1	5	2	VARY	0.246	1.227	1600.6	65.0	1534.6	78.6	*****	603	1
179	1	5	2	VARY	0.246	1.472	1933.8	78.5	1854.1	81.2	*****	603	1
181	1	5	2	VARY	0.246	1.576	2527.5	102.9	2423.1	70.5	*****	604	1
182	1	5	2	VARY	0.246	2.483	3278.8	133.2	3143.5	83.6	*****	604	1
183	1	5	2	VARY	0.246	2.577	VARY	163.0	VARY	91.9	*****	604	1
184	1	5	2	VARY	0.250	4.002	5293.6	222.3	5067.8	91.5	*****	604	1
185	1	5	2	VARY	0.249	1.990	2587.0	107.3	2478.1	81.4	*****	604	1
186	1	5	2	VARY	0.248	2.505	3332.4	137.1	3193.1	89.6	*****	604	1
188	1	5	2	VARY	0.239	0.405	521.8	20.1	501.4	62.0	*****	604	1
189	1	5	2	VARY	0.243	0.490	629.9	25.0	604.5	67.7	*****	604	1
190	1	5	2	VARY	0.246	0.590	756.5	30.6	725.4	70.5	*****	604	1
191	1	2	2	20.0	0.246	0.605	775.9	31.5	743.9	71.3	*****	604	1
192	1	5	2	VARY	0.246	0.622	800.3	32.5	767.4	72.5	*****	604	1
193	1	5	2	VARY	0.246	0.694	895.5	36.4	858.6	74.1	*****	604	1
194	1	5	2	VARY	0.246	0.793	1027.2	41.7	984.9	75.7	*****	604	1
195	1	5	2	VARY	0.247	0.889	1151.4	47.1	1103.6	76.8	*****	604	1
196	1	5	2	VARY	0.246	0.987	1286.0	52.3	1232.8	78.2	*****	604	1
198	1	5	2	VARY	0.245	1.220	1556.7	62.9	1492.8	68.1	*****	607	1
199	1	5	2	VARY	0.247	1.475	1902.0	77.7	1823.1	74.7	*****	607	1
200	1	5	2	VARY	0.246	1.599	2673.9	108.9	2563.3	89.6	*****	607	1
201	1	5	2	VARY	0.247	2.476	3336.8	126.4	3198.3	93.7	*****	607	1
202	1	5	2	VARY	0.248	2.594	4020.1	165.8	3851.7	94.1	*****	607	1
203	1	5	2	VARY	0.248	3.957	5362.8	221.3	5138.0	98.3	*****	607	1

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MODEL: FAR CYLINDER TABLE IV - RUN SCHEDULE (AVERAGE VALUES FOR A RUN)

RUN	SEC FROM	SEC TO	CONF	ALPHA	MACHU	RN/FT	PT	QIU	PIU	TIF	PROBE	DATE	FMT
204	1	5	2	VARY	0.248	4.553	6790.1	279.5	6506.3	102.8	****	607	1
205	1	5	2	VARY	0.249	5.563	8278.2	340.9	7882.1	107.1	****	607	1
206	1	5	2	VARY	0.248	6.751	9408.5	387.9	9014.7	110.6	****	607	1
209	1	5	2	VARY	0.113	2.781	VARY	68.3	VARY	78.3	****	607	1
209	1	5	2	VARY	0.036	0.909	VARY	7.2	VARY	76.9	****	607	1
210	1	5	2	VARY	0.046	1.150	7792.1	11.4	7780.7	75.5	****	607	1
211	1	5	2	VARY	VARY	VARY	VARY	VARY	VARY	75.3	****	607	1
212	1	5	2	VARY	0.115	2.872	7794.7	72.0	7722.5	76.8	****	607	1
213	1	5	2	VARY	VARY	VARY	VARY	VARY	VARY	78.8	****	607	1
214	1	5	2	VARY	0.173	4.243	7818.2	160.4	7656.6	81.3	****	607	1
215	1	5	2	VARY	0.207	5.015	7839.0	227.8	7608.7	84.8	****	607	1
216	2	20	2	0.04	0.246	VARY	VARY	VARY	VARY	VARY	****	607	2
217	3	18	21	0.04	0.247	1.968	2557.7	104.8	2451.3	78.7	0.015	608	2
218	1	12	21	15.1	0.247	1.946	2573.9	105.2	2467.2	85.6	0.016	608	2
219	1	10	21	25.1	0.248	1.940	2583.0	106.4	2475.0	90.1	0.017	608	2
220	1	16	21	0.04	0.248	3.570	5363.8	221.0	5139.4	96.6	0.032	608	2
221	1	18	21	15.1	0.247	3.949	VARY	220.8	VARY	99.1	0.041	608	2
222	1	24	21	25.1	0.248	3.913	5335.4	220.3	5111.7	101.1	0.073	609	2
223	1	17	21	0.04	VARY	VARY	VARY	VARY	VARY	101.3	0.035	608	2
224	1	16	21	15.1	0.248	5.893	8116.9	334.5	7777.3	105.2	0.042	608	2
226	1	5	3	VARY	0.246	0.419	537.7	21.8	515.5	71.7	****	609	1
227	1	5	3	VARY	0.247	0.487	629.9	25.9	603.6	76.9	****	609	1
228	1	5	3	VARY	0.249	0.594	768.8	32.0	736.3	80.0	****	609	1
229	1	5	3	VARY	0.251	0.695	899.2	37.8	860.8	82.3	****	609	1
230	1	5	3	VARY	0.249	0.798	1040.8	43.3	996.9	83.0	****	609	1
231	1	5	3	VARY	0.248	0.890	1167.3	48.0	1118.5	83.1	****	609	1
232	1	5	3	VARY	0.248	0.989	1296.3	53.5	1242.0	83.7	****	609	1
233	1	5	3	VARY	0.247	1.230	1620.5	66.6	1552.9	85.0	****	609	1
234	1	5	3	VARY	0.247	1.474	1950.1	79.7	1869.2	85.8	****	609	1
235	1	5	3	VARY	VARY	VARY	VARY	VARY	VARY	87.0	****	609	1
236	1	5	3	VARY	0.247	1.581	2629.3	108.0	2519.7	88.2	****	609	1
237	1	5	3	VARY	0.247	2.485	3322.9	135.8	3185.1	90.3	****	609	1
238	1	5	3	VARY	0.248	2.975	3984.8	164.2	3818.1	92.7	****	609	1

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MODEL: FAR CYLINDER TABLE IV - RUN SCHEDULE (AVERAGE VALUES FOR A RUN)

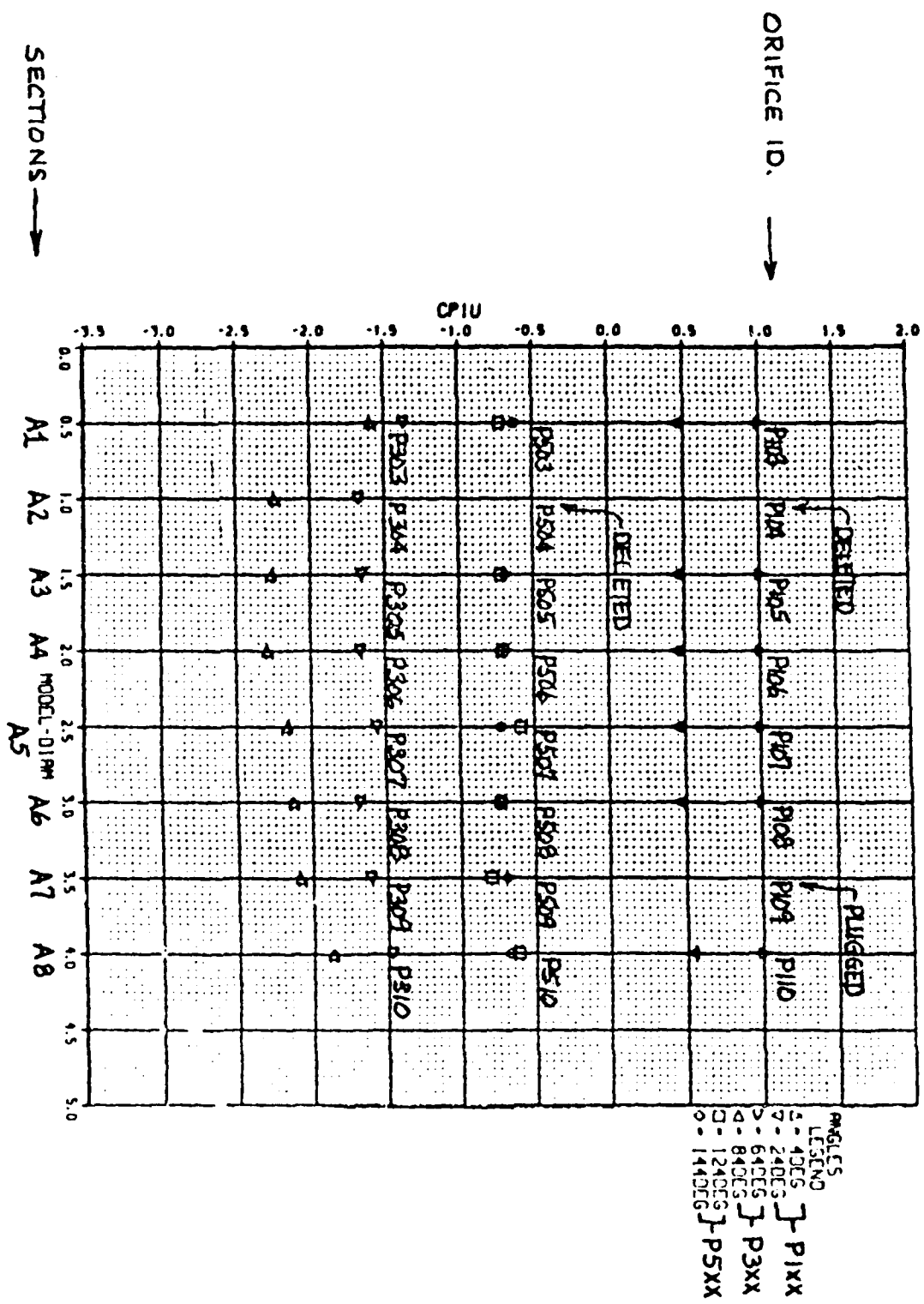
RUN	SEQ FROM	SEQ TO	CONF	ALPHA	MACHU	RA/FT	PT	QIU	PIU	TTF	PROBE	DATE	FMT
239	1	5	3	VARY	0.247	3.462	4678.6	191.0	4484.7	94.7	****	609	1
240	1	5	3	VARY	0.247	3.562	5379.3	270.1	5155.9	97.2	****	609	1
241	1	5	3	VARY	0.247	4.509	6733.9	275.2	6454.5	101.5	****	609	1
242	1	5	3	VARY	0.247	5.895	8166.7	334.3	7827.3	106.3	****	609	1
243	1	5	3	VARY	0.248	7.028	9852.1	405.0	9440.9	112.6	****	609	1
244	2	5	3	VARY	0.203	5.770	9699.5	270.8	9425.9	108.1	****	609	1
245	1	1	3	0.63	0.181	5.217	9664.8	217.7	9445.4	102.2	****	609	1
246	1	1	3	0.65	0.151	4.394	9664.8	151.3	9512.7	99.8	****	609	1
247	1	1	3	0.64	0.123	3.539	9399.6	98.4	9300.9	94.4	****	609	1
248	1	1	3	0.64	0.103	2.562	9350.1	68.4	9281.5	92.0	****	609	1
249	1	1	3	0.65	0.072	2.073	9325.4	33.4	9291.9	91.1	****	609	1
250	1	1	3	0.65	0.062	1.806	9294.9	25.3	9269.6	89.6	****	609	1
251	1	1	3	0.63	0.040	1.164	9264.5	10.5	9254.1	88.4	****	609	1
252	1	1	3	0.53	0.031	0.886	9229.9	6.0	9223.8	87.0	****	609	1
253	1	1	3	0.53	0.041	1.172	9202.3	10.6	9191.7	85.8	****	609	1
254	1	1	3	0.53	0.063	1.811	9195.9	25.2	9170.7	85.4	****	609	1
255	1	1	3	0.53	0.072	2.089	9190.3	33.5	9156.7	85.1	****	609	1
256	1	1	3	0.53	0.103	2.971	9187.4	67.8	9119.5	84.9	****	609	1
257	1	1	3	0.53	0.124	3.567	9189.6	97.9	9091.3	85.0	****	609	1
258	1	1	3	0.53	0.155	4.433	9203.7	151.7	9051.1	85.8	****	609	1
259	1	1	3	0.53	0.187	5.379	9232.0	220.6	9009.5	87.4	****	609	1
260	1	1	3	0.53	0.206	5.856	9264.5	268.4	8993.3	89.4	****	609	1
261	1	1	3	0.53	0.029	0.206	2123.2	1.2	2122.0	54.9	****	609	1
262	1	1	3	0.53	0.041	0.295	2118.3	2.5	2115.8	56.5	****	609	1
263	1	1	3	0.53	0.060	0.421	2118.3	5.3	2113.0	61.3	****	609	1
264	1	3	3	0.53	0.100	0.700	2118.3	VARY	2103.0	64.7	****	609	1
265	1	1	3	0.53	0.145	1.023	2117.6	32.3	2085.1	68.0	****	609	1
266	1	1	3	0.53	0.181	1.230	2117.6	47.3	2069.9	70.4	****	609	1
267	1	1	3	0.53	0.200	1.352	2117.6	57.6	2059.4	71.7	****	609	1
268	1	25	31	0.04	VARY	0.387	VARY	VARY	VARY	72.0	0.032	610	2
269	1	22	31	10.0	0.245	0.410	533.2	21.5	511.3	75.7	0.031	610	2
270	1	33	31	25.1	VARY	0.406	VARY	VARY	VARY	78.3	0.073	610	2
271	1	24	31	16.9	VARY	0.412	VARY	VARY	VARY	80.3	0.047	610	2

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MODEL: FAR CYLINDER TABLE IV - RUN SCHEDULE (AVERAGE VALUES FOR A RUN)

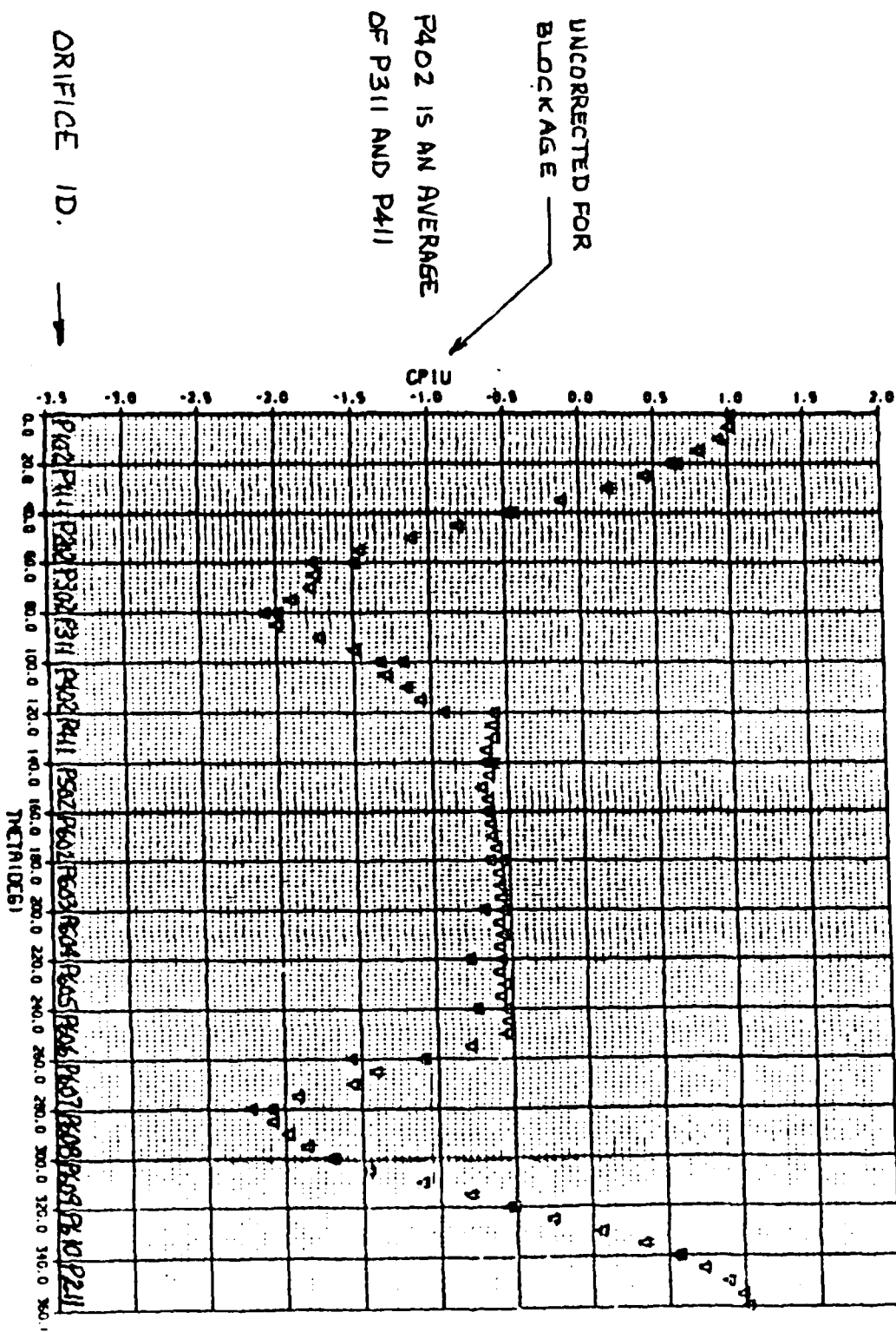
RUN	SEQ FROM	SEQ TC	CONF	ALPHA	MACHU	RN/FT	PT	QIU	PIU	TTF	PROBE DATE	FMT
272	1	21	31	0.06	0.248	0.493	642.2	26.5	615.3	81.3	0.038	610 2
273	1	23	31	10.0	0.248	0.503	654.0	27.0	626.6	80.1	0.045	610 2
274	1	22	31	25.1	VARY	0.492	VARY	VARY	VARY	79.3	0.075	610 2
275	1	20	31	0.06	0.249	0.789	1020.7	42.6	977.4	80.4	0.033	610 2
276	1	21	31	15.0	VARY	0.763	VARY	VARY	VARY	79.5	0.053	610 2
277	1	30	31	25.1	0.250	0.819	VARY	44.1	VARY	78.8	VARY	610 2
278	1	20	31	15.0	0.247	2.955	3893.7	159.8	3731.4	84.8	0.043	610 2
279	1	35	31	25.1	VARY	VARY	VARY	VARY	VARY	86.9	VARY	610 2
280	1	46	31	20.0	0.247	2.861	VARY	VARY	VARY	88.6	0.059	610 2
281	1	27	31	20.0	0.248	1.618	2117.6	87.6	2028.7	83.5	0.059	610 2
282	1	35	31	25.1	0.248	1.613	2117.1	87.6	2028.2	84.7	VARY	610 2
283	9	31	31	15.0	0.248	6.807	9361.8	384.8	8971.1	104.0	0.052	611 2
284	1	30	31	25.1	0.248	6.749	9364.7	385.4	8973.4	108.2	VARY	611 2
285	1	24	31	20.0	0.248	6.687	9342.1	384.2	8951.9	111.1	0.069	611 2
286	1	30	31	10.1	0.248	6.617	VARY	393.4	VARY	113.8	0.051	611 2
287	1	27	31	15.0	0.248	5.912	8290.5	341.0	7944.3	112.8	0.046	611 2
288	1	41	31	25.1	0.248	5.875	VARY	339.4	VARY	112.9	VARY	611 2
289	1	31	31	20.0	0.248	5.835	VARY	337.8	VARY	113.0	0.059	611 2
290	1	25	31	20.0	0.248	4.920	6856.6	283.1	6569.1	110.0	0.061	611 2
291	1	28	31	25.1	0.247	4.885	6813.3	279.6	6529.5	109.9	VARY	611 2
292	1	25	31	15.0	0.247	4.852	6766.3	277.3	6484.8	109.5	0.049	611 2
293	1	25	31	15.0	0.247	3.918	VARY	222.1	VARY	105.5	0.043	611 2
294	1	29	31	25.1	0.249	3.898	VARY	221.0	VARY	105.2	VARY	611 2
295	1	25	31	23.1	0.247	3.870	VARY	218.8	VARY	104.3	0.073	611 2
296	1	25	31	20.0	0.248	3.860	5294.0	218.7	5072.0	103.7	0.061	611 2
297	1	23	31	23.1	0.248	2.945	4001.3	165.0	3833.7	99.2	VARY	611 2
298	1	30	31	25.1	0.247	2.439	3308.4	135.1	3171.2	96.4	VARY	611 2
299	1	23	31	20.0	0.247	2.423	3275.0	134.3	3138.6	95.7	0.057	611 2
300	1	24	31	20.0	0.248	1.958	2622.5	107.9	2513.0	92.3	0.056	611 2
301	1	30	31	25.1	0.248	1.948	2604.8	107.1	2496.0	91.6	VARY	611 2
302	1	25	31	20.0	0.249	1.001	VARY	54.5	1256.0	84.7	0.052	611 2
303	1	23	31	25.1	0.248	1.032	1353.0	56.0	1296.1	84.6	VARY	611 2

TEST, PHASE, TUN, RUN, SEQ.
 226, 1, 12 5.00 5.00 LONGITUDINAL PRESSURE COEFFICIENTS

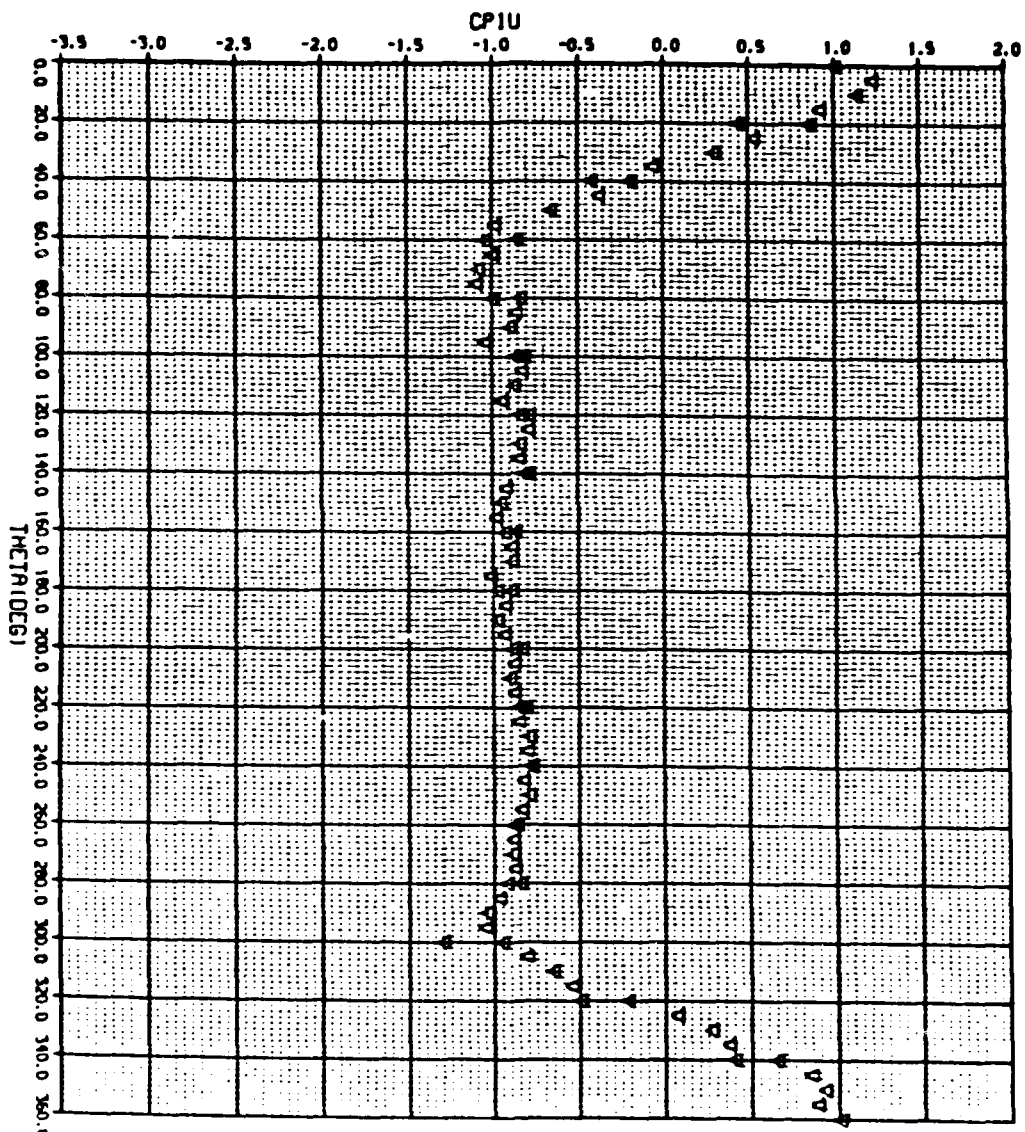


TEST PHASE TUN. RUN SEG.
226.1.12 5.00: 5.00 DMC PRESS. COEFFICIENTS

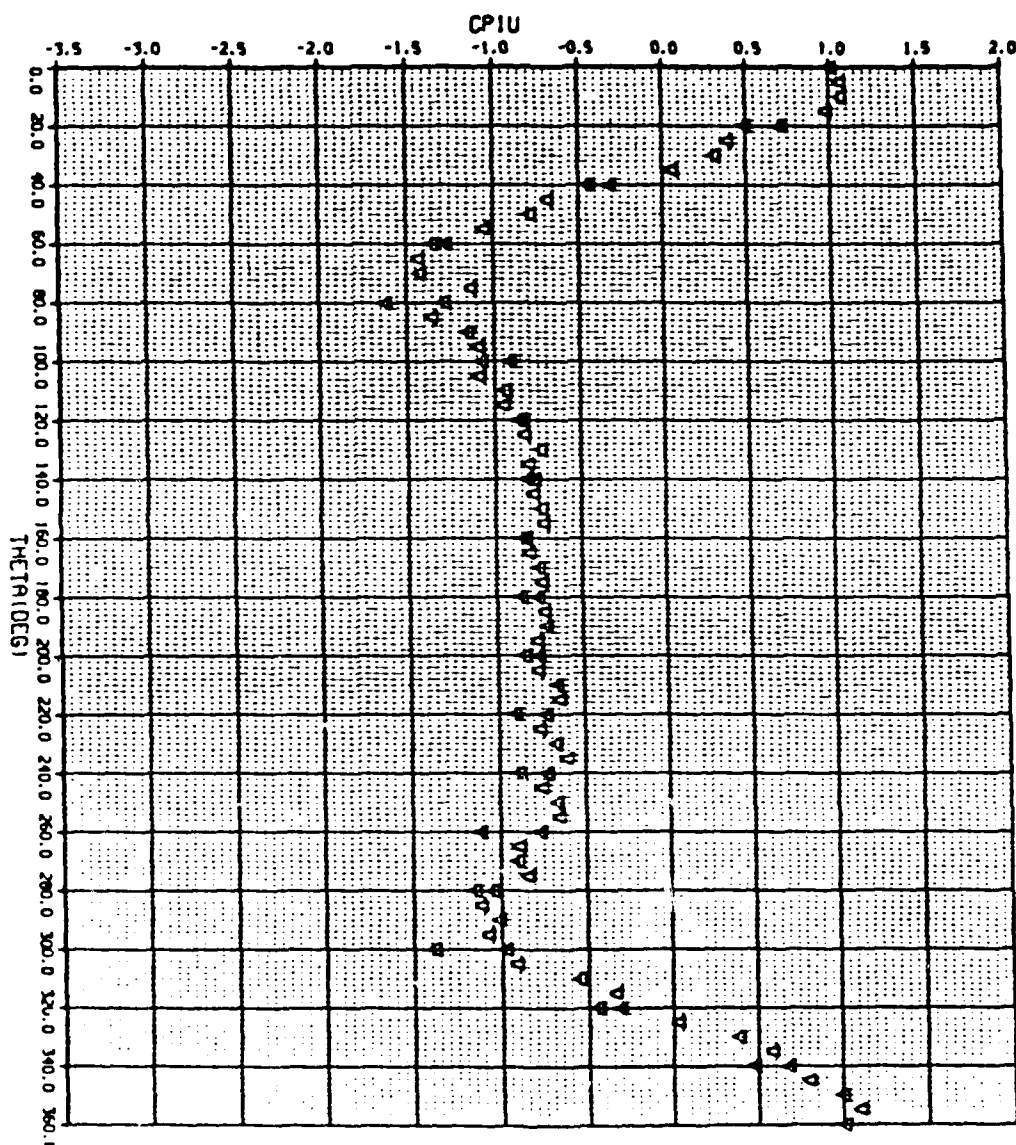
INTEGRATED SECTION COEFF.
0.0518 CO- 0.4930 INC-7.653
FROM SEG. 5



