

AD-775 892

STATIC STABILITY WIND-TUNNEL TEST OF 18,  
22, AND 26 CALIBER CYLINDER-OGIVE BODIES  
AND AN AEROBALLISTIC TEST VEHICLE AT  
MACH NUMBERS FROM 0.69 TO 4.24

Harvey Chaplin

Naval Ordnance Laboratory  
White Oak, Maryland

28 July 1953

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**NAVORD REPORT**

2934

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**AD 775892**

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28 JULY 1953

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**Aeroballistic Research Report 186**

**STATIC STABILITY WIND-TUNNEL TEST OF 18, 22, AND 26  
CALIBER CYLINDER-OGIVE BODIES AND AN AEROBALLISTIC  
TEST VEHICLE AT MACH NUMBERS FROM 0.69 TO 4.24**

Prepared by:

Harvey Chaplin

**ABSTRACT:** This report presents the results of an investigation in the 40 x 40 Cal Aeroballistics Tunnel No. 1 to determine the static stability of the Naval Ordnance Test Agency Body and an Aeroballistic Test Vehicle at Mach numbers from 0.69 to 4.24.

**U. S. NAVAL ORDNANCE LABORATORY**  
PACIFIC DIVISION  
CHINA BEACH, CALIFORNIA

NAVED Report 2934

28 July 1953

This investigation was performed at the request (reference a) of the U. S. Naval Ordnance Test Station. The wind-tunnel data were obtained 21 and 22 May 1953. The investigation was performed under task number NOL-403d-453-1-53.

The purpose of this investigation was to determine the static stability of the Naval Ordnance Test Station Long Bodies and an Aeroballistic Test Vehicle.

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A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, AA, AB, AC, AD, AE, AF, AG, AH, AI, AJ, AK, AL, AM, AN, AO, AP, AQ, AR, AS, AT, AU, AV, AW, AX, AY, AZ, BA, BB, BC, BD, BE, BF, BG, BH, BI, BJ, BK, BL, BM, BN, BO, BP, BQ, BR, BS, BT, BU, BV, BW, BX, BY, BZ, CA, CB, CC, CD, CE, CF, CG, CH, CI, CJ, CK, CL, CM, CN, CO, CP, CQ, CR, CS, CT, CU, CV, CW, CX, CY, CZ, DA, DB, DC, DD, DE, DF, DG, DH, DI, DJ, DK, DL, DM, DN, DO, DP, DQ, DR, DS, DT, DU, DV, DW, DX, DY, DZ, EA, EB, EC, ED, EE, EF, EG, EH, EI, EJ, EK, EL, EM, EN, EO, EP, EQ, ER, ES, ET, EU, EV, EW, EX, EY, EZ, FA, FB, FC, FD, FE, FF, FG, FH, FI, FJ, FK, FL, FM, FN, FO, FP, FQ, FR, FS, FT, FU, FV, FW, FX, FY, FZ, GA, GB, GC, GD, GE, GF, GG, GH, GI, GJ, GK, GL, GM, GN, GO, GP, GQ, GR, GS, GT, GU, GV, GW, GX, GY, GZ, HA, HB, HC, HD, HE, HF, HG, HH, HI, HJ, HK, HL, HM, HN, HO, HP, HQ, HR, HS, HT, HU, HV, HW, HX, HY, HZ, IA, IB, IC, ID, IE, IF, IG, IH, II, IJ, IK, IL, IM, IN, IO, IP, IQ, IR, IS, IT, IU, IV, IW, IX, IY, IZ, JA, JB, JC, JD, JE, JF, JG, JH, JI, JJ, JK, JL, JM, JN, JO, JP, JQ, JR, JS, JT, JU, JV, JW, JX, JY, JZ, KA, KB, KC, KD, KE, KF, KG, KH, KI, KJ, KK, KL, KM, KN, KO, KP, KQ, KR, KS, KT, KU, KV, KW, KX, KY, KZ, LA, LB, LC, LD, LE, LF, LG, LH, LI, LJ, LK, LL, LM, LN, LO, LP, LQ, LR, LS, LT, LU, LV, LW, LX, LY, LZ, MA, MB, MC, MD, ME, MF, MG, MH, MI, MJ, MK, ML, MM, MN, MO, MP, MQ, MR, MS, MT, MU, MV, MW, MX, MY, MZ, NA, NB, NC, ND, NE, NF, NG, NH, NI, NJ, NK, NL, NM, NN, NO, NP, NQ, NR, NS, NT, NU, NV, NW, NX, NY, NZ, OA, OB, OC, OD, OE, OF, OG, OH, OI, OJ, OK, OL, OM, ON, OO, OP, OQ, OR, OS, OT, OU, OV, OW, OX, OY, OZ, PA, PB, PC, PD, PE, PF, PG, PH, PI, PJ, PK, PL, PM, PN, PO, PP, PQ, PR, PS, PT, PU, PV, PW, PX, PY, PZ, QA, QB, QC, QD, QE, QF, QG, QH, QI, QJ, QK, QL, QM, QN, QO, QP, QQ, QR, QS, QT, QU, QV, QW, QX, QY, QZ, RA, RB, RC, RD, RE, RF, RG, RH, RI, RJ, RK, RL, RM, RN, RO, RP, RQ, RR, RS, RT, RU, RV, RW, RX, RY, RZ, SA, SB, SC, SD, SE, SF, SG, SH, SI, SJ, SK, SL, SM, SN, SO, SP, SQ, SR, SS, ST, SU, SV, SW, SX, SY, SZ, TA, TB, TC, TD, TE, TF, TG, TH, TI, TJ, TK, TL, TM, TN, TO, TP, TQ, TR, TS, TT, TU, TV, TW, TX, TY, TZ, UA, UB, UC, UD, UE, UF, UG, UH, UI, UJ, UK, UL, UM, UN, UO, UP, UQ, UR, US, UT, UY, UZ, VA, VB, VC, VD, VE, VF, VG, VH, VI, VJ, VK, VL, VM, VN, VO, VP, VQ, VR, VS, VT, VU, VV, VW, VX, VY, VZ, WA, WB, WC, WD, WE, WF, WG, WH, WI, WJ, WK, WL, WM, WN, WO, WP, WQ, WR, WS, WT, WU, WV, WW, WX, WY, WZ, XA, XB, XC, XD, XE, XF, XG, XH, XI, XJ, XK, XL, XM, XN, XO, XP, XQ, XR, XS, XT, XU, XV, XW, XX, XY, XZ, YA, YB, YC, YD, YE, YF, YG, YH, YI, YJ, YK, YL, YM, YN, YO, YP, YQ, YR, YS, YT, YU, YV, YW, YX, YY, YZ, ZA, ZB, ZC, ZD, ZE, ZF, ZG, ZH, ZI, ZJ, ZK, ZL, ZM, ZN, ZO, ZP, ZQ, ZR, ZS, ZT, ZU, ZV, ZW, ZX, ZY, ZZ

STATIC STABILITY WIND-TUNNEL TEST OF 18, 22, AND 26  
CALIBER CYLINDER-OJIVE BODIES AND AN AEROBALLISTIC  
TEST VEHICLE AT MACH NUMBERS FROM 0.69 TO 4.24

INTRODUCTION

1. The trend of rocket design toward longer bodies has made it necessary to obtain design data on bodies up to 26 calibers in length. In this investigation static stability data were obtained for 18, 22, and 26 caliber bodies as a part of the Naval Ordnance Test Station Systematic Wind-Tunnel Test Program. Results previously obtained under this program for 10, 14, and 18 caliber bodies are reported in references (b) through (g).

2. This report presents pitching moment and normal force data obtained for the Naval Ordnance Test Station Long Bodies at Mach numbers of 0.585, 0.92, 1.56, 1.86, 2.87, and 4.24 and for an Aeroballistic Test Vehicle at Mach numbers of 0.58, 0.92, 1.56, and 2.17.

4. All data were obtained using a five-component internal strain-gage balance (designated 5-5) designed and built at the Naval Ordnance Laboratory. The angles of attack include a correction for elastic deflection of the balance.

#### RESULTS

5. The data are plotted in coefficient form versus angle of attack in Figures 3 through 9. No analysis of these data is being made in this report.

6. Tabulated data of this test are also presented. The sheets of data are in order of run number and have lists of corrected angle of attack, normal force coefficient, and pitching moment coefficient.

