TECHNICAL NOTES

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

No. 128

TESTS ON AN AIRPLANE MODEL, AEG D I OF THE ALLGEMEINE ELEKTRICITATS GESELLSCHAFT, A.-G., AIRPLANE CONSTRUCTION SECTION CONDUCTED AT THE GÖTTINGEN MODEL TESTING LABORATORY FOR AERODYNAMICS.

By Max Munk and Wilhelm Molthan.

From Technische Berichte, Volume III, Part 2.

February, 1923.

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Tests were carried out in the small wind tunnel of the Göttingen establishment, on a complete model of the AEG D I Airplane (See Fig. 1). The agreement between the model and the complete airplane applies particularly to the wings, which have ribs cut out of sheet metal, and built up in exactly the same manner as in the actual airplane. These ribs are assembled upon a steel spar and secured by intermediate soldered strips with the individual ribs set at the correct angle of incidence. Instead of using a fabric covering for the wing framing, the spaces between the individual ribs were filled with plaster of Paris.

All control surfaces were adjustable and could be placed at any desired angle; while a spirit-level, placed in the interior of the wooden body of the model so as to be visible from the outside, was set coincident with a horizontal engine crankshaft axis, thereby facilitating the placing of the model in the correct position. The model was not fitted with a propeller,

* From Technische Berichte, Volume III, Part 2.

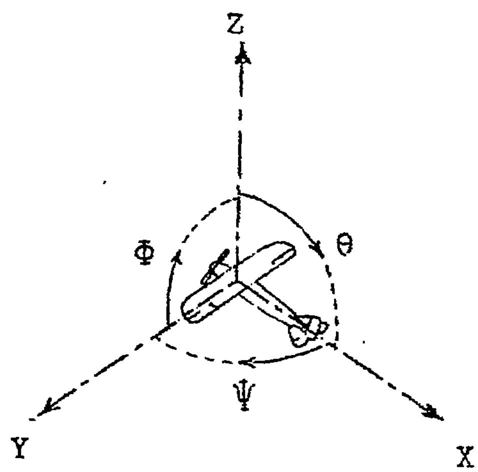
so that the effect it would produce does not appear in the accompanying test data. Figure 1 shows the principal dimensions of the model, as well as particulars regarding the more important angles of incidence.

Numerous series of tests were carried out with this model, in which one or other of the control surfaces were adjusted to various angles, while the others remained in their neutral positions.

During the first three series of tests, the stabilizer was set at a positive angle of 3° 45' relative to the axis of the engine crankshaft, in accordance with the data given on the drawings - after which further tests at a 6° 30' angle were made. Finally, the model was tested with the tail group removed.

With the elevators set in the prescribed positions, the lift, the drag, and the moments about an axis passing through the center of gravity and perpendicular to the plane of symmetry were measured. All three sets of readings are given as absolute coefficients, (See tables 1 to 4). In order to obtain these coefficients, the readings obtained for the lift and the drag have been divided by the product of q/100 and the area of the entire supporting surface $S = 1480\ cm^2$ ($229.4\ in^2$) - the area representing the space occupied by the fuselage on the lower wing, i.e., the product of the body width and the chord of the lower wing, being included in the total wing area. The moments, similarly, refer to this surface and the maximum chord of the upper wings, be-ing divided by the product of the wing area and the maximum upper wing chord, S c = 17908 cm³ (1092.82 in³).

In these tests, where one of the other control surfaces was deflected from its neutral position, the moment produced by that adjustment of the surface was also measured. The rolling moment (C_l) is about an axis passing through the center of gravity and parallel to the axis of the engine crankshaft. The axis of the yawing moment (C_n) passes through the center of gravity, perpendicular to the axis referred to above, and is considered positive in an upward direction.



The coefficients for both these latter moments are obtained by dividing the readings obtained by the same product of the maximum upper wing chord and the wing area, as when determining the pitching moment C_m. The moments are considered positive if the rotation produced by them, when observed in the direction of their positive axis, is clockwise.

The yawing moment produced by the setting of the ailerons was not measured, since it is negligible compared with the moment produced by the rudder, attaining a maximum of only $1\frac{1}{2}$ units.

The data obtained are plotted in Figures 2 to 5, so that the lift curves for the several positions of the control surfaces are always on the left, while the corresponding moment values, dependent upon these lift coefficients, are to the right.

Table 1.

Experiments with Variation in the Elevator Adjustment.
Stabilizer 3° 45'.

Elevator 0° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.334	.106	-.041	-3.1
-6	-.081	.0664	-.017	-1.2
-4.5	.024	.0574	-.012	0.4
-3	.130	.0521	-.007	2.5
-1.5	.234	.0507	.001	4.6
0	.342	.0530	.011	6.4
1.5	.439	.0563	.017	7.5
3	.549	.0672	.028	8.2
4.5	.650	.0760	.036	8.6
6	.756	.0900	.055	8.4
9	.942	.128	.087	7.3
12	1.058	.183	.147	5.8

Elevator 5° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.308	.104	-.012	-3.0
-6	-.055	.0674	.011	-0.8
-4.5	-.051	.0578	.016	0.9
-3	.158	.0539	.022	2.9
-1.5	.258	.0534	.028	4.8
0	.371	.0563	.039	6.6
1.5	.473	.0626	.051	7.6
3	.582	.0719	.058	8.1
4.5	.676	.0821	.067	8.2
6	.787	.0976	.084	8.0
9	.966	.139	.109	7.0
12	1.080	.199	.176	5.4

Table 1 (Contd.)

Experiments with Variation in the Elevator Adjustment.
Stabilizer 3° 45'.

