I eat F-15's for breakfast

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Basic Geometry

Length: 18.92 m

Height: 5.08 m

Wingspan: 13.56 m

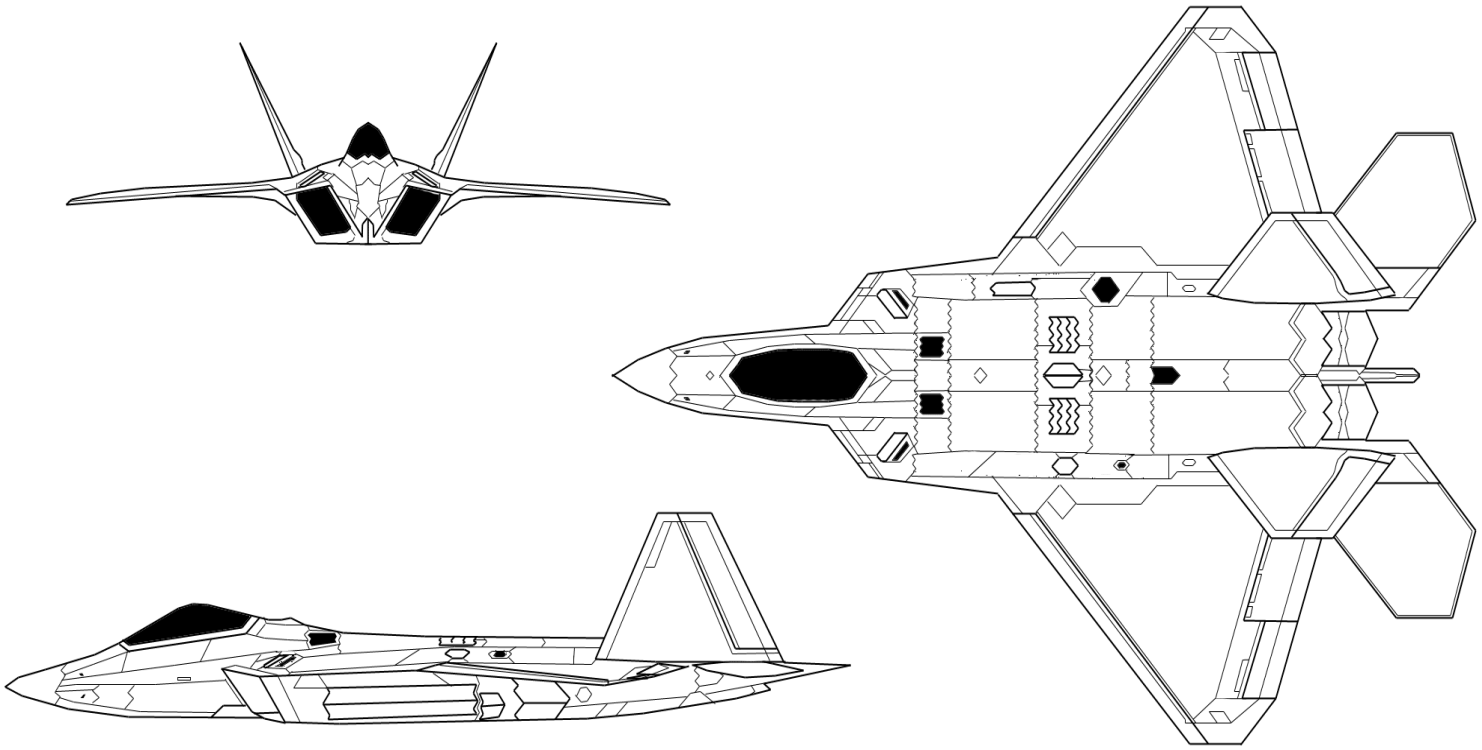
Wing Area: 78.04 m^2

Aspect Ratio: 2.1

Taper Ratio: 0.155

Horizontal Tailspan: 8.84 m

Leading Edge Sweep: 42^o

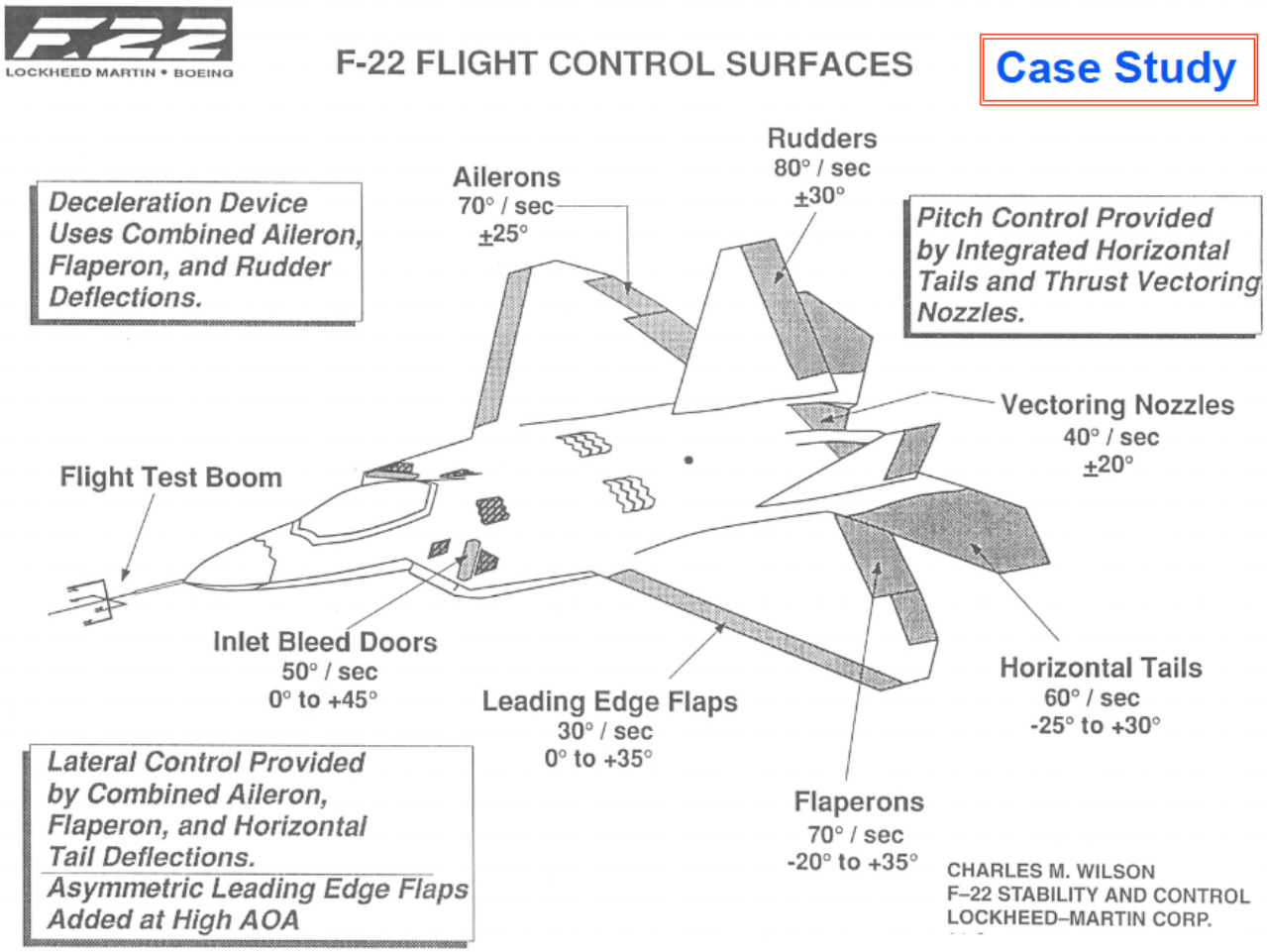


Basic Performance

W/S	71.42 psf	T/W	1.26
Minimum Takeoff Distance	1575 feet	Service Ceiling	65000 feet
Minimum Landing Distance	657 feet	Maneuver g-limits	-3.0 g/+9.0 g
