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RESEARCH MEMORANDUM

EVALUATION OF GUST AND DRAFT VELOCITIES FROM FLIGHTS OF AN AT-6 AIRPLANE WITHIN CUMULUS CLOUDS JULY 1, 1947 TO JULY 22, 1947 AT CLINTON COUNTY ARMY AIR FIELD, OHIO

By

Jack Funk

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Langley Field, Va.

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RESEARCH MEMORANDUM

EVALUATION OF GUST AND DRAFT VELOCITIES FROM FLIGHTS OF AN AT-6 AIRPLANE WITHIN CUMULUS CLOUDS JULY 1, 1947 TO JULY 22, 1947 AT CLINTON COUNTY ARMY AIR FIELD, OHIO

By Jack Funk

During the operation of the Thunderstorm Project at Clinton County Army Air Field, Ohio, measurements of gust and draft velocities within cumulus clouds were obtained with an AT-6 airplane in July 1947. These measurements were made to supplement the data obtained with P-61C airplanes within thunderstorms (reference 1). The data obtained with the AT-6 airplane are summarized in tables I and II and are of the type presented in reference 1 for the P-61C airplanes.

Langley Memorial Aeronautical Laboratory
National Advisory Committee for Aeronautics
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Jack Funk
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Approved: Richard V. Rhode
Richard V. Rhode
Chief of Aircraft Loads Division

JCR

REFERENCE

1. Tolefson, H. B.: Evaluation of Gust and Draft Velocities from Flights of P-61C Airplanes within Thunderstorms May 13, 1947 to May 29, 1947 at Clinton County Army Air Field, Ohio. NACA RM No. L7J29, 1947.

TABLE I.- SUMMARY OF GUST MEASUREMENTS FROM FLIGHTS

OF AN AT-6 AIRPLANE WITHIN THUNDERSTORMS

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 1, 1947 - Flight 2A								
Airplane AT-6 364 - Traverse 1 Length of traverse 168.5 sec, 36,582 ft								
0 - 30	10,000	----	-----	----	-----	---	---	0
30 - 40		----	-1.4	----	-3.9	---	48	1
40 - 50		1.9	-----	3.2	-----	77	---	1
50 - 60		3.3	-4.3	4.2	-----	43	---	5
60 - 70		----	-----	----	-----	---	---	0
70 - 80		4.3	-3.8	----	-9.0	---	51	3
80 - 90		3.8	-----	----	-----	---	---	2
90 - 110		----	-----	----	-----	---	---	0
110 - 120		2.7	-4.1	----	-7.9	---	74	2
120 - 140		----	-----	----	-----	---	---	0
140 - 150		3.6	-----	4.9	-----	77	---	1
150 - 170		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 2 Length of traverse 91.7 sec, 19,821 ft								
0 - 20	9,000	----	-----	----	-----	---	---	0
20 - 30		1.9	-----	----	-----	---	---	1
30 - 40		3.3	-----	5.3	-5.1	52	127	2
40 - 50		----	-3.1	----	-----	---	---	1
50 - 60		----	-----	----	-----	---	---	0
60 - 70		3.3	-----	6.2	-----	57	---	1
70 - 80		3.3	-3.6	----	-----	---	---	2
80 - 90		----	-1.9	----	-4.8	---	70	1
90 - 100		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 3 Length of traverse 138.9 sec, 29,145 ft								
0 - 120	8,000	----	-----	----	-----	---	---	0
120 - 130		2.6	-----	6.6	-----	135	---	1
130 - 140		2.4	-----	5.5	-----	156	---	1

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 1, 1947 - Flight 2A								
Airplane AT-6 364 - Traverse 4 Length of traverse 119.0 sec, 23,953 ft								
0 - 120	7,000	----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 5 Length of traverse 132.8 sec, 27,694 ft								
0 - 140	6,000	----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 6 Length of traverse 137.3 sec, 26,764 ft								
0 - 30	5,000	----	-----	----	-----	---	---	0
30 - 40		3.6	-----	5.5	-----	50	---	1
40 - 140		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 7 Length of traverse 153.9 sec, 26,020 ft								
0 - 160	4,000	----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 8 Length of traverse 155.6 sec, 29,700 ft								
0 - 30	3,000	----	-----	----	-----	---	---	0
30 - 40		4.4	-----	5.0	-----	70	---	1
40 - 50		----	-3.4	----	-5.3	---	127	2
50 - 60		3.2	-----	4.9	-----	55	---	1
60 - 160		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 9 Length of traverse 189.0 sec, 34,523 ft								
0 - 40	2,000	----	-----	----	-----	---	---	0
40 - 50		----	-2.6	----	-----	---	---	1
50 - 60		3.4	-----	3.8	-----	44	---	1
60 - 70		----	-----	----	-----	---	---	0
70 - 80		----	-6.0	----	-----	---	---	1
80 - 90		----	-----	----	-----	---	---	0