Elevator 10° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crank-shaft axis.	C_L	C_D	C_m	L/D
-9°	-.310	.104	.019	-3.0
-6	-.057	.0643	.043	-0.9
-4.5	.051	.0580	.047	0.9
-3	.156	.0530	.059	3.0
-1.5	.262	.0535	.067	4.9
0	.375	.0585	.077	6.4
1.5	.487	.0650	.083	7.5
3	.592	.0756	.098	7.9
4.5	.691	.0862	.103	8.1
6	.784	.101	.120	7.9
9	.977	.142	.150	6.9
12	1.080	.206	.207	5.2

Elevator 15° - Rudder 0° - Aileron 0°

Angle of incidence	C_L	C_D	C_m	L/D
-9°	-.285	.105	.083	-2.6
-6	-.028	.0710	.135	-0.4
-4.5	.078	.0599	.131	1.3
-3	.188	.0570	.140	3.3
-1.5	.294	.0578	.138	5.1
0	.405	.0638	.156	6.3
1.5	.505	.0720	.164	7.0
3	.619	.0824	.173	7.5
4.5	.711	.0933	.181	7.6
6	.819	.110	.190	7.4
9	1.000	.152	.217	6.6
12	1.102	.218	.259	5.1

Table 1 (Cont.)

Experiments with Variation in the Elevator Adjustment.
Stabilizer 3° 45'

Elevator 20° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.266	.105	.115	-2.5
-6	-.007	.0703	.161	-1.1
-4.5	.093	.0652	.163	1.4
-3	.205	.0619	.180	3.3
-1.5	.307	.0642	.185	4.8
0	.421	.0698	.197	6.1
1.5	.525	.0776	.209	6.8
3	.632	.0893	.216	7.1
4.5	.737	.102	.229	7.3
6	.840	.116	.234	7.2
9	1.020	.161	.253	6.3
12	1.120	.229	.281	4.9

Elevator 25° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.242	.109	.180	-2.2
-6	.011	.0771	.209	0.1
-4.5	.120	.0716	.217	1.7
-3	.234	.0691	.235	3.4
-1.5	.334	.0723	.234	4.6
0	.447	.0773	.248	5.8
1.5	.548	.0862	.258	6.3
3	.658	.0975	.268	6.8
4.5	.750	.109	.267	6.9
6	.854	.124	.272	6.9
9	1.035	.169	.284	6.1
12	1.122	.237	.318	4.7

Table 1 (Cont.)

Experiments with Variation in the Elevator Adjustment.
Stabilizer 3° 45'.

Elevator 30° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.201	.115	.235	-1.8
-6	-.051	.0842	.270	0.6
-4.5	.160	.0785	.276	2.0
-3	.270	.0773	.294	3.5
-1.5	.382	.0801	.304	4.8
0	.486	.0871	.314	5.6
1.5	.594	.0968	.317	6.2
3	.699	.109	.324	6.4
4.5	.790	.120	.319	6.6
6	.893	.134	.323	6.6
9	1.062	.180	.325	5.9
12	1.158	.249	.378	4.7

Elevator -5° - Rudder 0° - Aileron 0°

Angle of incidence	C_L	C_D	C_m	L/D
-9°	-.331	.108	-.076	-3.0
-6	-.051	.0691	-.057	-0.7
-4.5	+.029	.0588	-.052	0.5
-3	.130	.0552	-.046	2.0
-1.5	.241	.0552	-.043	4.4
0	.350	.0585	-.035	6.0
1.5	.450	.0642	-.032	7.0
3	.563	.0730	-.018	7.7
4.5	.665	.0840	-.009	7.9
6	.767	.0965	.009	8.1
9	.946	.138	.031	6.9
12	1.046	.200	.084	5.2

Table 1 (Contd)

Experiments with Variation in the Elevator Adjustment.
Stabilizer 3° 45'.

Elevator -10° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.349	.109	-.121	-3.2
-6	-.093	.0682	-.103	-1.4
-4.5	.006	.0581	-.098	0.1
-3	.118	.0540	-.089	2.2
-1.5	.217	.0526	-.086	4.1
0	.328	.0554	-.076	6.9
1.5	.431	.0617	-.068	7.0
3	.543	.0693	-.055	7.8
4.5	.651	.0803	-.048	8.1
6	.756	.0928	-.028	8.2
9	.940	.133	.002	7.1
12	1.035	.192	.053	5.4

Elevator -15° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.377	.115	-.183	-3.3
-6	-.122	.074	-.171	-1.6
-4.5	-.011	.063	-.161	-0.2
-3	.095	.058	-.150	1.6
-1.5	.198	.057	-.150	3.4
0	.306	.058	-.135	5.2
1.5	.410	.064	-.132	6.4
3	.521	.072	-.115	7.3
4.5	.631	.082	-.104	7.8
6	.737	.096	-.089	7.7
9	.917	.133	-.046	6.8
12	1.020	.193	.015	5.3

Table 1 (Cont.)

Experiments with Variation in the Elevator Adjustment.
Stabilizer 3° 45'.

Elevator -20° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.392	-.121	-.226	-3.2
-6	-.138	.0780	-.213	-1.8
-4.5	-.030	.0680	-.207	-0.4
-3	.071	.0619	-.199	+1.2
-1.5	.183	.0603	-.191	3.0
-0	.296	.0624	-.176	4.8
1.5	.397	.0670	-.173	5.9
3	.508	.0735	-.159	6.9
4.5	.604	.0815	-.147	7.4
6	.714	.0943	-.124	7.6
9	.900	.131	-.081	6.9
12	1.000	.188	-.012	5.3
Elevator -25° -		Rudder 0° -	Aileron 0°	
-9°	-.410	.128	-.275	-3.2
-6	-.165	.0850	-.262	-1.9
-4.5	-.053	.0754	-.256	-0.7
-3	.053	.0682	-.242	0.8
-1.5	.157	.0666	-.244	2.4
0	.273	.0685	-.230	4.0
1.5	.373	.0728	-.220	5.1
3	.486	.0795	-.206	6.3
4.5	.594	.0878	-.182	6.8
6	.694	.0997	-.181	7.0
9	.878	.134	-.153	6.5
12	.990	.192	-.057	5.1

Table 1 (Cont.)

Experiments with Variation in the Elevator Adjustment.
Stabilizer 3° 45'.