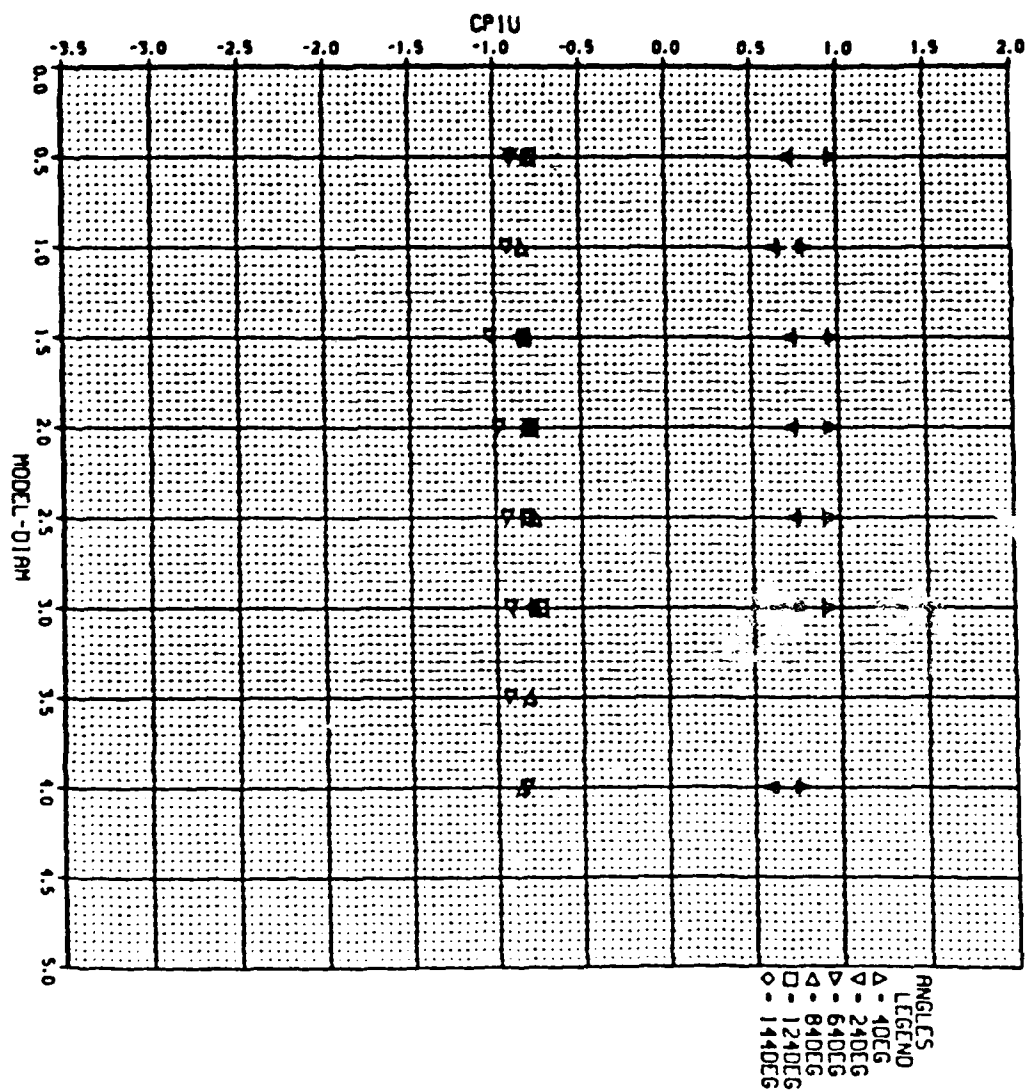
226.1,12 33.00: 5.00 QMC PRESS. COEFFICIENTS CL- 0.0117 CD- 0.9994 RND-0.306



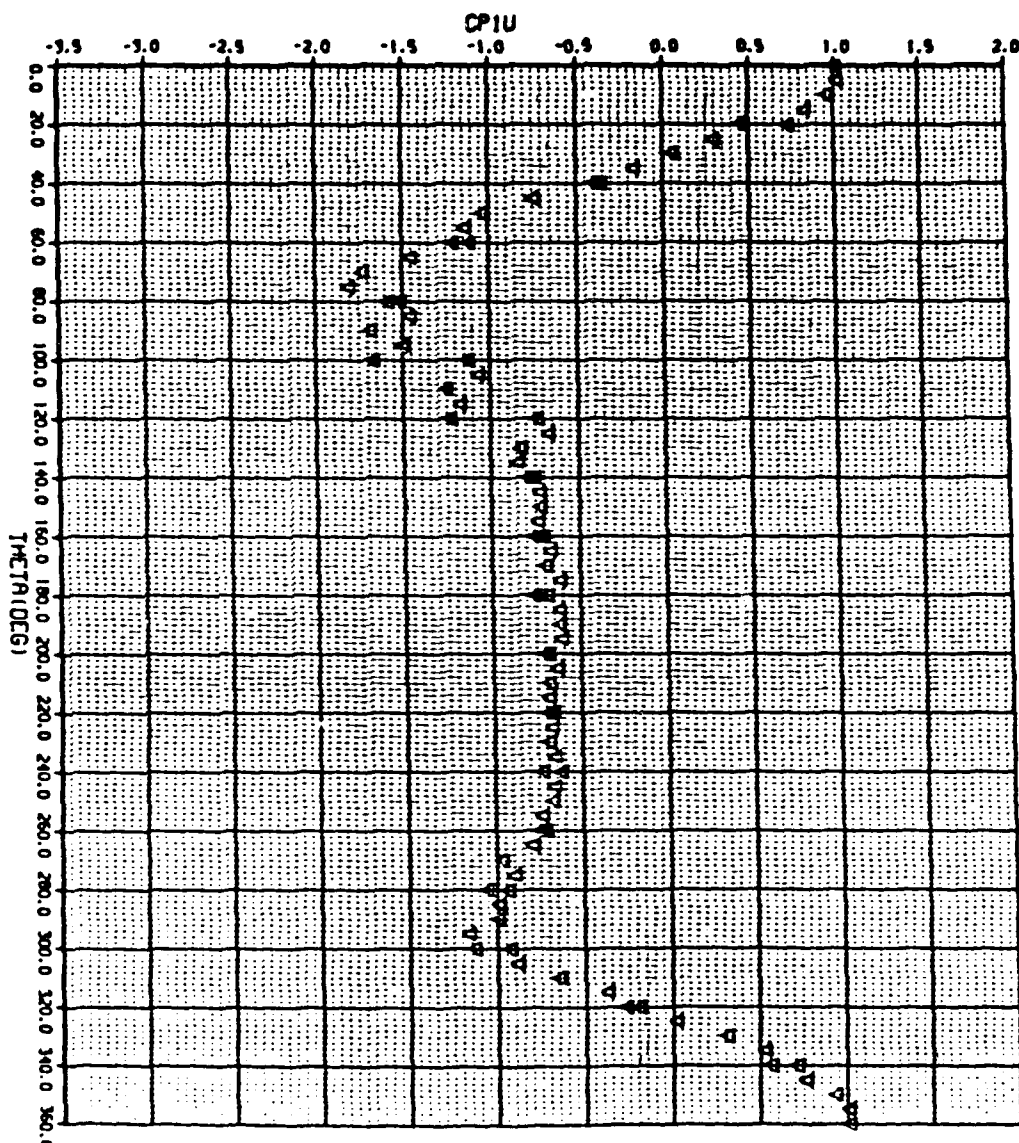
226,1.12 38.00: 5.00 QUNC PRESS. COEFFICIENTS CL- 0.1787 CD- 0.8525 RND-0.389



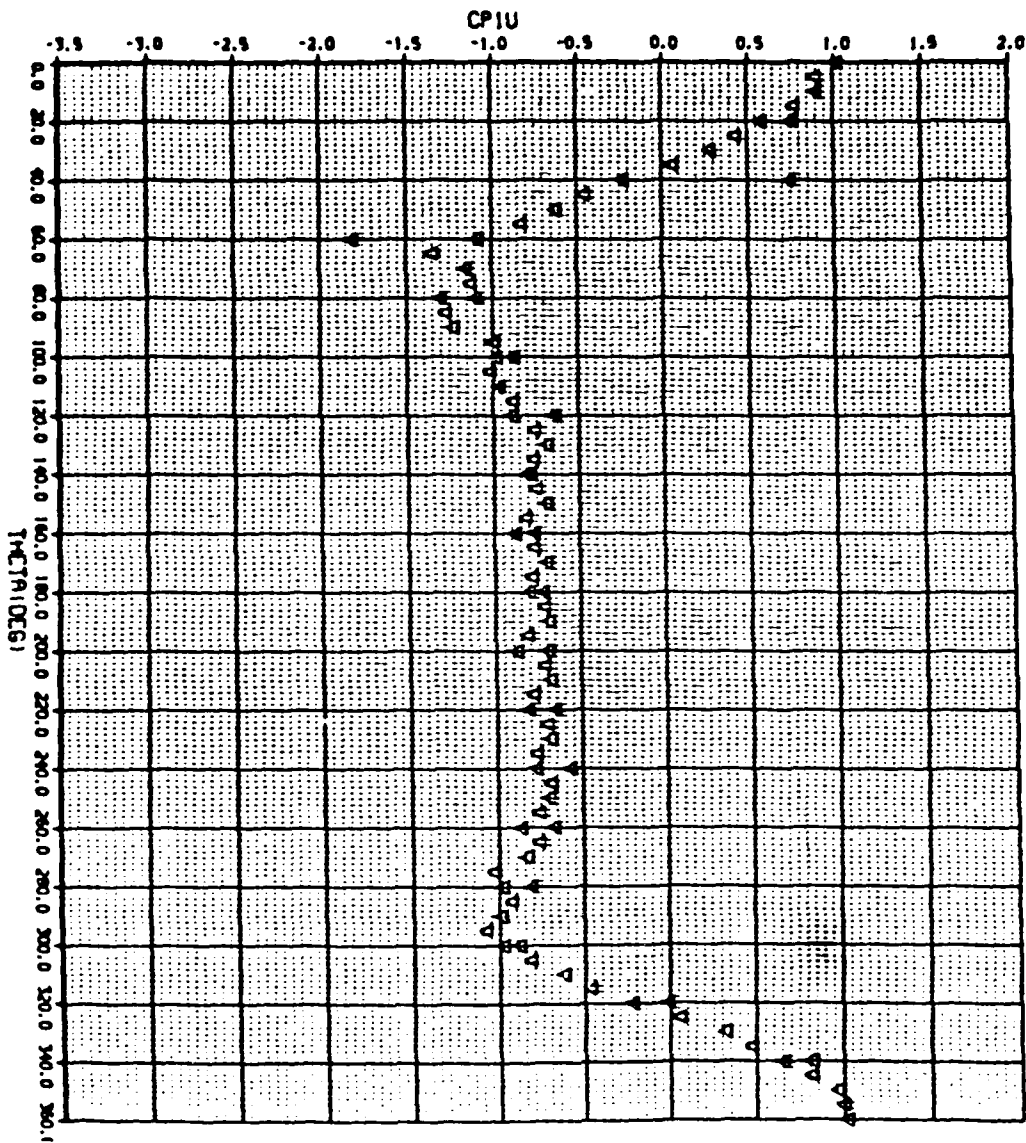
226.1,12 33.001 5.00 LONGITUDINAL PRESSURE COEFFICIENTS



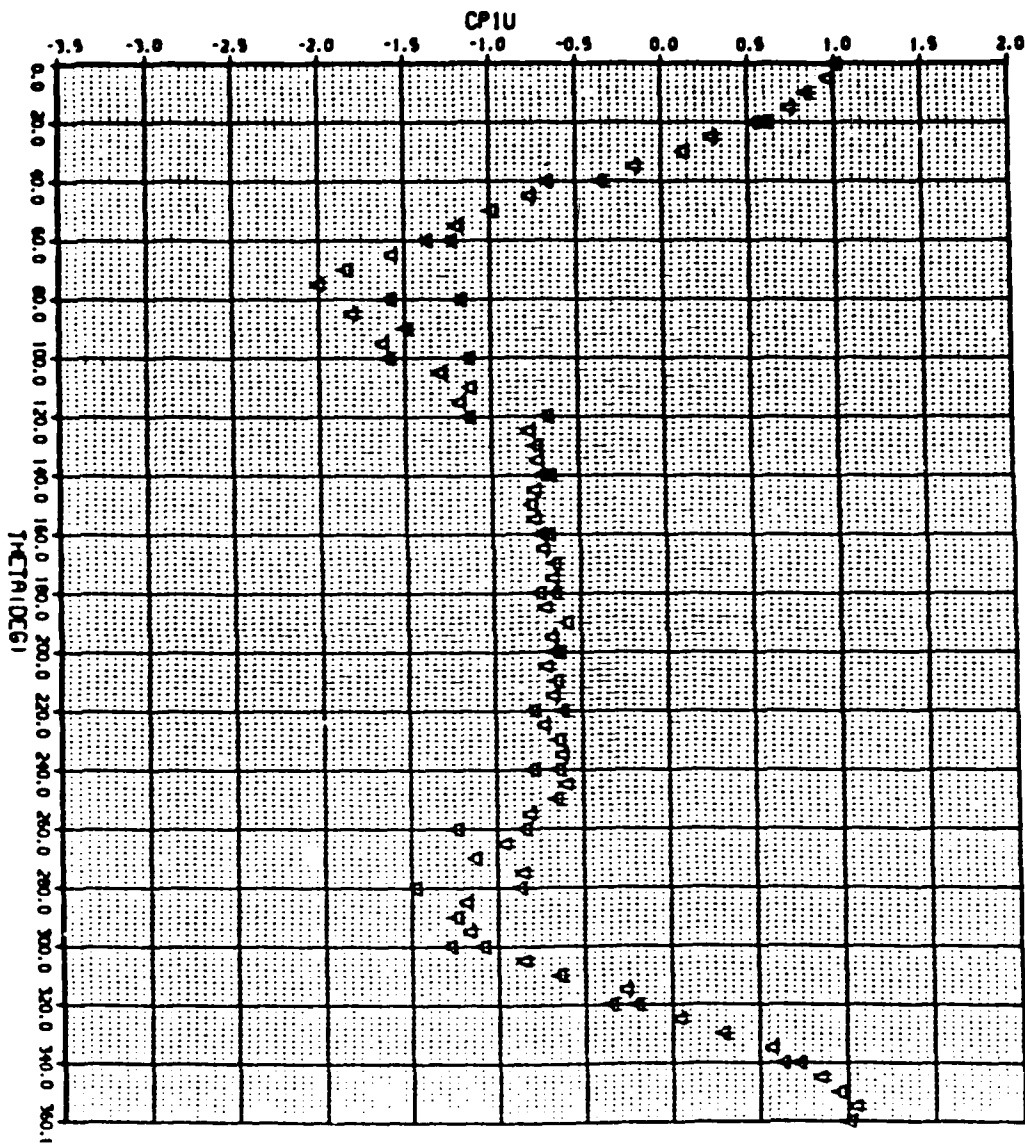
226.1.12 39.00: 5.00 DUNC PRESS. COEFFICIENTS CL- 0.3610 CD- 0.7471 RND-0.402



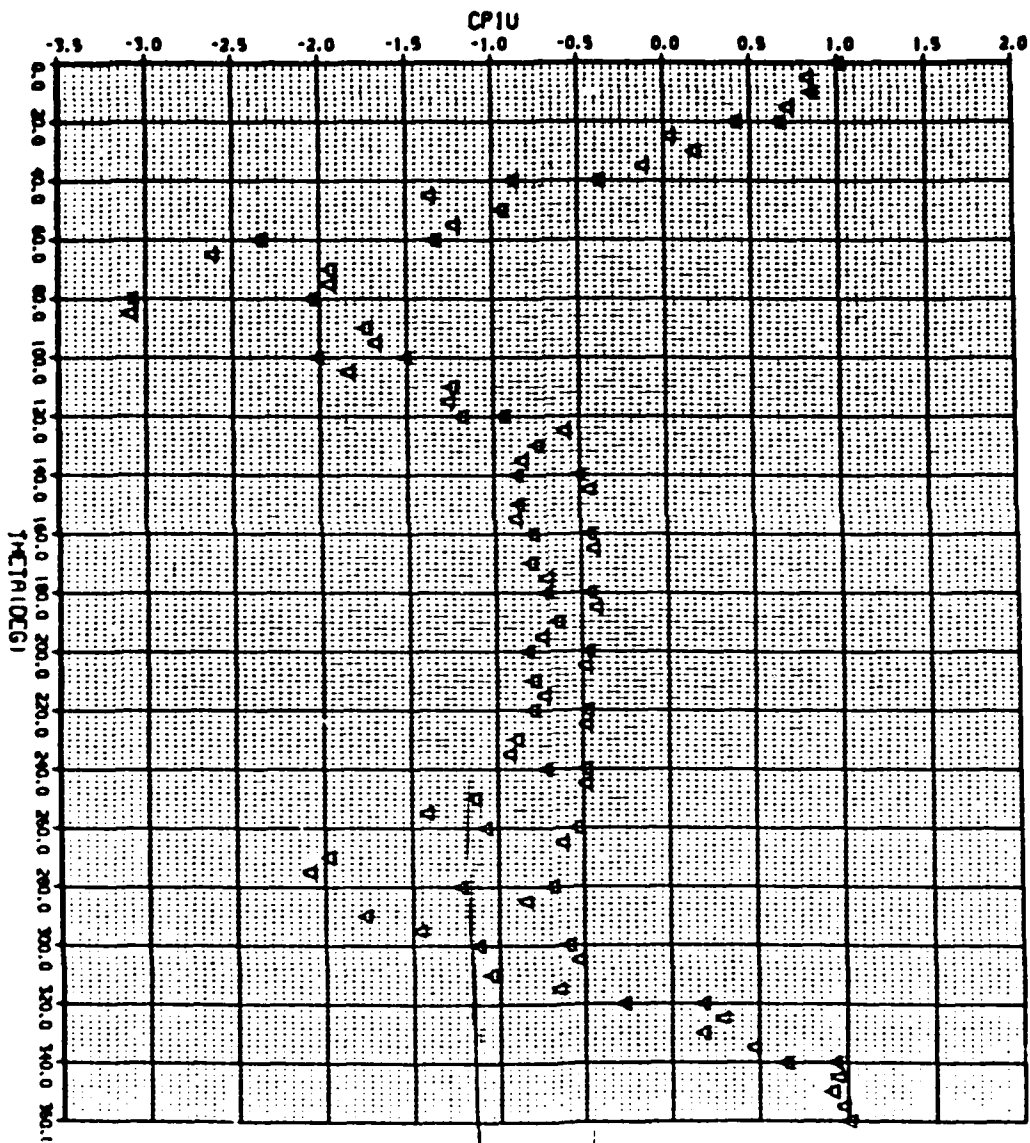
226.1,12 21.001 5.00 QUNC PRESS. COEFFICIENTS CL- 0.1350 CO- 0.8713 RND-0.408



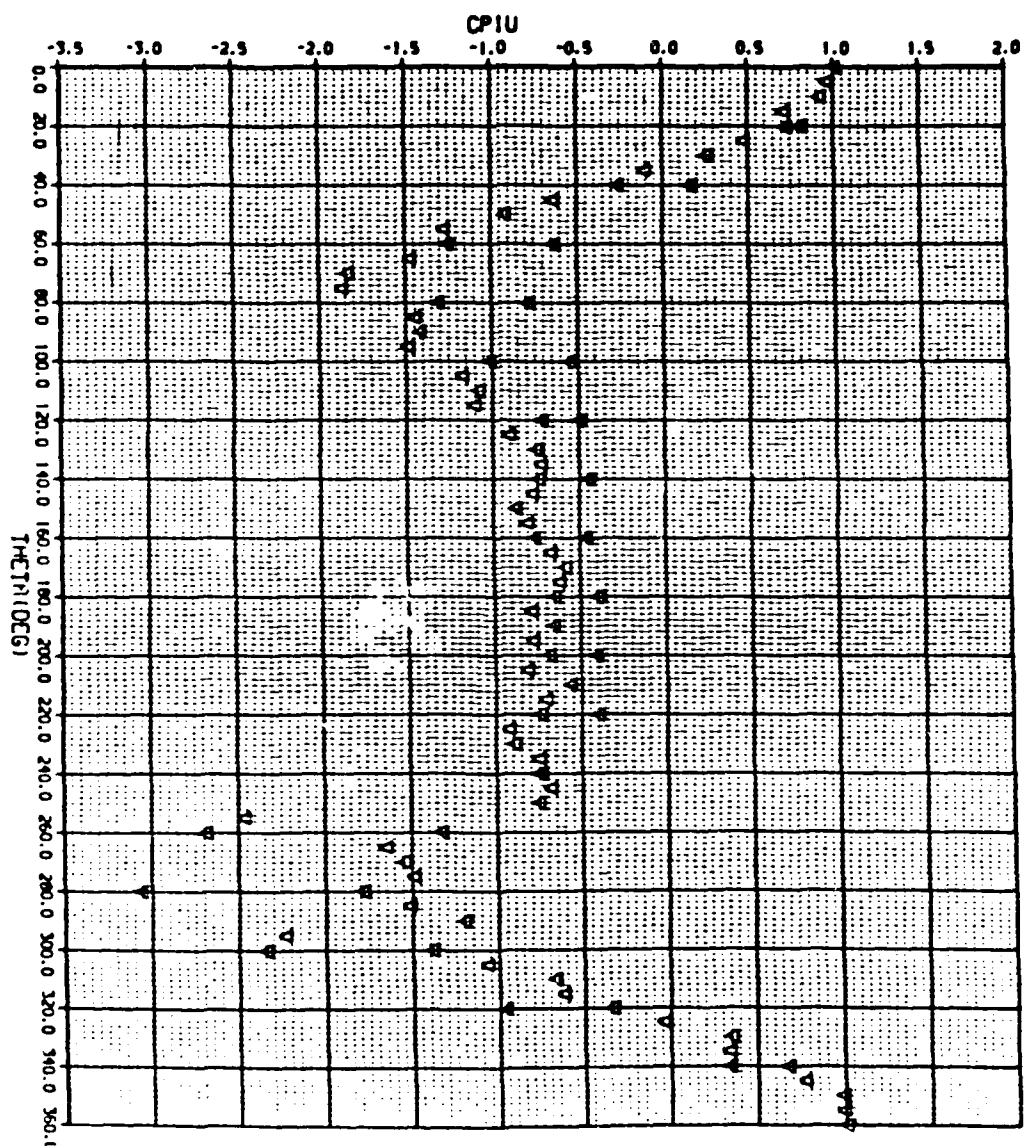
226,1,12 40.00 5.00 QMC PRESS. COEFFICIENTS CL- 0.3435 CO- 0.7291 RND-0.411



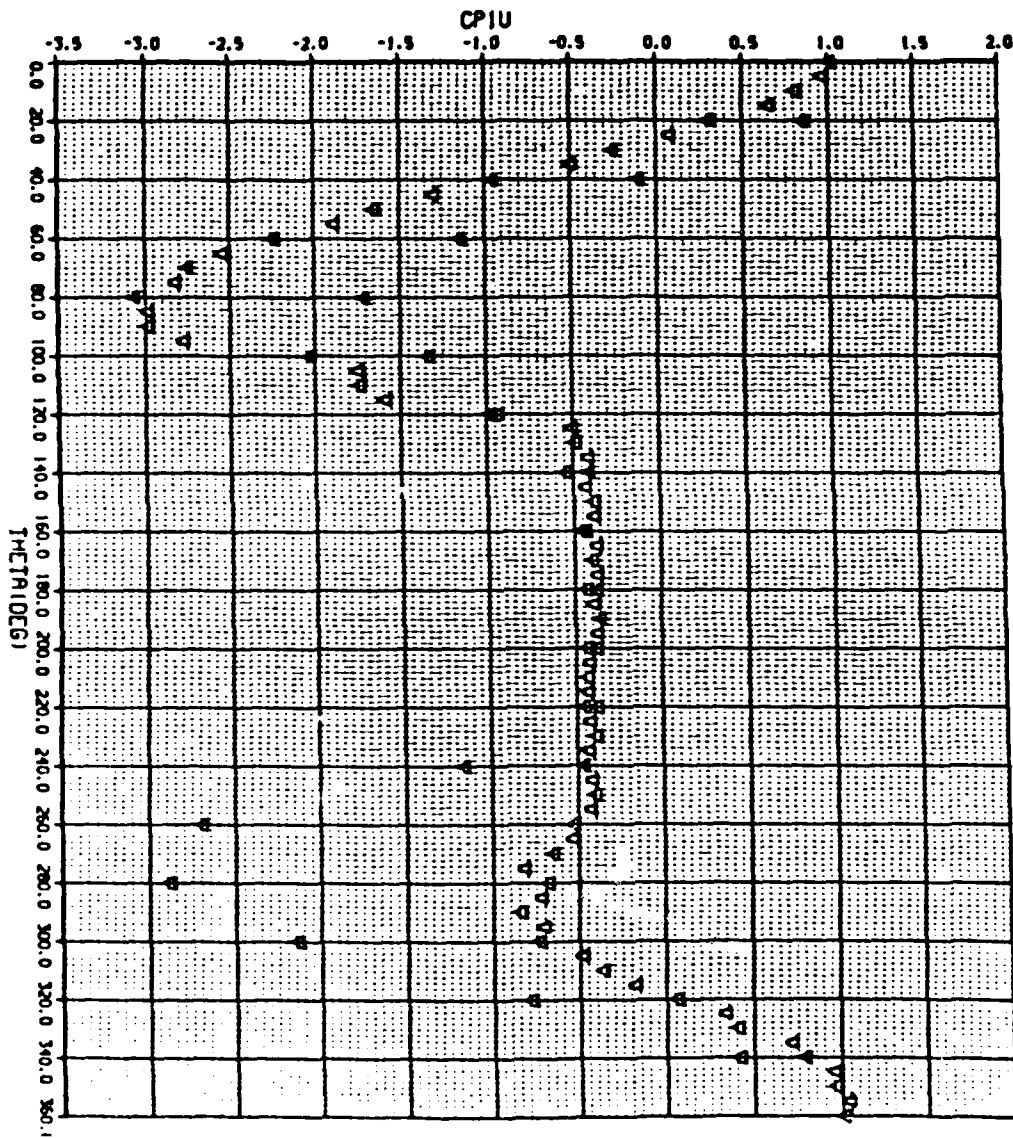
226,1,12 45.00: 5.00 QMC PRESS. COEFFICIENTS CL- 0.4760 CD- 0.6473 RND-0.422