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TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 1, 1947 - Flight 2A								
Airplane AT-6 364 - Traverse 9 Length of traverse 189.0 sec, 34,523 ft								
90 - 100		3.4	-----	3.0	-----	51	---	1
100 - 110		2.7	-----	4.1	-----	62	---	1
110 - 120		3.4	-1.1	----	-----	---	---	2
120 - 130		----	-1.1	----	-----	---	---	1
130 - 150		----	-----	----	-----	---	---	0
150 - 160		----	-1.4	----	-----	---	---	1
160 - 170		3.2	-----	----	-----	---	---	1
170 - 190		----	-----	----	-----	---	---	0
July 12, 1947 - Flight 3A								
Airplane AT-6 364 - Traverse 1 Length of traverse 97.5 sec, 19,750 ft								
0 - 10	10,500	3.6	-----	----	-----	---	---	1
10 - 20		----	-----	----	-----	---	---	0
20 - 30		7.4	-3.8	----	-6.5	---	63	7
30 - 40		9.2	-7.1	----	-----	---	---	8
40 - 50		9.5	-8.1	----	-----	---	---	14
50 - 60		5.0	-10.7	----	-----	---	---	13
60 - 70		11.2	-7.6	----	-----	---	---	13
70 - 80		11.4	-8.8	5.6	-----	34	---	14
80 - 90	11,000	5.0	-5.4	----	-----	---	---	11
90 - 100		3.1	-3.5	----	-5.9	---	45	9
Airplane AT-6 364 - Traverse 2 Length of traverse 60.8 sec, 14,670 ft								
0 - 10	10,000	14.0	-7.2	----	-----	---	---	12
10 - 20		6.4	-6.9	----	-----	---	---	12
20 - 40		----	-----	----	-----	---	---	0
40 - 50		7.8	-7.6	----	-4.5	---	33	9
50 - 60		----	-6.2	----	-6.5	---	101	4
60 - 70		----	-----	----	-----	---	---	0

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TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 12, 1947 - Flight 3A								
Airplane AT-6 364 - Traverse 3 Length of traverse 63.1 sec, 13,462 ft								
0 - 20	9,500	----	-----	----	-----	---	---	0
20 - 30		6.2	-7.6	----	-4.9	---	36	10
30 - 40	9,000	4.3	-----	----	-----	---	---	3
40 - 50		4.3	-2.9	----	-9.0	---	50	3
50 - 60		3.8	-4.3	4.0	-6.2	47	82	8
60 - 70		4.0	-4.7	----	-----	---	---	3
Airplane AT-6 364 - Traverse 4 Length of traverse 63.0 sec, 13,982 ft								
0 - 10	9,000	5.0	-4.0	----	-----	---	---	5
10 - 20		5.0	-5.2	----	-----	---	---	5
20 - 30		2.2	-----	----	-----	---	---	1
30 - 40		4.5	-11.4	----	-----	---	---	11
40 - 50	8,500	5.7	-2.8	----	-----	---	---	6
50 - 60		----	-----	5.2	-----	115	---	1
60 - 70		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 5 Length of traverse 68.8 sec, 13,637 ft								
0 - 10	8,500	2.8	-----	----	-----	---	---	6
10 - 20		5.5	-2.2	----	-4.3	---	23	3
20 - 30		2.2	-3.3	----	-5.6	---	96	3
30 - 40		2.9	-2.2	4.5	-----	23	---	6
40 - 50		3.4	-3.3	----	-----	---	---	9
50 - 60		3.1	-----	----	-6.2	---	30	4
60 - 70		5.8	-7.0	----	-----	---	---	11
Airplane AT-6 364 - Traverse 6 Length of traverse 38.9 sec, 8,473 ft								
0 - 10	8,000	3.1	-4.8	----	-----	---	---	4
10 - 20		6.0	-----	----	-----	---	---	10
20 - 30		3.6	-8.6	----	-----	---	---	9
30 - 40		2.9	-----	5.7	-----	64	---	4