REFERENCES

- (a) Highberg, Ivar E., NOL Aeroballistic Research Request (ARR 220) (Conf) (1953)
- (b) DeMeritte, F. J., Aeroballistic Research Investigation of a Family of Rectangular Pinned Models at Mach Number 2.92 NOLM 10117 (Restr) (1949)
- (c) DeMeritte, F. J. and Greene, John E., Aeroballistic Research Investigation of Body and Rectangular Fin Combinations at Mach Numbers 1.86 and 1.56 NOLM 10122 (Restr) (1949)
- (d) DeMeritte, F. J. and Darling, J. A., Aeroballistic Research Investigation of Body-Alone Models at Mach Number 1.86 and 2.92 NOLM 10132 (Restr) (1950)
- (e) Darling, J. A. and DeMeritte, F. J., Aeroballistic Research Investigation of NACA Research Navord Report 1946 (Conf) (1950)
- (f) DeMeritte, F. J., Greary, E., and Darling, J. A., Aeroballistic Investigation of NACA Research at Mach Number 1.86 Navord Report 1946 (Conf)
- (g) Darling, J. A., Aeroballistic Research Investigation of NACA Research Navord Report 1946 (Restr) (1950)



TABLE I

LIST OF RUNS AND TEST CONDITIONS

Run	Config-uration	Reyn. No.	Dynamic Pressure (psi)	Reynolds No. (per ft.)	Figure
1	126	0.875	3.41	$3.91 \times 10^6$	3
2	122	—	—	—	—
3	118	—	—	—	—
4	126	0.974	4.87	4.50	4
5	122	—	—	—	—
6	118	0.883	—	—	—
7	126	1.07	5.50	4.87	6
8	122	—	—	—	—
9	118	—	—	—	—
10	126	—	—	—	—
11	122	—	—	—	—
12	118	—	—	—	—
13	126	—	2.89	2.85	7
14	122	—	—	—	—
15	118	—	—	—	—
16	126	—	0.877	1.39	8
17	122	—	0.883	—	—
18	118	—	0.874	—	—
19	126	—	6.04	4.55	5
20	122	—	5.07	4.87	9
21	118	—	6.87	3.61	—
22	126	—	3.44	3.92	—
23	122	—	—	—	—
24	118	—	—	—	—

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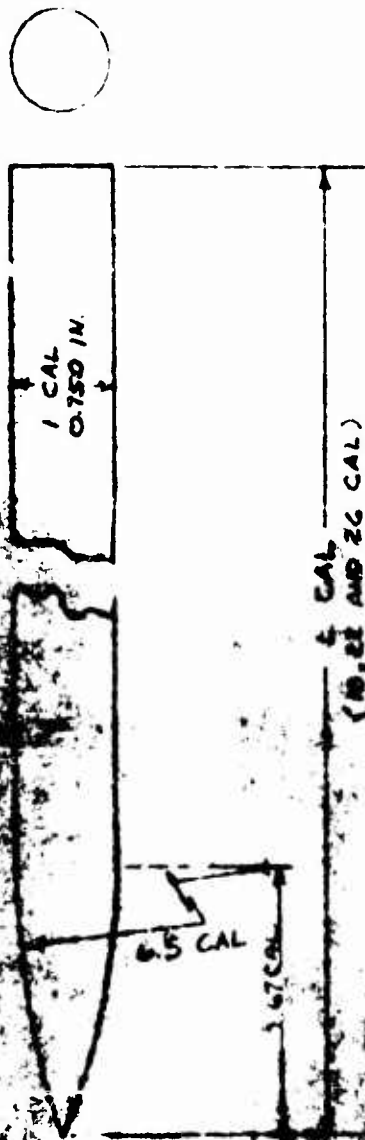


FIGURE 1  
NOTS LONG BODIES

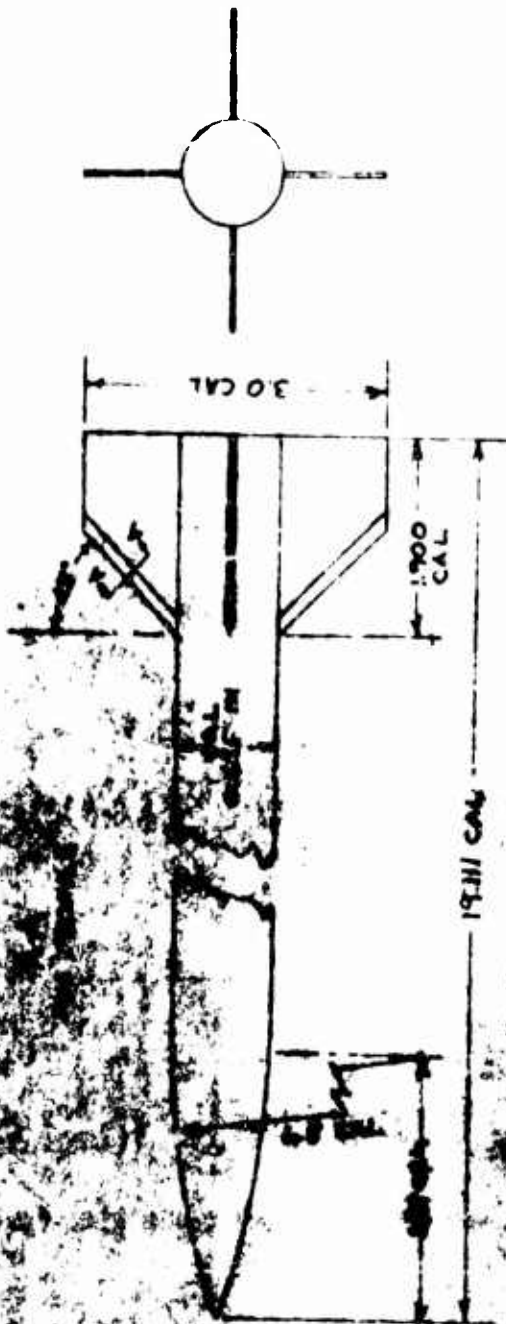
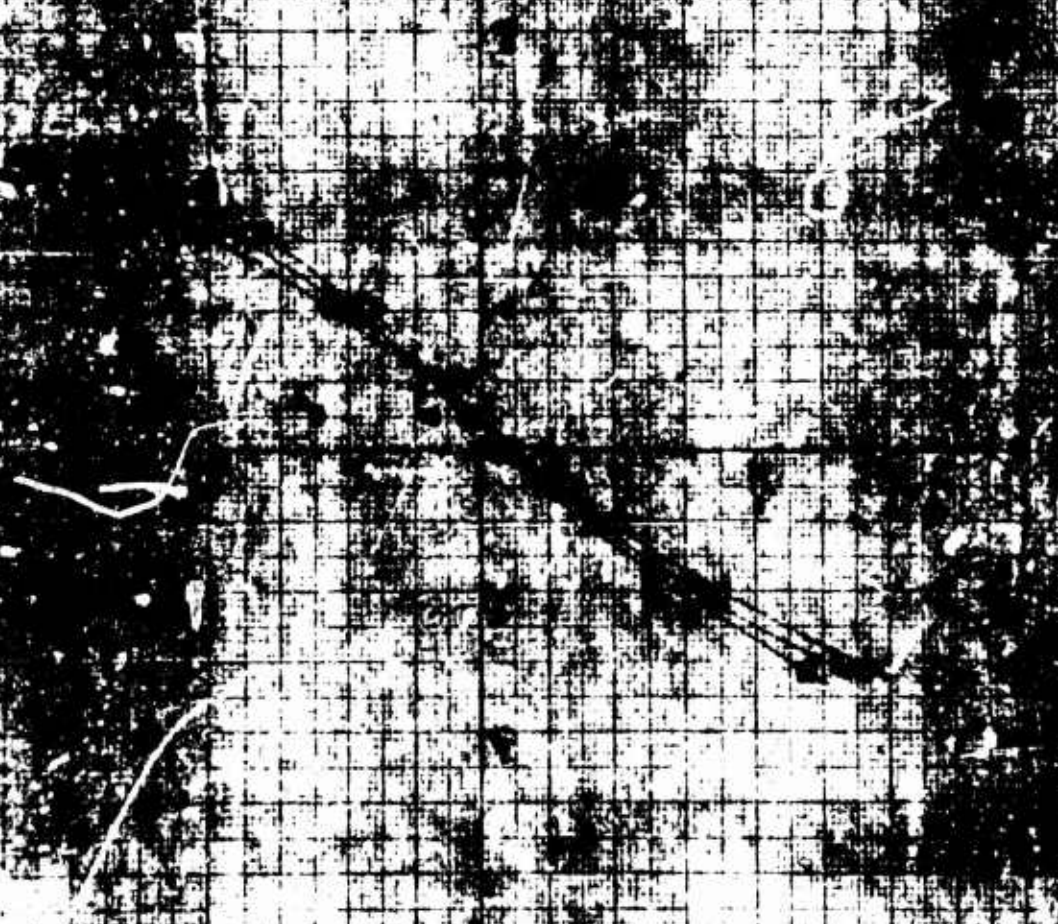
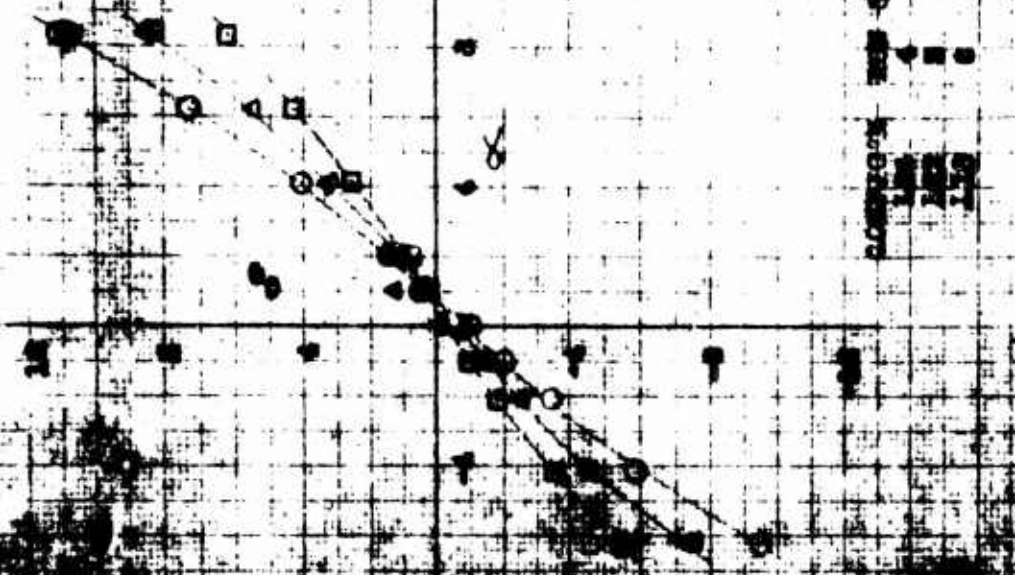