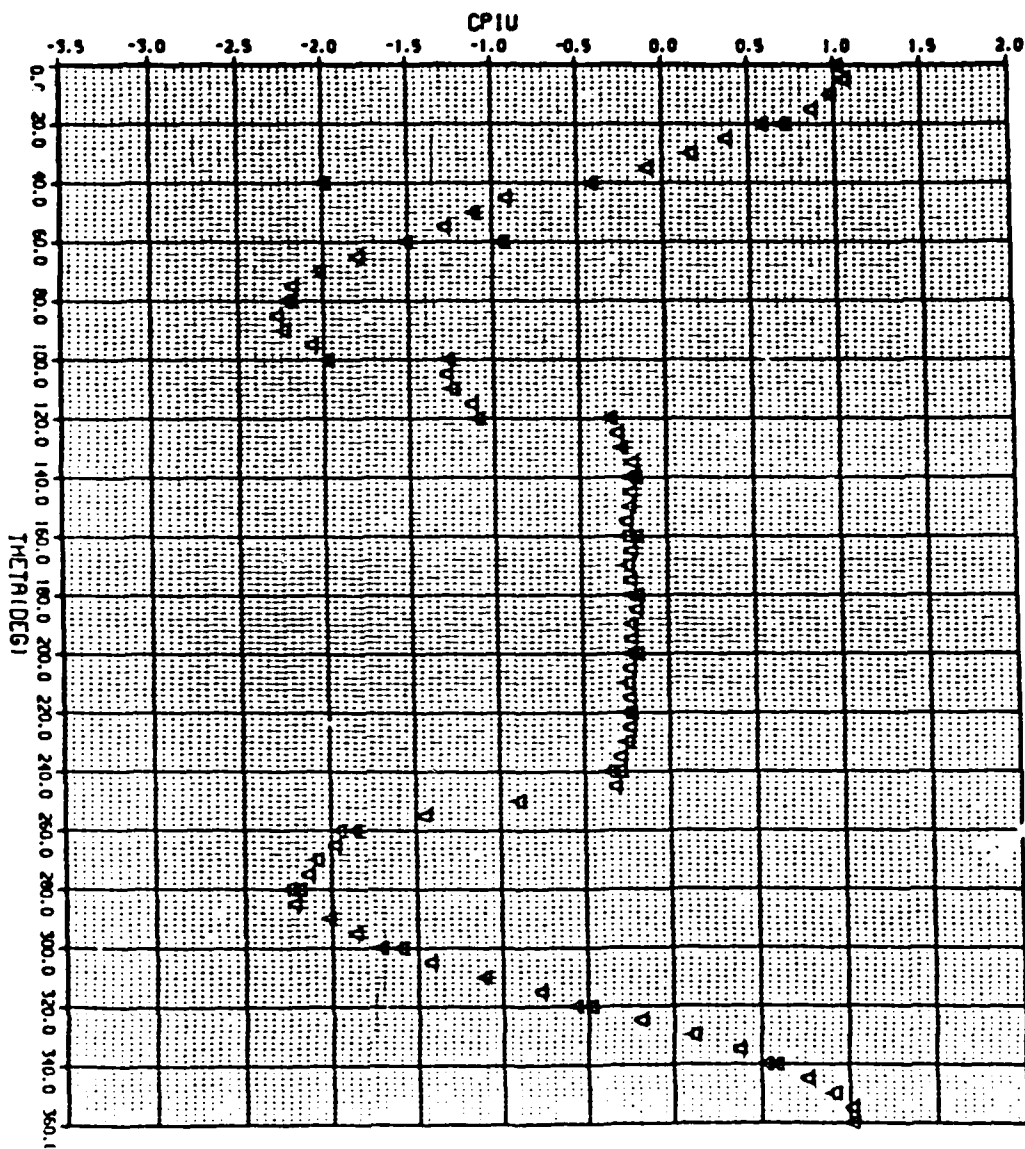
226,1,12 42.00 5.00 DMC PRESS. COEFFICIENTS CL--0.1810 CO- 0.7215 RND-0.426



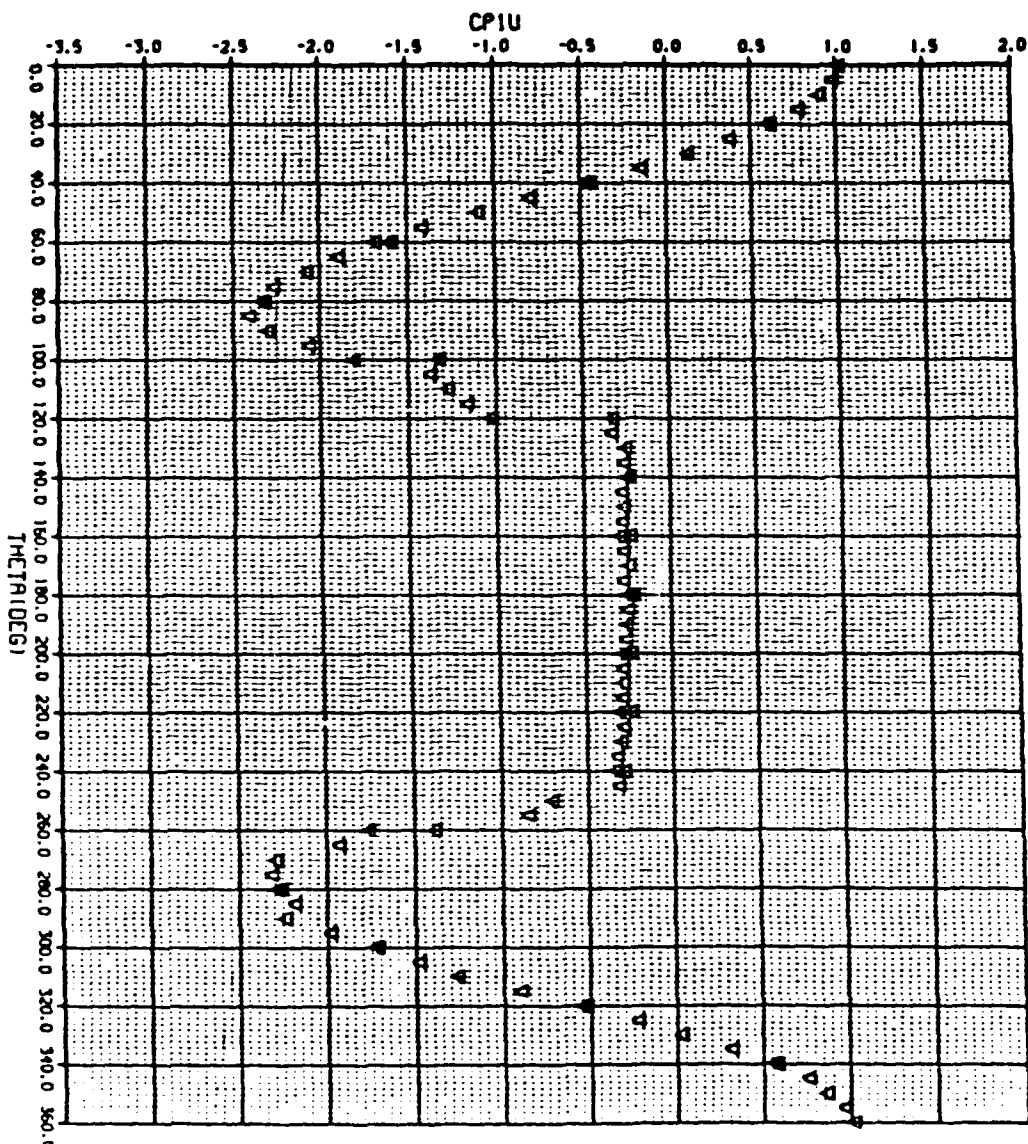
226.1, 12 43.00: 5.00 QMC PRESS. COEFFICIENTS CL- 0.9230 CD- 0.4224 RND-0.433



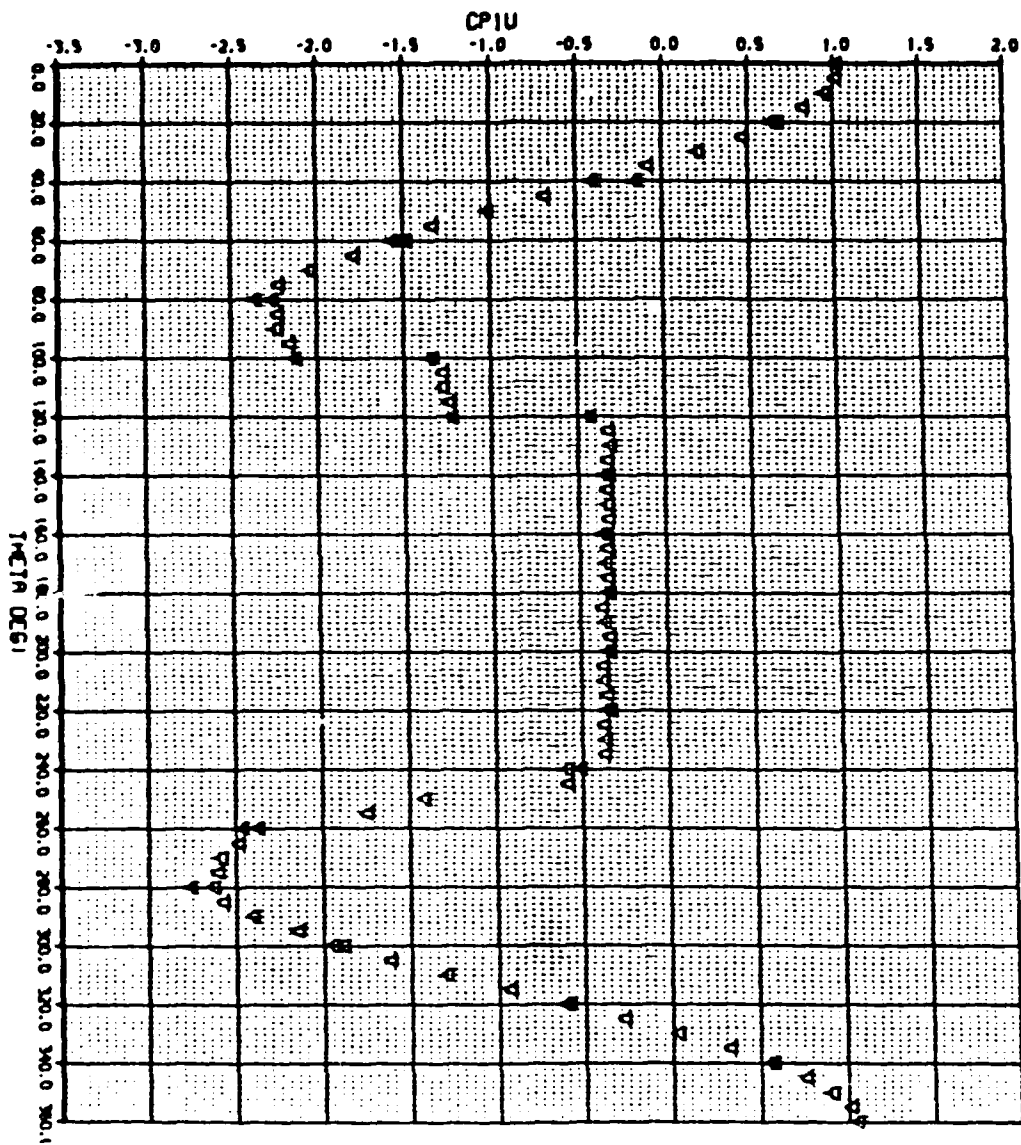
226.1,12 22.001 5.00 QAC PRESS. COEFFICIENTS CL- 0.0510 CD- 0.1755 RND-0.509



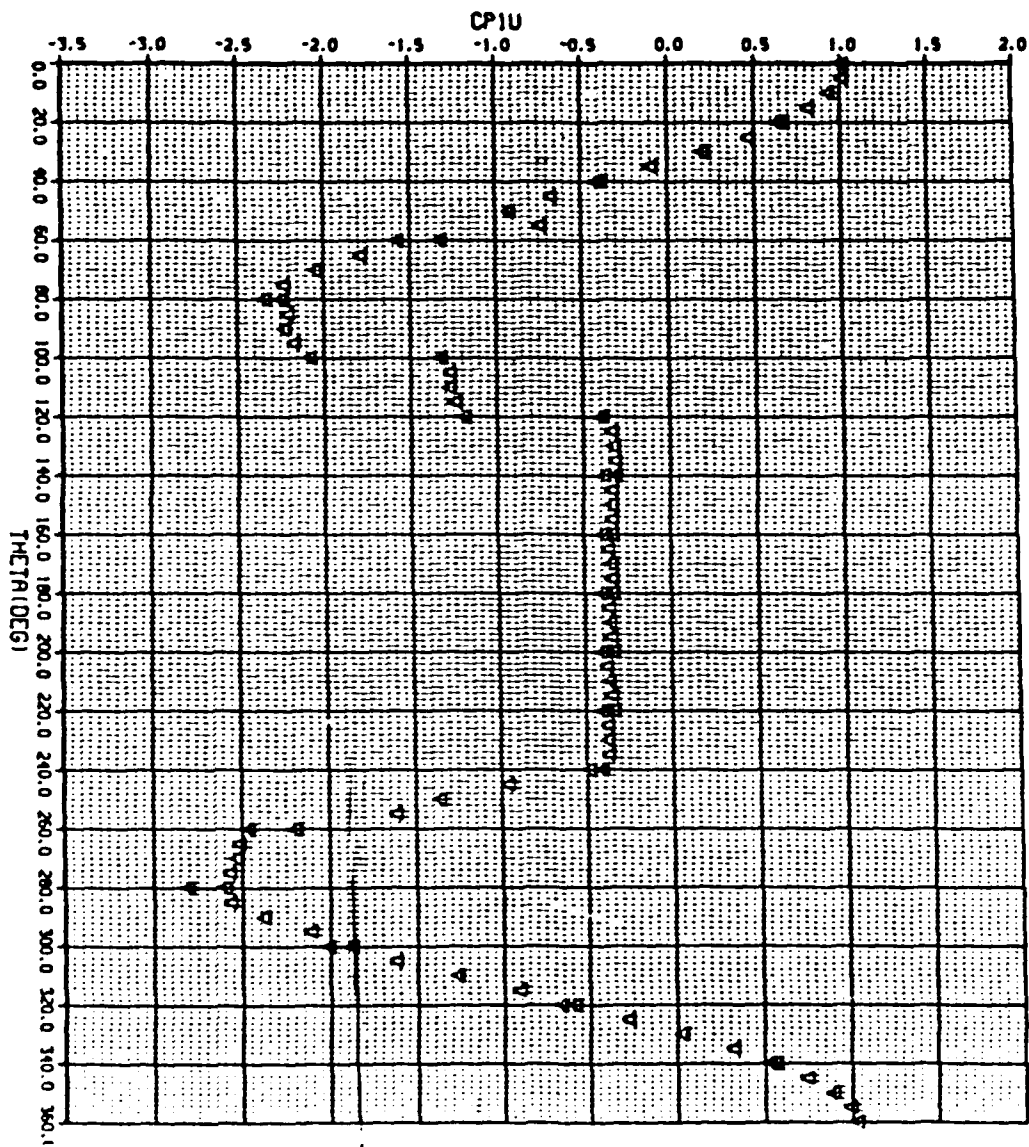
226,1,12 20.001 5.00 QMC PRESS. COEFFICIENTS CL- 0.0707 CD- 0.1742 RND-0.695



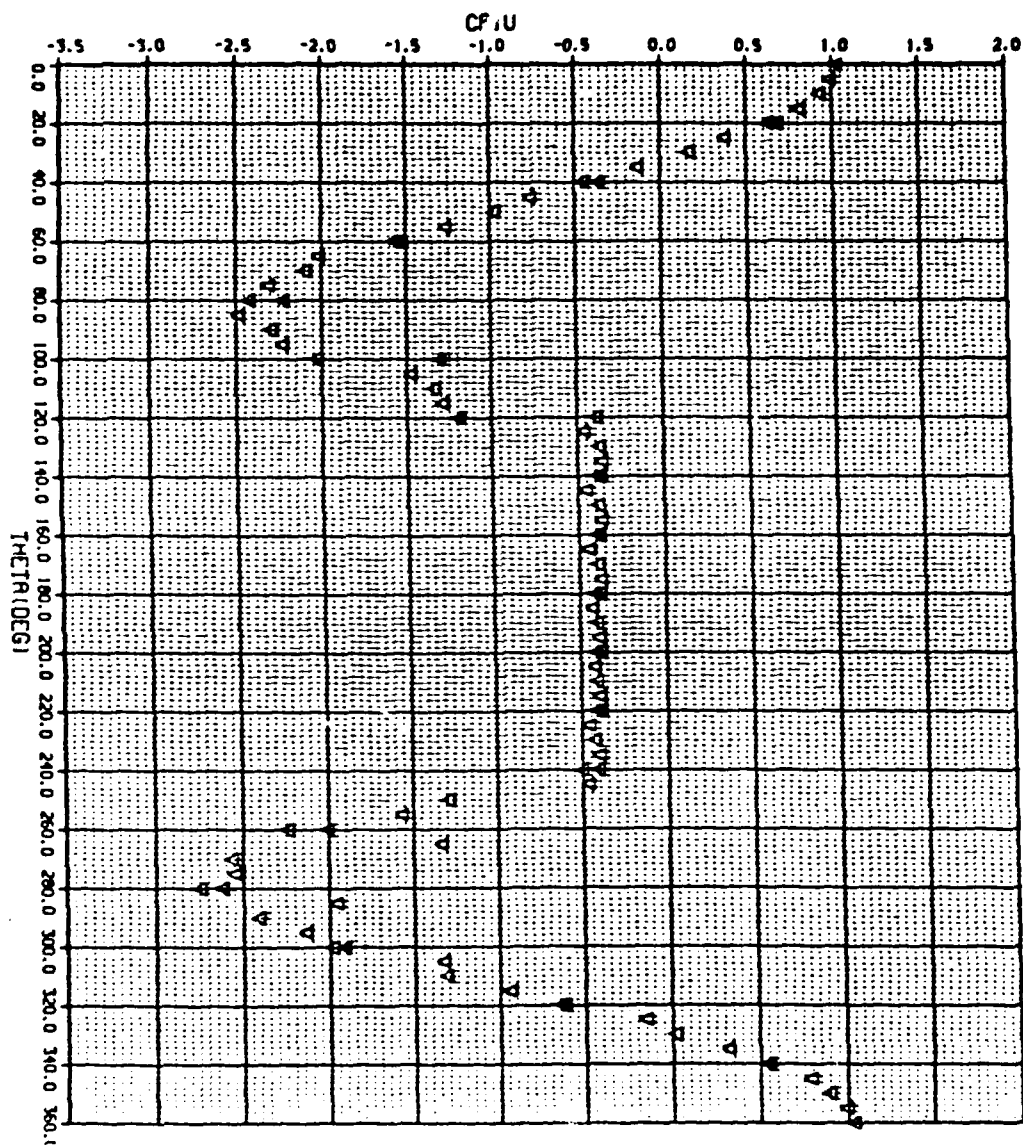
226,1,12 16.00: 5.00 QMC PRESS. COEFFICIENTS CL--0.1956 CO- 0.2943 RND-1.266



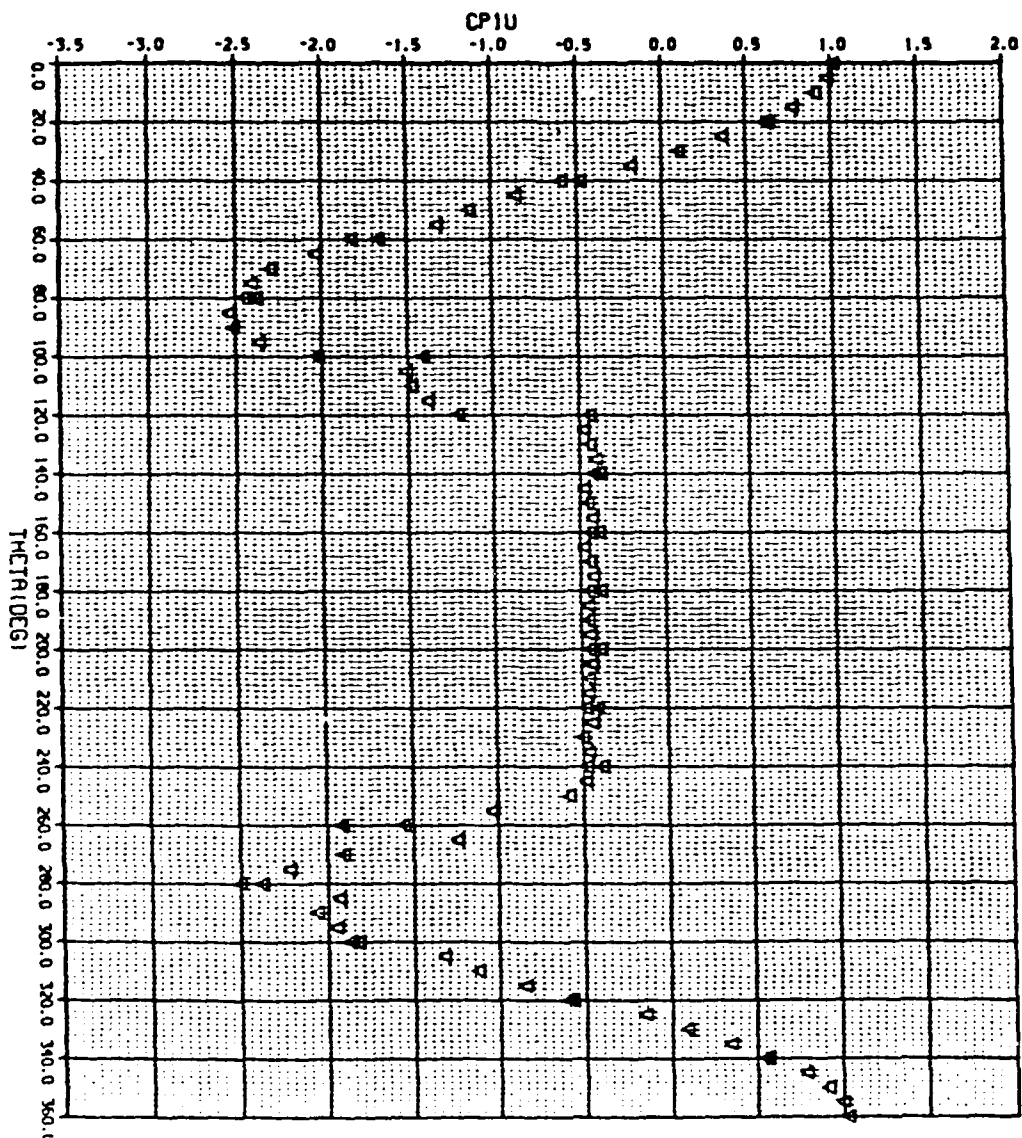
226,1,12 15.00: 5.00 QAC PRESS. COEFFICIENTS CL=-0.2180 CD- 0.3115 RND-1.512



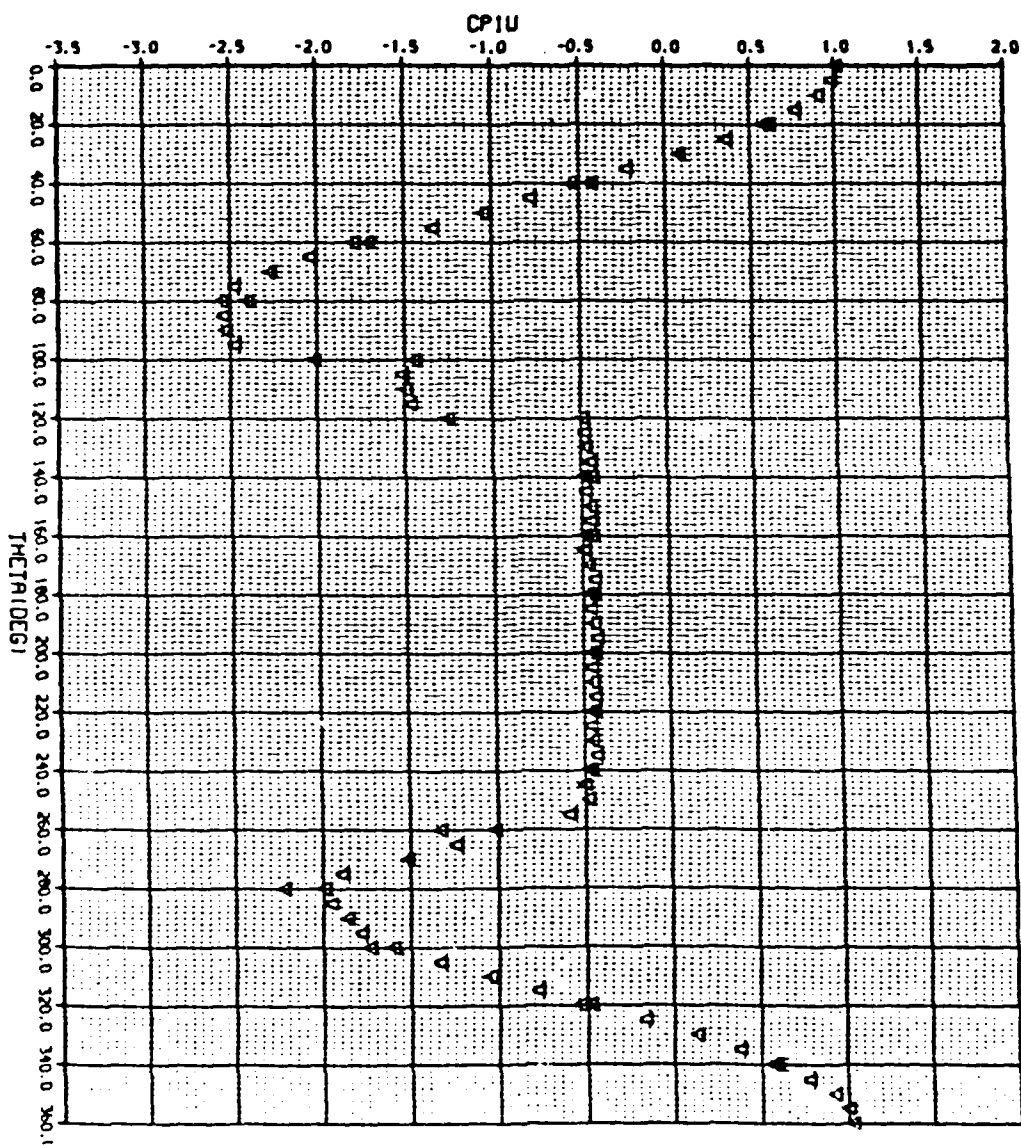
226,1,12 14.00: 5.00 QUNC PRESS. COEFFICIENTS CL=-0.0205 CD=0.3221 RND=1.085



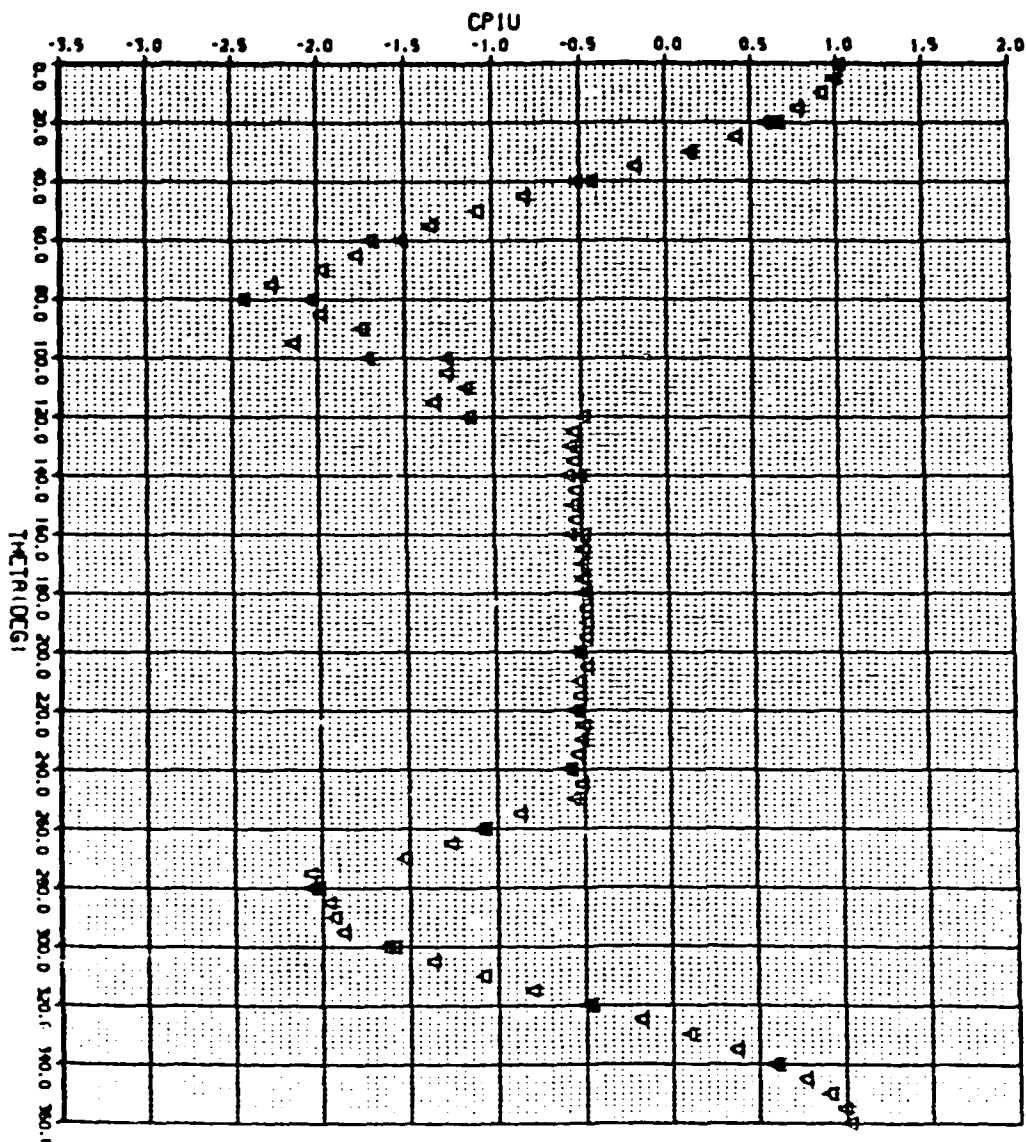
226,1,12 13.001 5.00 QMC PRESS. COEFFICIENTS CL- 0.2163 CD- 0.3428 RND-2.520