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TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 12, 1947 - Flight 3A								
Airplane AT-6 364 - Traverse 7 Length of traverse 60.8 sec, 14,012 ft								
0 - 10	8,000	3.1	-----	5.1	-----	79	---	2
10 - 20		----	-----	----	-----	---	---	0
20 - 30		4.8	-----	4.8	-----	50	---	6
30 - 40		7.6	-7.6	----	-----	---	---	12
40 - 50		10.0	-7.2	21.9	-7.1	109	82	11
50 - 60		2.8	-----	----	-4.6	---	101	5
60 - 70		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 8 Length of traverse 64.5 sec, 15,545 ft								
0 - 10	7,500	8.9	-6.5	----	-----	---	---	2
10 - 20		5.7	-2.7	----	-----	---	---	7
20 - 30		8.4	-6.2	----	-----	---	---	11
30 - 40		6.3	-10.3	----	-----	---	---	13
40 - 50		5.1	-6.2	----	-4.0	---	53	12
50 - 60	7,000	4.1	-2.4	----	-----	---	---	6
60 - 70		1.6	-----	----	-----	---	---	3
Airplane AT-6 364 - Traverse 9 Length of traverse 57.5 sec, 12,796 ft								
0 - 10	7,000	3.1	-2.7	----	-----	---	---	6
10 - 20		7.4	-4.1	----	-----	---	---	7
20 - 30		6.3	-7.9	4.8	-----	67	---	6
30 - 40		5.5	-5.3	----	-----	---	---	8
40 - 50		2.2	-4.6	----	-----	---	---	4
50 - 60		5.7	-7.5	----	-----	---	---	7
Airplane AT-6 364 - Traverse 10 Length of traverse 85.1 sec, 18,147 ft								
0 - 10	6,500	----	-----	----	-----	---	---	0
10 - 20		4.1	-10.1	7.0	-----	130	---	4
20 - 30		4.3	-3.0	----	-----	---	---	8
30 - 40		2.5	-4.4	----	-5.9	---	109	6
40 - 50		1.9	-1.9	----	-----	---	---	2
50 - 60		5.4	-3.4	7.4	-----	41	---	8

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TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 12, 1947 - Flight 3A								
Airplane AT-6 364 - Traverse 10 Length of traverse 85.1 sec, 18,147 ft								
60 - 70		4.1	-2.9	----	-----	---	---	9
70 - 80		5.4	-3.5	----	-6.7	---	64	10
80 - 90		1.8	-----	5.8	-----	79	---	2
July 17, 1947 - Flight 4A								
Airplane AT-6 364 - Traverse 1 Length of traverse 131.0 sec, 32,741 ft								
0 - 90	10,000	----	-----	----	-----	---	---	0
90 - 100		5.0	-----	8.0	-----	88	---	2
100 - 110		8.6	-6.6	6.0	-----	73	---	7
110 - 120		1.0	-2.6	1.7	-----	83	---	5
120 - 130		1.0	-----	----	-----	---	---	2
130 - 140		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 2 Length of traverse 97.3 sec, 25,770 ft								
0 - 10	9,500	3.1	-2.8	----	-----	---	---	8
10 - 20		3.1	-4.5	4.9	-----	92	---	8
20 - 30		2.6	-2.8	----	-----	---	---	9
30 - 40		4.8	-1.6	5.7	-3.5	84	77	7
40 - 50		3.6	-----	----	-----	---	---	6
50 - 60		5.0	-6.7	----	-----	---	---	20
60 - 90		----	-----	----	-----	---	---	0
90 - 100		----	-1.9	----	-3.4	---	169	1
Airplane AT-6 364 - Traverse 3 Length of traverse 141.8 sec, 35,724 ft								
0 - 10	9,000	----	-----	1.8	-----	140	---	1
10 - 20		----	-----	----	-2.6	---	134	1
20 - 60		----	-----	----	-----	---	---	0
60 - 70		5.2	-6.7	4.7	-----	79	---	10
70 - 80		5.5	-5.0	----	-----	---	---	17
80 - 90		5.5	-5.5	----	-5.8	---	217	12
90 - 100		10.3	-8.1	14.1	-5.0	84	54	12

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TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 17, 1947 - Flight 4A								
Airplane AT-6 364 - Traverse 3 Length of traverse 141.8 sec, 35,724 ft								
100 - 110		5.9	-4.6	7.4	-8.2	116	149	10
110 - 120		10.8	-13.1	----	-3.4	---	48	12
120 - 130		1.2	-2.2	2.8	-3.7	53	83	4
130 - 140		----	-----	----	-4.4	---	84	1
140 - 150		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 4 Length of traverse 101.6 sec, 26,831 ft								
0 - 10	8,500	----	-----	2.7	-----	173	---	1
10 - 20		----	-----	1.6	-----	72	---	1
20 - 30		7.6	-3.4	----	-3.0	---	45	14
30 - 40		7.2	-5.3	----	-----	---	---	14
40 - 50		6.5	-6.0	4.1	-----	44	---	13
50 - 60		5.2	-5.2	----	-----	---	---	14
60 - 70		4.1	-5.0	----	-4.7	---	58	13
70 - 80		2.9	-----	----	-----	---	---	4
80 - 90		----	-----	----	-----	---	---	0
90 - 100		1.5	-----	1.6	-----	48	---	2
100 - 110		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 5 Length of traverse 114.5 sec, 28,702 ft								
0 - 10	8,000	1.5	-----	1.7	-----	87	---	2
10 - 20		----	-----	----	-----	---	---	0
20 - 30		2.7	-3.1	----	-4.6	---	154	2
30 - 40		6.0	-2.9	9.3	-----	63	---	10
40 - 50		4.6	-3.6	7.7	-----	94	---	10
50 - 60		4.6	-4.1	----	-6.7	---	74	15
60 - 70		5.1	-5.3	----	-8.3	---	37	13
70 - 80		2.1	-----	----	-----	---	---	2
80 - 120		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 6 Length of traverse 116.5 sec, 28,900 ft								
0 - 30	7,500	----	-----	----	-----	---	---	0
30 - 40		6.0	-3.1	----	-----	---	---	8