Elevator -30° — Rudder 0° — Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.428	.142	-.328	-3.0
-6	-.181	.0997	-.324	-1.8
-4.5	-.076	.0876	-.323	-0.9
-3	-.032	.0803	-.312	0.4
-1.5	.136	.0773	-.311	1.8
0	.246	.0777	-.300	3.2
1.5	.350	.0810	-.290	4.3
3	.459	.0875	-.274	5.2
4.5	.560	.0948	-.270	5.9
6	.665	.106	-.258	6.3
9	.858	.141	-.218	6.1
12	.982	.195	-.133	5.0

Table 2.

Experiments with Variation in the Rudder Adjustment.
Stabilizer 3° 45'.

Angle of incidence with reference to the crankshaft axis	C_L	C_D	C_m	C_l	C_n	L/D
Elevator 0° -		Rudder -10° -			Aileron 0°	
-9°	-.300	.102	-.0449	—	.0491	-2.9
-6	-.057	.0652	-.0220	—	.0445	-0.9
-4.5	.049	.0550	-.0100	—	.0434	0.9
-3	.154	.0512	-.0056	—	.0425	3.0
-1.5	.251	.0518	.0018	—	.0440	4.9
0	.362	.0558	.0104	—	.0432	6.5
1.5	.457	.0612	.0174	—	.0428	7.5
3	.563	.0709	.0268	—	.0404	7.9
4.5	.659	.0799	.0407	—	.0399	8.2
6	.766	.0940	.0685	—	.0389	8.1
9	.939	.134	.0894	—	.0419	7.0
12	1.038	.191	.140	—	.0399	5.4
15	1.020	.329	.218	—	.0589	3.1
Elevator	0° -	Rudder -5°		-	Aileron 0°	
-9°	-.297	.0980	-.0413	—	.0351	-3.0
-6	-.061	.0619	-.0153	—	.0311	-1.0
-4.5	.039	.0534	-.0113	—	.0300	0.7
-3	.139	.0485	-.0025	—	.0302	2.9
-1.5	.242	.0485	.0062	—	.0288	5.0
0	.337	.0505	.0097	—	.0289	6.7
1.5	.438	.0573	.0199	—	.0285	7.7
3	.542	.0656	.0261	—	.0273	8.3
4.5	.640	.0761	.0364	—	.0268	8.4
6	.730	.0885	.0541	—	.0252	8.3
9	.900	.125	.0912	—	.0273	7.2
12	1.006	.179	.138	—	.0248	5.6
15	.995	.315	.208	—	.0436	3.2

Table 2 (Cont.)

Experiments with Variation in the Rudder Adjustment.
Stabilizer 3° 45'.

Elevator 0° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	C_l	C_n	L/D
-9°	-.285	.0964	-.0332	-.0357	.0077	-3.0
-6	-.025	.0591	-.0097	-.0280	.0061	0.8
-4.5	.066	.0525	.0051	-.0314	.0051	1.1
-3	.163	.0482	0.0000	-.0297	.0051	3.4
-1.5	.260	.0480	.0089	-.0342	.0035	5.4
0	.370	.0522	.0149	-.0339	.0035	7.1
1.5	.467	.0582	.0215	-.0361	.0022	8.0
3	.569	.0665	.0336	-.0289	.0018	8.5
4.5	.666	.0775	.0403	-.0287	.0006	8.6
6	.765	.0886	.0586	-.0381	.0009	8.6
9	.943	.130	.102	-.0318	.0028	7.2
12	1.040	.187	.135	-.0311	.0016	5.6
15	1.024	.322	.221	.0070	.0148	3.1

Elevator 0° - Rudder 5° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	C_l	C_n	L/D
-9°	-.284	.106	-.0325	--	.0009	-2.7
-6	-.040	.0668	.0005	--	-.0050	-0.6
-4.5	.053	.0596	.0044	--	-.0049	0.9
-3	.160	.0532	.0127	--	-.0083	3.0
-1.5	.251	.0538	.0172	--	-.0073	4.7
0	.361	.0575	.0256	--	-.0102	6.3
1.5	.454	.0654	.0335	--	-.0097	6.9
3	.560	.0756	.0427	--	-.0132	7.4
4.5	.654	.0861	.0520	--	-.0152	7.6
6	.752	.101	.0681	--	-.0142	7.5
9	.925	.142	.0979	--	-.0169	6.5
12	1.035	.202	.145	--	-.0190	5.1

Table 2 (Cont.)

Experiments with Variation in the Rudder Adjustment.
Stabilizer 3° 45'.

Elevator 0° - Rudder 10° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	C_l	C_n	L/D
-9°	-.282	.105	-.0326	--	-.0252	-2.7
-6	-.044	.0668	-.0042	--	-.0290	-0.7
-4.5	.056	.0582	.0029	--	-.0266	0.9
-3	.153	.0529	.0080	--	-.0318	2.9
-1.5	.250	.0544	.0196	--	-.0318	4.6
0	.359	.0593	.0251	--	-.0344	6.1
1.5	.452	.0668	.0289	--	-.0328	6.7
3	.563	.0765	.0433	--	-.0332	7.3
4.5	.649	.0873	.0485	--	-.0352	7.4
6	.752	.103	.0644	--	-.0340	7.3
9	.921	.143	.0913	--	-.0373	6.4
12	1.030	.204	.141	--	-.0400	5.0

Elevator 0° - Rudder 15° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	C_l	C_n	L/D
-9°	-.283	.107	-.0340	--	-.0480	-2.6
-6	-.046	.0700	-.0083	--	-.0454	-0.7
-4.5	.056	.0617	-.0009	--	-.0447	0.9
-3	.158	.0560	.0089	--	-.0492	2.8
1.5	.248	.0558	.0152	--	-.0491	4.5
0	.362	.0600	.0256	--	-.0509	6.0
1.5	.450	.0680	.0270	--	-.0514	6.6
3	.555	.0773	.0390	--	-.0557	7.2
4.5	.645	.0870	.0507	--	-.0563	7.4
6	.745	.102	.0620	--	-.0591	7.3
9	.915	.142	.0940	--	-.0609	6.4
12	1.030	.204	.144	--	-.0631	5.1

Table 2 (Cont.)

