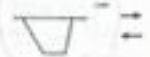
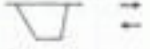
Tab.14 - Effect of Section Shape on the Free-Stream Characteristics of All-Movable Control Surfaces
(Whicker and Fehlner, 1958)
(all control surfaces tested against groundboard with gap = 0.005 c)

Item No.	Profile		$\bar{c}$, ft	a	A	λ	t/c	Tip Shape	Section Shape	Direction	Rn × 10^{-6} of test	$\left(\frac{\partial C_L}{\partial \alpha}\right)_{\alpha=0}$ per degree	C_L @ 10°	C_L @ 20°	$C_{L_{max}}$	Stall angle, deg	α for $(L/D)_{max}$, deg	L/D_{max}	L/D @ α = 10°	L/D @ α = 20°	L/D @ stall angle	(CP'); @ α = 10°	(CP'); @ α = Stall Pt.	(CP'); @ α = 10°	(CP'); @ α = Stall Pt.
1		→	2.0	2	0	0.45	0.15	Square	NACA 0015	Ahead	2.72	0.0412	0.435	0.93	1.32	28.3	5.5	12.3	10.35	5.81	4	0.195	0.25	0.425	0.48
		←								Astern	3.00	0.0388	0.39	0.63	0.63	20.0	6.8	6.8	5.42	2.58	2.5	0.15	0.19	0.41	0.41
2		→	2.0	2	0	0.45	0.167	Square	TMB EHP	Ahead	2.70	0.0382	0.392	0.85	1.18	27.8	6.4	12	10.9	5.99	4.4	0.15	0.21	0.45	0.48
		←								Astern	3.00	0.0325	0.395	0.61	0.61	23.3	8	7.3	6.37	2.6	2.5	0.16	0.19	0.41	0.40
3		→	2.0	2	0	0.45	0.167	Square	NSS	Ahead	2.70	0.0332	0.375	0.842	1.24	29.7	6.6	12.2	10.7	5.93	4.0	0.12	0.22	0.45	0.48
		←								Astern	3.00	0.0362	0.4	0.635	0.66	18.0	8	9.7	8.9	2.87	3.5	0.14	0.15	0.43	0.41
4		→	2.0	2	0	0.45	0.167	Square	TMB Fairing No. 7	Ahead	2.77	0.04	0.42	0.885	1.13	24.5	7	10.2	9.55	5.82	4.8	0.13	0.20	0.45	0.48
		←								Astern	3.00	0.046	0.44	0.865	0.89	21.5	10	6.7	6.66	3.23	2.7	0.21	0.26	0.41	0.41
5		→	2.0	2	0	0.45	0.15	Square	TMB 07507515	Ahead	2.77	0.0481	0.51	1.65	1.45	26.9	6	10.9	8.8	5.60	4.1	0.20	0.24	0.46	0.49
		←								Astern	3.00	0.0457	0.505	0.886	0.89	20.0	8	4.8	4.43	2.59	2.6	0.13	0.29	0.42	0.41

Tab.13 - Effect of Aspect Ratio, Sweep Angle and Tip Shape on the Free-Stream Characteristics of All-Movable Control Surfaces (Whicker and Fehlner, 1958)

(all control surfaces tested against groundboard with gap = 0.005 c)