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 17, 1947 - Flight 4A								
Airplane AT-6 364 - Traverse 6 Length of traverse 116.5 sec, 28,900 ft								
40 - 50		5.1	-4.1	6.5	-----	186	---	17
50 - 60		6.9	-2.6	4.7	-5.7	130	42	13
60 - 70		7.9	-7.4	4.2	-----	54	---	11
70 - 80		6.0	-3.1	3.7	-----	142	---	17
80 - 90		2.1	-2.1	3.4	-----	71	---	2
90 - 100		2.7	-----	----	-----	---	---	3
100 - 110		4.3	-----	----	-3.3	---	34	6
110 - 120		1.2	-----	----	-----	---	---	1
Airplane AT-6 364 - Traverse 7 Length of traverse 94.2 sec, 23,384 ft								
0 - 10	7,500	----	-----	----	-----	---	---	0
10 - 20		3.6	-2.6	4.7	-----	135	---	6
20 - 30		2.6	-2.6	----	-6.1	---	117	6
30 - 40	7,000	5.1	-2.6	4.5	-----	129	---	15
40 - 50		2.7	-2.6	----	-3.9	---	22	16
50 - 60		6.0	-5.3	3.5	-----	86	---	13
60 - 70		3.2	-2.6	5.0	-4.1	41	53	11
70 - 80		----	-2.4	----	-----	---	---	8
80 - 90		2.1	-----	----	-3.7	---	146	3
90 - 100		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 8 Length of traverse 112.6 sec, 26,376 ft								
0 - 30	6,500	----	-----	----	-----	---	---	0
30 - 40		3.4	-3.2	3.4	-----	43	---	10
40 - 50		4.6	-5.6	----	-----	---	---	9
50 - 60		4.6	-1.7	----	-4.4	---	73	9
60 - 70	7,000	5.0	-2.2	4.5	-----	42	---	3
70 - 80		4.6	-6.0	----	-9.3	---	117	12
80 - 90	6,500	2.7	-----	----	-----	---	---	6
90 - 100		3.1	-----	----	-----	---	---	1
100 - 110		1.7	-----	----	-----	---	---	1
110 - 120		1.7	-----	----	-----	---	---	1

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 21, 1947 - Flight 5A								
Airplane AT-6 364 - Traverse 1 Length of traverse 83.6 sec - (a)								
0 - 60	13,000	----	-----	----	-----	---	---	0
60 - 70		11.0	-----	11.6	-----	66	---	10
70 - 80	13,500	9.1	-5.7	----	-7.6	---	41	7
80 - 90		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 2 Length of traverse 100.4 sec - (a)								
0 - 10	12,500	3.6	-----	----	-----	---	---	2
10 - 20		3.0	-3.4	----	-----	---	---	2
20 - 30		2.9	-----	----	-----	---	---	3
30 - 40		----	-----	----	-----	---	---	0
40 - 50		5.4	-5.8	----	-----	---	---	6
50 - 60		7.4	-4.6	9.5	-----	84	---	11
60 - 70		5.2	-6.3	----	-----	---	---	9
70 - 80		7.5	-4.4	10.3	-----	75	---	5
80 - 90		9.7	-6.3	----	-----	---	---	8
90 - 100		6.0	-----	----	-----	---	---	3
Airplane AT-6 364 - Traverse 3 Length of traverse 38.0 sec - (a)								
0 - 20	12,000	----	-----	----	-----	---	---	0
20 - 30		6.5	-6.6	----	-----	---	---	5
30 - 40		5.0	-6.8	10.0	-----	139	---	5
Airplane AT-6 364 - Traverse 4 Length of traverse 143.1 sec - (a)								
0 - 60	13,000	----	-----	----	-----	---	---	0
60 - 70		7.2	-9.7	10.7	-20.4	175	190	11
70 - 80		9.4	-8.3	----	-----	---	---	13
80 - 90		----	-----	----	-----	---	---	0
90 - 100	12,500	5.7	-11.5	----	-20.1	---	52	6
100 - 110		8.7	-9.6	7.2	-----	44	---	9
110 - 120		10.3	-7.0	11.6	-----	60	---	7