Experiments with Variation in the Rudder Adjustment.
Stabilizer 3° 45'.

Elevator 0° - Rudder 20° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	C_l	C_n	L/D
-9°	-.274	.109	-.0392	--	-.0694	-2.6
-6	-.050	.0716	-.0026	--	-.0689	-0.7
-4.5	-.048	.0630	-.0018	--	-.0695	0.9
-3	.150	.0598	.0010	--	-.0683	2.5
-1.5	.252	.0596	.0069	--	-.0683	4.2
0	.357	.0640	.0184	--	-.0718	5.6
1.5	.447	.0711	.0220	--	-.0718	6.3
3	.559	.0817	.0340	--	-.0707	6.8
4.5	.643	.0900	.0445	--	-.0726	7.1
6	.752	.106	.0555	--	-.0738	7.1
9	.917	.149	.0967	--	-.0727	6.2
12	1.020	.206	.122	--	-.0744	4.9

Elevator 0° - Rudder 25° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	C_l	C_n	L/D
-9°	-.291	.118	-.0533	--	-.088	-2.5
-6	-.049	.079	-.0223	--	-.0894	-0.6
-4.5	.048	.070	-.0158	--	-.0890	0.7
-3	.148	.0661	-.0075	--	-.0876	2.2
-1.5	.240	.0652	-.0008	--	-.0903	3.7
0	.351	.0698	.0106	--	-.0901	5.0
1.5	.449	.0769	.0173	--	-.0920	5.8
3	.549	.0862	.0280	--	-.0921	6.4
4.5	.645	.0960	.0380	--	-.0968	6.7
6	.750	.112	.0475	--	-.0952	6.7
9	.911	.152	.0792	--	-.0927	6.0
12	1.020	.213	.125	--	-.0928	4.8

Table 3.

Experiments with Variations in the Aileron Adjustment.
Stabilizer 3° 45'.

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	C_l	L/D
Elevator 0° - Rudder 0° - Aileron -10°					
-9°	-.277	.100	-.0440	-.198	-2.8
-6	-.026	.0641	-.0138	-.214	-0.4
-4.5	-.066	.0560	-.0086	-.206	1.2
-3	.175	.0517	.0017	-.217	3.4
-1.5	.266	.0530	.0031	-.215	5.0
0	.382	.0578	.0154	-.226	6.6
1.5	.500	.0662	.0322	-.237	7.6
3	.575	.0730	.0336	-.216	7.9
4.5	.680	.0837	.0419	-.242	8.2
6	.772	.0970	.0558	-.215	8.0
9	.960	.137	.0905	-.234	7.0
12	1.030	.194	.128	-.157	5.3
15	1.015	.337	.207	-.088	3.0
Elevator 0° - Rudder 0° - Aileron -5°					
-9°	-.286	.0980	-.0349	-.109	-2.9
-6	-.037	.0638	-.0102	-.129	-0.6
-4.5	.061	.0538	-.0012	-.128	1.0
-3	.166	.0498	.0038	-.132	3.2
-1.5	.270	.0490	.0105	-.133	5.5
0	.378	.0538	.0222	-.140	7.0
1.5	.475	.0600	.0277	-.143	8.0
3	.583	.0685	.0386	-.148	8.9
4.5	.678	.0793	.0481	-.147	8.5
6	.778	.0922	.0652	-.149	8.4
9	.951	.130	.103	-.140	7.3
12	1.050	.188	.150	-.088	5.5
15	.982	.326	.215	.012	3.0

Table 3 (Cont.)

Experiments with Variations in the Aileron Adjustment.
Stabilizer 3° 45'.

Elevator 0° - Rudder 0° - Aileron 5°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	C_l	L/D
-9°	-.303	.108	-.0356	.0399	-2.8
-6	-.061	.0685	-.0068	.0507	-0.9
-4.5	.045	.0624	-.0008	.0505	0.7
-3	.149	.0554	.0095	.0520	2.7
-1.5	.249	.0540	.0149	.0570	4.6
0	.350	.0562	.0249	.0544	6.2
1.5	.444	.0625	.0340	.0586	7.1
3	.550	.0740	.0417	.0530	7.4
4.5	.648	.0861	.0513	.0547	7.5
6	.744	.0980	.0650	.0537	7.6
9	.926	.140	.0940	.0453	6.6
12	1.030	.197	.141	.0371	5.2
15	1.026	.339	.195	.0121	3.0
Elevator 0° -		Rudder 0° -		Aileron 10°	
-9°	-.290	.108	-.0327	.104	-2.7
-6	-.039	.0692	-.0050	.115	-0.6
-4.5	.061	.0599	.0036	.114	1.0
-3	.162	.0554	.0124	.128	2.9
-1.5	.260	.0566	.0214	.122	4.6
0	.370	.0590	.0308	.119	6.3
1.5	.453	.0665	.0344	.122	6.8
3	.565	.0764	.0458	.118	7.4
4.5	.655	.0858	.0590	.118	7.7
6	.757	.102	.0713	.118	7.4
9	.928	.143	.0982	.109	6.5
12	1.023	.200	.158	.086	5.1

Table 3 (Cont.)

Experiments with Variations in the Aileron Adjustment.
Stabilizer 3° 45'.