FIGURE 2  
ATV  
ALL TERRAIN VEHICLE

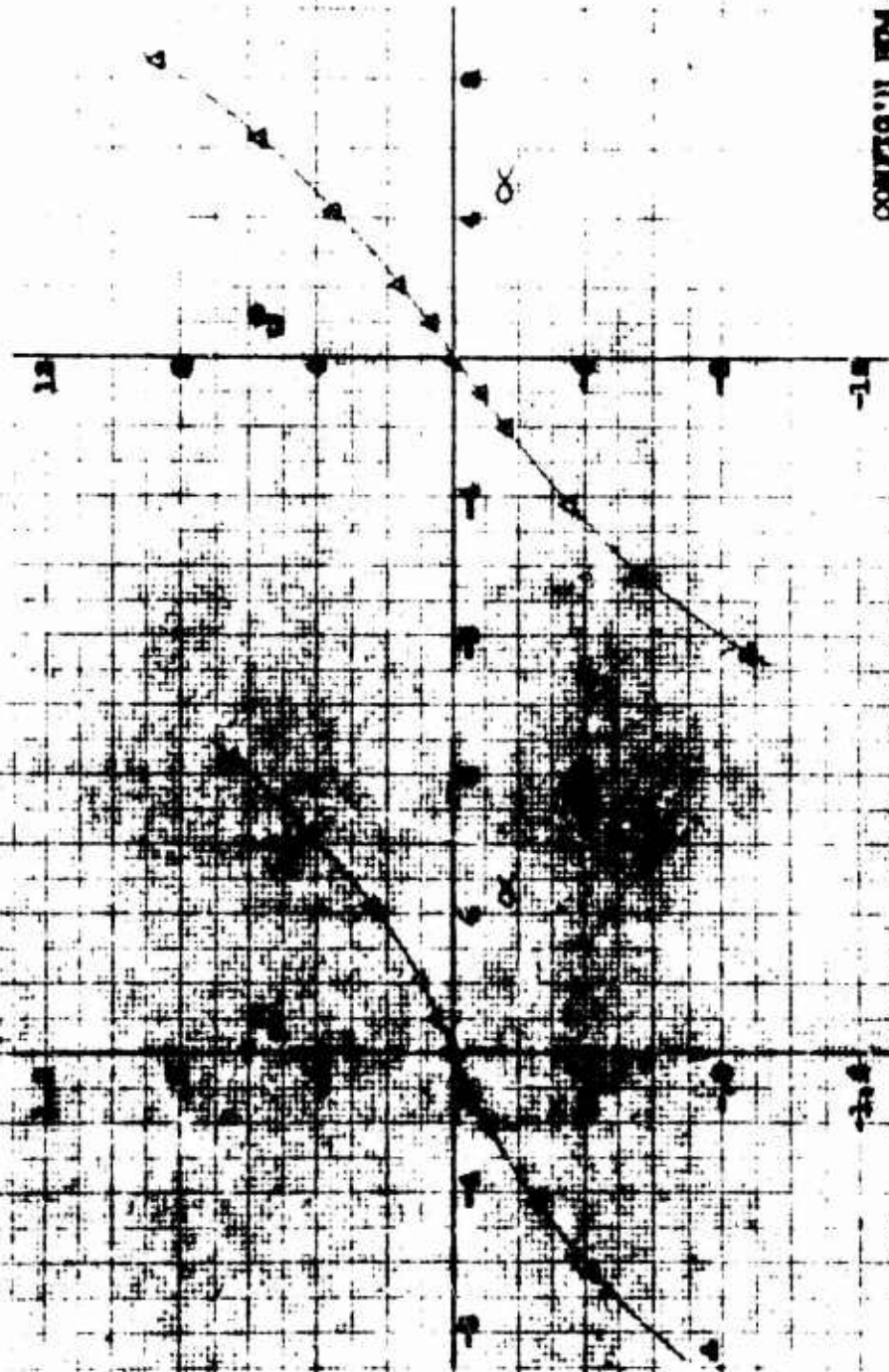
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COMBAT



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COMPTON HULL STRENGTH  
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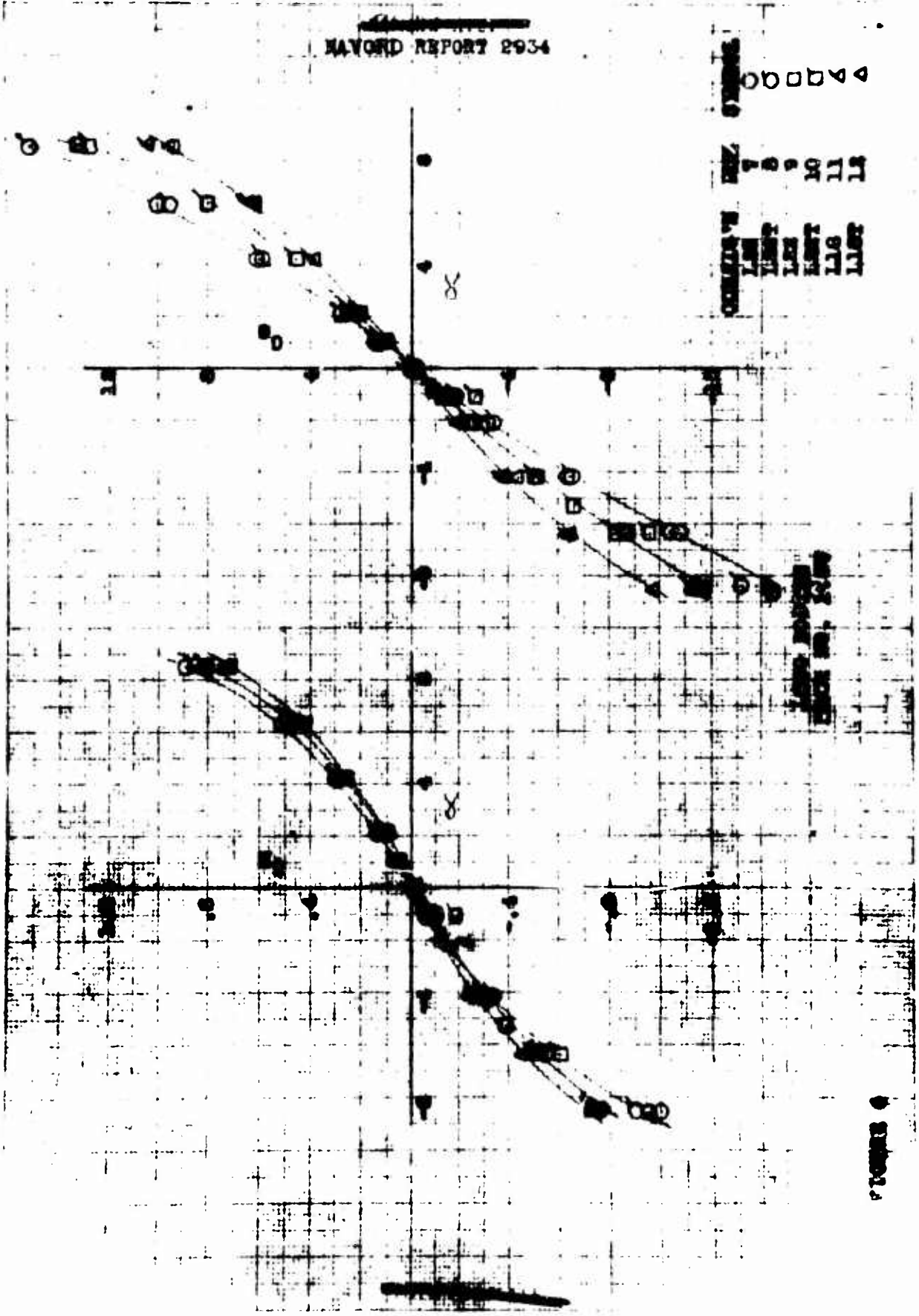


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DATE	TIME	W. STATION
12	11 53	1281
10	11 50	1282
9	11 47	1283
8	11 44	1284
7	11 41	1285
5	11 38	1286
4	11 35	1287
3	11 32	1288
2	11 29	1289
1	11 26	1290