[a]Computation of length of traverse in feet discontinued in order to expedite forwarding of data.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 21, 1947 - Flight 5A								
Airplane AT-6 364 - Traverse 4 Length of traverse 143.1 sec - (a)								
120 - 130	13,000	6.0	-3.4	----	-----	---	---	7
130 - 140		2.5	-12.1	----	-14.1	---	56	8
140 - 150		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 5 Length of traverse 133.9 sec - (a)								
0 - 10	12,500	----	-----	----	-----	---	---	0
10 - 20		3.6	-1.3	----	-----	---	---	2
20 - 30		5.6	-10.2	----	-----	---	---	6
30 - 40		7.6	-13.1	----	-----	---	---	11
40 - 50	12,000	14.9	-5.1	----	-6.3	---	87	9
50 - 60	12,500	6.3	-7.1	----	-----	---	---	7
60 - 70	12,000	5.7	-14.5	----	-----	---	---	8
70 - 80	115,000	14.9	-5.7	----	-----	---	---	5
80 - 90	12,000	9.3	-----	----	-----	---	---	5
90 - 100		4.7	-11.7	----	-----	---	---	9
100 - 110	11,500	7.1	-6.1	----	-----	---	---	9
110 - 120		13.0	-8.1	----	-----	---	---	12
120 - 130		6.3	-4.5	8.6	-11.0	29	58	11
130 - 140		5.4	-6.7	----	-17.0	---	92	4
Airplane AT-6 364 - Traverse 6 Length of traverse 197.5 sec - (a)								
0 - 10	12,000	4.2	-----	----	-----	---	---	1
10 - 20		4.1	-----	----	-----	---	---	1
20 - 30		5.4	-1.5	7.5	-----	132	---	2
30 - 40		4.8	-5.5	----	-----	---	---	7
40 - 50	11,500	9.1	-5.5	6.3	-----	69	---	6
50 - 60	12,000	10.5	-5.5	----	-----	---	---	8
60 - 70		----	-2.9	----	-6.2	---	109	1
70 - 80	11,500	----	-2.8	----	-----	---	---	1
80 - 90		----	-----	----	-----	---	---	0
90 - 100		6.4	-8.5	----	-----	---	---	6
100 - 110		4.6	-----	9.1	-----	41	---	6

[a]Computation of length of traverse in feet discontinued in order to expedite forwarding of data.

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TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 21, 1947 - Flight 5A								
Airplane AT-6 364 - Traverse 6 Length of traverse 197.5 sec - (a)								
110 - 120		5.2	-13.3	----	-----	---	---	9
120 - 130		18.8	-12.7	----	-----	---	---	8
130 - 140		5.5	-6.3	----	-----	---	---	6
140 - 150		6.0	-6.8	----	-----	---	---	6
150 - 160		5.3	-2.1	----	-----	---	---	5
160 - 170	12,000	1.3	-6.2	5.9	-----	83	---	3
170 - 180		11.9	-10.4	----	-----	---	---	9
180 - 190		12.8	-6.1	13.7	-----	27	---	7
190 - 200		10.0	-3.8	----	-----	---	---	5
Airplane AT-6 364 - Traverse 7 Length of traverse 109.8 sec - (a)								
0 - 10	11,500	----	-----	----	-----	---	---	0
10 - 20	11,000	----	-----	----	-----	---	---	0
20 - 30		5.2	-----	4.1	-----	38	---	4
30 - 40		8.0	-11.0	----	-9.0	---	38	7
40 - 50		9.4	-7.4	6.8	-----	26	---	6
50 - 60		2.6	-1.4	----	-5.3	---	65	2
60 - 70		6.0	-----	6.6	-----	30	---	7
70 - 80		5.7	-9.7	----	-----	---	---	7
80 - 90		9.9	-5.6	----	-----	---	---	14
90 - 100		8.6	-3.9	----	-4.4	---	21	10
100 - 110		5.7	-5.7	6.4	-----	54	---	9
Airplane AT-6 364 - Traverse 8 Length of traverse 129.3 sec - (a)								
0 - 10	11,000	----	-5.6	----	-----	---	---	5
10 - 20		6.8	-3.4	13.7	-6.0	105	83	3
20 - 30		6.3	-7.7	----	-----	---	---	5
30 - 40	10,500	5.8	-----	----	-----	---	---	6
40 - 50		10.9	-5.9	----	-----	---	---	3
50 - 60		5.5	-----	7.1	-----	80	---	2
60 - 70		3.5	-5.3	----	-----	---	---	5
70 - 80		6.3	-8.3	----	-----	---	---	8

[a]Computation of length of traverse in feet discontinued in order to expedite forwarding of data.