Angle of incidence with reference to the crank shaft axis.	C_L	C_D	C_m	C_l	L/D
Elevator 0° -		Rudder 0° -		Aileron 15°	
-9°	-.291	.133	-.0515	.196	-2.2
-6	-.045	.0738	-.0069	.217	-0.5
-4.5	-.048	.0645	-.0012	.209	0.7
-3	.156	.0612	.0079	.210	2.6
-1.5	.257	.0627	.0094	.212	4.0
0	.351	.0653	.0242	.233	5.4
1.5	.447	.0701	.0311	.221	6.4
3	.552	.0798	.0383	.236	6.8
4.5	.639	.0893	.0514	.222	7.2
6	.735	.104	.0584	.212	7.1
9	.911	.137	.0942	.204	6.7
12	1.010	.202	.157	.175	5.0
Elevator 0° -		Rudder 0° -		Aileron 20°	
-9°	-.290	.115	-.0380	.229	-2.5
-6	-.055	.0795	-.0102	.260	-0.7
-4.5	.045	.0695	-.0066	.262	0.6
-3	.149	.0660	.0027	.264	2.3
-1.5	.251	.0658	.0068	.273	3.8
0	.355	.0690	.0194	.271	5.2
1.5	.450	.0743	.0261	.274	6.1
3	.554	.0860	.0352	.288	6.5
4.5	.646	.0954	.0455	.268	6.8
6	.740	.108	.0584	.260	6.9
9	.910	.149	.0869	.254	6.1
12	1.010	.206	.138	.202	4.9

Table 3 (Cont.)

Experiments with Variations in the Aileron Adjustment.
Stabilizer 3° 45'.

Elevator 0° — Rudder 0° — Aileron 25°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	C_l	L/D
-9°	-.296	.126	-.0464	.258	-2.4
-6	-.068	.0820	-.0210	.324	-0.8
-4.5	-.036	.0794	-.0110	.321	0.4
-3	.149	.0746	-.0015	.322	2.0
--1.5	.244	.0738	.0027	.320	3.3
0	.352	.0814	.0118	.319	4.3
1.5	.450	.0853	.0189	.319	5.2
3	.550	.0954	.0324	.318	5.8
4.5	.638	.105	.0370	.310	6.1
6	.731	.118	.0564	.308	6.2
9	.896	.157	.0812	.303	5.7
12	1.005	.216	.135	.263	4.7

Table 4.

Experiments with Variation in the Elevator Adjustment
and also without Tail Group.
Stabilizer 6° 30'.

Elevator −30° — Rudder 0° — Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_L	C_m	L/D
−9°	−.463	.154	−.332	−3.0
−6	−.197	.106	−.310	−1.8
−4.5	−.095	.0925	−.311	−1.0
−3	.021	.0845	−.296	0.2
−1.5	.132	.0800	−.286	1.6
0	.246	.0812	−.279	3.0
1.5	.349	.0830	−.267	4.2
3	.470	.0920	−.252	5.1
4.5	.565	.100	−.241	5.6
6	.685	.113	−.222	6.1
9	.880	.146	−.170	6.0
12	1.020	.201	−.078	5.0
Elevator −25° — Rudder 0° — Aileron 0°				
−9°	−.443	.143	−.294	−3.1
−6	−.195	.0963	−.265	−2.0
−4.5	−.069	.0336	−.260	−0.8
−3	.043	.0756	−.248	0.6
−1.5	.151	.0723	−.238	2.1
0	.262	.0745	−.230	3.6
1.5	.370	.0776	−.220	4.8
3	.490	.0852	−.204	5.7
4.5	.587	.0927	−.190	6.3
6	.706	.107	−.169	6.6
9	.901	.143	−.125	6.3
12	1.033	.200	−.044	5.2

Table 4 (Cont.)

Experiments with Variations in the Elevator Adjustment
and also without Tail Group.
Stabilizer 6° 30'.

Elevator -20° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.418	.132	-.228	-3.2
-6	-.161	.0890	-.207	-1.8
-4.5	-.048	.0759	-.206	-0.6
-3	.066	.0682	-.186	1.0
-1.5	.176	.0671	-.180	2.6
0	.288	.0687	-.170	4.2
1.5	.394	.0730	-.165	5.4
3	.517	.0812	-.143	6.4
4.5	.618	.0895	-.132	6.9
6	.733	.104	-.109	7.1
9	.932	.142	-.061	6.6
12	1.056	.201	-.031	5.2

Elevator -15° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.404	.125	-.182	-3.2
-6	-.138	.0809	-.153	-1.7
-4.5	-.023	.0700	-.146	-0.3
-3	-.088	.0650	-.134	1.4
-1.5	.191	.0618	-.123	3.1
0	.314	.0640	-.114	4.9
1.5	.411	.0690	-.106	6.0
3	.535	.0780	-.092	6.9
4.5	.633	.0870	-.078	7.3
6	.746	.101	-.060	7.4
9	.934	.139	-.021	6.7
12	1.130	.198	.046	5.7

Table 4 (Cont.)

Experiments with Variations in the Elevator Adjustment and also without Tail Group.
Stabilizer 6° 30'.

Elevator -10° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.372	.119	-.117	-3.1
-6	-.112	.0763	-.088	-1.5
-4.5	.001	.0646	-.078	0.0
-3	.113	.0601	-.075	1.9
-1.5	.219	.0586	-.067	3.7
0	.333	.0615	-.058	5.4
1.5	.432	.0673	-.052	6.4
3	.555	.0770	-.035	7.2
4.5	.653	.0866	-.025	7.5
6	.768	.101	-.008	7.6
9	.965	.143	.030	6.8
12	1.080	.201	.088	5.4

Elevator -5° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.355	.116	-.067	-3.1
-6	-.088	.0732	-.039	-1.2
-4.5	.015	.0638	-.032	0.2
-3	.130	.0570	-.026	2.3
-1.5	.235	.0567	-.020	4.1
0	.351	.0602	-.013	5.8
1.5	.455	.0660	-.005	6.9
3	.569	.0759	.006	7.5
4.5	.670	.0861	.018	7.8
6	.782	.102	.034	7.7
9	.978	.133	.078	7.4
12	1.090	.204	.116	5.3

Table 4 (Cont.)

Experiments with Variations in the Elevator Adjustment and also without Tail Group.
Stabilizer 6° 30'.