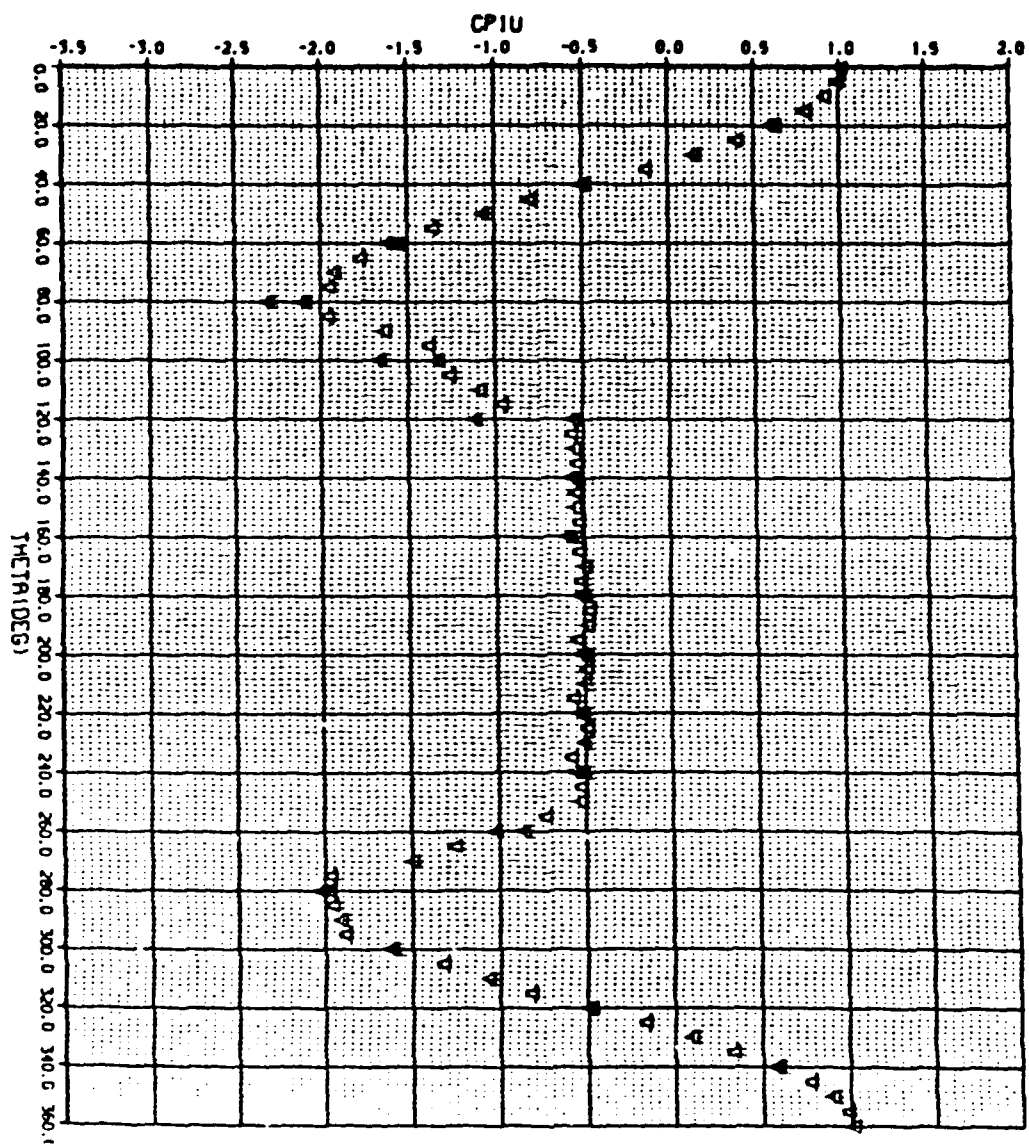
226,1,12 12.00: 5.00 QMC PRESS. COEFFICIENTS CL- 0.3584 CO- 0.3668 RND-2.971



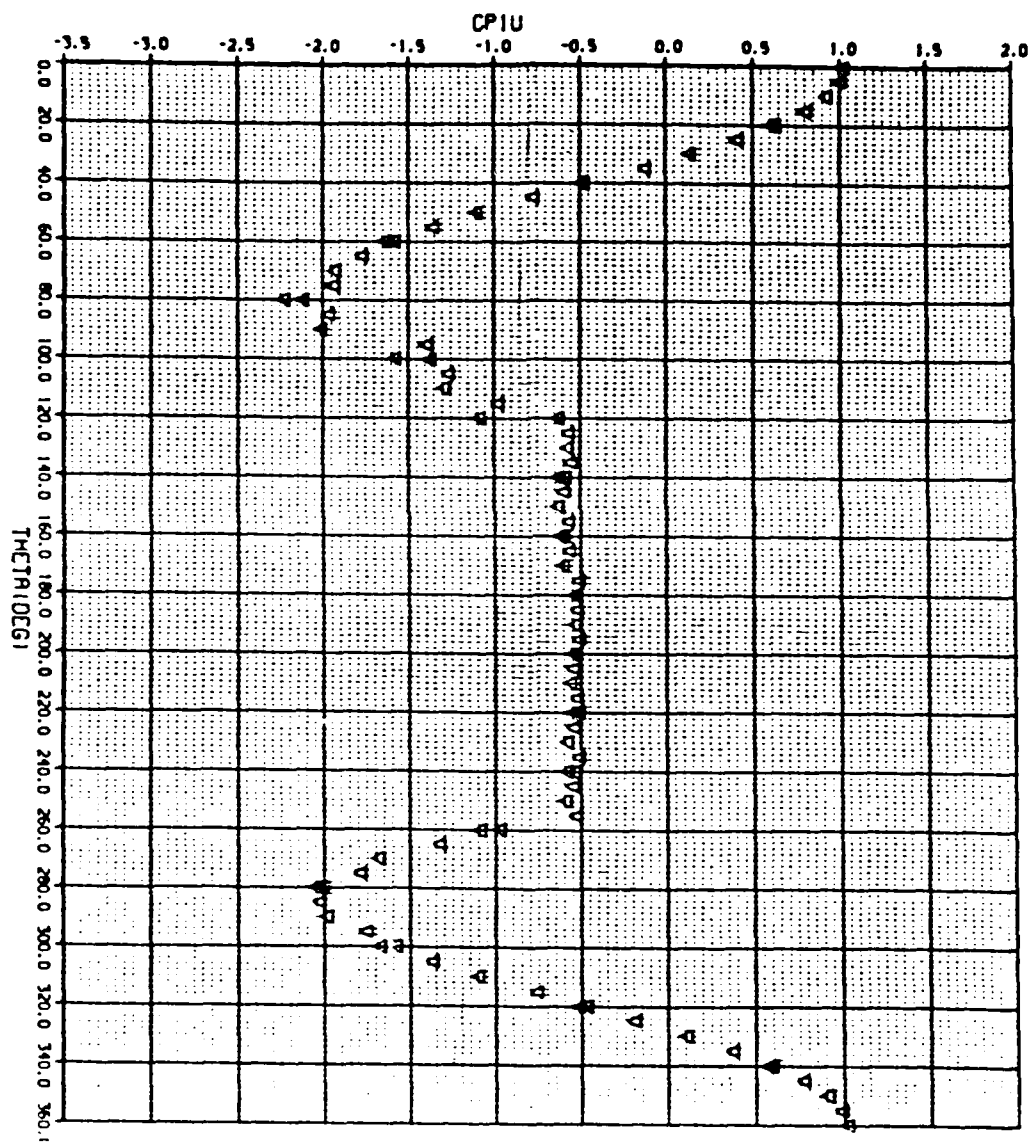
226,1,12 9.00: 5.00 DMC PRESS. COEFFICIENTS CL- 0.1644 CD- 0.4300 RND-3.926



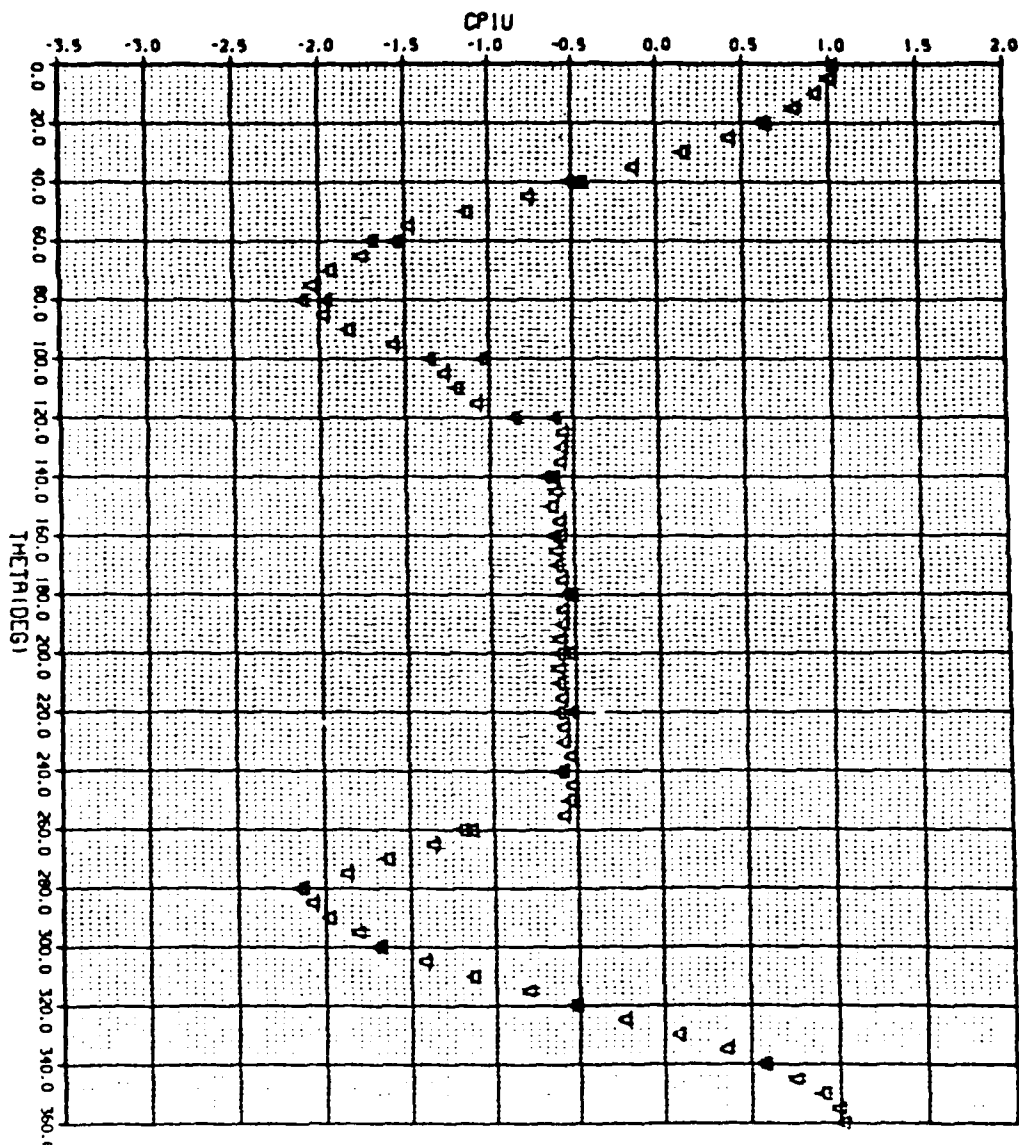
226.1,12 8.001 5.00 DUNC PRESS. COEFFICIENTS CL- 0.1136 CD- 0.4310 RND-4.919



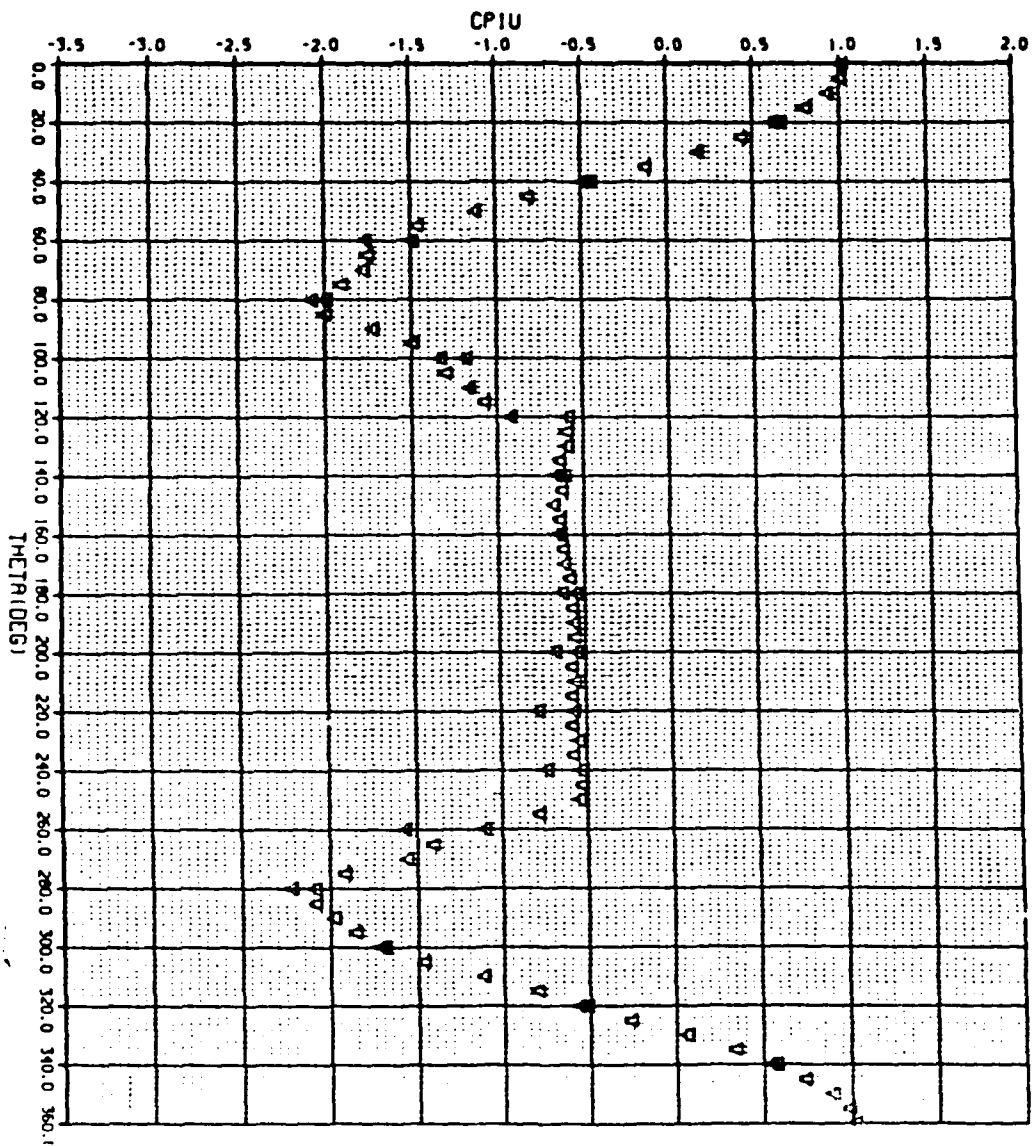
226.1,12 7.001 5.00 QUNC PRESS. COEFFICIENTS CL- 0.1371 CD- 0.4633 RND-5.873



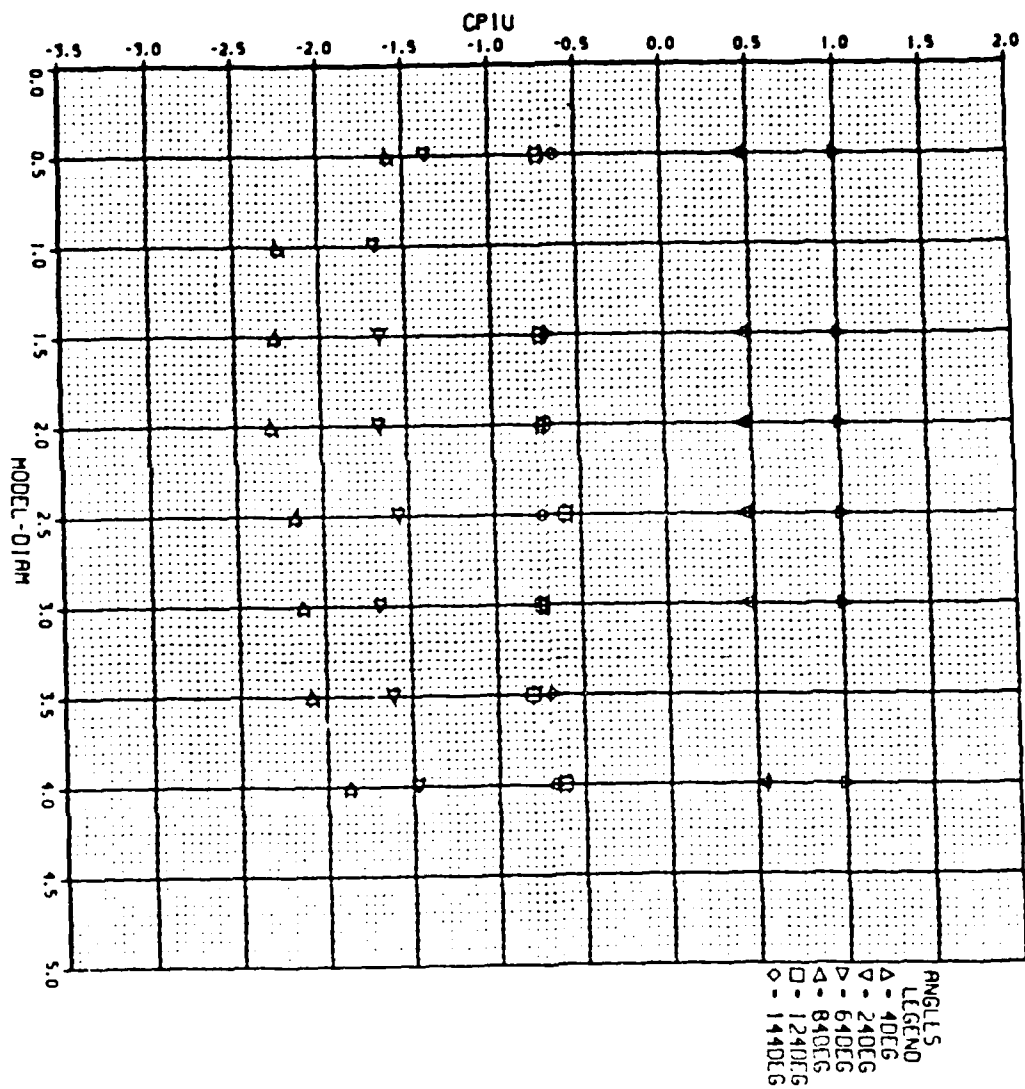
6.00: 5.00 DUNC PRESS. COEFFICIENTS CL- 0.0914 CO- 0.4735 RND-6.726



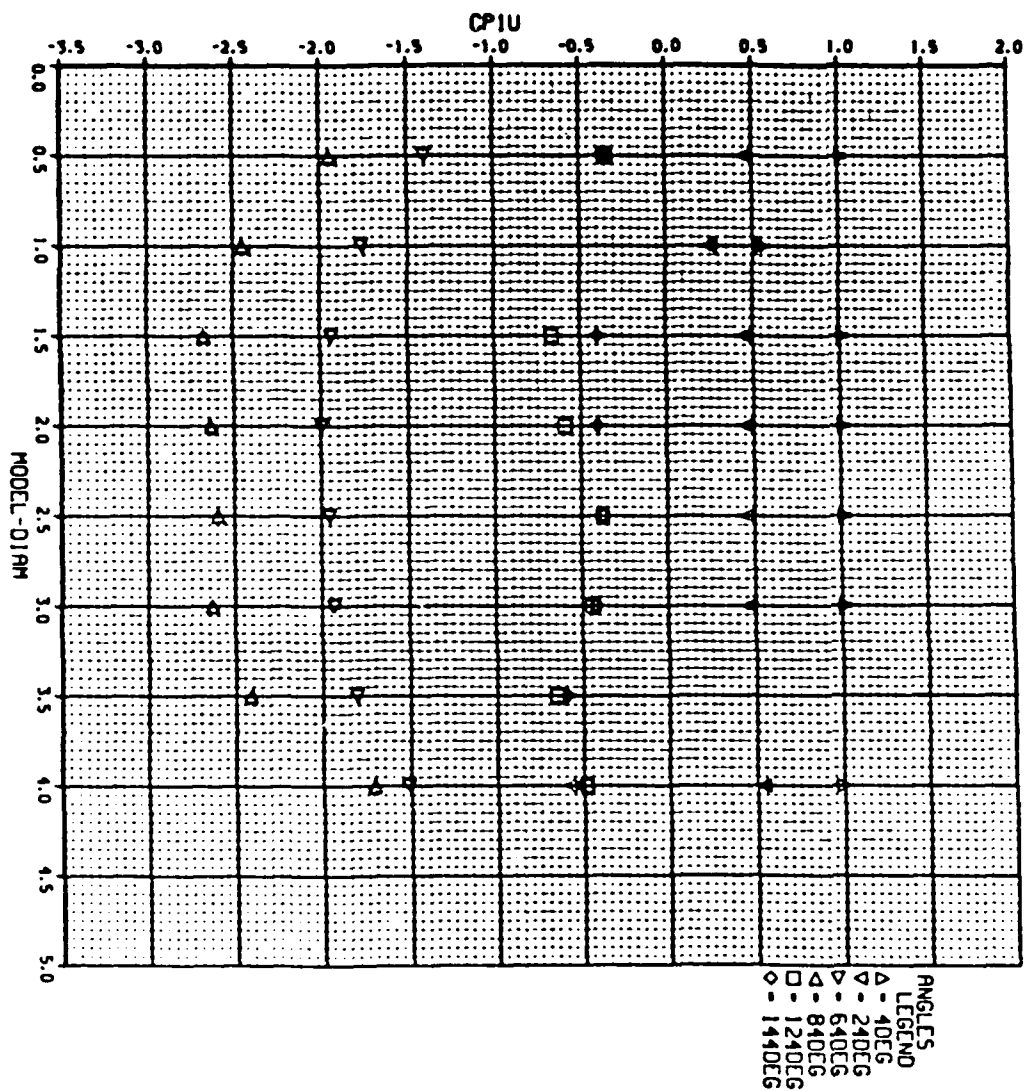
226,1,12 5.00: 5.00 QUNC PRESS. COEFFICIENTS CL- 0.0518 CD- 0.4930 RND-7.683



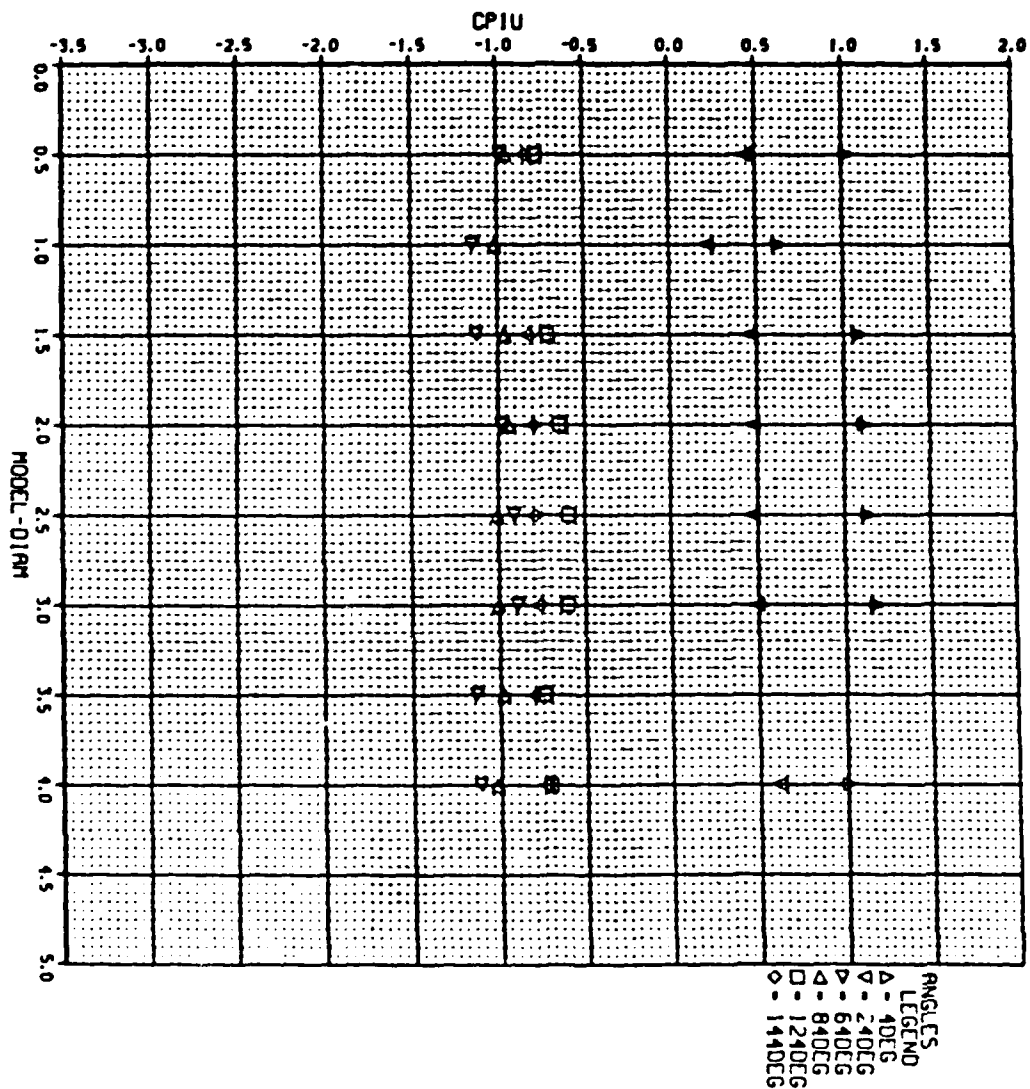
226,1,12 5.00, 5.00 LONGITUDINAL PRESSURE COEFFICIENTS