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TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 21, 1947 - Flight 5A								
Airplane AT-6 364 - Traverse 8 Length of traverse 129.3 sec - (a)								
80 - 90		11.0	-11.6	----	-----	---	---	7
90 - 100		4.5	-4.7	----	-----	---	---	4
100 - 130		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 9 Length of traverse 166.8 sec - (a)								
0 - 10	10,500	2.0	-----	----	-----	---	---	1
10 - 20		7.0	-6.7	----	-----	---	---	10
20 - 30		24.1	-20.4	34.6	-21.8	71	46	8
30 - 40		10.8	-9.0	----	-----	---	---	9
40 - 50		11.3	-5.8	4.2	-----	59	---	7
50 - 60		11.3	-11.7	----	-8.1	---	120	9
60 - 70		9.2	-7.3	----	-----	---	---	5
70 - 80		6.4	-2.5	----	-6.4	---	70	8
80 - 90		5.3	-7.7	6.5	-----	49	---	9
90 - 100		5.2	-4.4	----	-----	---	---	3
100 - 110		4.4	-4.4	----	-----	---	---	4
110 - 120	10,000	4.6	-6.5	----	-----	---	---	5
120 - 130		5.8	-5.0	----	-----	---	---	3
130 - 140		4.6	-2.0	----	-5.7	---	116	2
140 - 150		5.2	-----	----	-----	---	---	1
150 - 160		4.0	-2.6	----	-----	---	---	3
160 - 170		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 10 Length of traverse 133.2 sec - (a)								
0 - 10	9,500	4.8	-6.1	6.8	-----	53	---	4
10 - 20		11.0	-8.7	----	-----	---	---	12
20 - 30		5.5	-----	10.5	-----	85	---	2
30 - 40		5.2	-4.7	----	-----	---	---	4
40 - 50		5.1	-5.2	----	-----	---	---	8
50 - 60		4.6	-6.4	9.8	-----	43	---	8
60 - 70		7.3	-9.7	----	-----	---	---	12
70 - 80		9.6	-13.5	----	-9.5	---	162	15

[a]Computation of length of traverse in feet discontinued in order to expedite forwarding of data.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 21, 1947 - Flight 5A								
Airplane AT-6 364 - Traverse 10 Length of traverse 133.2 sec - (a)								
80 - 90		5.1	-1.3	----	-----	---	---	4
90 - 100		6.1	-----	----	-----	---	---	1
100 - 110		2.6	-4.8	----	-----	---	---	3
110 - 120		2.0	-----	----	-----	---	---	1
120 - 130		----	-1.4	----	-----	---	---	2
130 - 140		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 11 Length of traverse 133.1 sec - (a)								
0 - 10	9,500	----	-----	----	-----	---	---	0
10 - 20		3.0	-4.7	5.5	-----	92	---	3
20 - 30		8.0	-4.5	----	-----	---	---	8
30 - 40		4.2	-3.3	----	-----	---	---	7
40 - 50		5.1	-----	----	-----	---	---	1
50 - 60		9.9	-11.1	----	-4.1	---	49	7
60 - 70	9,000	7.9	-7.3	12.9	-----	115	---	8
70 - 80		7.2	-5.3	----	-10.6	---	57	5
80 - 90		5.1	-3.6	----	-----	---	---	9
90 - 100		12.7	-8.4	----	-----	---	---	10
100 - 110		8.1	-6.0	----	-----	---	---	10
110 - 120		4.3	-3.7	----	-6.2	---	65	4
120 - 130		3.3	-2.5	----	-----	---	---	2
Airplane AT-6 364 - Traverse 12 Length of traverse 211.9 sec - (a)								
0 - 10	8,500	----	-----	----	-----	---	---	0
10 - 20		2.7	-3.8	----	-----	---	---	4
20 - 30	9,000	3.4	-6.7	----	-13.6	---	94	8
30 - 40		5.7	-4.5	12.0	-----	100	---	9
40 - 50	8,500	4.6	-4.4	----	-----	---	---	8
50 - 60		3.8	-4.3	----	-----	---	---	6
60 - 70		7.9	-5.1	----	-----	---	---	6
70 - 80		2.9	-2.2	----	-----	---	---	2
80 - 90		8.6	-9.2	13.0	-----	161	---	9

[a]Computation of length of traverse in feet discontinued in order to expedite forwarding of data.

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TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 21, 1947 - Flight 5A								
Airplane AT-6 364 - Traverse 12 Length of traverse 211.9 sec - (a)								
90 - 100	9,000	----	-3.4	----	-----	---	---	1
100 - 110		7.0	-5.2	----	-----	---	---	8
110 - 120		5.8	-5.2	----	-----	---	---	8
120 - 130		6.2	-7.1	8.0	-----	70	---	8
130 - 140		9.3	-7.1	----	-----	---	---	9
140 - 150		8.4	-8.0	----	-----	---	---	10
150 - 160		5.2	-6.9	----	-----	---	---	7
160 - 170		5.9	-8.2	7.2	-----	52	---	7
170 - 180		3.3	-2.6	5.5	-----	59	---	6
180 - 190		3.8	-2.6	----	-----	---	---	3
190 - 200		4.5	-----	----	-----	---	---	2
200 - 220		----	-----	----	-----	---	---	0
July 22, 1947 - Flight 6A								
Airplane AT-6 364 - Traverse 1 Length of traverse 115.1 sec - (a)								
0 - 120	12,000	----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 2 Length of traverse 77.9 sec - (a)								
0 - 80	11,500	----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 3 Length of traverse 109.1 sec - (a)								
0 - 30	11,000	----	-----	----	-----	---	---	0
30 - 40		----	-3.4	----	-4.6	---	34	1
40 - 50		4.8	-3.4	----	-----	---	---	3
50 - 110		----	-----	----	-----	---	---	0