Elevator 0° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crank-shaft axis.	C_L	C_D	C_m	L/D
-9°	-.344	.113	-.025	-3.1
-6	-.072	.0721	-.015	-1.0
-4.5	.042	.0618	.023	0.7
-3	.153	.0579	.029	2.6
-1.5	.259	.0575	.035	4.5
0	.377	.0617	.047	6.1
1.5	.482	.0682	.058	7.1
3	.599	.0796	.068	7.5
4.5	.698	.0900	.078	7.7
6	.812	.106	.094	7.6
9	1.003	.150	.127	6.7
12	1.119	.212	.183	5.3
Elevator 5°	-	**Rudder 0°**	-	**Aileron 0°**
-9°	-.311	.112	.012	-2.8
-6	-.049	.0722	.057	-0.7
-4.5	.059	.0643	.060	0.9
-3	.174	.0581	.071	3.0
-1.5	.281	.0600	.077	4.7
0	.397	.0639	.088	6.2
1.5	.496	.0710	.096	7.0
3	.619	.0829	.109	7.5
4.5	.721	.0947	.119	7.6
6	.830	.112	.134	7.5
9	1.020	.156	.165	6.5
12	1.140	.224	.209	4.5

Table 4 (Cont.)

Experiments with Variations in the Elevator Adjustment and also without Tail Group.
Stabilizer 6° 30'.

Elevator 10° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.312	.113	.063	-2.8
-6	-.038	.0739	.105	-0.5
-4.5	.078	.0654	.112	1.2
-3	.182	.0622	.127	2.9
-1.5	.299	.0633	.133	4.7
0	.417	.0690	.149	6.0
1.5	.519	.0770	.156	6.7
3	.644	.0898	.172	7.2
4.5	.740	.100	.186	7.4
6	.849	.118	.203	7.2
9	1.030	.173	.216	6.0
12	1.150	.226	.277	5.1
Elevator 15° - Rudder 0° - Aileron 0°				
-9°	-.288	.114	.105	-2.5
-6	-.016	.0757	.141	-2.0
-4.5	.093	.0679	.150	1.4
-3	.206	.0655	.162	3.1
-1.5	.314	.0660	.175	4.7
0	.430	.0705	.192	6.1
1.5	.537	.0790	.200	6.8
3	.648	.0910	.210	7.1
4.5	.750	.104	.224	7.2
6	.861	.124	.233	7.0
9	1.050	.168	.260	6.3
12	1.165	.234	.309	5.0

Table 4 (Cont.)

Experiments with Variations in the Elevator Adjustment and also without Tail Group. Stabilizer 6° 30'.

Elevator 20° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.254	.120	.185	-2.1
-6	.015	.0826	.227	0.2
-4.5	.127	.0761	.236	1.7
-3	.242	.0747	.251	3.2
-1.5	.348	.0775	.257	4.5
0	.462	.0846	.270	5.5
1.5	.571	.0942	.282	6.1
3	.684	.106	.293	6.4
4.5	.787	.120	.304	6.6
6	.894	.137	.312	6.5
9	1.070	.184	.324	6.8
12	1.180	.244	.374	4.9

Elevator 25° - Rudder 0° - Aileron 0°

Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.242	.125	.222	-1.9
-6	.032	.0865	.267	0.4
-4.5	.141	.0843	.273	1.7
-3	.257	.0816	.290	3.2
-1.5	.362	.0843	.301	4.3
0	.479	.0901	.315	5.3
1.5	.583	.101	.318	5.8
3	.696	.112	.331	6.2
4.5	.795	.127	.332	6.3
6	.894	.143	.336	6.3
9	1.080	.189	.348	5.7
12	1.188	.258	.384	4.6

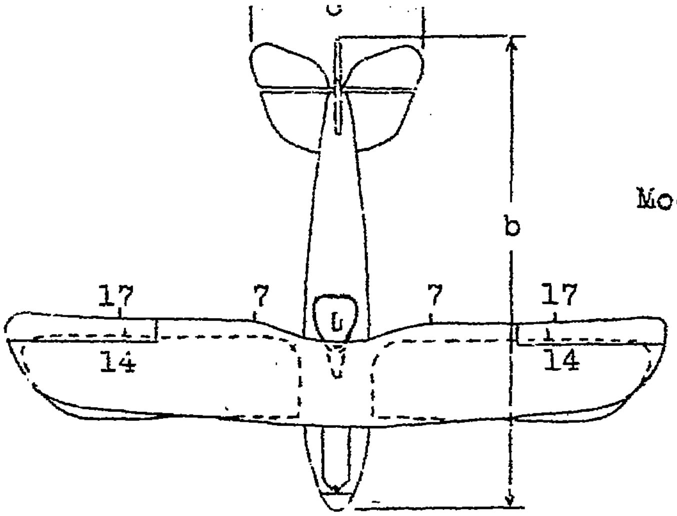
Table 4 (Cont.)

Experiments with Variations in the Elevator Adjustment and also without Tail Group. Stabilizer 6° 30'.