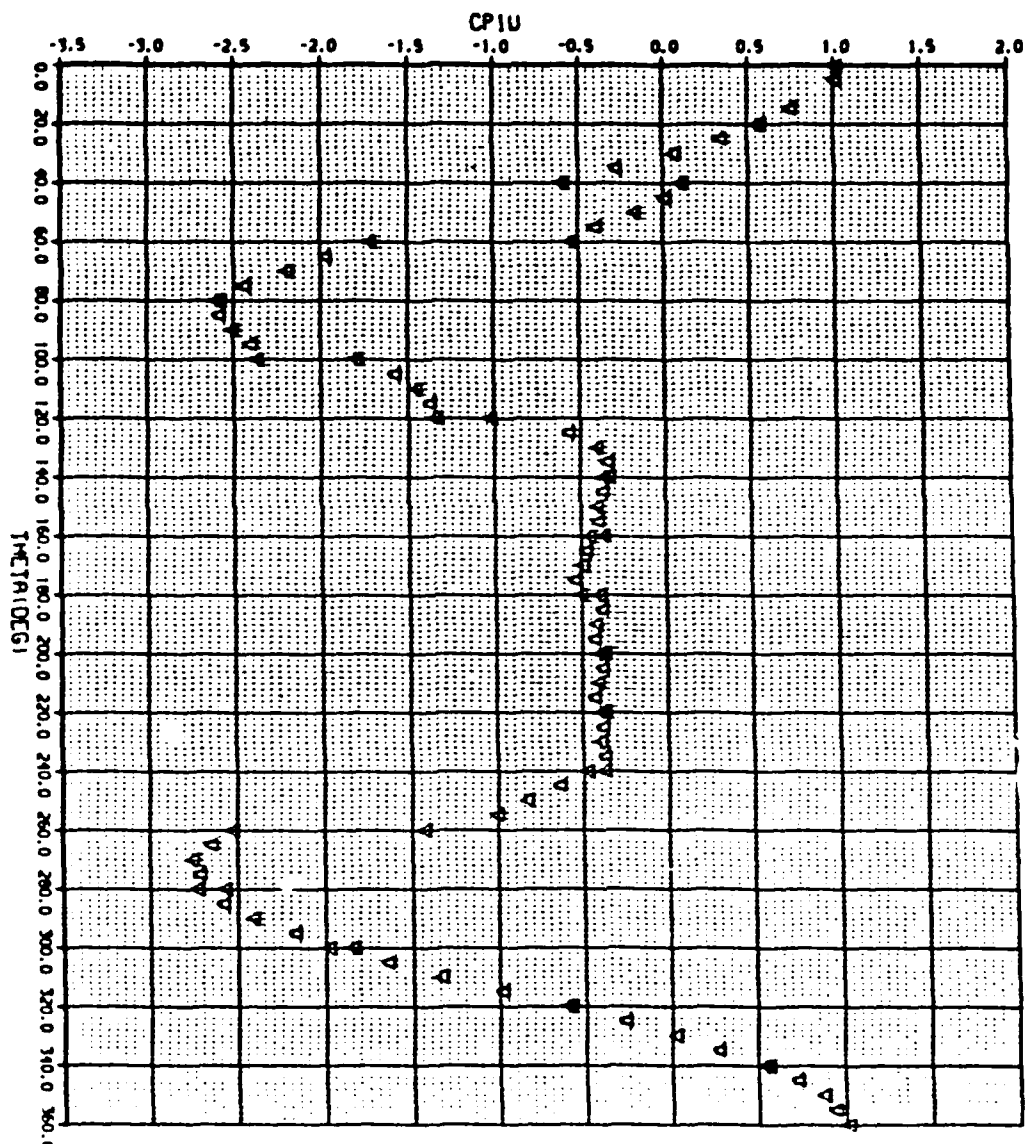
226,1,12 14.001 5.00 LONGITUDINAL PRESSURE COEFFICIENTS



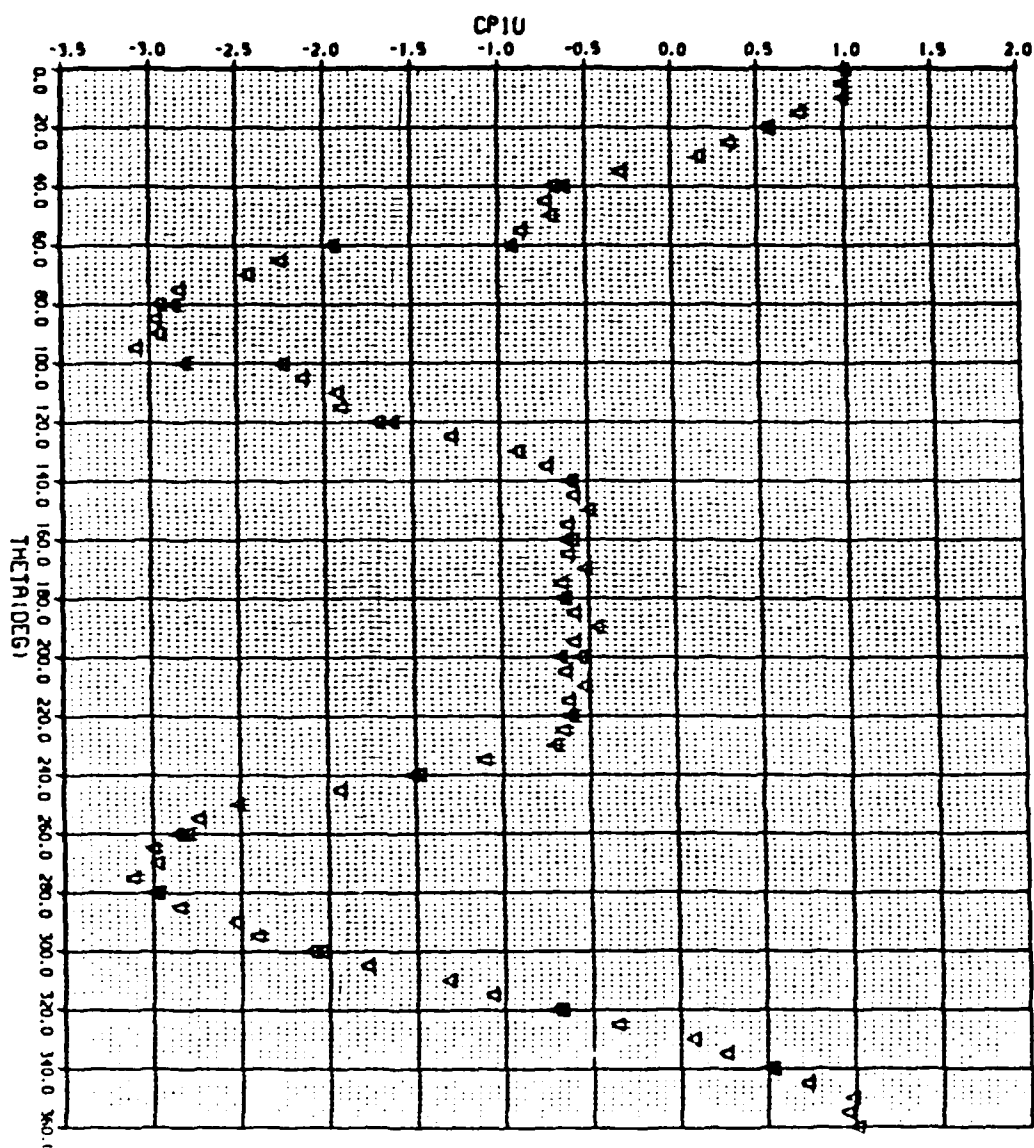
226,1,12 21.00 5.00 LONGITUDINAL PRESSURE COEFFICIENTS



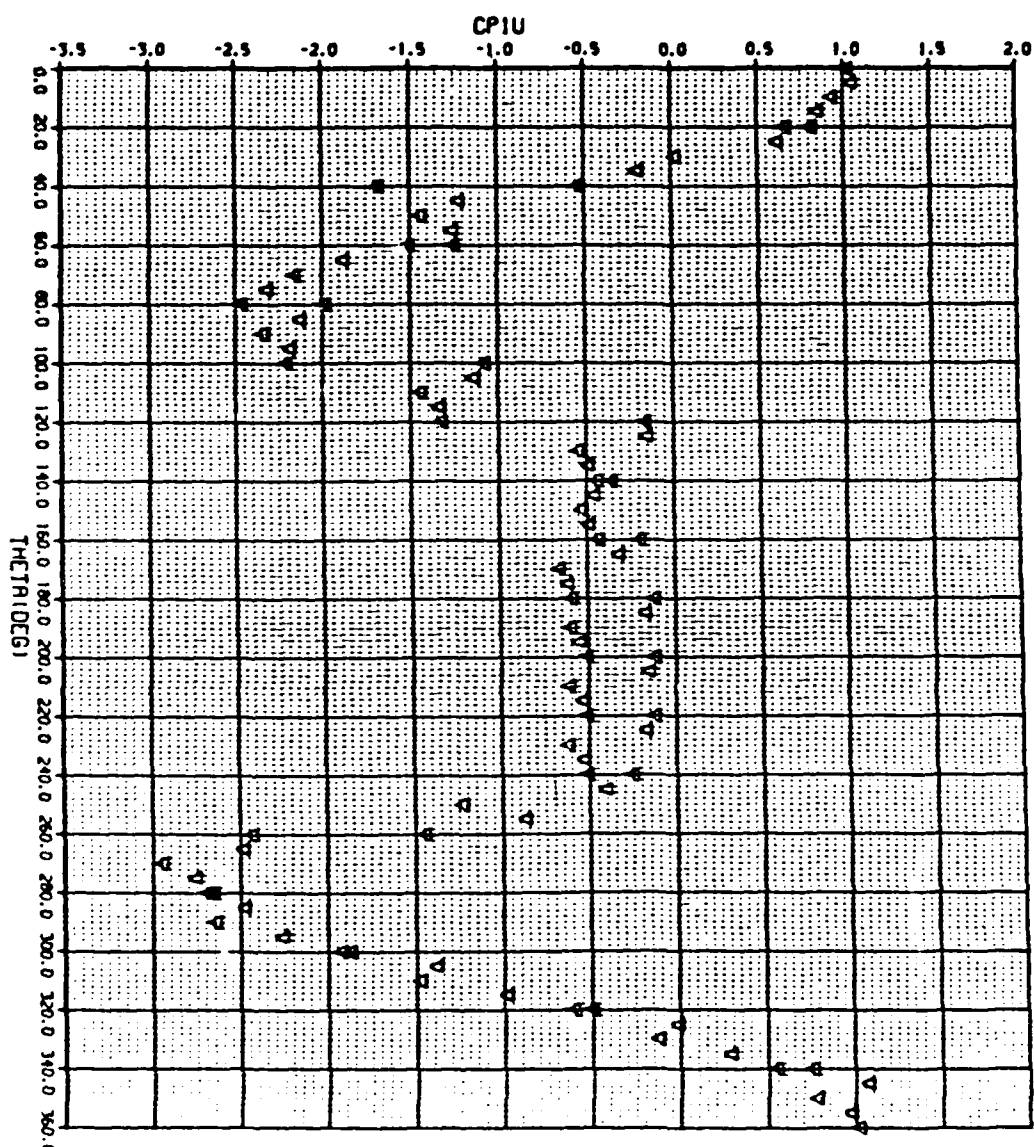
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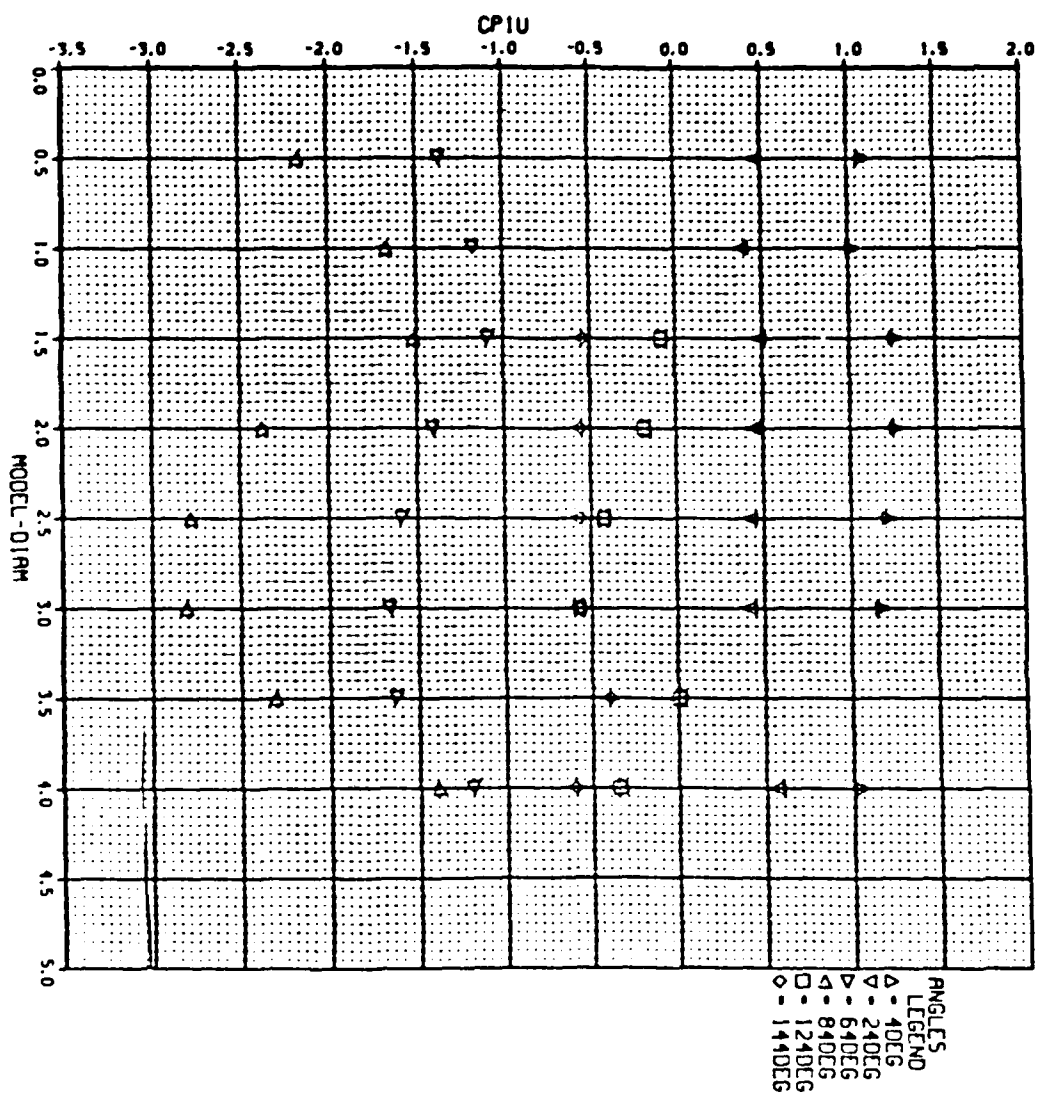
226,2,12 189.001 5.00 DMC PRESS. COEFFICIENTS CL--0.1571 CD- 0.6067 RND-0.515



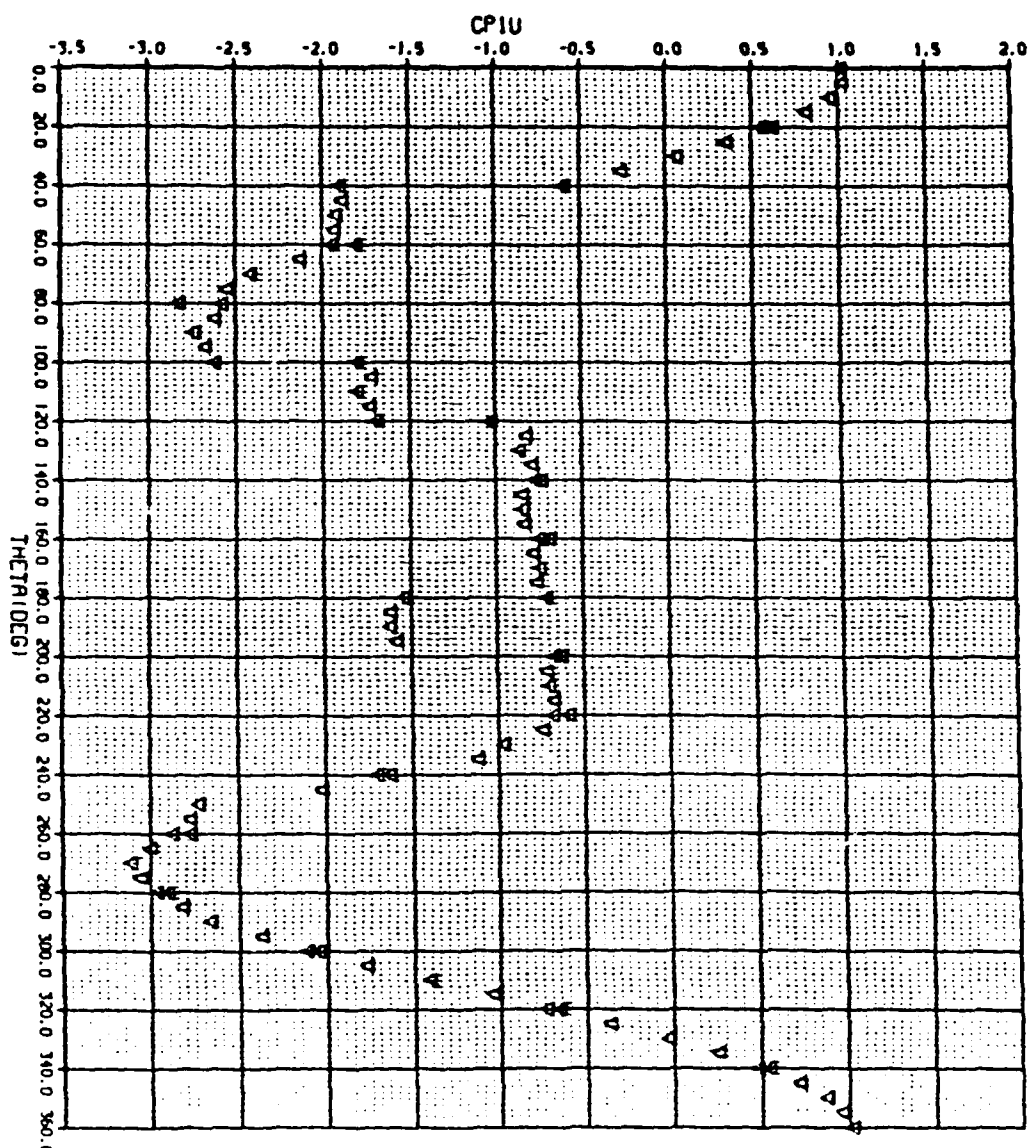
226,2,12 172.00, 5.00 QMC PRESS. COEFFICIENTS CL=-0.0737 CO= 0.2957 RND=0.503



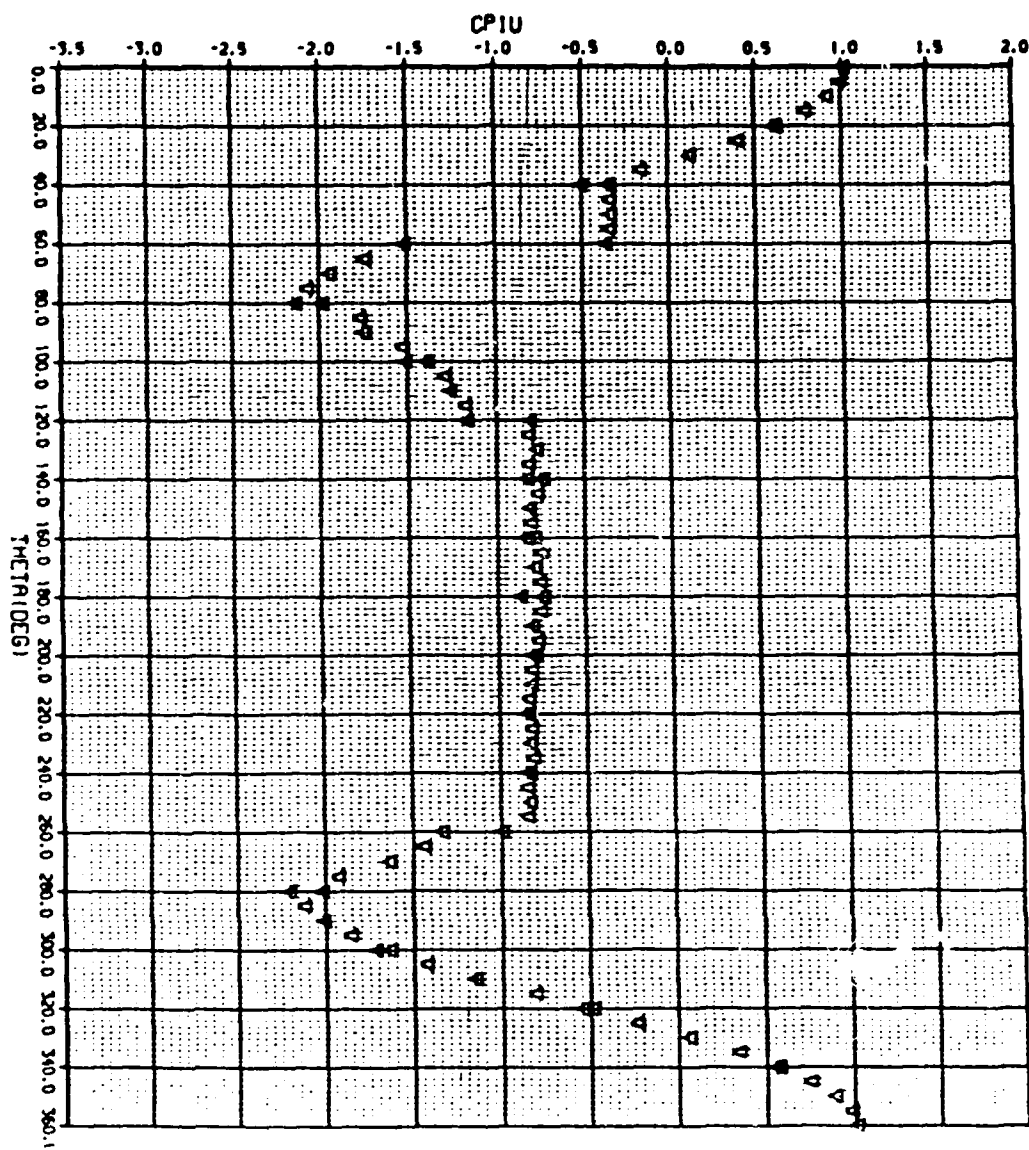
226.2.12 172.00: 5.00 LONGITUDINAL PRESSURE COEFFICIENTS



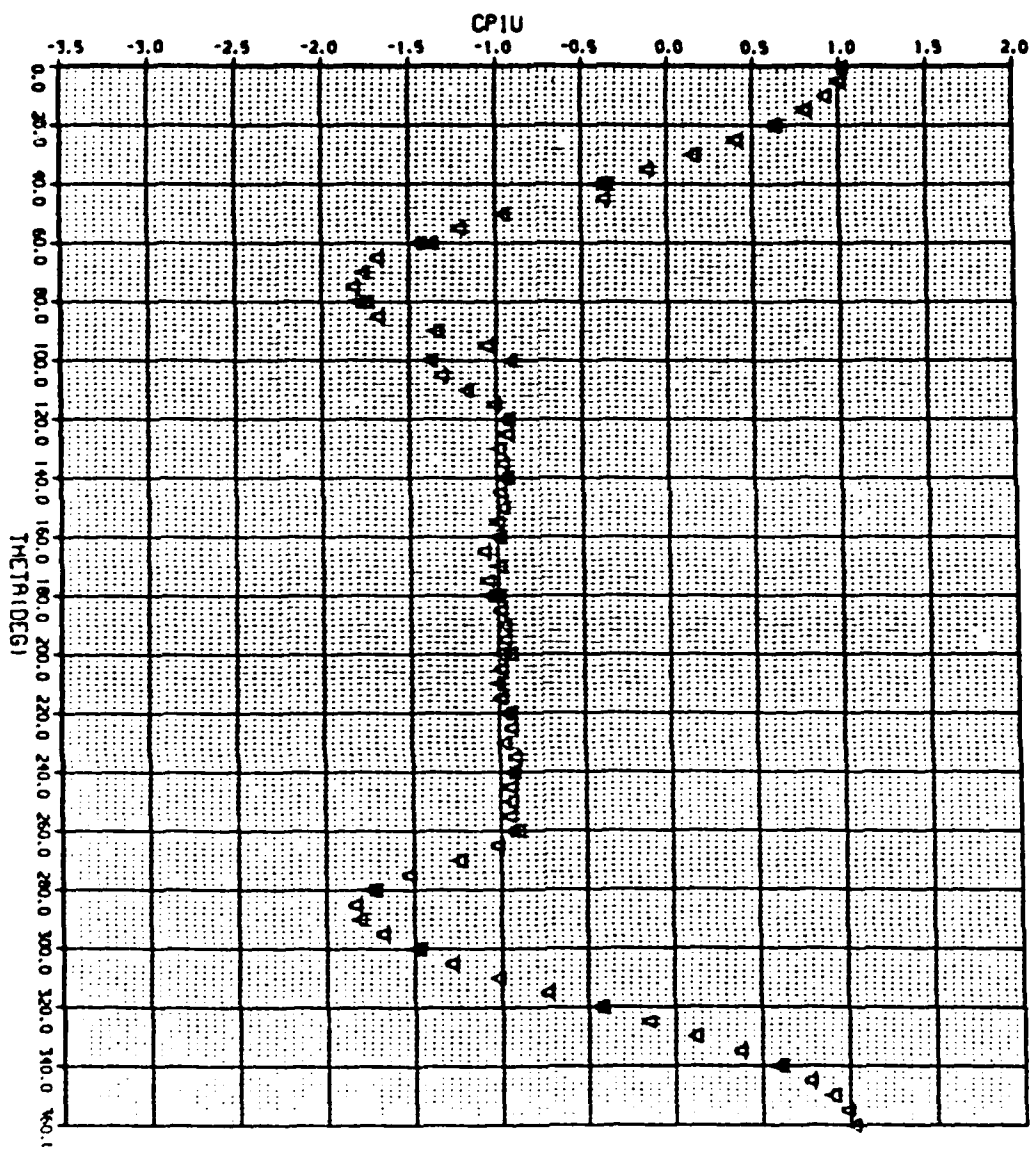
226,2.12 192.00: 5.00 QMC PRESS. COEFFICIENTS CL--0.1900 CD- 0.7011 RND-0.649



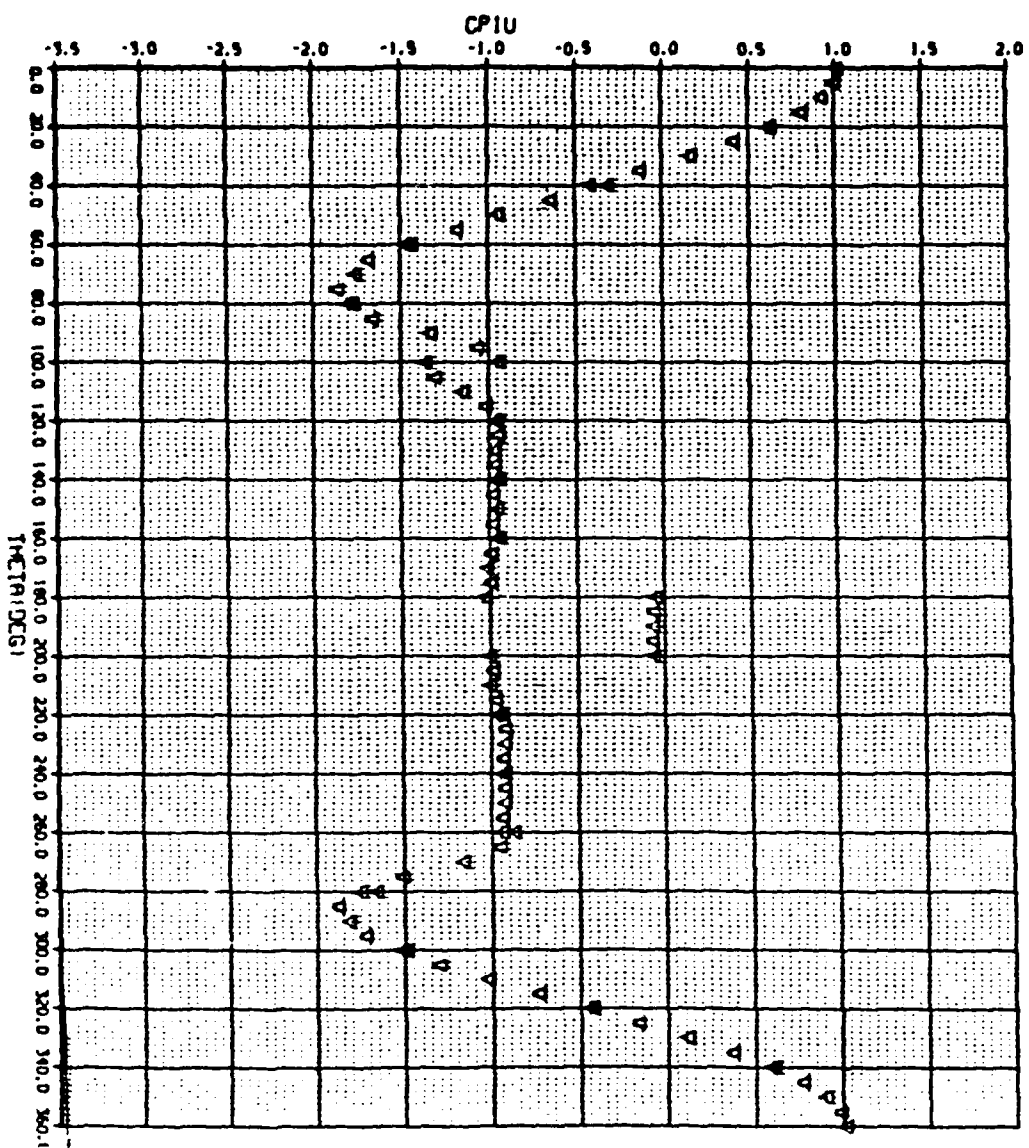
226.2,12 199.00: 5.00 QUNC PRESS. COEFFICIENTS CL=-0.0626 CD= 0.7516 RND=1.533