Item No.	Profile		$\bar{c}$, ft	a	Λ, deg	λ	t/c	Section Shape	Tip Shape	Rn × 10^{-6} of test	Direction	$\left(\frac{\partial C_L}{\partial \alpha}\right)_{\alpha=0}$ per degree	C_L @ 10°	C_L @ 20°	$C_{L_{max}}$	Stall Angle, deg	α for $(L/D)_{max}$ deg	L/D_{max}	L/D @ α = 10°	L/D @ α = 20°	L/D @ Stall Angle	$-(CP)'_{\frac{c}{2}}$ @ α = 10°	$-(CP)'_{\frac{c}{2}}$ @ α = Stall	$-(CP)'_{\frac{3c}{4}}$ @ α = 10°	$-(CP)'_{\frac{3c}{4}}$ @ α = Stall
1		→ ← →	2.0	1	−8	0.45	0.15	NACA 0015	Square	2.25	Ahead	0.023	25	0.59	1.24	39.4	8	8.0	7.45	4.24	2.0	0.14	0.30	0.48	0.51
									Square	3.00	Astern	0.023	0.30	0.67	0.96	31.2	8	5.4	5.36	2.85	1.7	0.20	0.27	0.45	0.42
									Faired	2.28	Ahead	0.021	0.23	0.53	1.03	36.3	8	8.2	7.66	4.27	1.8	0.10	0.32	0.46	0.49
2		→ ← →	2.0	2	−8	0.45	0.15	NACA 0015	Square	2.72	Ahead	0.04	0.42	0.91	1.33	28.7	6	12.2	10.1	5.9	4.0	0.18	0.25	0.45	0.48
									Square	3.00	Astern	0.012	0.40	0.64	0.64	21.0	7	6.8	5.89	2.4	2.3	0.18	0.20	0.40	0.39
									Faired	2.72	Ahead	0.039	0.41	0.86	1.24	28.8	5	13.0	10.9	5.9	4.0	0.18	0.24	0.44	0.47
3		→ ← →	2.0	3	−8	0.45	0.15	NACA 0015	Square	2.26	Ahead	0.056	0.56	1.09	1.13	21.0	4.6	15.8	12.05	6.95	6.8	0.19	0.22	0.44	0.45
									Square	3.00	Astern	0.047	0.46		0.62	17.4	5	8.1	5.75		2.7	0.13	0.17	0.38	0.40
									Faired	2.26	Ahead	0.049	0.51	1.02	1.21	24.0	4.4	15.4	12.15	6.8	5.4	0.195	0.24	0.44	0.47
4		→ ← →	2.0	1	0	0.45	0.15	NACA 0015	Square	2.70	Ahead	0.023	0.27	0.60	1.26	38.5	7.0	8.0	7.16	4.25	2.2	0.16	0.31	0.48	0.50
									Square	3.00	Astern	0.023	0.30	0.68	0.93	29.2	7.8	5.5	5.1	2.9	1.9	0.19	0.26	0.42	0.41
									Faired	2.29	Ahead	0.020	0.24	0.54	1.11	36.4	8	8.2	7.35	4.31	2.0	0.11	0.31	0.46	0.49
5		→ ← →	2.0	2	0	0.45	0.15	NACA 0015	Square	2.72	Ahead	0.04	0.44	0.93	1.33	28.7	5.5	12.4	10.35	5.79	4.0	0.19	0.25	0.45	0.48
									Square	3.00	Astern	0.039	0.40	0.62	0.63	19.2	6.8	6.8	5.41	2.54	2.7	0.15	0.18	0.41	0.41
									Faired	2.72	Ahead	0.04	0.42	0.87	1.17	26.8	5	13.0	10.61	5.88	4.2				
6		→ ← →	2.0	3	0	0.45	0.15	NACA 0015	Square	2.70	Ahead	0.054	0.55	1.10	1.25	23.0	4.5	16.0	12.4	7.05	6.0	0.18	0.23	0.45	0.48
									Square	3.00	Astern	0.042	0.46		0.59	15.5	5.2	7.5	6.05		3.3	0.11	0.16	0.42	0.42
									Faired	2.26	Ahead	0.052	0.53	1.05	1.14	22.0	4.6	16.2	12.6	7.1	6.4	0.20	0.22	0.44	0.46
7		→ ← →	2.0	1	11	0.45	0.15	NACA 0015	Square	2.28	Ahead	0.024	0.26	0.60	1.40	43.4	7.0	8.2	7.42	4.22	1.7	0.17	0.34	0.46	0.49
									Square	3.00	Astern	0.023	0.29	0.67	0.84	28.2	8.0	5.7	5.00	2.92	1.8	0.17	0.26	0.42	0.40
									Faired	2.28	Ahead	0.021	0.25	0.55	1.21	39.4	7.0	8.3	8.80	4.44	2.0	0.12	0.32	0.45	0.50
8		→ ← →	2.0	2	11	0.45	0.15	NACA 0015	Square	2.72	Ahead	0.042	0.45	0.94	1.33	28.8	4.0	13.2	10.20	5.73	4.0	0.19	0.25	0.46	0.48
									Square	3.00	Astern	0.026	0.39	0.61	0.65	18.2	8.0	6.8	6.21	2.52	3.1	0.12	0.19	0.42	0.44
									Faired	2.72	Ahead	0.043	0.44	0.90	1.18	26.8	4.6	14.0	10.50	5.70	4.4	0.18	0.23	0.44	0.47
9		→ ← →	2.0	3	11	0.45	0.15	NACA 0015	Square	2.26	Ahead	0.050	0.52	10.5	1.25	24.2	5.0	15.5	12.85	7.00	5.6	0.20	0.24	0.44	0.47
									Square	3.00	Astern	0.046	0.48		0.57	13.4	5.6	7.4	5.22		3.6	0.10	0.16	0.42	0.44
									Faired	2.26	Ahead	0.054	0.54	10.55	1.08	20.9	4.0	16.8	12.72	7.03	5.6	0.185	0.21	0.44	0.45
10		→	3.0	2	22.5	0.45	0.15	NACA 0015	Square	3.00	Ahead	0.045	0.46	0.96	1.46	31.8	5.2	10.6	9.10	5.45	3.3	0.22	0.26	0.44	0.49