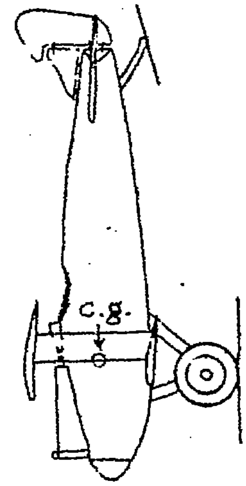
Elevator 30° - Rudder 0° - Aileron 0°

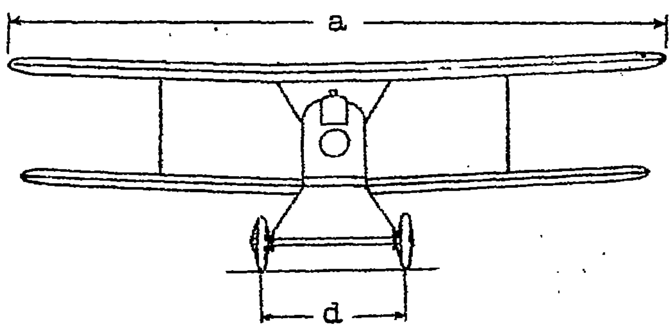
Angle of incidence with reference to the crankshaft axis.	C_L	C_D	C_m	L/D
-9°	-.231	.135	.265	-1.7
-6	.049	.100	.306	0.5
-4.5	.160	.0921	.319	1.7
-3	.275	.0910	.334	3.0
-1.5	.391	.0939	.345	4.0
0	.500	.102	.353	4.9
1.5	.601	.112	.359	5.4
3	.710	.124	.369	5.7
4.5	.815	.139	.372	5.9
6	.919	.155	.372	5.9
9	1.100	.197	.382	5.6
12	1.200	.264	.412	4.5
	Without Elevator and Tail Group.			
-9°	-.301	.0995	.033	-3.0
-6	-.049	.0621	.044	-0.8
-4.5	.050	.0530	.035	0.9
-3	.152	.0488	.034	3.1
-1.5	.244	.0481	.022	5.1
0	.349	.0516	.019	6.8
1.5	.447	.0578	.015	7.7
3	.547	.0652	.013	8.4
4.5	.644	.0747	.010	8.6
6	.731	.0871	-.010	8.4
9	.908	.125	-.001	7.2
12	1.005	.174	.011	5.7

Translated by the National Advisory Committee for Aeronautics.



Model 1/11 size.





a-773mm (30.43 in.)
b-554mm (21.81 in.)
c-210mm (8.27 in.)
d-164mm (6.46 in.)

Angle of attack at
Rib 7-3°30' } upper
" 17-2°30' } wing
" 14-3° 6' lower

Fuselage
Length 503 mm (19.80 in.)
Width 70 mm (2.76 in.)
Height 105 mm (4.13 in.)

	Maximum			
	Span	Chord	Area	Mean gap
Upper wing	773 mm 30.43 in.	121 mm 4.76 in.	833 cm^2 129.11 in^2	135 mm 5.31 in.
Lower "	735 mm 28.94 in.	92 mm 3.62 in.	582 cm^2 90.21 in^2	
Elevator	210 mm 8.27 in.	55 mm 2.17 in.	83.5 cm^2 12.94 in^2	
Rudder	107 mm 4.21 in.	50 mm 1.97 in.	47.5 cm^2 7.36 in^2	
Ailerons	185 mm 7.28 in.	30 mm 1.18 in.	95.0 cm^2 14.72 in^2	
Stabilizer	195 mm 7.68 in.	74 mm 2.91 in.	96.5 cm^2 14.96 in^2	
Fin	------ ------	------ ------	14.5 cm^2 2.25 in^2	

Fig. 1 Model of the Aeg D1 airplane

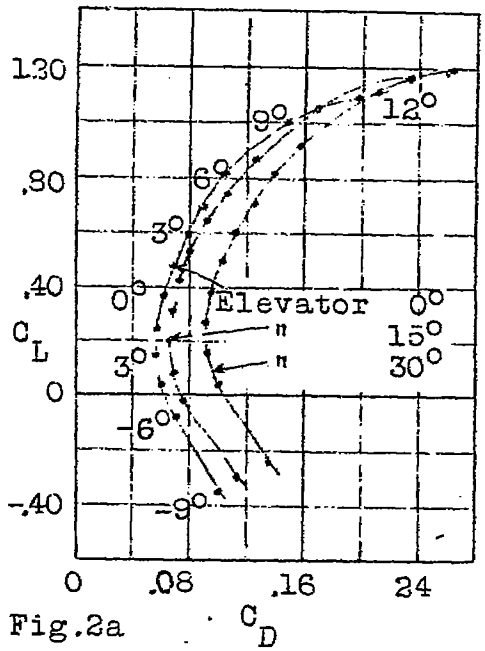


Fig.2a

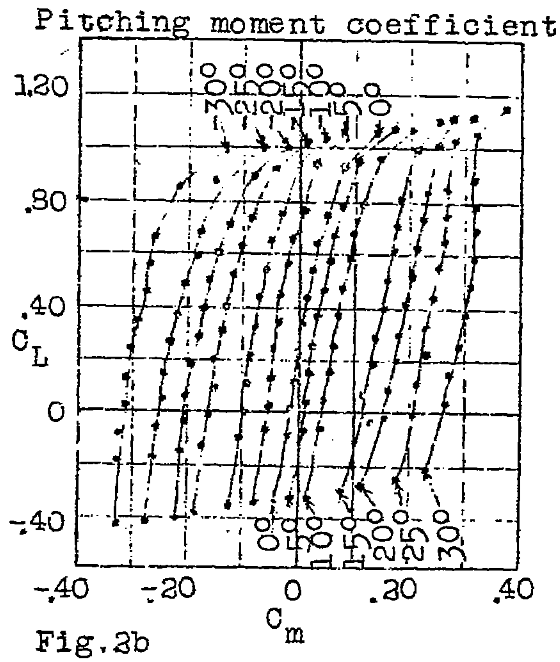


Fig.2b

Test data with varying elevator setting. Stabilizer 3°45'