NAUTICAL DISTANCE  
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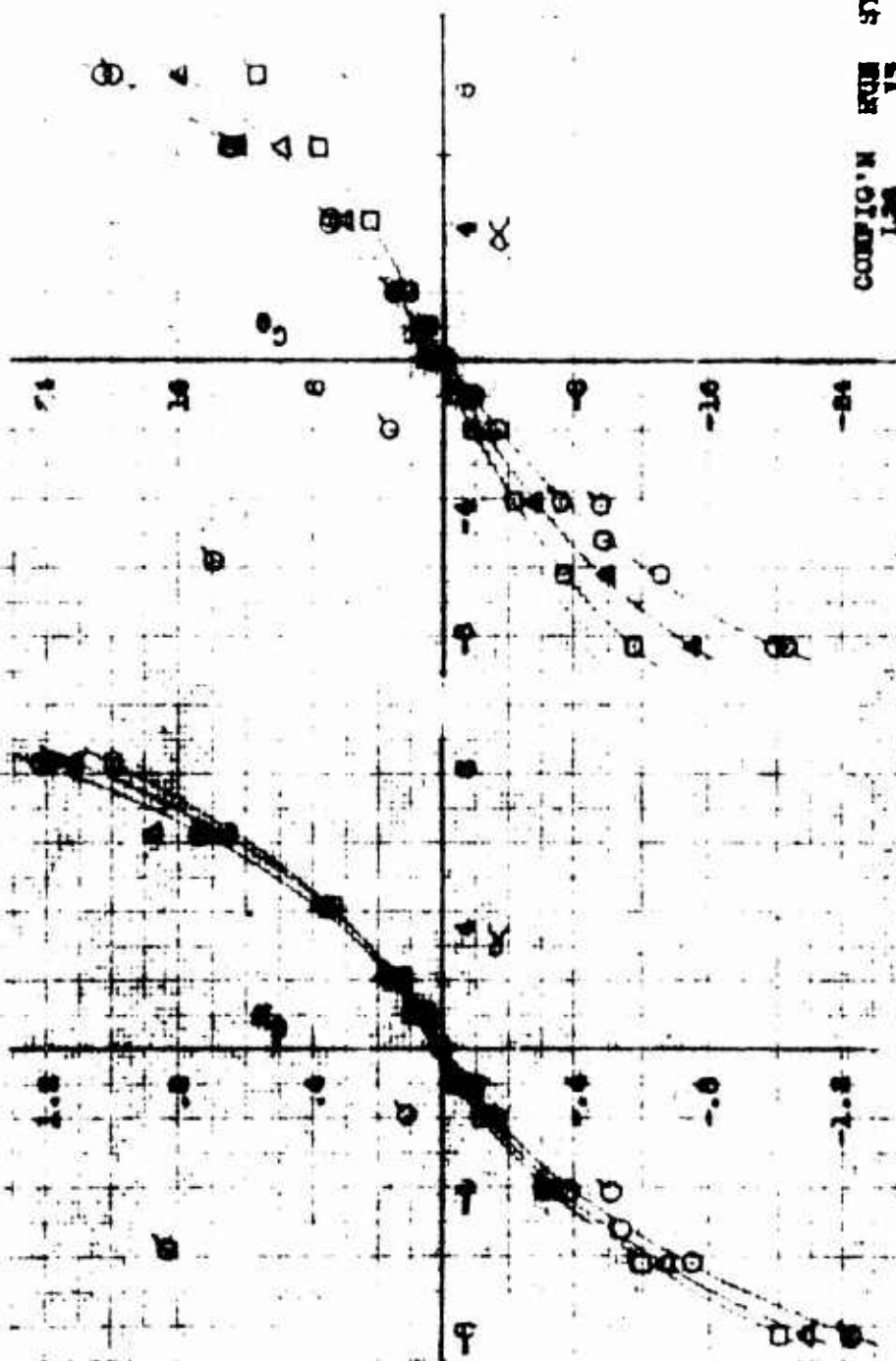
FIGURE 6



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COMPTON  
L26  
L26T  
L22  
L18

RUN SYMBOL  
13  
14  
15  
16



1.4 1.6 1.8 2.0 2.2

1.4 1.6 1.8 2.0 2.2

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COMPTON	WAVE	SYMBOL
100	17	○
100	18	△
100	19	□

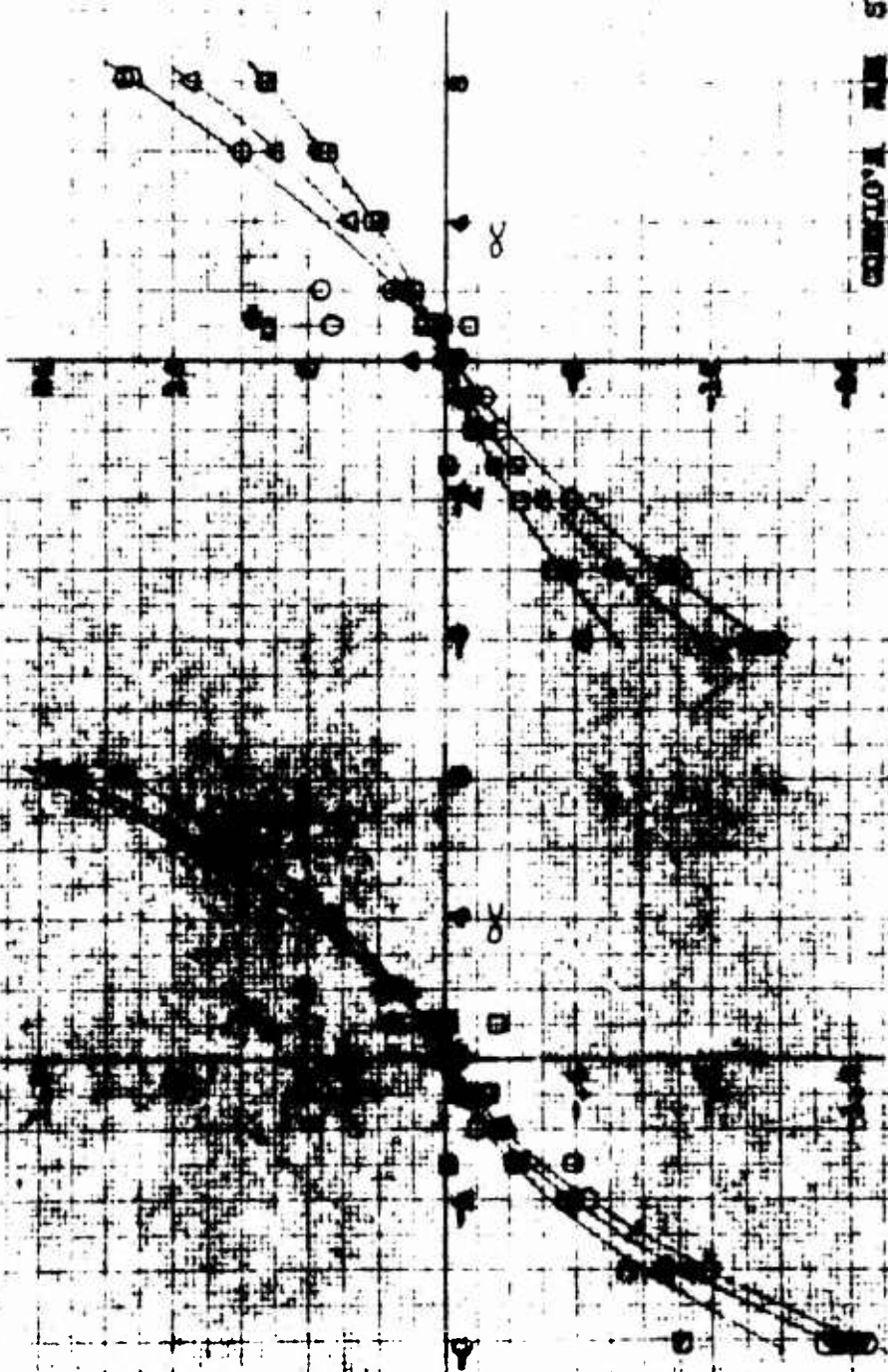
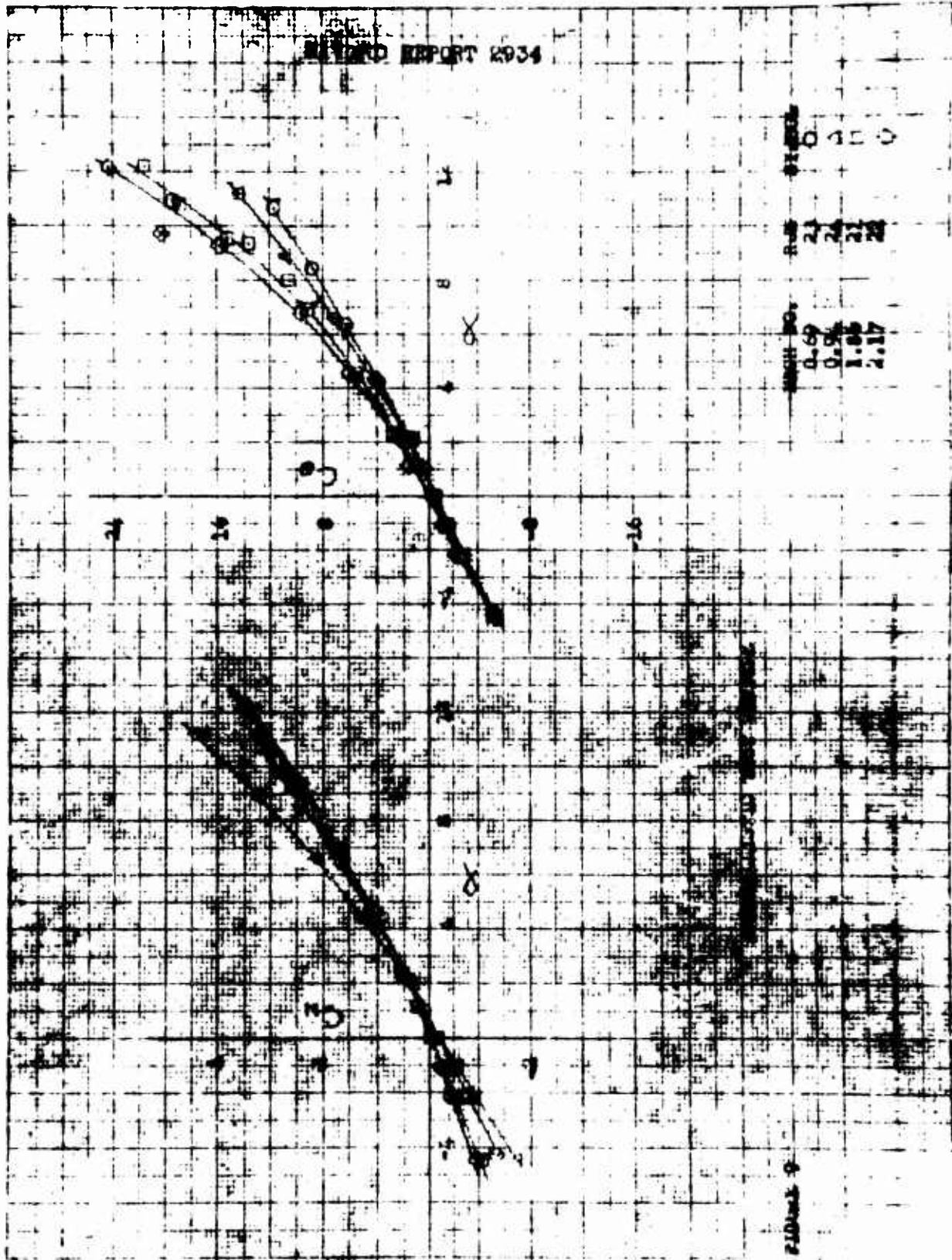