[a]Computation of length of traverse in feet discontinued in order to expedite forwarding of data.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 22, 1947 - Flight 6A								
Airplane AT-6 364 - Traverse 4 Length of traverse 99.1 sec - (a)								
0 - 50	10,500	----	-----	----	-----	---	---	0
50 - 60		5.8	-3.2	----	-6.6	---	79	3
60 - 70		11.0	-5.2	----	-----	---	---	2
70 - 100		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 5 Length of traverse 117.2 sec - (a)								
0 - 70	10,000	----	-----	----	-----	---	---	0
70 - 80		5.7	-5.8	----	-----	---	---	7
80 - 90	19,500	5.7	-3.2	----	-1.1	---	167	8
90 - 100		7.5	-1.9	4.0	-----	37	---	2
100 - 120		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 6 Length of traverse 158.6 sec - (a)								
0 - 60	9,500	----	-----	----	-----	---	---	0
60 - 70	9,000	3.5	-----	7.1	-----	65	---	1
70 - 80		6.8	-----	----	-----	---	---	1
80 - 90		3.8	-5.1	3.5	-----	33	---	4
90 - 100		5.0	-5.5	6.8	-----	25	---	6
100 - 110		1.5	-5.0	----	-----	---	---	6
110 - 120		3.6	-----	----	-----	---	---	2
120 - 160	9,000	----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 7 Length of traverse 125.3 sec - (a)								
0 - 10	9,000	----	-----	----	-----	---	---	0
10 - 20		3.2	-----	----	-----	---	---	1
20 - 30		----	-3.1	----	-6.9	---	145	1
30 - 50		----	-----	----	-----	---	---	0
50 - 60		6.2	-4.6	----	-----	---	---	4
60 - 70		4.5	-4.6	----	-5.2	---	44	4
70 - 80		6.7	-4.5	----	-10.5	---	77	3

[a]Computation of length of traverse in feet discontinued in order to expedite forwarding of data.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 22, 1947 - Flight 6A								
Airplane AT-6 364 - Traverse 7 Length of traverse 125.3 sec - (a)								
80 - 90		4.0	-----	6.6	-----	54	---	3
90 - 130	8,500	----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 8 Length of traverse 136.0 sec - (a)								
0 - 50	8,500	----	-----	----	-----	---	---	0
50 - 60		----	-2.6	----	-----	---	---	1
60 - 70		3.4	-3.8	----	-----	---	---	5
70 - 80		3.4	-----	----	-----	---	---	2
80 - 90		3.6	-2.0	----	-----	---	---	1
90 - 100		10.4	-5.4	19.6	-----	67	---	2
100 - 110		1.6	-----	----	-----	---	---	2
110 - 120		2.3	-----	----	-----	---	---	1
120 - 140		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 9 Length of traverse 130.9 sec - (a)								
0 - 60	8,000	----	-----	----	-----	---	---	0
60 - 70		7.8	-6.3	11.7	-----	96	---	4
70 - 80		----	-3.4	----	-5.3	---	29	2
80 - 90		7.3	-4.9	----	-----	---	---	3
90 - 100		----	-5.5	----	-11.1	---	139	3
100 - 110		----	-2.7	----	-----	---	---	1
110 - 140		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 10 Length of traverse 128.9 sec - (a)								
0 - 30	7,500	----	-----	----	-----	---	---	0
30 - 40		3.4	-----	----	-----	---	---	1
40 - 50		6.7	-3.4	9.0	-----	70	---	6
50 - 60		6.1	-3.3	5.6	-----	48	---	1
60 - 80		----	-----	----	-----	---	---	0

[a]Computation of length of traverse in feet discontinued in order to expedite forwarding of data.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 22, 1947 - Flight 6A								
Airplane AT-6 364 - Traverse 10 Length of traverse 128.9 sec - (a)								
80 - 90		7.0	-4.0	----	-4.4	---	36	2
90 - 100		5.6	-3.9	----	-----	---	---	2
100 - 110		5.9	-5.1	----	-----	---	---	4
110 - 120		----	-2.2	----	-----	---	---	1
120 - 130		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 11 Length of traverse 113.0 sec - (a)								
0 - 30	7,000	----	-----	----	-----	---	---	0
30 - 40		6.1	-3.7	----	-----	---	---	3
40 - 50		----	-2.9	----	-----	---	---	3
50 - 60		4.5	-2.9	----	-7.3	---	107	6
60 - 70		----	-4.5	----	-----	---	---	2
70 - 80		6.8	-5.5	----	-----	---	---	3
80 - 90		5.7	-4.1	----	-----	---	---	3
90 - 100		5.9	-5.1	11.8	-8.1	66	55	4
100 - 120		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 12 Length of traverse 114.4 sec - (a)								
0 - 20	6,500	----	-----	----	-----	---	---	0
20 - 30		3.8	-2.4	----	-----	---	---	3
30 - 40		----	-----	----	-----	---	---	0
40 - 50		3.9	-4.6	----	-----	---	---	5
50 - 60		----	-----	----	-----	---	---	0
60 - 70		.6	-2.7	----	-----	---	---	2
70 - 80		3.5	-2.6	----	-3.3	---	82	3
80 - 120		----	-----	----	-----	---	---	0
Airplane AT-6 364 - Traverse 13 Length of traverse 121.3 sec - (a)								
0 - 10	6,000	3.5	-3.8	----	-5.4	---	118	3
10 - 20		4.3	-3.2	4.9	-----	42	---	2