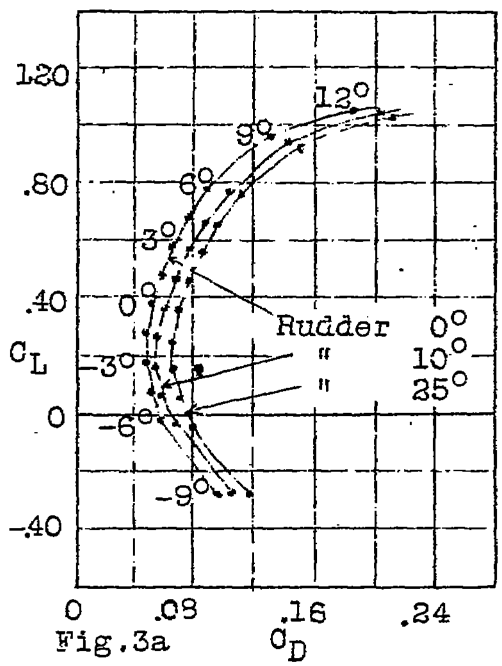


Fig.3a

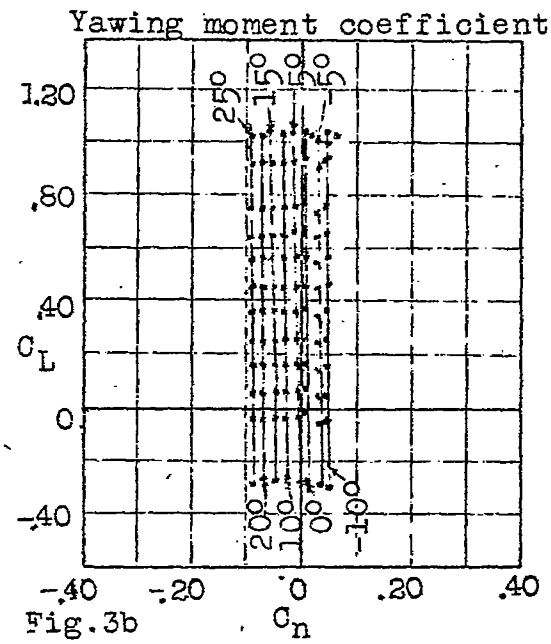


Fig.3b

Test data with varying rudder setting. Stabilizer 3°45'

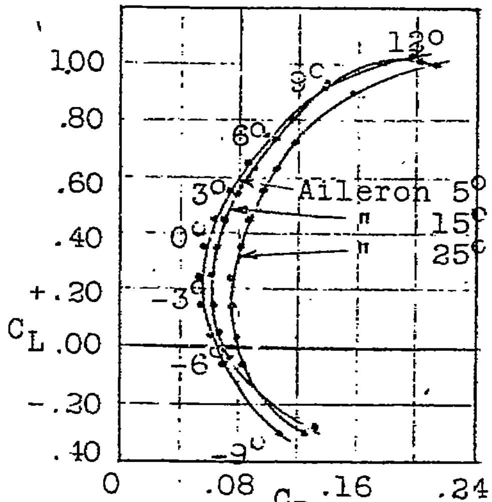


Fig.4a

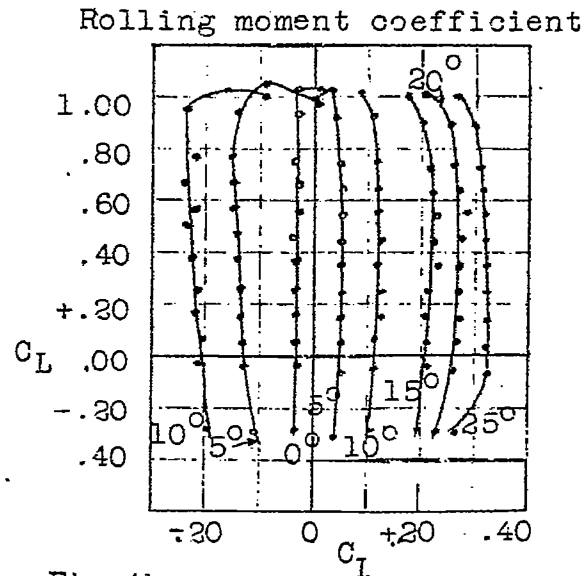


Fig.4b

Test data with varying aileron settings. Stabilizer 3° 45'

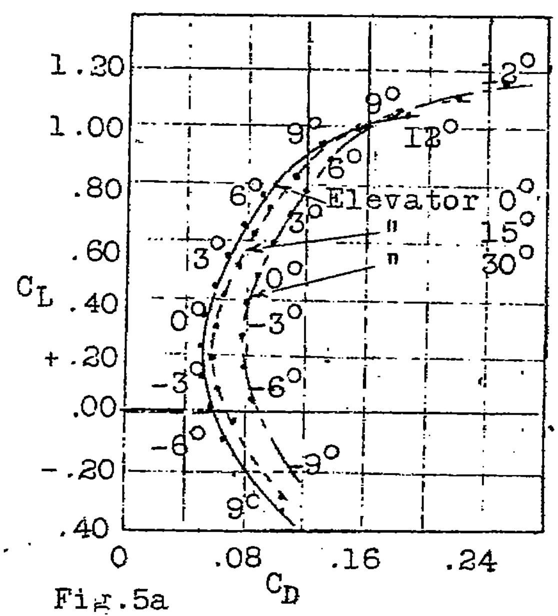


Fig.5a

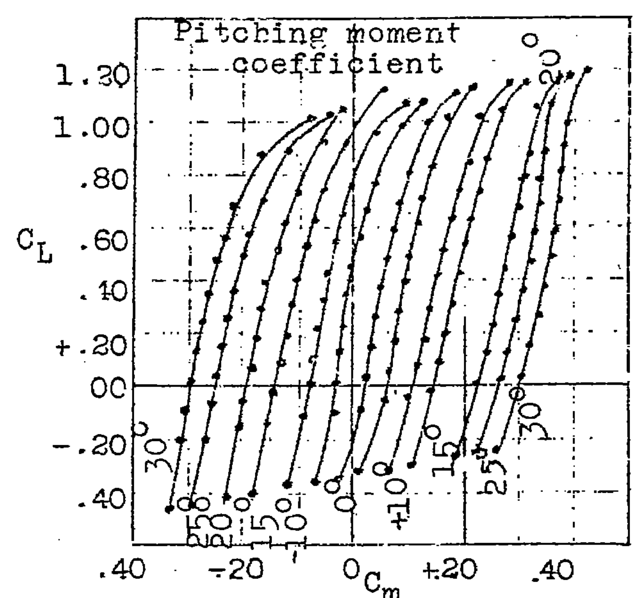


Fig.5b

Test data with varying elevator settings. Stabilizer 6° 30'