Figure 1

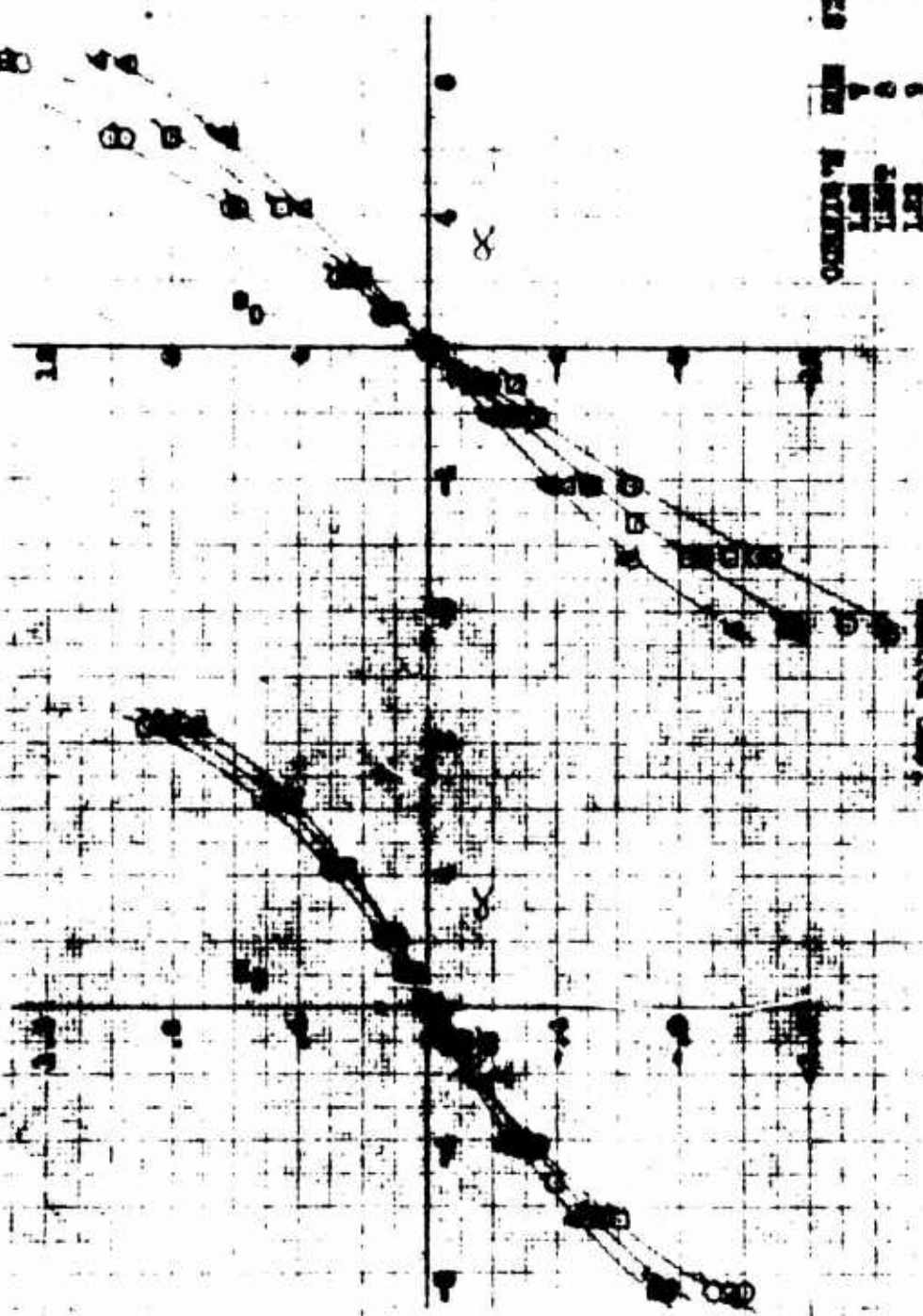


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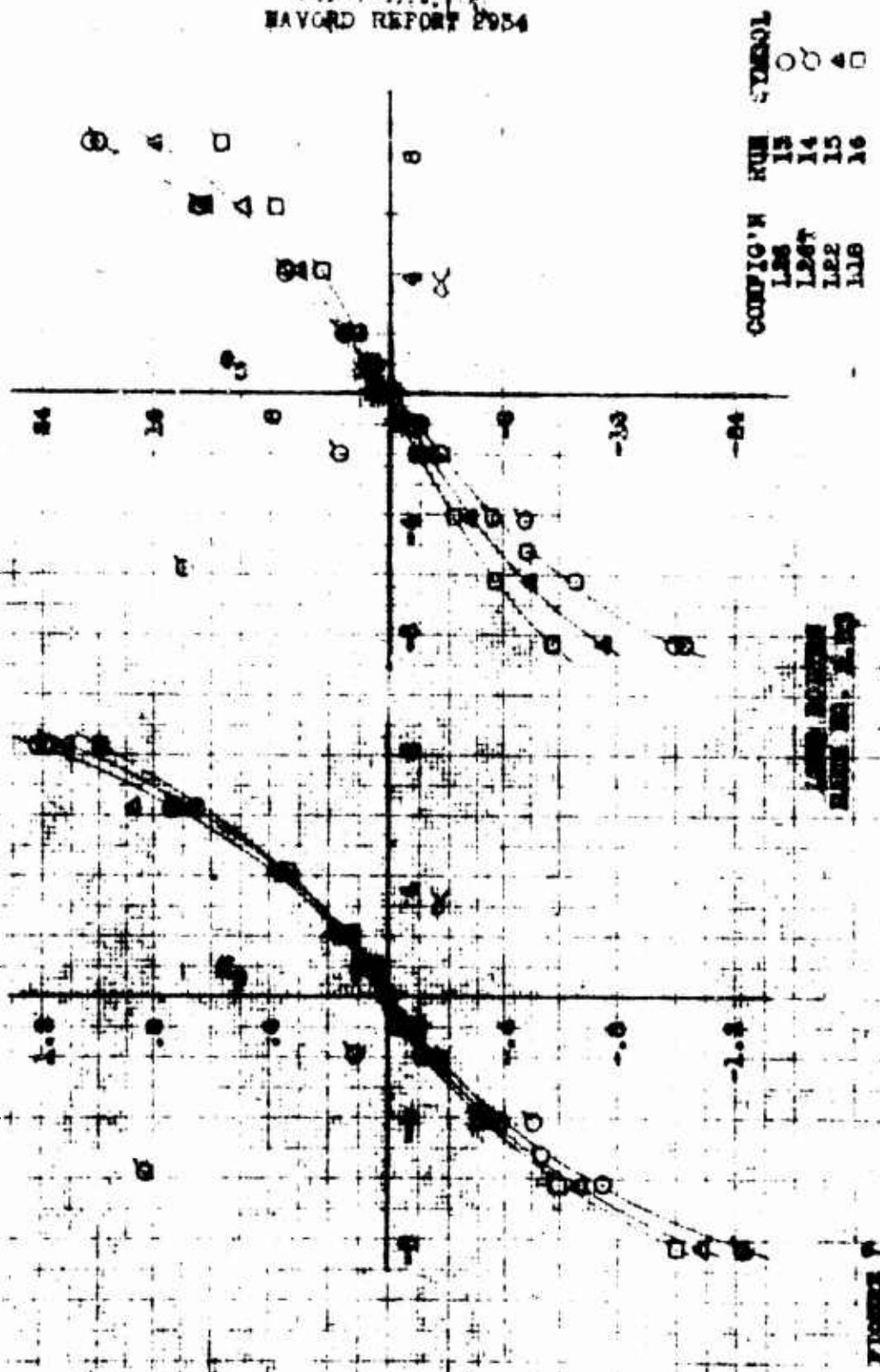