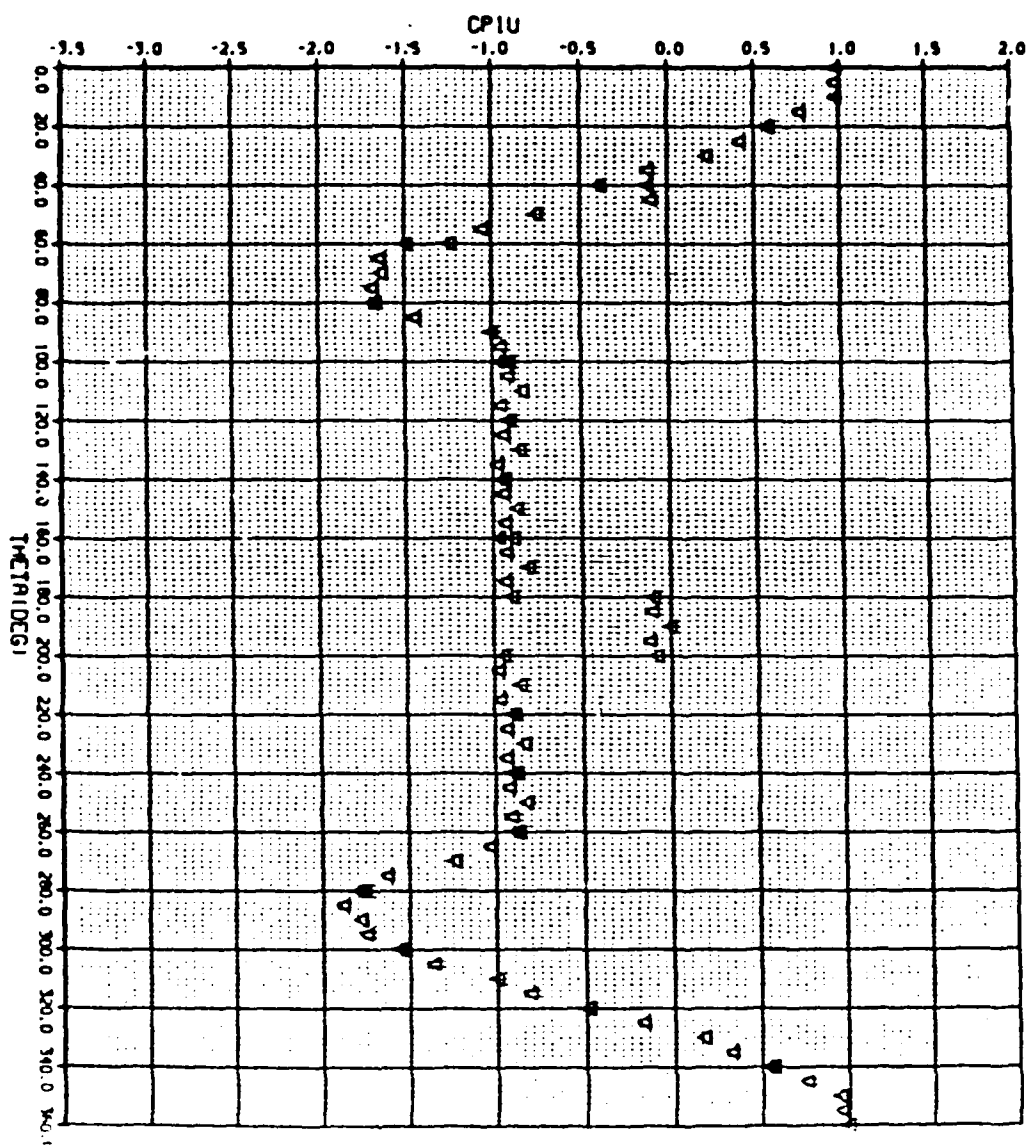
226,2,12 202.00: 5.00 DMC PRESS. COEFFICIENTS CL= 0.0271 CD= 0.9097 RND=3.121



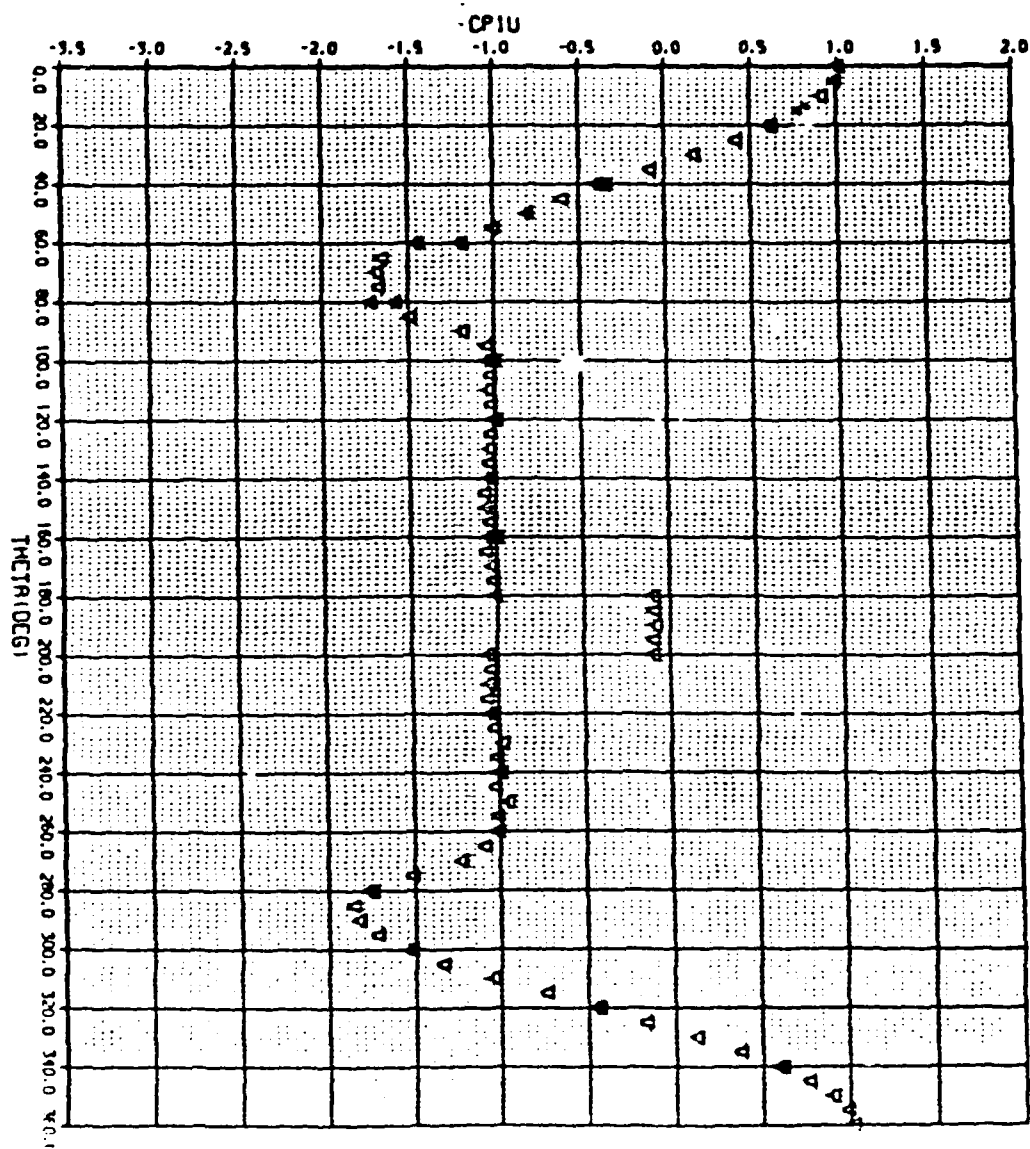
226.2.12 205.00: 5.00 QUNC PRESS. COEFFICIENTS CL- 0.0682 CO- 0.7293 RND-6.182



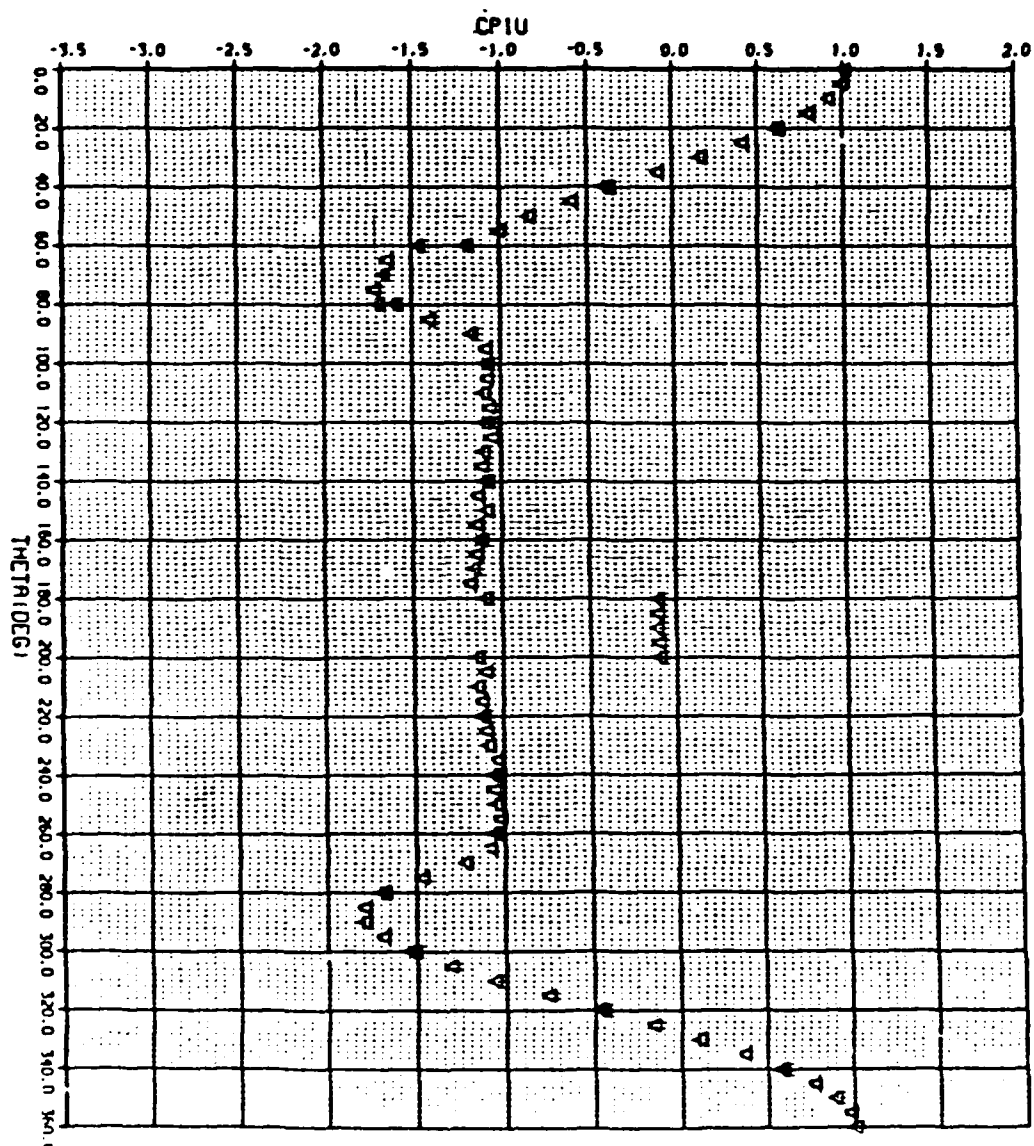
226,2,12 226.001 5.00 QUAC PRESS. COEFFICIENTS CL=-0.0717 CD= 0.7036 RND=0.444



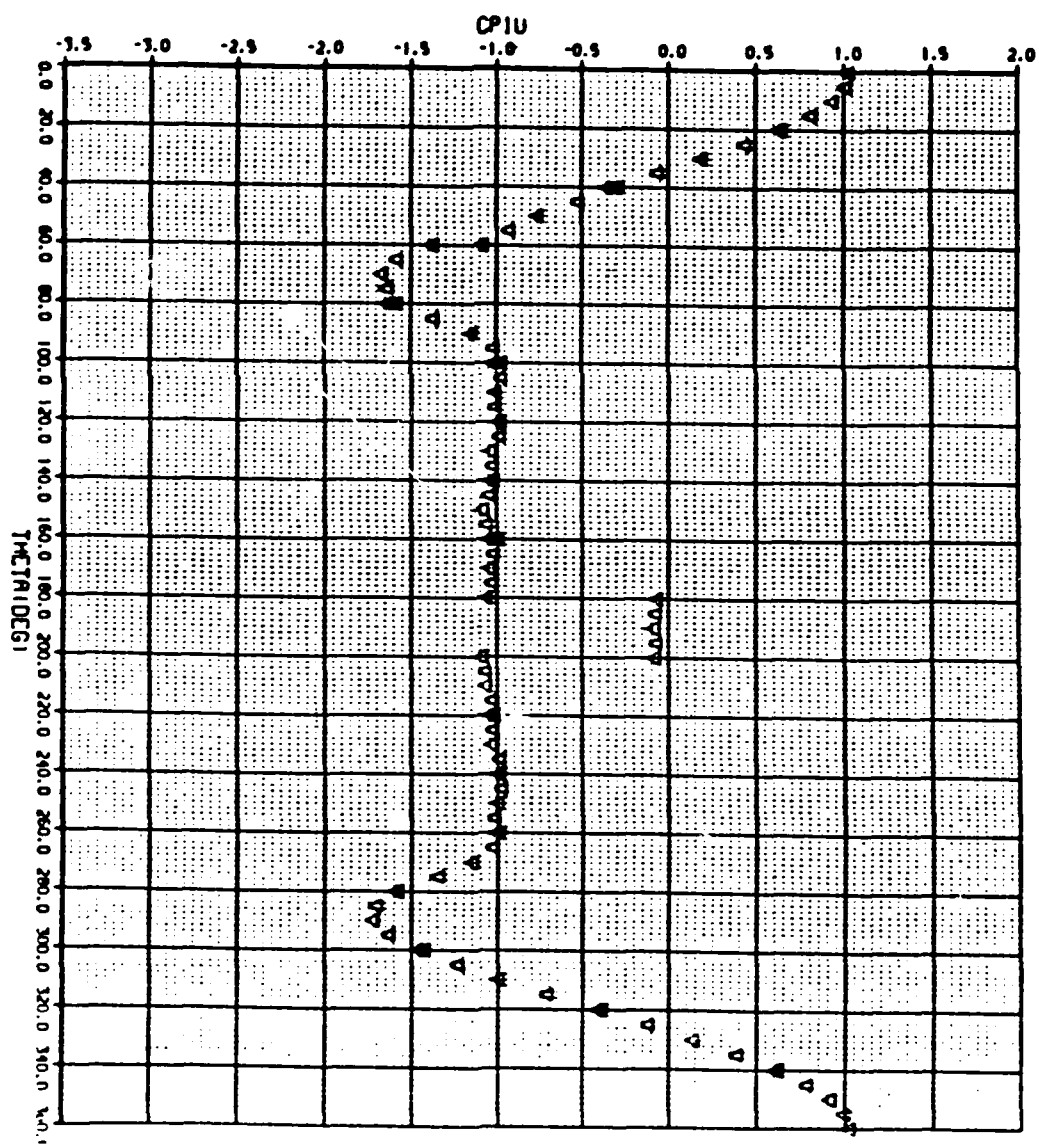
226.2,12 229.00: 5.00 QMC PRESS. COEFFICIENTS CL--0.0297 CD- 0.7954 RND-0.725



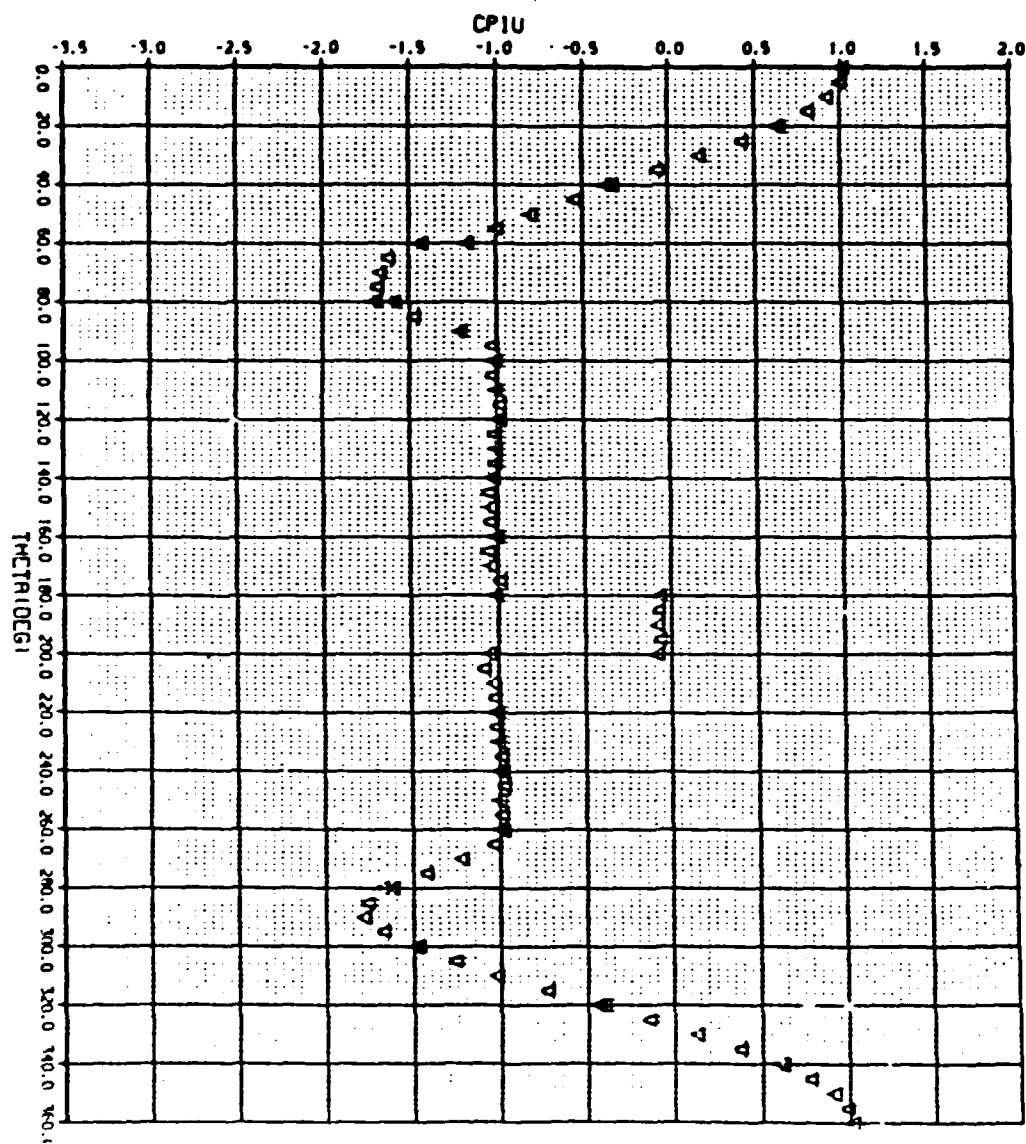
226,2.12 233.00: 5.00 QMC PRESS. COEFFICIENTS CL=-0.0185 CO=0.8593 RND=1.279



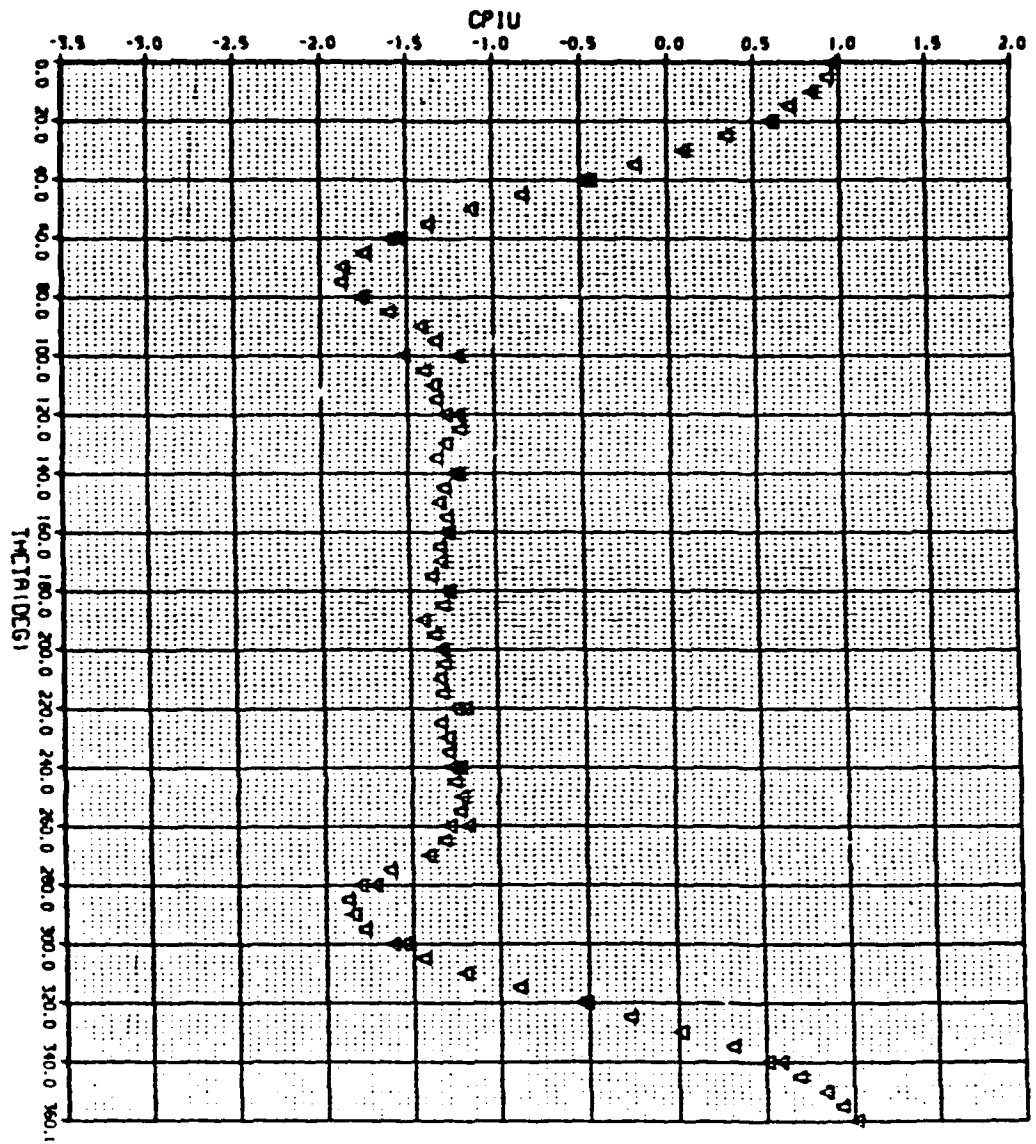
226.2,12 239.001 5.00 QMC PRESS. COEFFICIENTS CL--0.0152 CD- 0.8298 RND-3.093



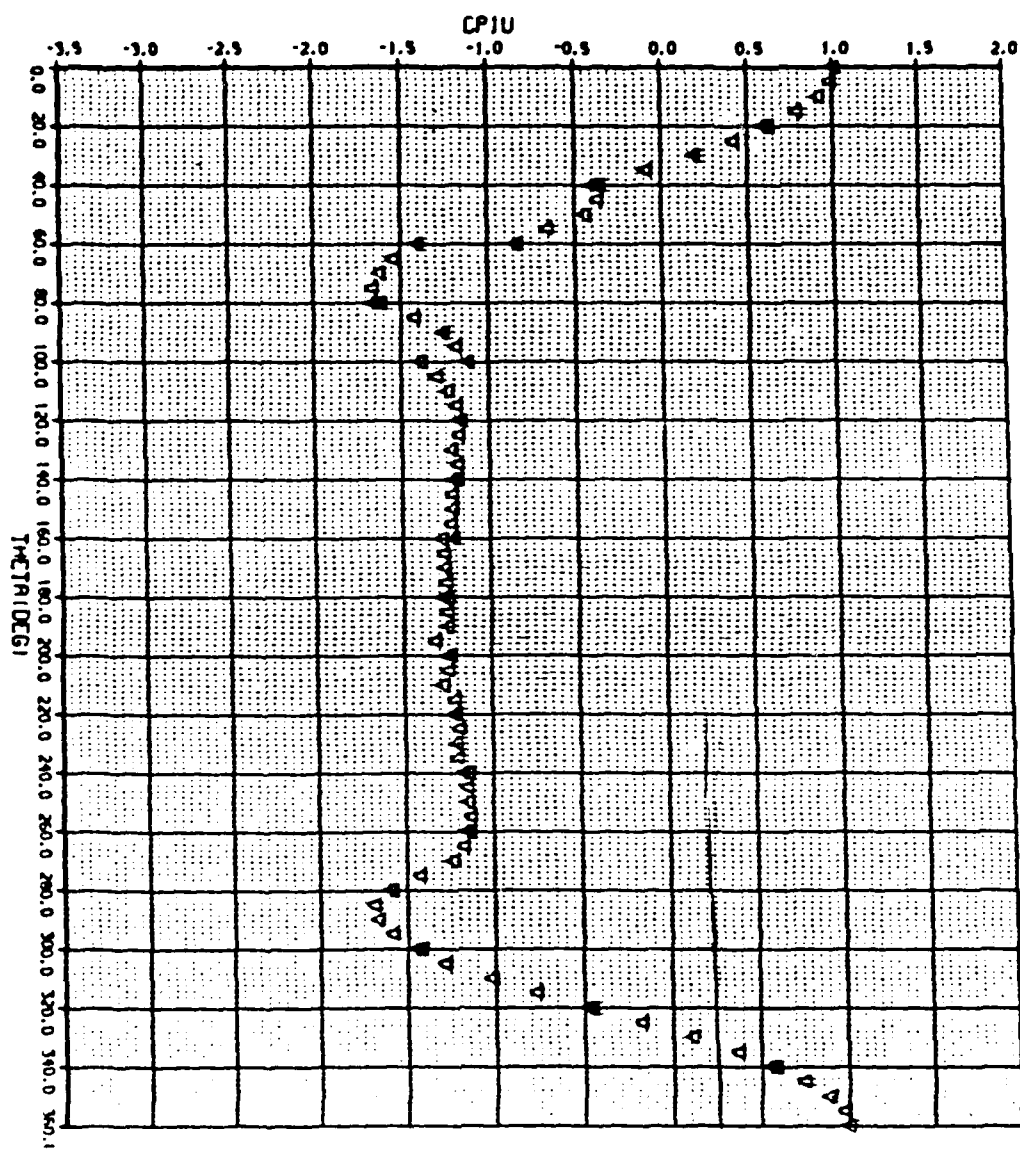
226,2,12 243,00: 5,00 DMC PRESS. COEFFICIENTS CL--0,0152 CD- 0,8007 RND-7,270



