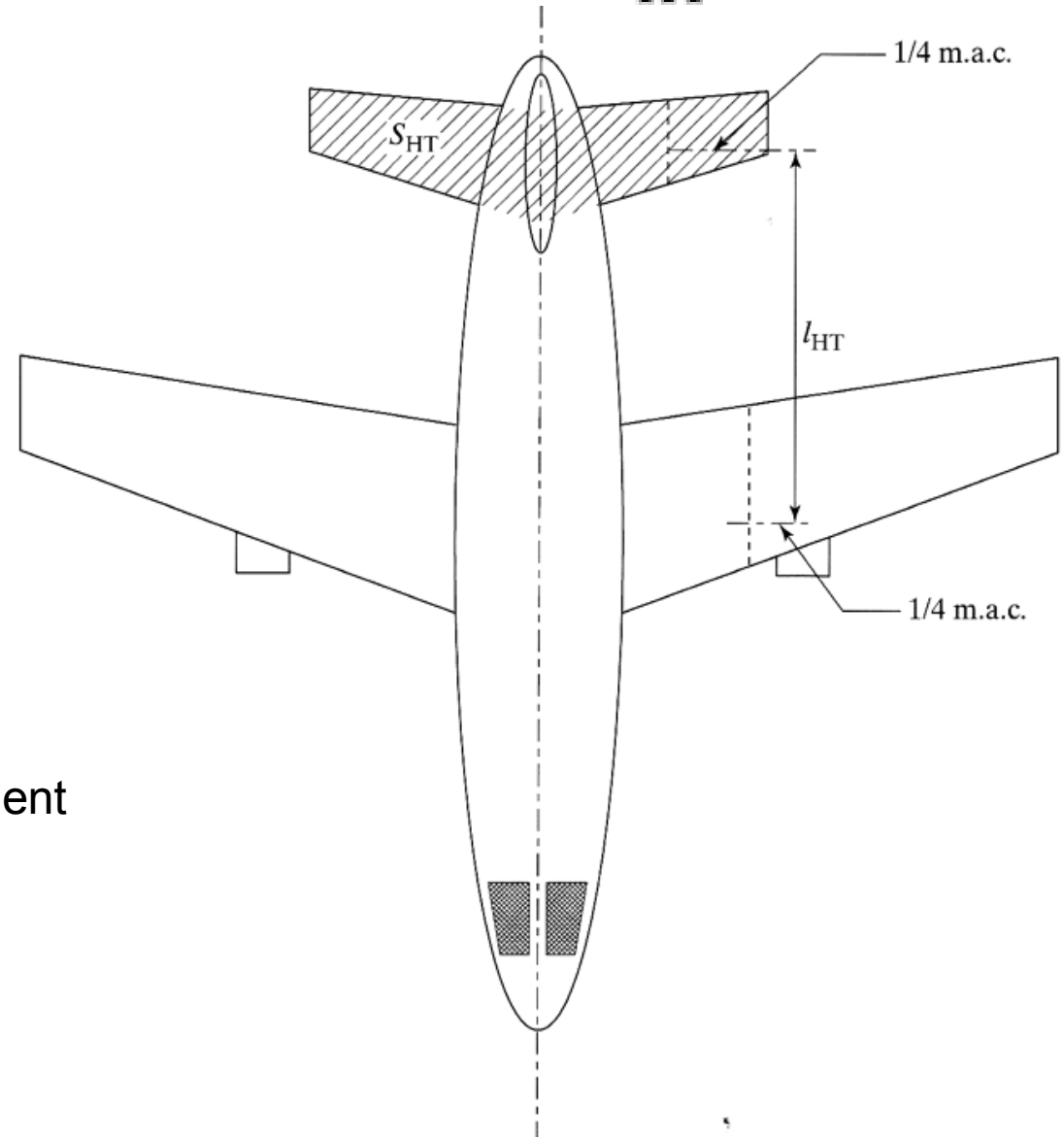
Data to size the tail

by T. C. Corke „Design of Aircraft”