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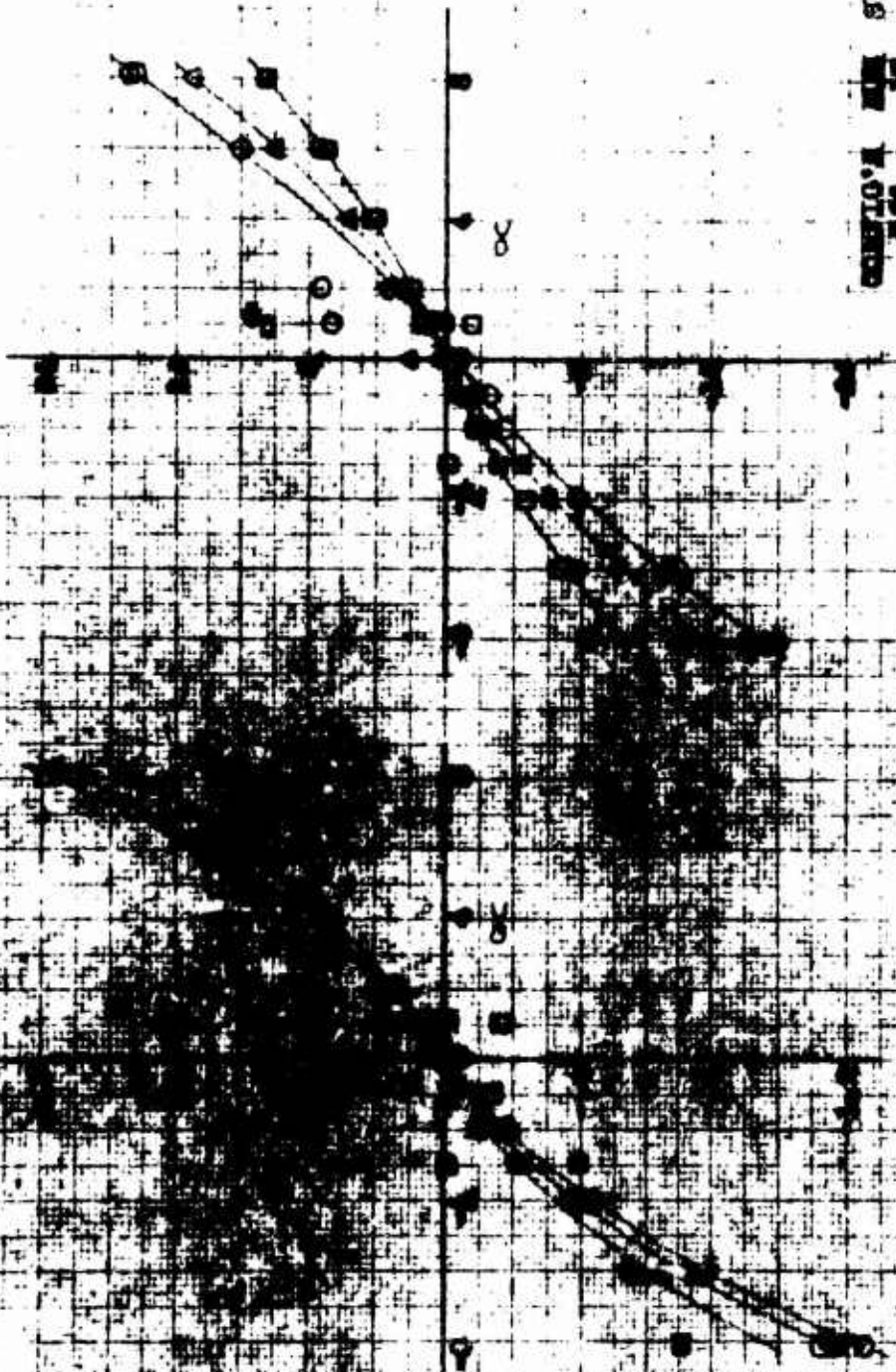
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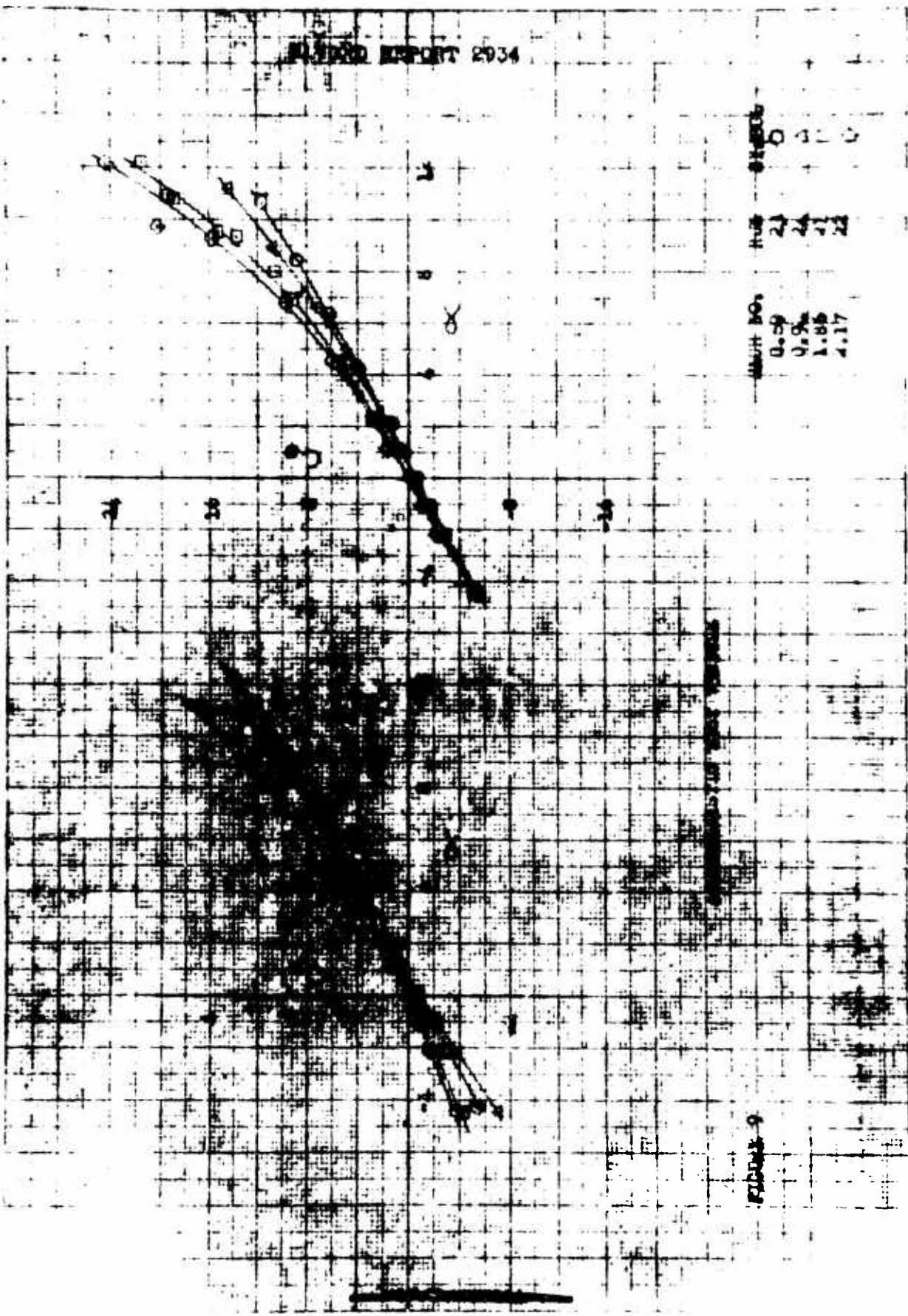