Tab.15 - Effect of Taper Ratio and Tip Shape on the Free-Stream Characteristics of All-Movable Control Surfaces (Windsor, 1962)

(all control surfaces tested against groundboard with gap = 0.005 c)

Item No.	Profile		$\bar{c}$, ft	α	Λ, deg	t/c	λ	Section Shape	Tip Shape	Rn × 10^{-6} of test	Direction	Ref. Fig. No.	
1		→	3.0	2	11	0.15	0.80	NACA 0015	Square	3.0	Ahead	7(a-d)	*
		←							Faired	3.0	Ahead	22(a-f)	*
2		→	3.0	2	11	0.15	0.60	NACA 0015	Square	3.0	Ahead	7(a-d)	*
		←							Faired	3.0	Ahead	22(a-d)	*
3		→	2.0	2	11	0.15	0.45	NACA 0015	Square	2.72	Ahead	60	†
		←							Square	3.00	Astern	94	†
		←							Faired	2.72	Ahead	85	†
4		→	3.0	2	11	0.15	0.20	NACA 0015	Square	3.0	Ahead	7(a-d)	*
		←							Faired	3.0	Ahead	29(a-d)	*

$\left(\frac{\partial C_L}{\partial \alpha}\right)_{\alpha=0}$ per degree	C_L @ 10°	C_L @ 20°	$C_{L_{max}}$	Stall Angle, deg	$(L/D)_{max}$	L/D @ α = 10°	L/D @ α = 20°	L/D @ Stall Angle	(CP) — α = — 10°	(CP) — α = — Stall	(CP) — α = — 10°	(CP) — α = — Stall	α for $(L/D)_{max}$ deg
0.046	0.47	1.0	1.53	31.6	11.1	9.05	5.41	3.5	0.215	0.26	0.45	0.52	6
0.046	0.47	0.97	1.30	28.4	11.0	9.4	5.61	3.61	0.19	0.235	0.455	0.51	4
0.046	0.46	0.99	1.45	30.2	10.81	9.2	5.6	3.7	0.206	0.26	0.445	0.51	6
0.046	0.45	0.93	1.26	27.7	10.51	9.39	5.07	4.0	0.19	0.255	0.438	0.50	6
0.042	0.45	0.95	1.33	28.8	13.2	10.2	5.73	4.0	0.19	0.25	0.46	0.48	4
0.026	0.39	0.61	0.65	18.2	6.8	6.21	2.52	3.1	0.12	0.19	0.42	0.44	8
0.043	0.44	0.90	1.18	26.8	14.0	10.5	5.7	4.4	0.18	0.23	0.44	0.47	4.6
0.040	0.42	0.89	1.24	27.6	11.9	9.55	5.85	4.2	0.175	0.23	0.415	0.475	6
0.040	0.42	0.84	1.25	27.5		13.6	6	4.3	0.155	0.23	0.42	0.474	

* Windsor, 1962.
† Whicker and Fehlner, 1958.