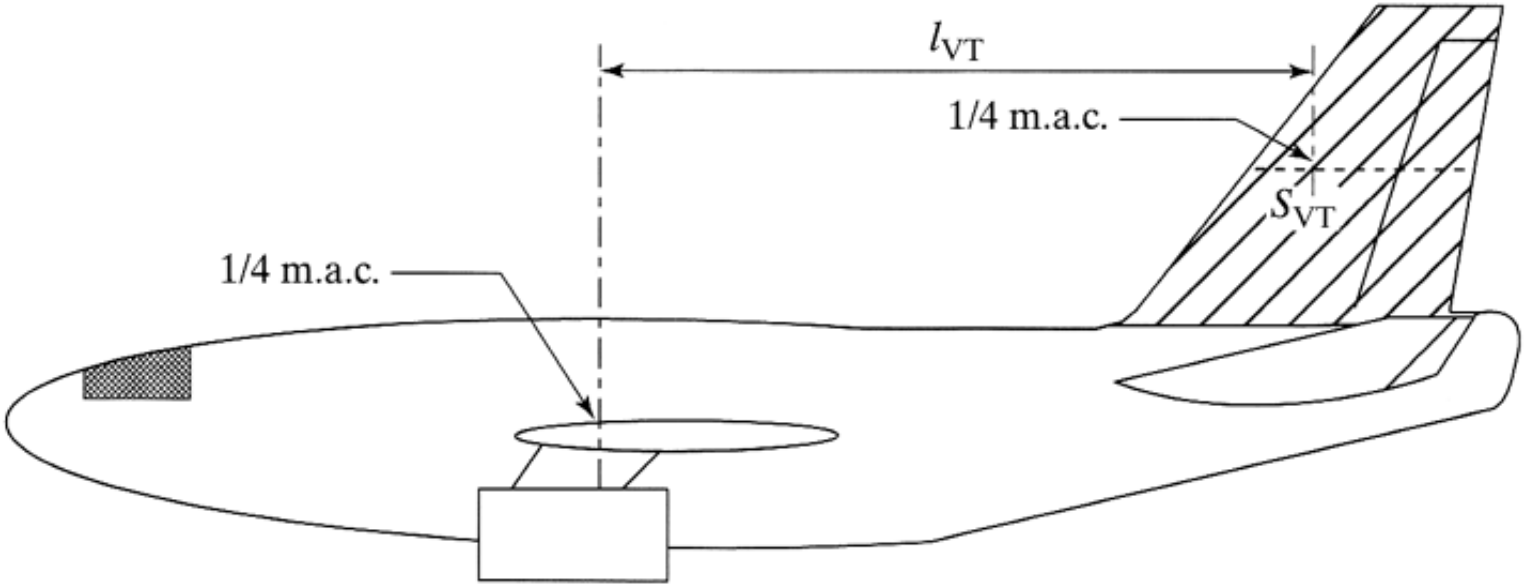
$$S_{HT} = C_{HT} \frac{\bar{c}_W S_W}{l_{HT}},$$