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040  
19 19 19  
19 19 19



FLIGHT REPORT 2934



WIND NO.	HUR	DIR
0.59	27	11
0.92	24	11
1.85	21	11
4.17	23	11

FIGURE 9

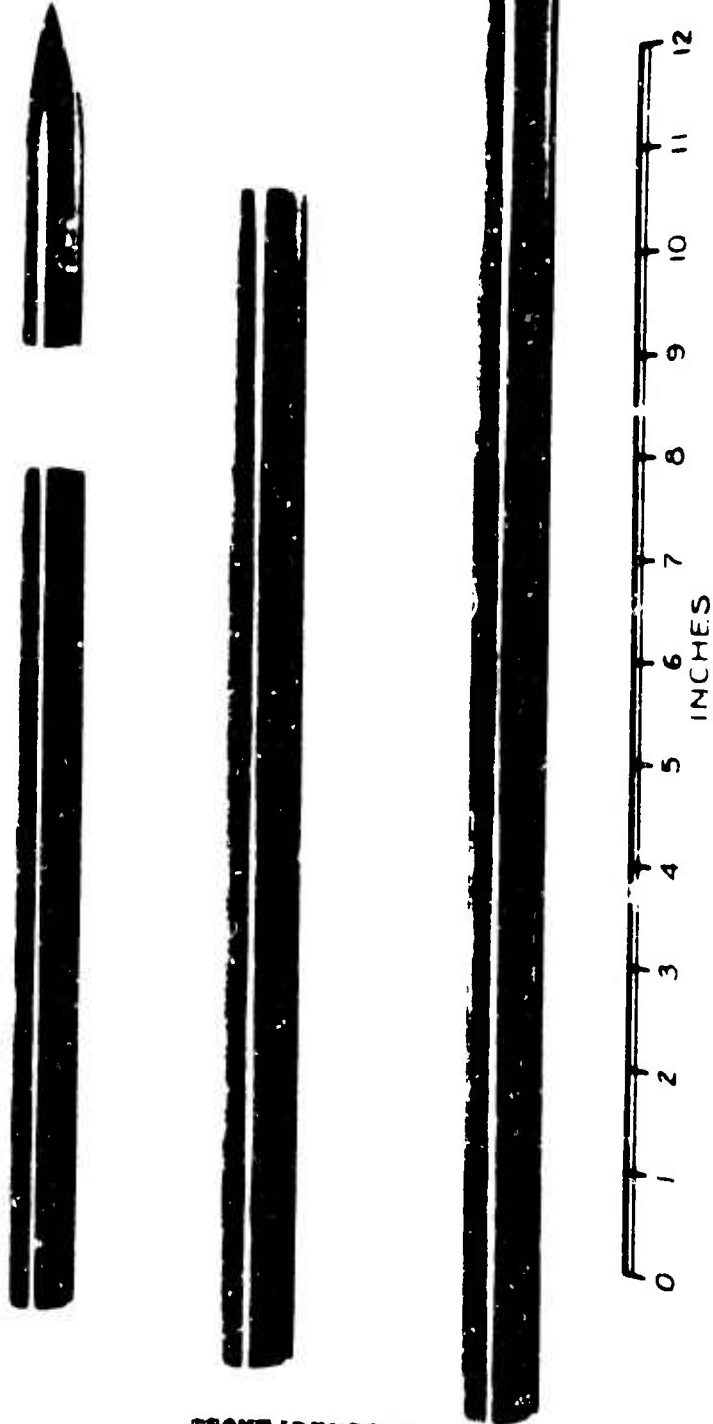


Fig. 10

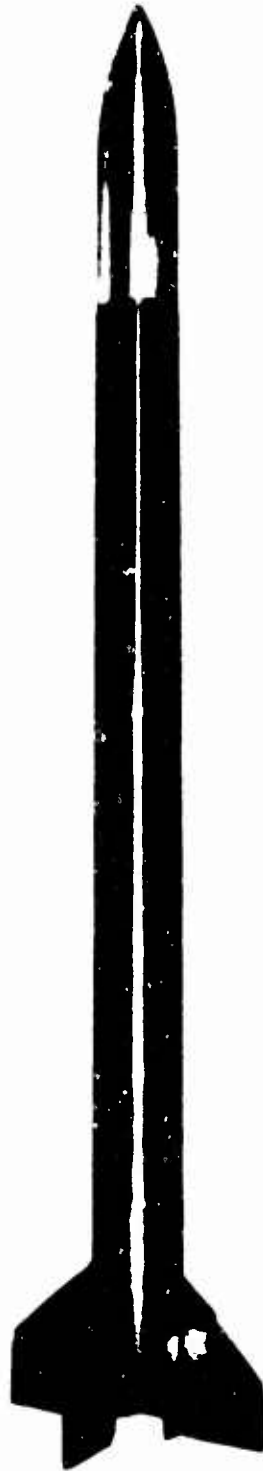


FIG. 11

Tabulated Data Information

- A. Column Heading symbols are defined on page 1.
- B. Decimal points for the coefficients and angles occur as indicated on Run 1.
- C. The sign of the coefficient and angles follow the readings.



229 01

	01	02	03
6	16-	5444-	9 2757-
4	11-	3585-	6 1681-
2	06-	1747-	3 1107-
1	04-	1387-	2 3674-
	02-	0545-	9 347-
2	01-	0219-	1 1652-
4	07-	0870-	1 7402-
6	12-	2148-	3 9093-
8	14-	3708-	6 6958-
2	08-	5491-	9 7071-
2	03-	1714-	3 1131-
1	03-	0804-	1 6269-
	08-	0874-	1 5729-
1	01-	0712-	1 1224-
1	03-	0147-	3 3505-
		0972-	1 7907-

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228 03

	AL	CN	CO
5	17-	4774-	6 9430-
4	11-	3085-	4 5504--
2	06-	1440-	2 6030--
1	04-	2199-	1 7 37--
	01-	0528-	
1	01-	0076-	6 143-
2	03-	0677-	1 2122-
4	08-	1423-	3 0547-
6	13-	3209-	5 1229-
8	20-	5207-	7 0297-
6	17-	4667-	2 0452--
2	06-	1432-	2 6209--
1	04-	1785-	1 5159--
1	00-	0169-	0 120-
1	04-	1225-	1 6022-

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228 03

	d	CN	Co
6	18-	4295-	5 1968-
4	12-	2527-	3 4054-
2	06-	1305-	1 8272-
1	04-	1157-	1 2974-
	02-	0492-	1 5510-
1	00	0118-	0 0701-
2	03	0355	0 7213
4	08	1624	2 3062
6	14	2819	3 8842
8	20	4569	5 8180
2	07-	1590-	1 9290-
1	04-	1117-	1 8535-
1	01	0003-	0 1579
6	18-	4387-	5 2616-

228 04

	OL	CN	Co
6	23-	5602-	9 5187-
4	15-	3469--	5 9111--
2	08-	2034--	3 4036--
1	05-	1172--	1 9924--
	01-	0407--	6 463--
1	01	0044	2 211
2	04	0738	1 4646
4	11	2247	4 0340
6	19	4154	7 3354
8	27	6591	11 1490
	02-	0640-	1 0109-
1	05-	1219-	2 0387-
1	01	0165	4 092
8	27	6487	10 9616
8	27	6364	10 8319

22A 05

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4	14-	3114-	4 5422-
2	08-	1721-	2 4901-
1	05-	1200-	1 5464-
	02-	0501-	5 5732-
1	04	0773	1 2714
2	05	0564	1 1055
4	12	2103	3 2477
6	20	3680	5 5621
8	30	5201	H 5188
1	05-	1103-	1 4354-
1	01	0001	2 052
2	05	0703	1 3337
6	25-	5214-	7 2773-

22A 06

α

6	27-
4	1M-
2	09-
1	05-
	01-
1	02
2	04
4	13
6	21
8	31
1	05-
1	01
2	06
8	40

β

4753-
3141-
1524-
0912-
0302-
0100
0258
1910
3285
5129
UM44-
U072
0776
6781

γ

5	492
1	0451
1	7799
	0794
	2769
	3162
	7124
2	5340
4	2827
6	2175
1	0061
	2605
1	1142
2	1964

22A 07

	$\alpha$	CN	C <sub>0</sub>
8	45 -	7564 -	14 3079 -
6	34 -	5524 -	10 8256 -
4	21 -	3402 -	6 5723 -
2	11 -	1407 -	3 1751 -
1	07 -	0869 -	1 5990 -
	01 -	0114 -	
1	05 -	0510 -	1 3757 -
2	09 -	1164 -	2 5334 -
4	19 -	2950 -	5 7909 -
6	33 -	5120 -	10 0456 -
8	51 -	8874 -	16 4721 -
4	36 -	5559 -	10 8744 -
1	07 -	0708 -	1 7175 -
8	86 -	0766 -	14 4314 -
4	21 -	3308 -	6 4582 -
4	20 -	3023 -	5 9598 -

CONFIDENTIAL  
 SACRED Report 2934

28A 08

	$\alpha$	CN	C	O
8	49-	4052-	16	3943-
6	34-	5567-	10	4263-
4	21-	3418-	6	5509-
2	14-	1713-	3	4561-
1	07-	UH39-	1	8179-
	01-	U107-		2400-
1	05	U604	1	3583
2	10	1277	2	7427
4	19	2286	5	8257
6	31	4828	9	5138
8	47	8149	15	0988
8	40-	7290-	13	2396-
1	07-	UH66-	1	8766-



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MAYO Report 293b

24A 04

	$\alpha$	CN	C $\theta$
8	59-	9554-	14 5137-
6	37	5309-	A 7175-
4	22	3205-	5 200A-
2	11	163H-	2 6890-
1	06	0940-	1 4979-
	00	0503-	1634-
1	05	0432	1 0501
2	10	1009	2 1531
4	20	2554	4 849A
6	35	4641	7 9532
8	55	A509	13 3003
8	55	A425	13 2917
5	2H-	3967-	6 6106-
1	06-	0903-	1 4A40-

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22A 10

$\alpha$	CN	C
8 47-	7313-	11 3673-
6 35-	5037-	8 2219-
4 21-	3161-	5 0624-
2 11-	1576-	2 5854-
06-	0955-	1 4921-
00	0167-	0 522A-
06	0530	1 197A
11	1151	2 2920
20	2569	4 5208
34	4700	7 9729
8 82	8167	12 702A
6 47-	7535-	11 6084-
6 40-	6079-	9 5842-
1 21-	1244-	2 7354-
6 35-	5005-	8 1962-