[a]Computation of length of traverse in feet discontinued in order to expedite forwarding of data.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Concluded

Time interval (sec)	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)		Maximum true gust velocity $U_{t_{max}}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 22, 1947 - Flight 6A								
Airplane AT-6 364 - Traverse 13 Length of traverse 121.3 sec - (a)								
20 - 40		----	-----	----	-----	---	---	0
40 - 50		3.5	-----	----	-----	---	---	1
50 - 60		3.9	-----	6.0	-----	43	---	1
60 - 80		----	-----	----	-----	---	---	0
80 - 90		7.3	-----	----	-----	---	---	2
90 - 100		----	-----	----	-----	---	---	0
100 - 110		3.6	-3.4	----	-----	---	---	2
110 - 120		----	-2.9	----	-----	---	---	1
120 - 130		----	-----	----	-----	---	---	0

[a]Computation of length of traverse in feet discontinued in order to expedite forwarding of data.

TABLE II.- SUMMARY OF DRAFT VELOCITY MEASUREMENTS FROM FLIGHTS OF AN AT-6 AIRPLANE WITHIN THUNDERSTORMS

Date	Flight no.	Airplane no.	Assigned altitude (ft)	Traverse no.	Draft location from start of traverse (sec)		Draft extent (ft)	Average draft velocity (fps)
					Start	End		
7-1-47	2A	AT-6 364		[a]1				
				[a]2				
				[a]3				
				[a]4				
				[a]5				
				[a]6				
				[a]7				
				[a]8				
				[a]9				
7-12-47	3A	AT-6 364	10,500	1	31.3	54.8	4,595	49.9
				[a]2				
			9,500	3	15.0	46.0	6,710	-6.5
			9,000	4	18.0	46.0	6,392	-6.4
				[a]5				
				[a]6				
				[a]7				
				[a]8				
				[a]9				
				[a]10				

[a]No draft velocities indicated by records.

TABLE II.- SUMMARY OF DRAFT VELOCITY MEASUREMENTS - Continued

Date	Flight no.	Airplane no.	Assigned altitude (ft)	Traverse no.	Draft location from start of traverse (sec)		Draft extent (ft)	Average draft velocity (fps)
					Start	End		
7-17-47	4A	AT-6 364		[a]1				
				[a]2				
				[a]3				
			8,500	4	46.0	80.0	8,386	-7.8
			8,000	5	27.0	57.0	7,708	-7.5
				[a]6				
				[a]7				
				[a]8				
7-21-47	5A	AT-6 364		[a]1				
			12,500	2	66.3	91.6	5,916	-4.0
				[a]3				
			13,000	4	71.6	86.4	3,555	-4.3
			12,500	5	103.0	133.5	6,759	-8.7
			12,000	6	72.5 131.2	82.5 173.7	2,390 8,995	-3.7 11.9
				[a]7				
				[a]8				
			10,000	9	86.5	140.5	11,657	-7.6
			9,500	10	17.4	45.4	5,848	-7.1
				[a]11				
			8,500	12	6.8 114.5	30.7 159.8	5,993 10,284	8.9 3.9

[a]No draft velocities indicated by records.

TABLE II.- SUMMARY OF DRAFT VELOCITY MEASUREMENTS - Concluded

Date	Flight no.	Airplane no.	Assigned altitude (ft)	Traverse no.	Draft location from start of traverse (sec)		Draft extent (ft)	Average draft velocity (fps)
					Start	End		
7-22-47	6A	AT-6 364		[a]1				
				[a]2				
				[a]3				
				[a]4				
			10,000	5	70.6	88.7	3,945	-18.1
				[a]6				
				[a]7				
				[a]8				
				[a]9				
				[a]10				
				[a]11				
				[a]12				
				[a]13				

[a]No draft velocities indicated by records.

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INDEX

Subject	Number
Gusts - Structure	6.1.2.1
Gusts - Frequency	6.1.2.2
Gusts - Turbulence	6.1.2.3

ABSTRACT

The gust and draft velocities from records of NACA instruments installed in an AT-6 airplane participating in flights through small cumulus clouds at Clinton County Army Air Field, Ohio, from July 1, 1947 to July 22, 1947 are presented.

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