Horizontal tail
volume coefficient

Corke

$$S_{VT} = C_{VT} \frac{b_W S_W}{l_{VT}},$$



Vertical tail
volume coefficient

Corke

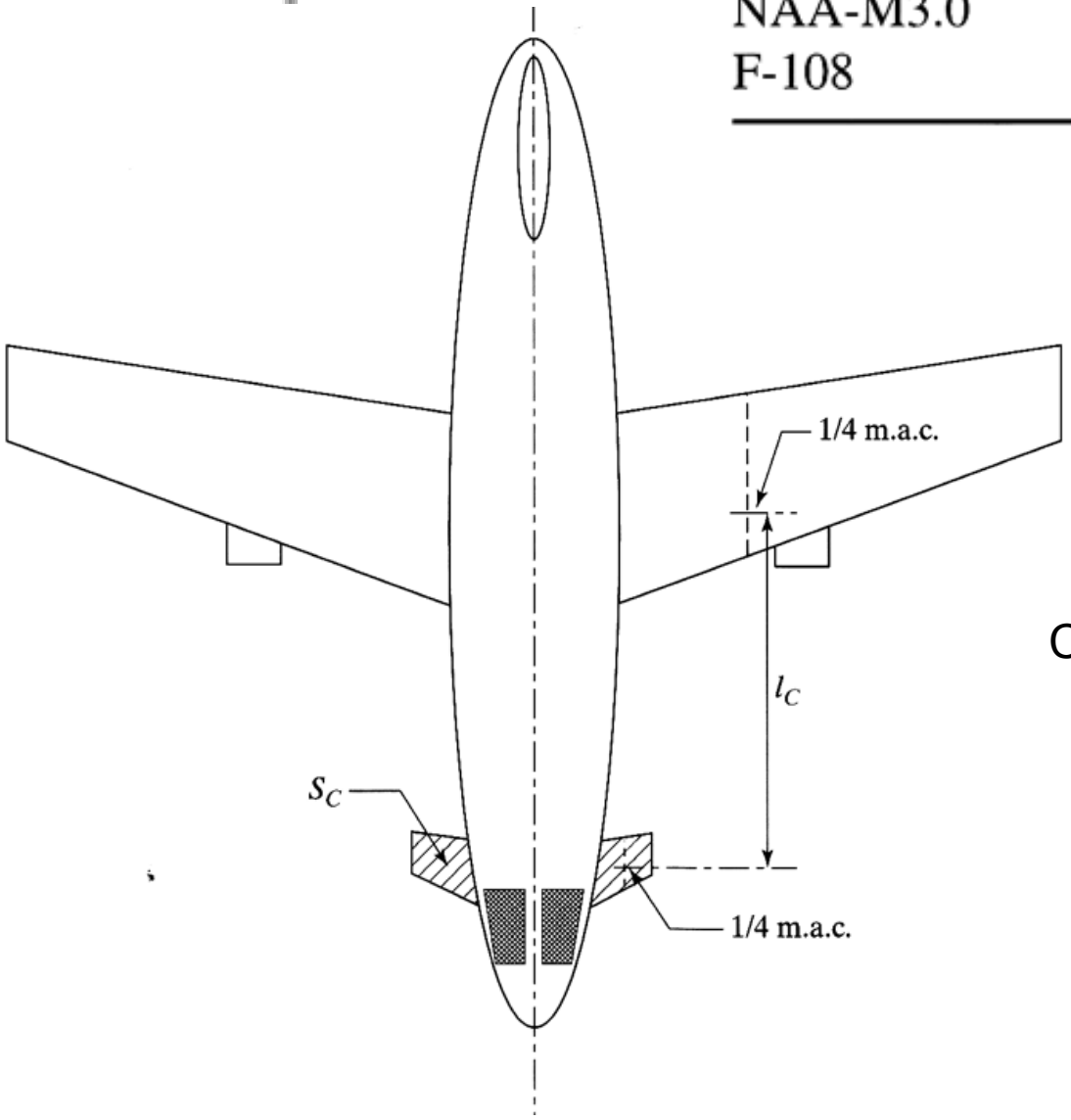
Horizontal tail (H) and vertical tail (V) volume coefficients – typical values

	C_{VT}	C_{HT}
Sail Plane	0.02	0.50
Homebuilt	0.04	0.50
General Aviation (single engine)	0.04	0.70
General Aviation (twin engine)	0.07	0.80
Twin Turboprop	0.08	0.90
Combat Jet Trainer	0.06	0.70
Combat Jet Fighter	0.07	0.40
Military Transport/Bomber	0.08	1.00
Commercial Jet Transport	0.09	1.00