~~CONFIDENTIAL~~  
RATED Report 8934

RUN  
22A 11

	$\alpha$	CN	C0
8	66-	9585-	11 7178-
6	37-	4776-	6 5309--
4	22-	2740-	3 8722--
2	11-	1347-	1 9052--
1	06-	0742-	1 0334--
	00	0072-	0083
1	06	0529	9944
2	11	1152	1 9392
4	22	2498	3 8052
6	37	4476	6 3930
8	52	8050	10 3482
1	06-	0722-	1 0070-
6	36	4399	6 1337

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NAVCO Report 8934

22N 12

$\alpha$	CN	C
35-	4464-	6 2242-
25-	3361-	4 4082-
11-	1394-	1 9679-
06-	UH24-	1 1012-
00	U037-	0459
1 06	0580	1 0339
2 11	1220	1 9656
1 22	2604	3 8465
6 35	4174	6 0964
8 54	7313	9 5580
8 55-	7473-	9 6791-
4 22-	2756-	3 8231-
1 06-	UH10-	1 0682-
1 06	0616	1 0458
8 53	7133	9 4089

NAVY Report 293

22A 13

$\alpha$	CN	C
6 20-	7521-	13 1884-
4 12-	3850-	7 3403-
2 06-	1652-	3 3600-
1 03-	0796-	1 6117-
00	0014	0207-
1 03	0760	1 8338
2 06	1845	3 1491
6 20	7396	12 9438
8 29	2237	20 4752
8 29-	2327-	20 5917-
5 16-	2431-	9 8359-
1 03-	0800-	1 7803-
1 03	0612	1 3489
4 12	3612	6 9828

~~CONFIDENTIAL~~  
MATED Report 299A

26A 14

	Q		CN		Co
8	2A-	1	205A-	20	0555-
5	80-		8270	13	935A
4	16-		5149-	9	5996-
1	94-		1616	3	3052
1	03-		0756-	1	5594-
	00		0044		0856
1	03		0711	1	5286
2	05		1492	3	012A
4	12		3661	7	0054
6	19		7359	12	8521
8	2A	1	1835	19	7526
4	12-		379A-	7	2406-

~~CONFIDENTIAL~~  
SECRET Report 1954

22A 15

$\alpha$	CN	Ce
8 31-	1 0434-	15 2048-
6 21-	6753-	9 9550-
4 13-	3385-	5 5811-
8 06-	1391-	2 4500-
1 03-	0728-	1 2287-
1 03	0573	1 1917
2 07	1793	8 9494
4 13	3774	6 0089
6 26	8760	12 6456
8 32	1 1230	15 7796
00	0144	1701
1 03-	0693-	1 1911-
6 21	6725	9 9248
1 03	0622	1 2289
2 06	1230	2 3479

REPORT  
RUCED Report 1954

220 16

	$\alpha$	CN	Co
8	33-	1 U02A-	11 6007-
6	22-	6134-	7 4247-
4	13-	3815-	4 3411-
2	06-	1861-	1 9497-
1	03-	U450-	0420-
	00	U021-	0621-
1	04	U916	1 1043
2	07	1422	2 1307
4	13	3305	4 4700
6	22	6633	7 6010
8	33	9852	11 3133
6	44	6305	7 8262
1	03-	U607-	9982-
1	03	U673	9782
2	06	1404	2 1150
1	03	0883	1 1640



**GENERAL**  
**SAVED Report 873**

**22A 17**

		3.	CN	Co
8	04-		1 1237-	12 2076-
6	05-		7563-	13 3209--
4	04-		4306-	7 7881--
2	04-		1241-	3 4046--
1	01-		0732-	1 5343--
	00		0945-	5649--
1	03		3222	6 6222
2	03		4062	7 2042
6	05		7100	11 2704
6	05		1242	12 2703
1	01-	1	1309-	2 5122-
	C1-		0475-	2702-
1	00		0317	7220
2	02		1737	3 7242
6	02-	1	2465-	12 2214-
6	02-	1	2132--	12 3235--
6	06-		2423-	14 1222-
8	07	1	1513	12 3222

STATISTICAL  
BUREAU REPORT 1954

228 18

	X	CN	C
8	10-	1 1572-	15 7824-
6	06-	7168-	10 2757-
4	04-	3992-	6 0437-
2	02-	1574-	2 7528-
1	01-	0320-	7207-
	00	0279	3402
1	01	0399	7442
2	02	1574	2 5434
4	04	3553	5 6817
6	06	7042	10 0722
8	09	1 1049	14 9652
4	01-	0711-	1 0000-
1	01-	0884-	1 4441-
	01	1777	2 2227
1	01	0456	8000
2	02	1559	2 9107

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 REPORT Report 1934

22A 19

	<i>d</i>	CN		Co
	3 0A-	7095-	8	3703-
	6 07-	6508-	7	6133-
	4 04-	3737-	4	6734-
	2 02-	1006-	1	6939-
	1 01-	1511-	1	6671-
	00	0136		0242
	1 01	0567		6035
	2 02	1375	1	0209
	4 04	3517	4	3000
	6 06	2754	6	8500
	8 09	9562	10	5269
	6 06-	5583-	6	6554-
	2 02-	1797-	2	2300-
	1 01-	0639-		1700-
	00	0482-		8500-
	1 01	1547	1	4100-
	00	0812-		4000-
	99	1610-	1	4900-
	00	0078-		2900-
	04	3250	4	1000-
	06	6131	7	1000-
	94-	3959-	4	5000-
	00-	3619-	4	6000-
	03-	2342-	2	9000-
	03-	2292-	2	9000-
	00-	0132-		1100-

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REPORT Report 873

82A 2C

8	53-	7656-	H	8292-
6	36-	4200--	5	7705--
4	23-	2616--	3	6262--
2	11-	1176--	1	7362--
1	06-	0616--		9246--
	01-	0043--		0883--
2	10	1094	1	6082
6	36	4147	5	7222
8	54	6525	2	6489
1	06-	0602--		8094--
	01-	0042--		0041--
1	05	0509		7506
4	22	2516	3	8150

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 REPORT Report 1976

22A 21

	$\alpha$		CN		Co	
	4	51-	1	4567-	H	3400-
	2	73-		6809-	3	0000-
	1	14-		373A-	2	2000-
		01-		U134-		2000-
	1	10		3343	1	7100-
	2	26		7490	4	2300-
	4	52	1	4940	0	5000-
	6	AA	2	3828	14	3000-
	9	6A	4	0817	27	1000-
	12	17	4	7713	34	7700-
	4	52-	1	4666-	0	4600-
	2	25-		7161-	4	1100-
	1	13-		3586-	2	2100-
		01-		U130-		1100-
	1	14		3600	2	2000-
	8	10	2	8166	17	0000-
	9	50	3	4980	26	1000-
	10	9A	4	2194	30	1000-
	6	90	2	3582	14	0000-
	4	00	2	3297	14	0000-
	4	56	1	5213	9	0000-
	2	27		7233	0	0000-
		02		0120		0000-
		33	2	4000	16	0000-
		34	3	3017	21	0000-
		77	4	0890	20	0000-
		25	1	4790	4	0000-
		25		7218	4	0000-

UNITED STATES  
BUREAU OF REVENUE  
Report 1934

82A 82

	$\alpha$	CN	Co
4	45-	1 3405-	8 6742-
2	14-	5464-	3 4989-
1	10-	2980-	1 8477-
	01-	0255-	8 2678-
1	13	2723	8 4089
2	21	6467	3 9078
4	48	1 4893	9 1873
6	92	2 2029	15 3782
9	71	4 2260	32 0880
12	07	4 7318	38 5883
1	40-	1 0381-	7 4733-
	04	0922	7 4228
	90	3109-	1 9178-
	88-	3688	8 3882
4	43	1 3008	8 2078
9	33	3 2872	84 8788
8	64	1 8038	18 0038

228 23

$\alpha$

4	32-
2	16-
1	10-
	04-
1	02-
2	07-
4	25-
6	36-
8	53-
10	70-
2	81-
1	11-
	09-
1	08-
4	23-
2	17-
	03-

CN

1	0708-
	9107--
	6662--
	2585--
	1435
	2111
1	4022
2	2029
3	2804
4	2976
1	1277-
	6347--
	4343--
	0807
1	3564
1	0833-
	2633-

CO

4	4141-
4	3361--
2	7868--
1	0834--
	4972--
1	9813-
6	3482-
9	6829-
3	9640-
1	4094-
1	6010--
	7999--
2	3738-
	4325-
5	9807-
4	5807-
	8400-

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**INAD Report 273**

**32A 24**

	<i>X</i>	CN	Co
	4 41-	2 3784-	8 9008-
	2 2 -	1 3040-	4 7755-
	1 10-	8247-	3 0346-
	05-	2808-	9923-
	1 05	2113	8774
	2 15	7250	2 7853
	4 36	1 7349	6 6888
	6 61	2 8906	11 3886
	9 91	4 4238	17 1894
	11 20	5 7429	22 4848
	6 61	2 9296	11 4943
	8 93	4 4705	17 3768
	11 31	6 0036	24 3773