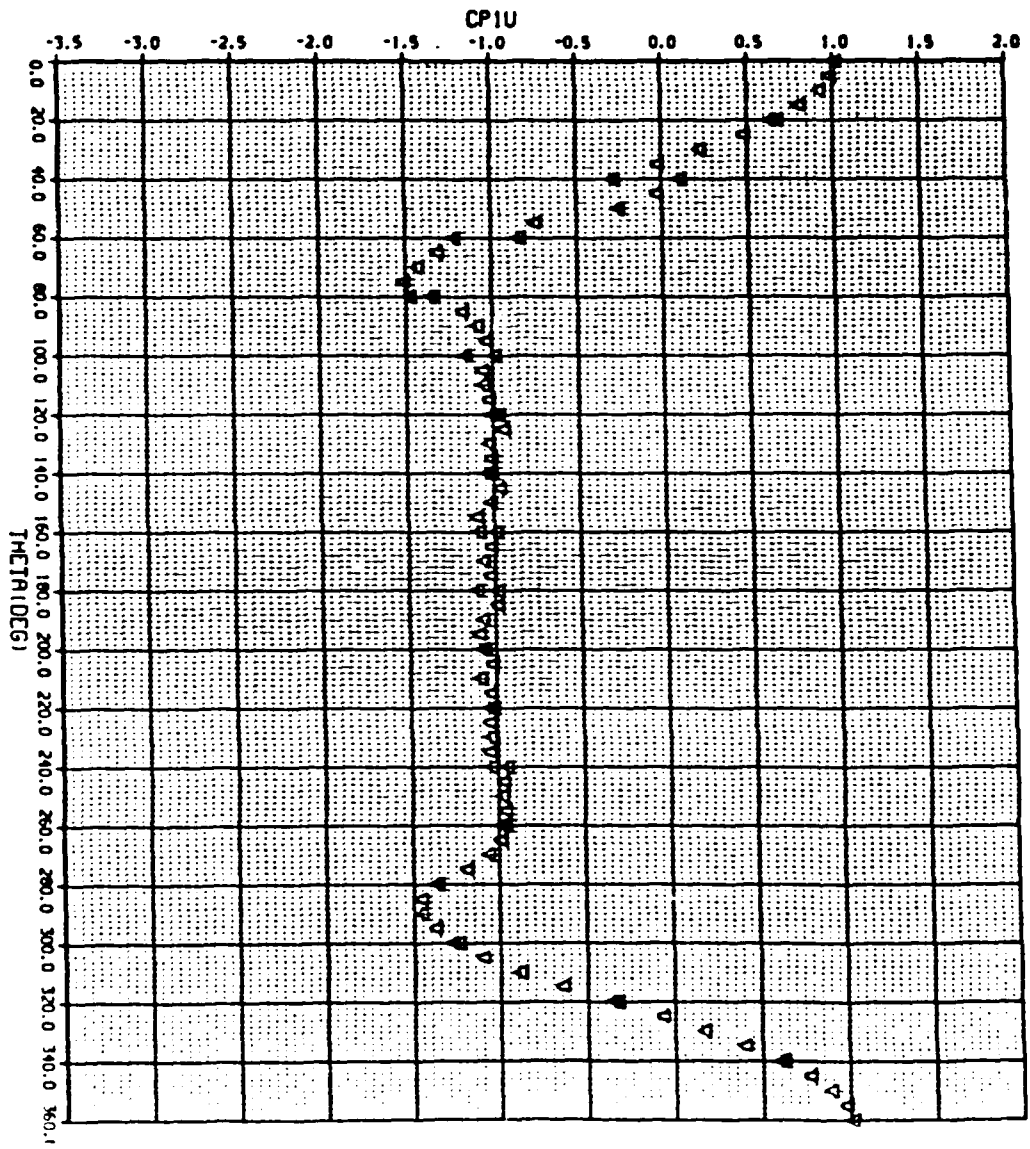
226,2.12 142.00: 5.00 QANC PRESS. COEFFICIENTS CL- 0.0044 CD- 1.1244 RND-0.417



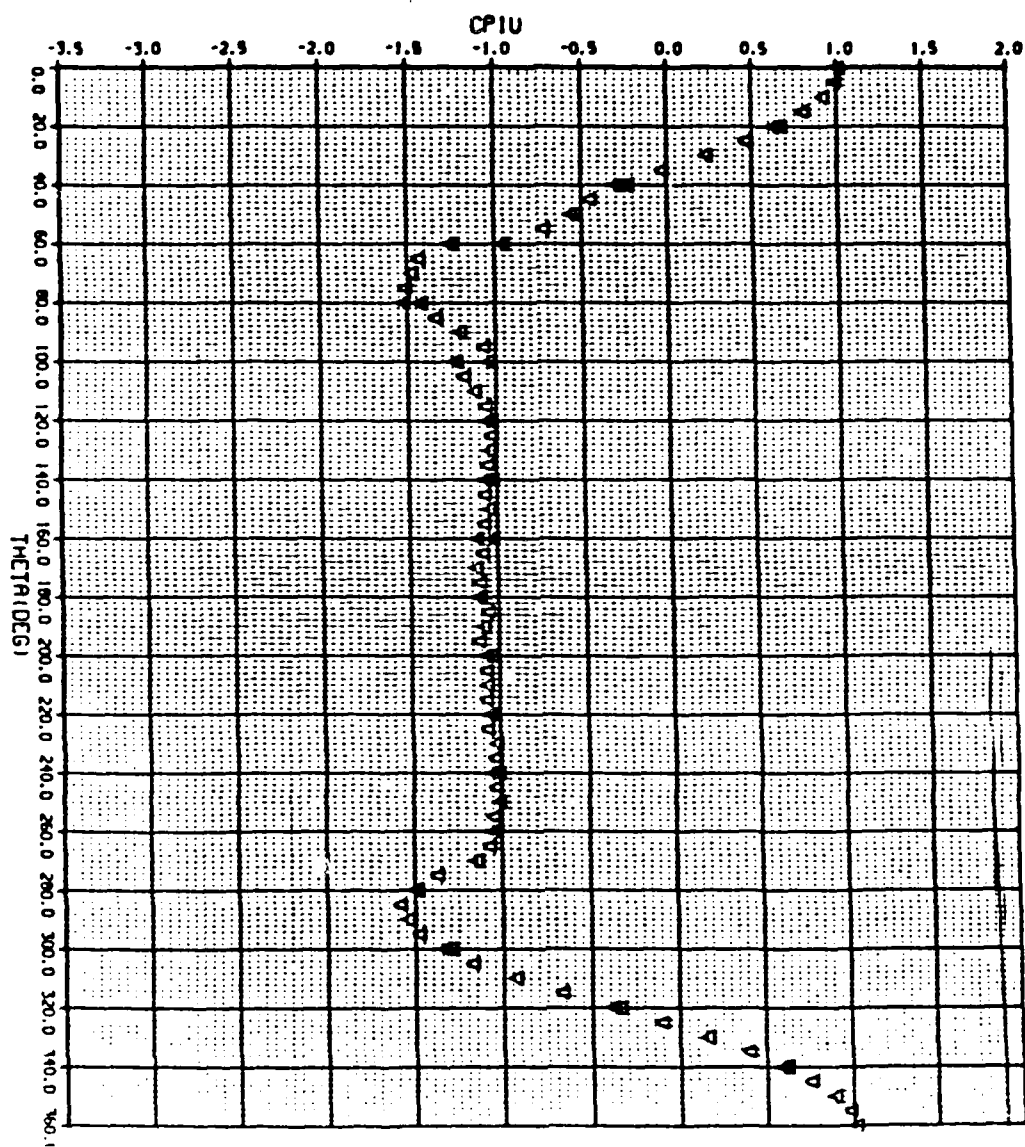
226,2,12 147.00: 5.00 QMC PRESS. COEFFICIENTS CL--0.0604 CD- 1.1907 RND-0.949



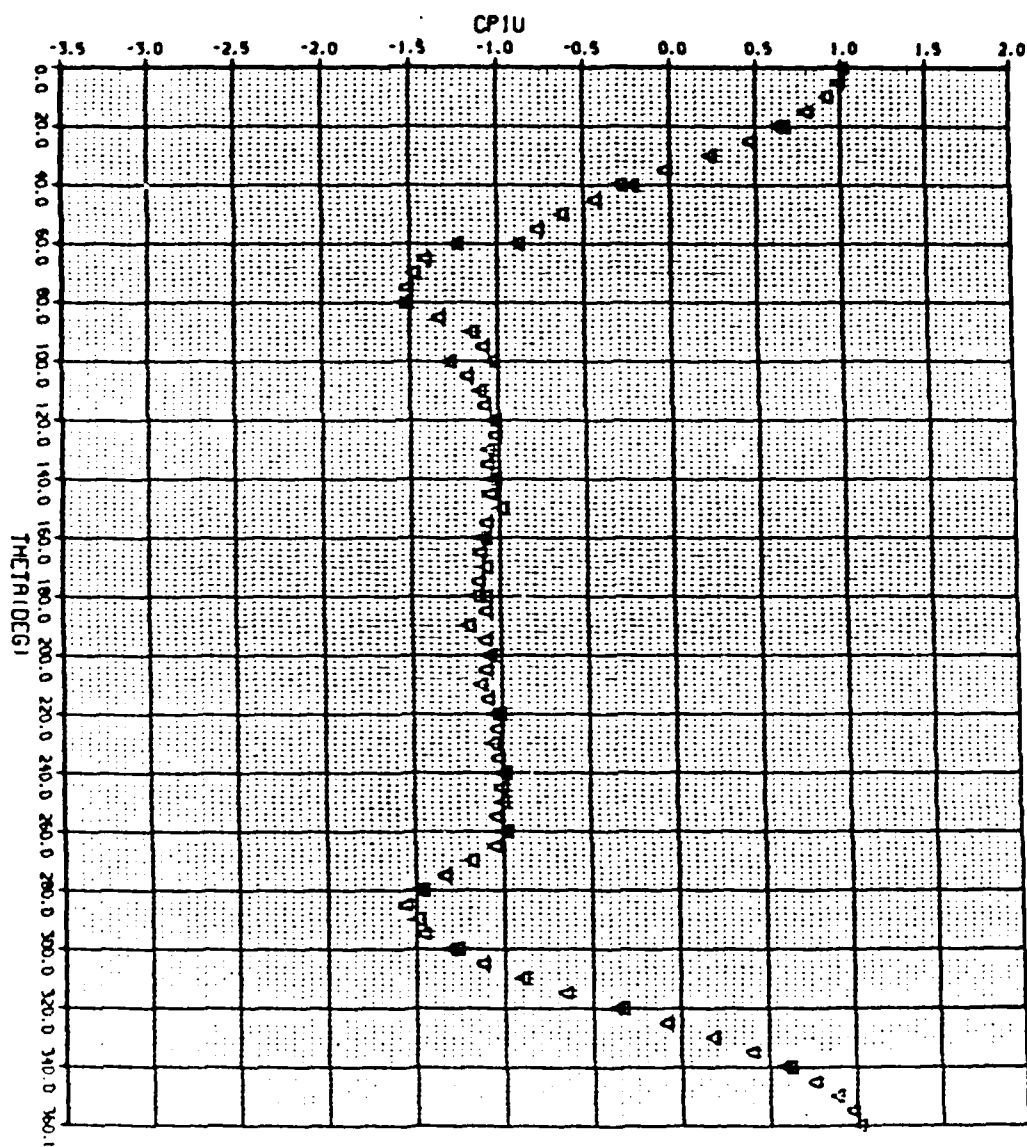
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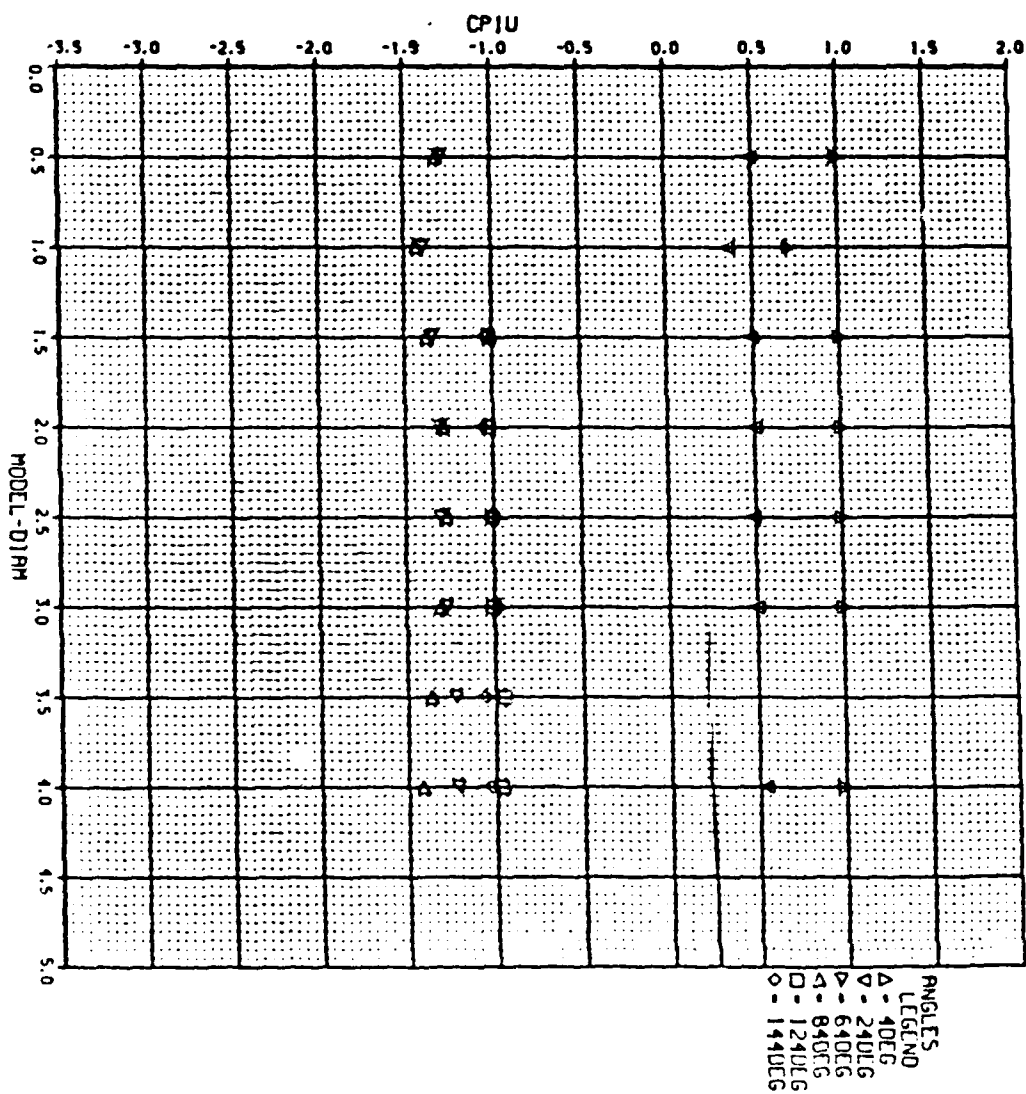
226.2,12 134.00: 5.00 QUNC PRESS. COEFFICIENTS CL=-0.0427 CD= 1.0750 RND=4.188



226.2.12 132.00: 5.00 DMC PRESS. COEFFICIENTS CL--0.0279 CD- 1.0831 RND-6.586



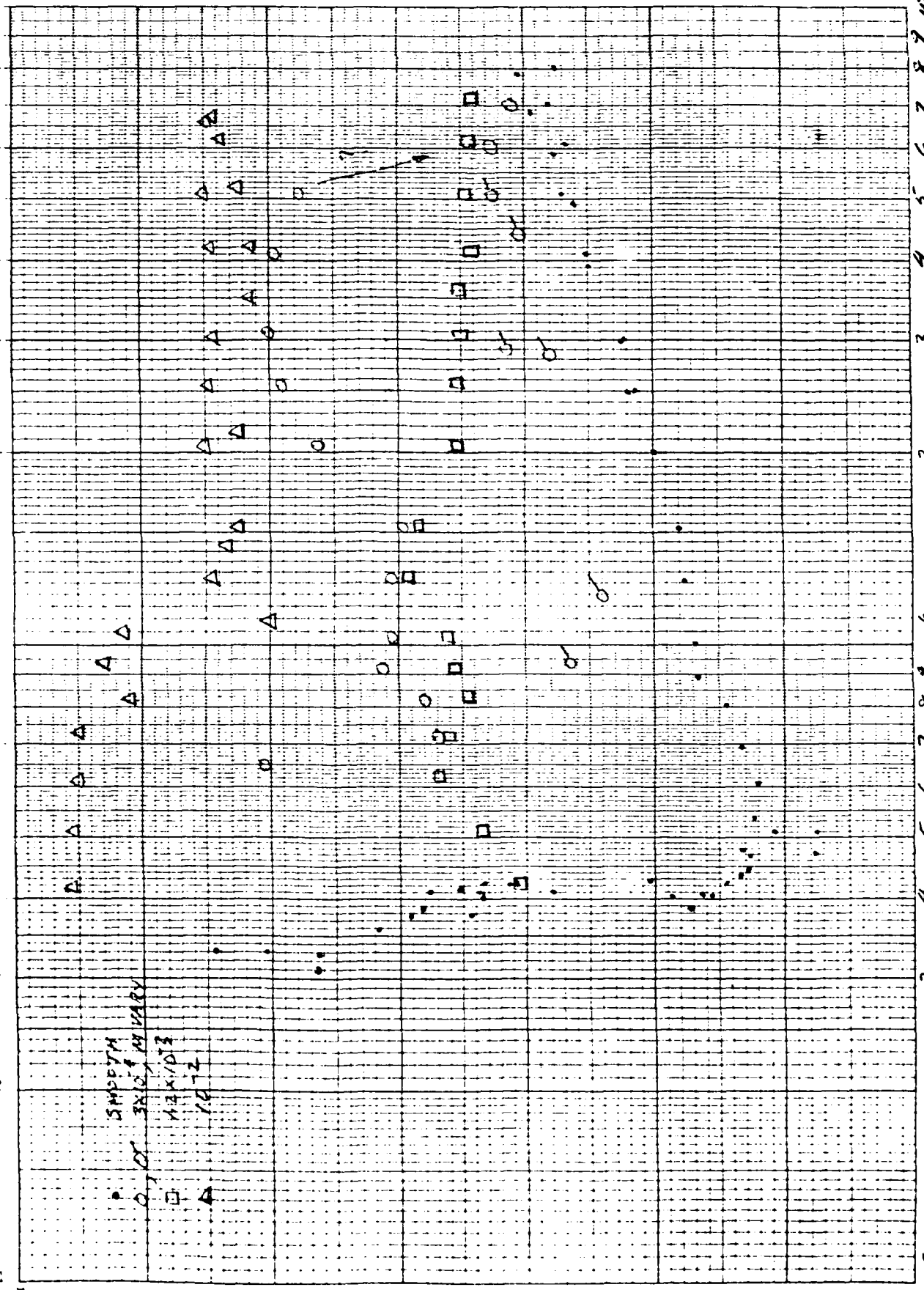
226.2.12 132.00: 5.00 LONGITUDINAL PRESSURE COEFFICIENTS



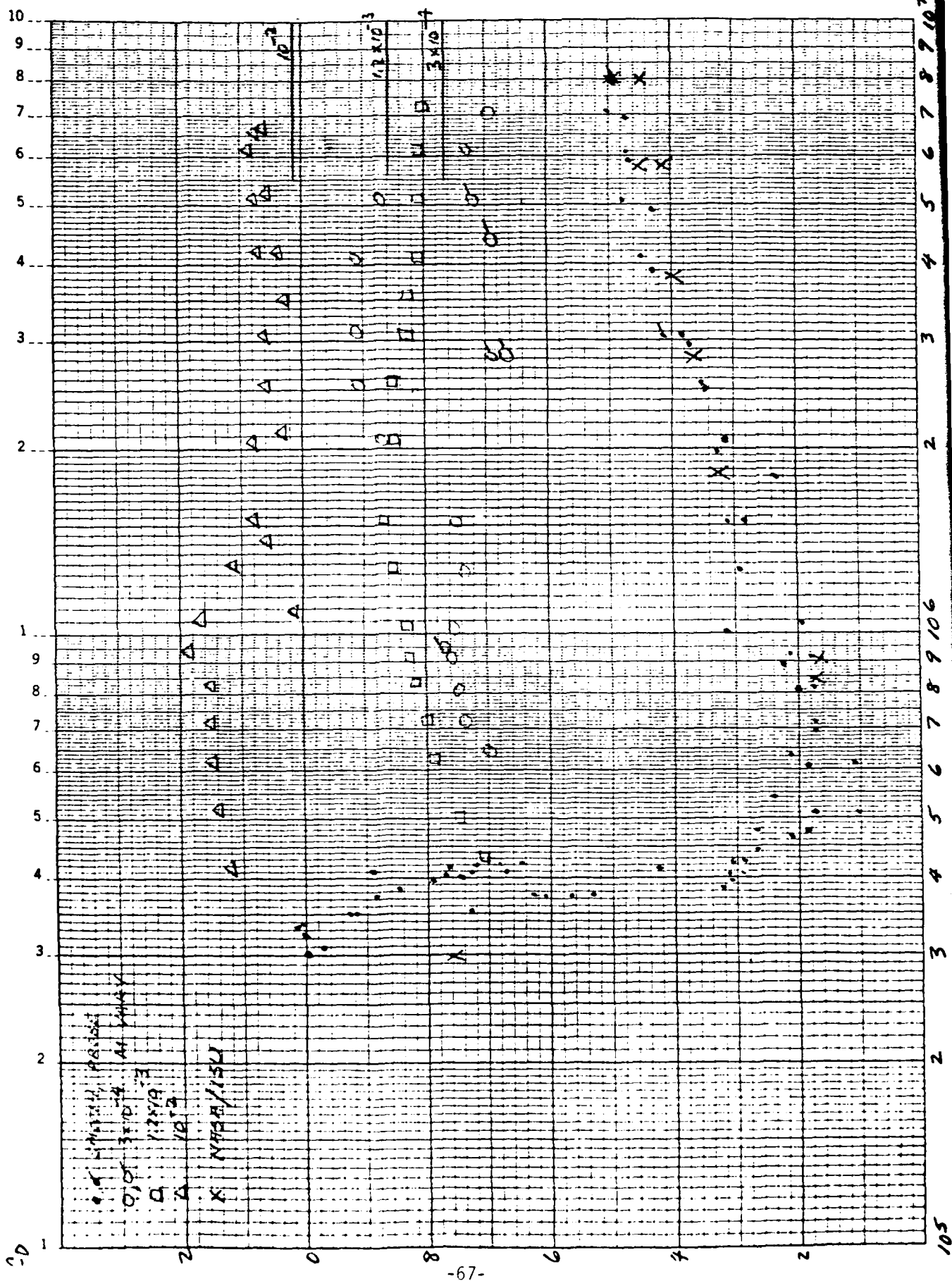
46 4973

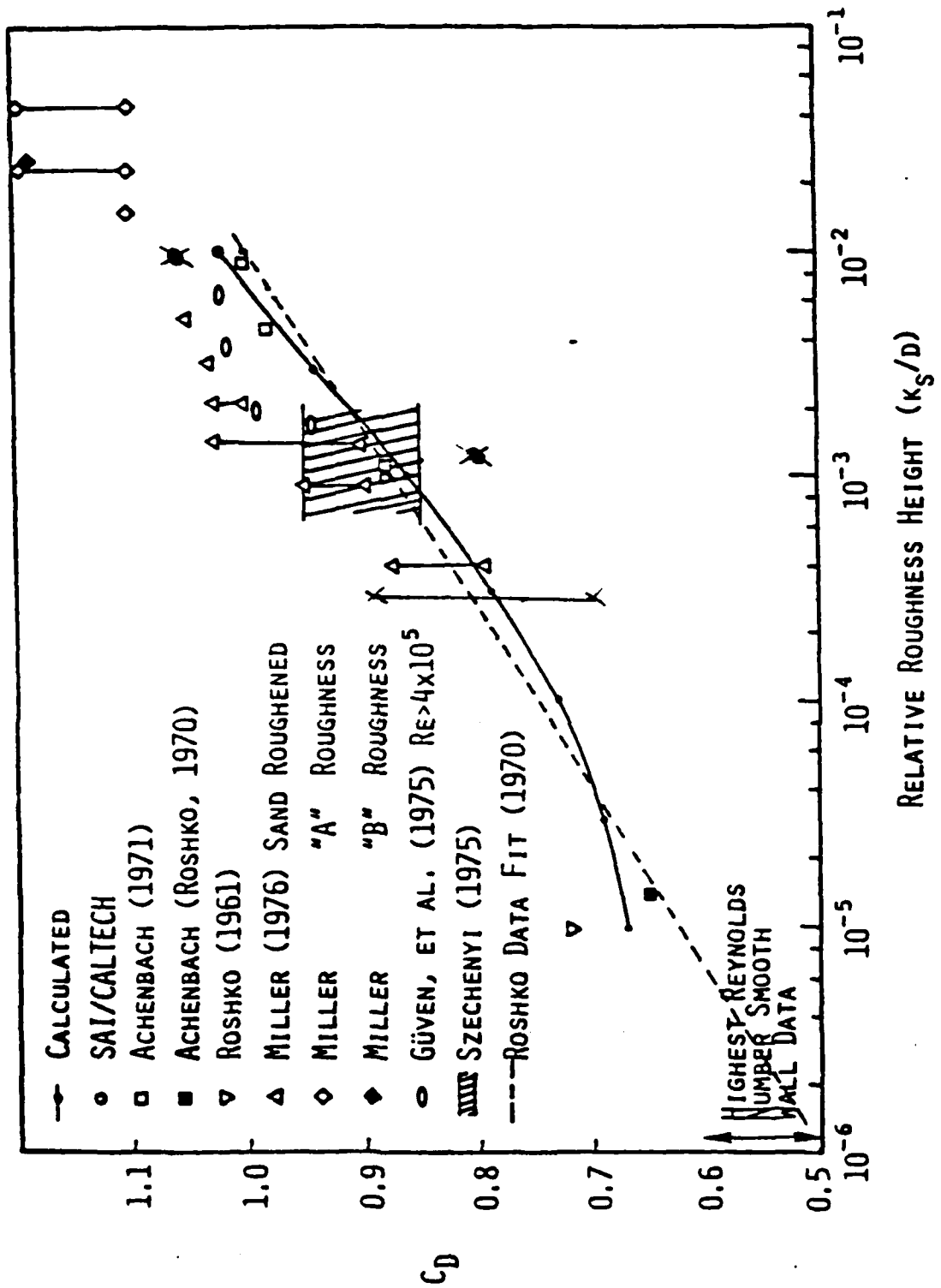
K-S SEMI-LOGARITHMIC PLOTS OF K-S
NEUTRON SENSITIVITY

$1/L$ (AVG)