Corke

$$S_C = C_C \frac{\bar{C}_W S_W}{l_C},$$

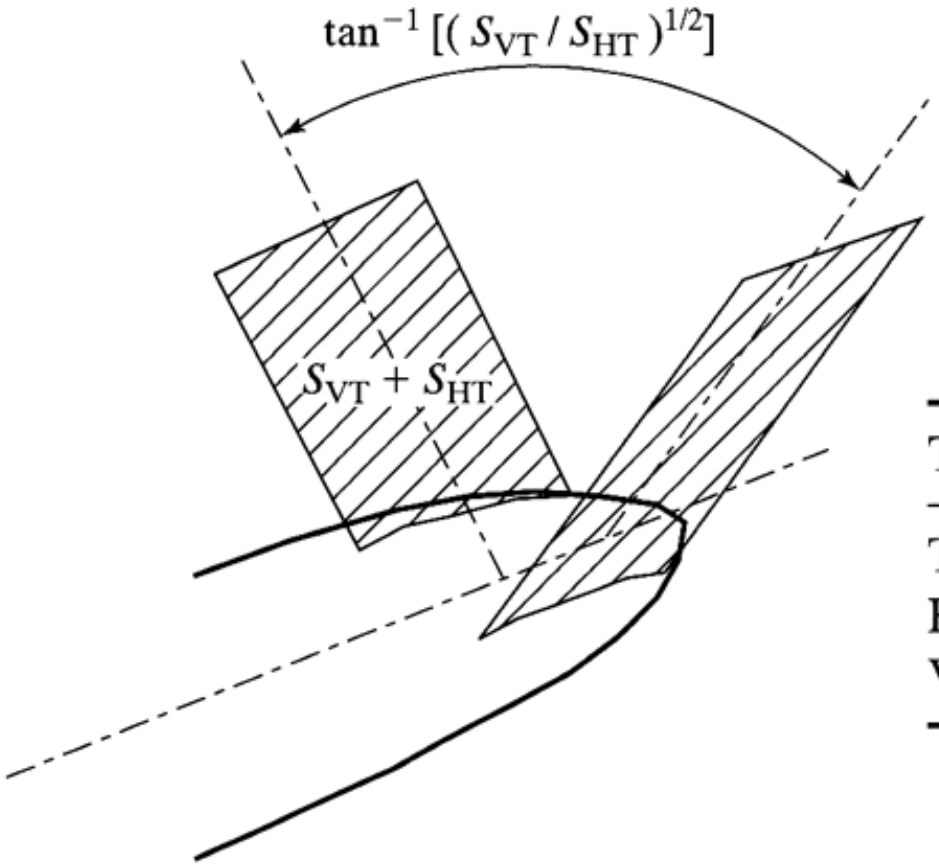
	C_C	Cruise Mach No.
B-70	0.104	2+
CL-408	0.12	3
NAA-M3.0	0.10	3
F-108	0.11	2+



Canard volume coefficient

Corke

Volume coefficients of V-tail



Type	Equivalent C_{VT}	Equivalent C_{HT}
T-Tail	0.95	—
H-Tail	0.50	0.95
V-Tail	1.00	1.00

Corke

Typical length of tail part of fuselage related to total length

Type	$l_{Tail}/l_{Fuselage}$
Front-Mounted Prop.	0.60
Wing-Mounted Engines	0.50–0.55
Fuselage-Mounted Engines	0.45–0.50
Canard	0.30–0.50

Corke

Typical values of tail aspect ratio and taper ratio

$$A = \frac{b^2}{S}.$$

$$C_r = \frac{2S}{b(1+\lambda)}$$

$$C_t = \lambda C_r.$$

	Aft-horizontal		Vertical	
	A	λ	A	λ
Combat	3–4	0.2–0.4	0.6–1.4	0.2–0.4
Sail Plane	6–10	0.3–0.5	1.5–2.0	0.4–0.6
Other	3–5	0.3–0.6	1.3–2.0	0.3–0.6
T-Tail	—	—	0.7–1.2	0.6–1.0

Corke

Interference coefficients for different types of tail

	Q
Conventional Tail	1.05
V-Tail	1.03
H-Tail	1.08

Corke