46 4973

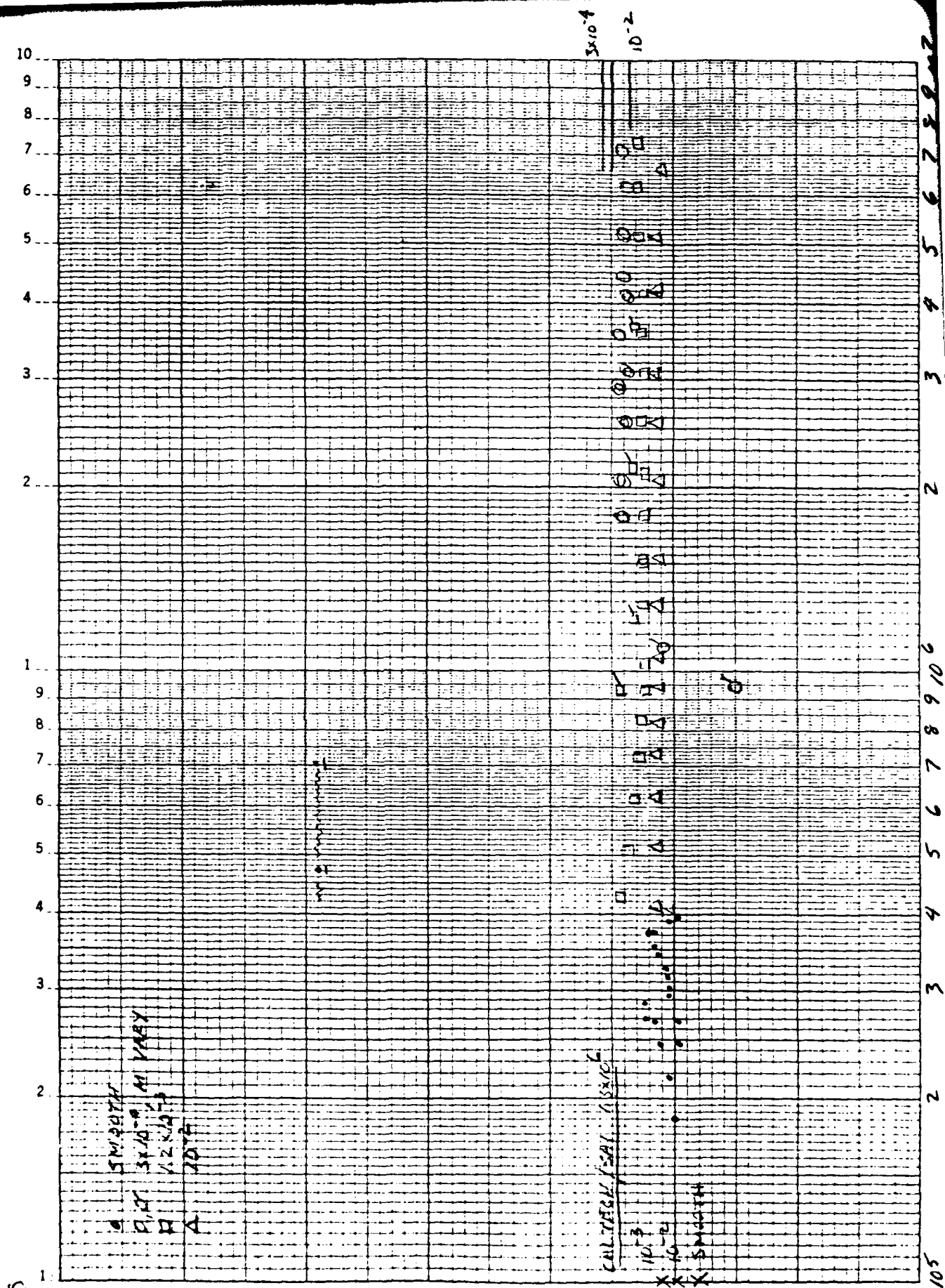


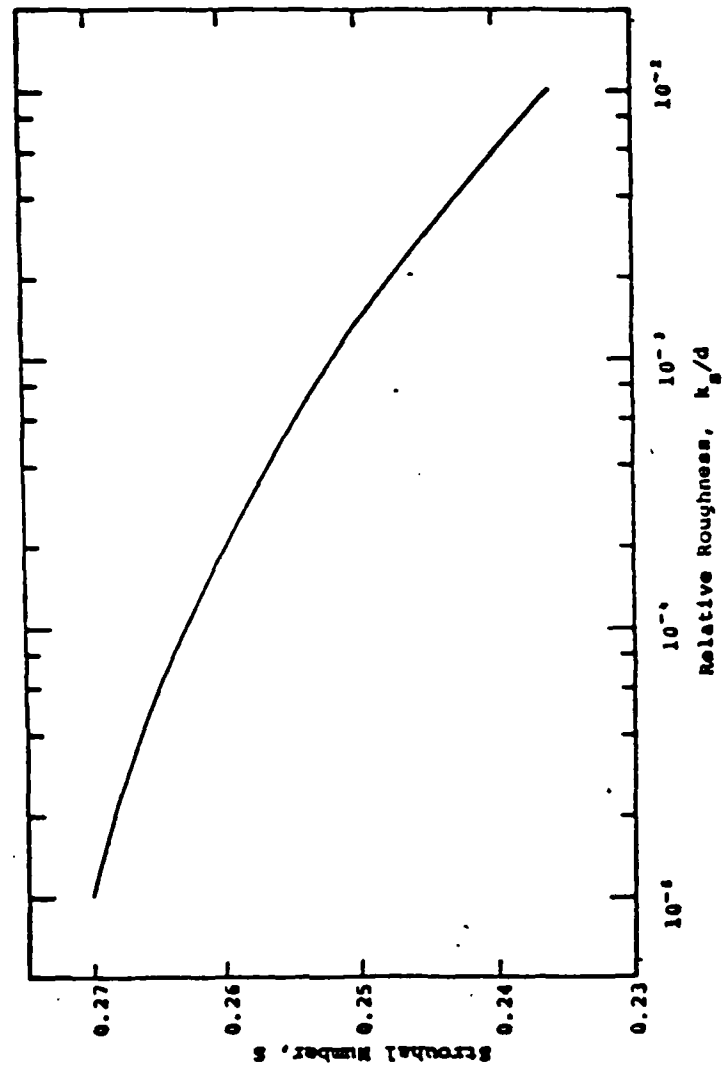


Roughness Effect on Drag Coefficient

KOZ SEATTLE GARY, INC. • 2000 1ST AVE. • SUITE 200 • S
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Effects of Relative Roughness on Strouhal Number in Reynolds Numbers Independence Regime

BOUNDARY LAYER ANALYSIS

DATA: BL RAKE - 4 PITOTS, 1 STATIC

DEFINITIONS: $\theta = \int_0^{\infty} \frac{u}{u_e} (1 - \frac{u}{u_e}) dy$; $\delta^* = \int_0^{\infty} (1 - \frac{u}{u_e}) dy$

VELOCITY PROFILES: $u/u_e = [(C_{pe} - C_{pe}) / (1 - C_{pe})]^{1/2}$

$$u^* = u/u_e = \frac{u}{u_e} (2/C_f)^{1/2}$$

$$y^* = \frac{u^* y}{d} = Re_d \frac{y}{d} \frac{u_e}{u_e} (C_f/2)^{1/2}$$

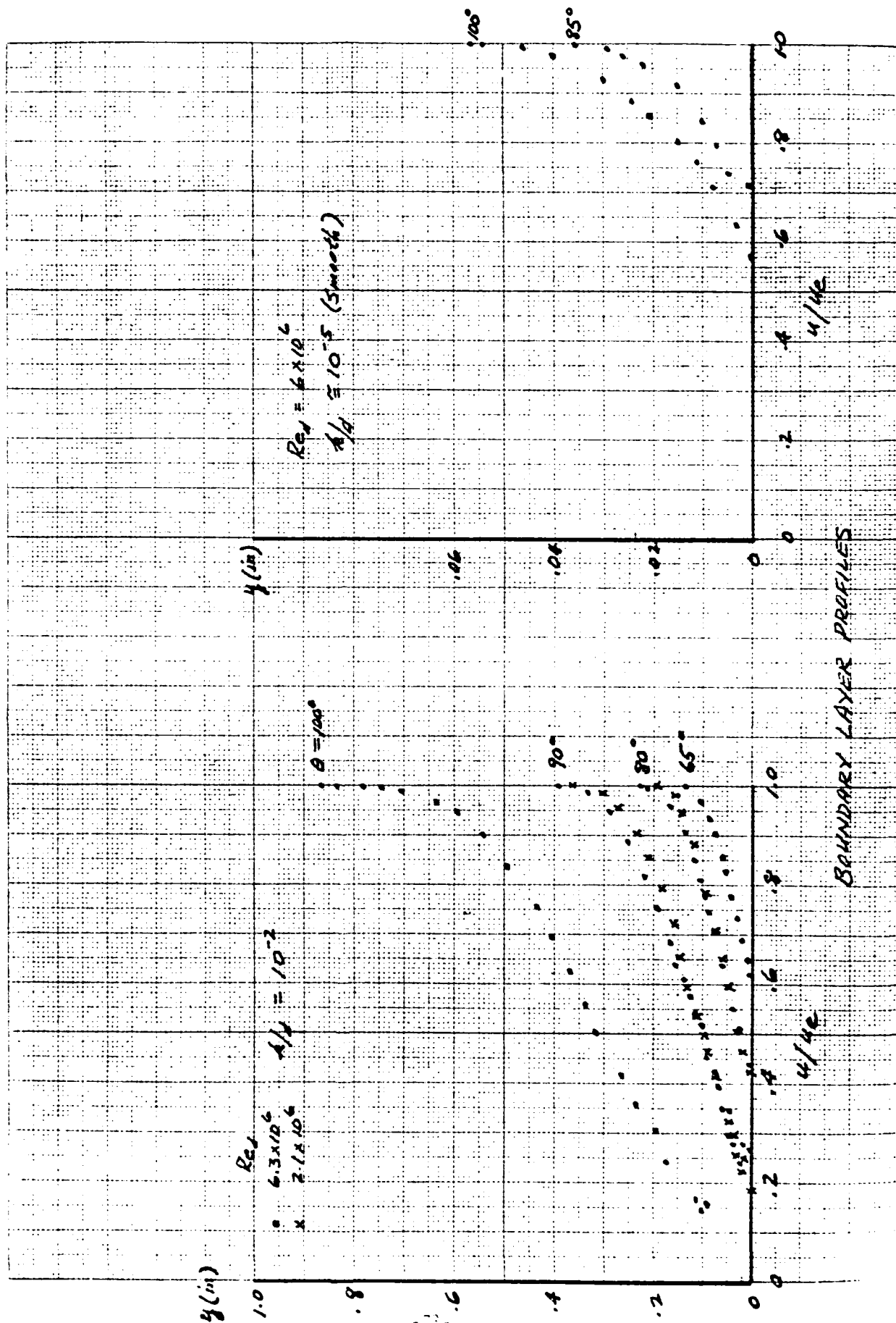
INTEGRAL MOMENTUM RELATION:

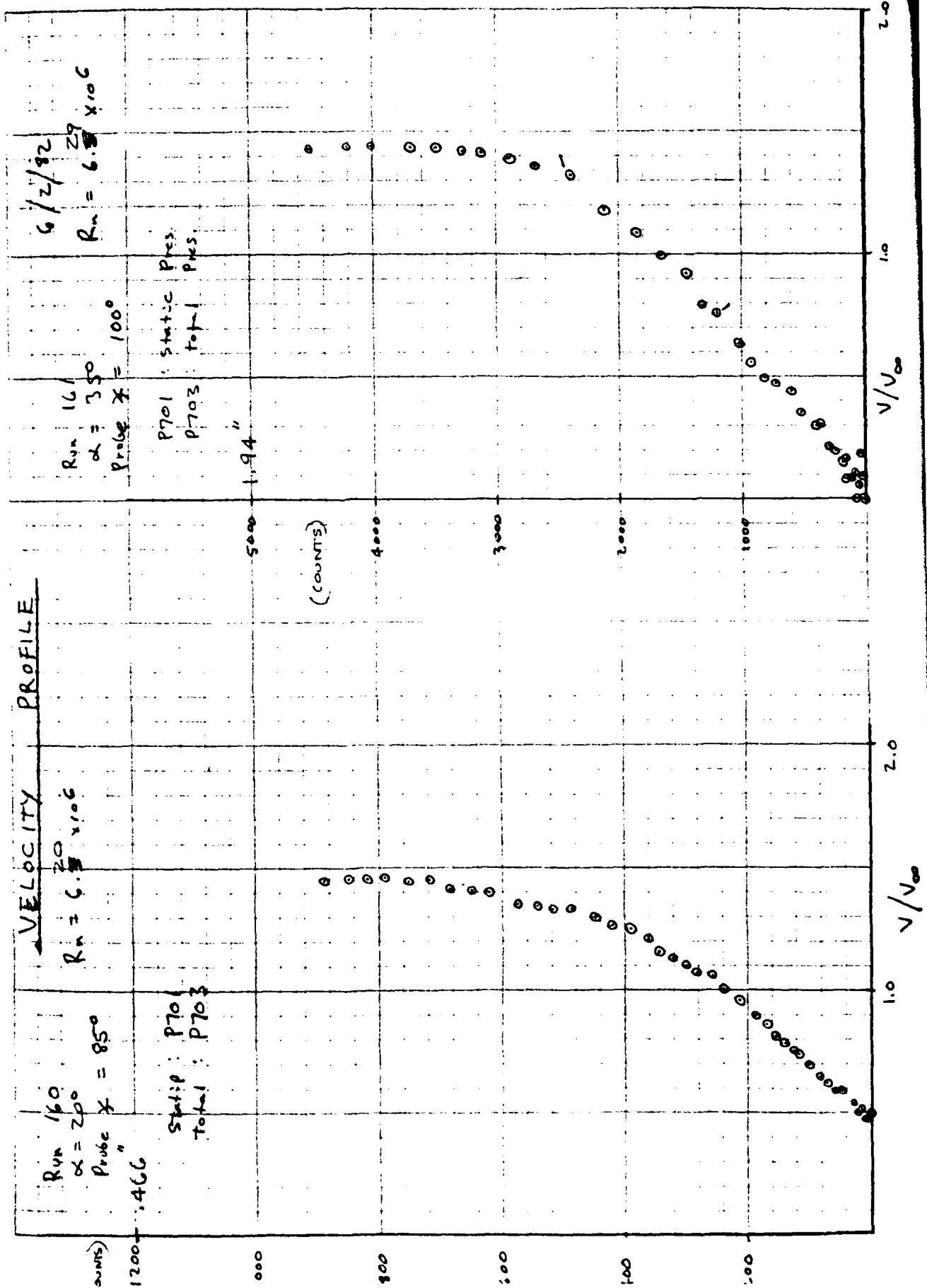
$$\frac{d\theta}{dx} + (2+H) \frac{\delta}{u_e} \frac{du_e}{dx} = \frac{C_f}{2}$$

$$H = \delta^* / \theta$$

NO. 346-M DIETZEN GRAPH, PAPER
MILLIMETER

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MADE IN U.S.A.





VELOCITY PROFILE

Run 162
 $R_n = 625 \times 10^6$
 $\alpha = 15^\circ$
 $Pr_{eff} \approx 80^\circ$

P701 : Static Pms.
 P703 : total Pms.

Run 163
 $R_n = 633 \times 10^6$
 $\alpha = 25^\circ$
 $Pr_{eff} \approx 90^\circ$

P701 : Static Pms.
 P703 : total Pms.

6/3/82

ms)

1000 - 383"

800

-76-

600

400

200

1.0

V/V_∞

2.0

(INCH)

.4

.3

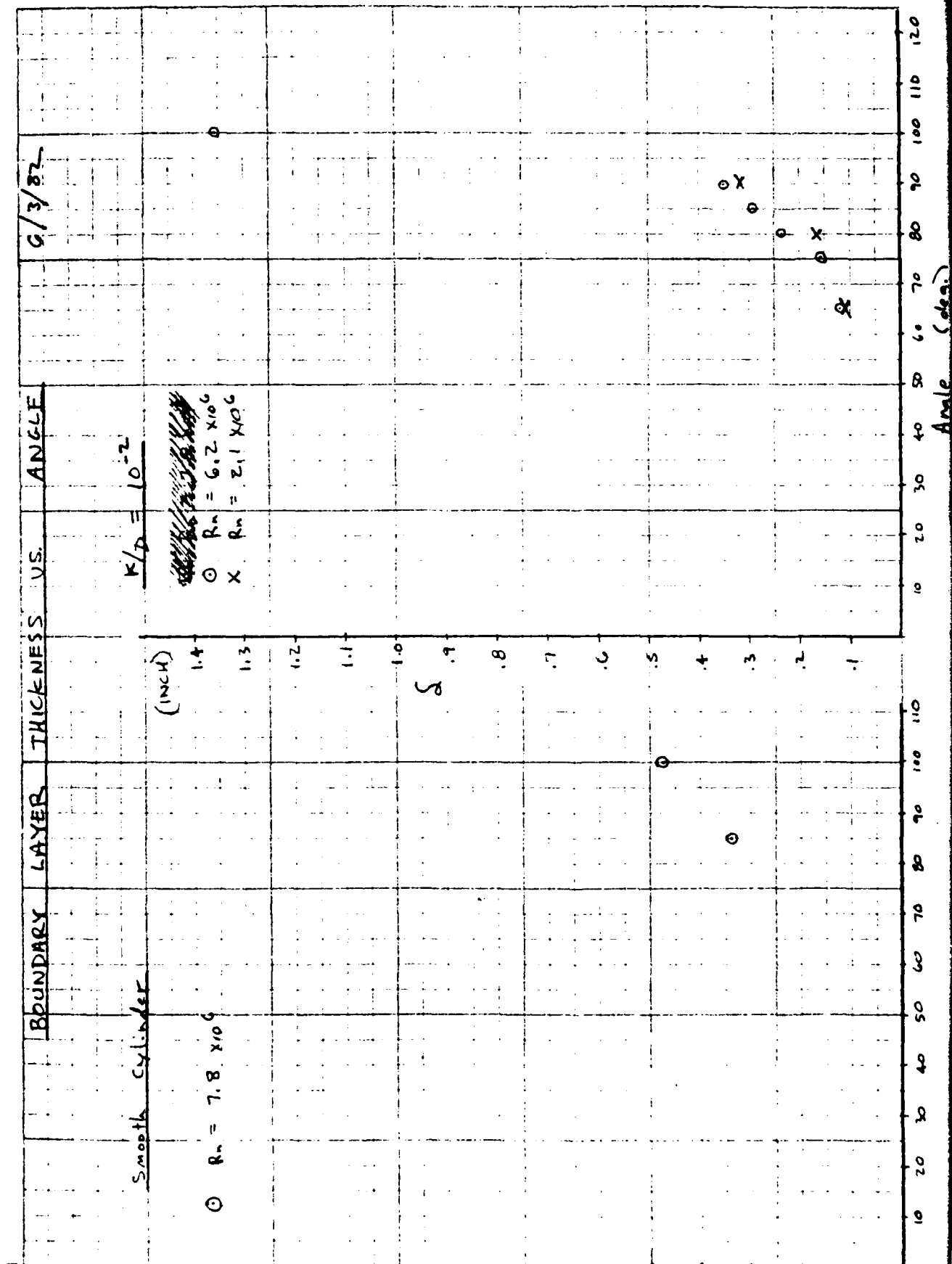
.2

.1

1.0

V/V_∞

2.0

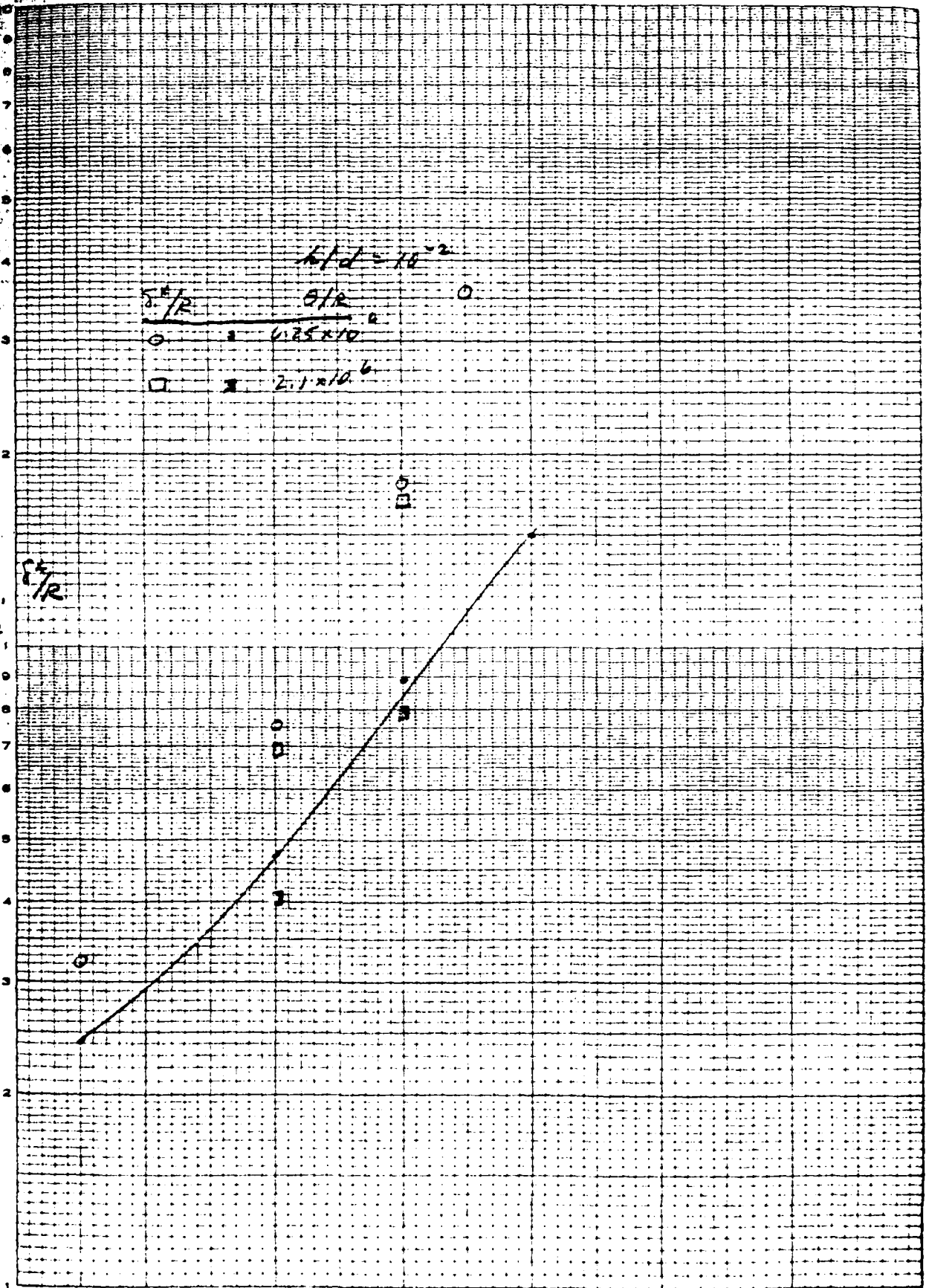


NO. 3400-L-10 OVERSEER QUADRY PAPER
 SEMI-LOGARITHMIC
 2 CYCLES X 10 DIVISIONS PER INCH

EUSCINE OVERSEER QUADRY PAPER
 MADE IN U. S. A.

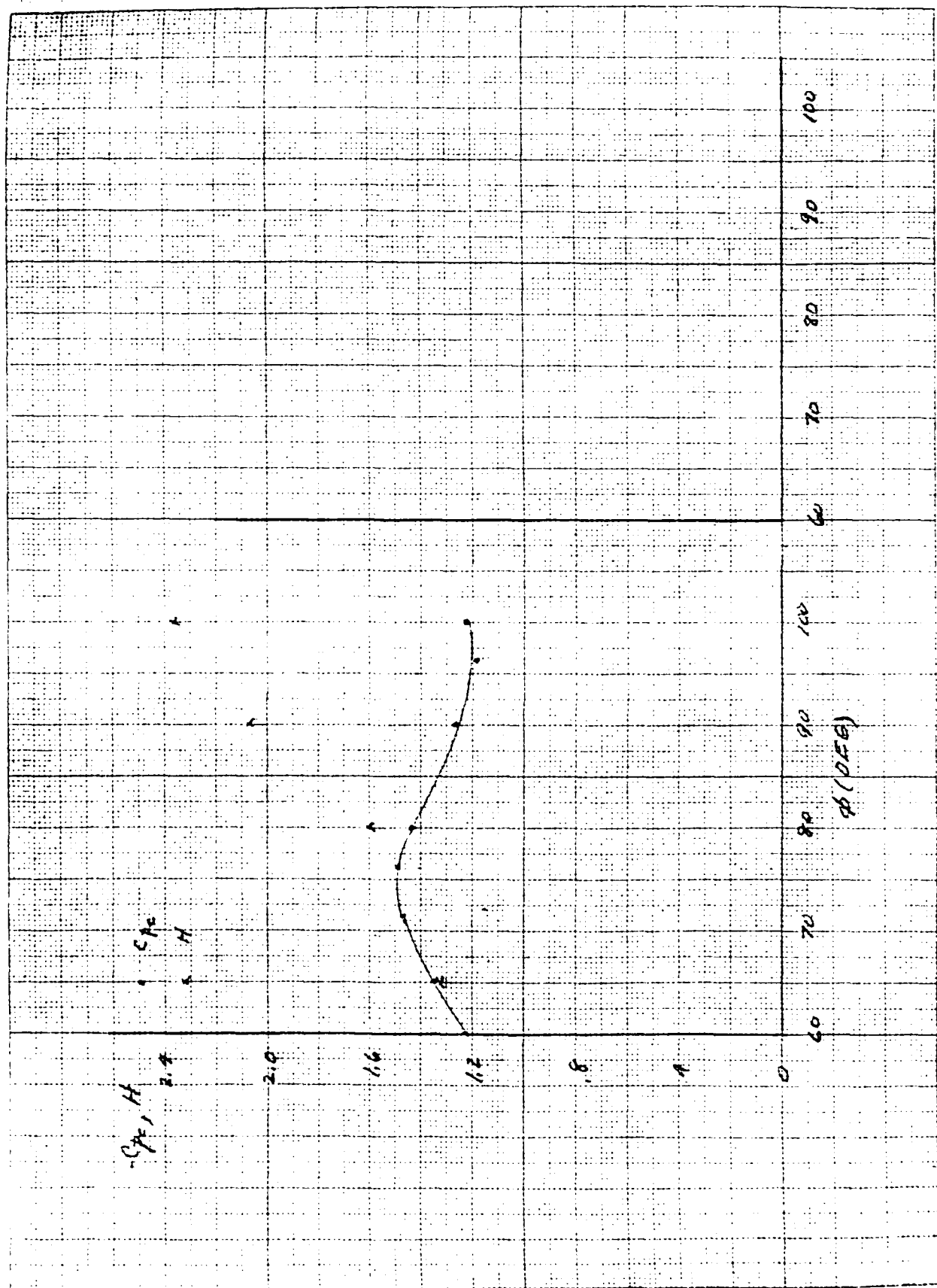
θ/R
 10^{-2}

10^{-3}



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NO. 3400 DIETZEN GRAPH PAPER
MILLIMETER



SOME PRELIMINARY BL DOODLINGS

PHI (DEG)	$\theta/RX10^3$	$\delta^*/RX10^3$	δ/R	$C_F/2X10^3$	$C_F(RE_D)^{1/2}$
65	2.41	3.21	.022	9.64	24.1
80	4.75	7.59	.037	12.00	30.0
90	8.93	18.00	.063	24.00	60.0
100	15.00	36.00	.140	35.00	87.5

$$Re_d = 6.25 \times 10^6, \quad h/d = 10^{-2}, \quad d = 2R = 12.46''$$



RECOMMENDATION

- STEADY PRESSURE DATA NEEDS FURTHER SCRUTINY
 - BAD POINTS SHOULD BE ELIMINATED FROM INTEGRATED OR AVERAGED RESULTS
 - FINAL PLOTS WITHOUT BAD POINTS REQUIRED
 - PERFORM DATA ANALYSIS
- NEED A CRITERION BASED ON VORTEX SHEDDING STRENGTH TO DEFINE PRESENCE OF PERIODIC SHEDDING
- CHECK ACCURACY OF DYNAMIC DATA WITH CORRECTED MEAN DATA: COMPLETE DATA ANALYSIS
- TURBULENT ROUGH WALL BOUNDARY LAYER ANALYSIS WITH PRESSURE GRADIENT:
 - PROFILE CALCULATIONS
 - BL INTEGRAL PROPERTIES
 - SKIN FRICTION
 - SIMILARITY IDEAS

DATE
ILME