Maximum Speed Supercruise	M=1.82	CG location	38.35 feet
Maximum Speed Afterburner	Apx. M=2.8	Neutral Point	35.17 feet
Empty Weight	43,430 lb	Static Margin	-24.45%
Max Takeoff Weight	83,500 lb	Combat Radius	471 miles

F-22 Mission Requirements – Air Superiority

Maneuverability – Fully moveable horizontal tails, flaperons, ailerons, rudders, vectoring nozzles, inlet bleed doors



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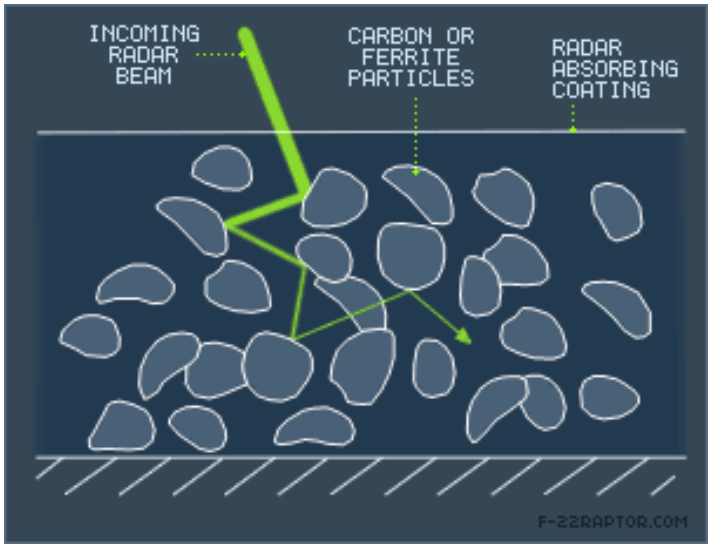
F-22 Mission Requirements – Air Superiority

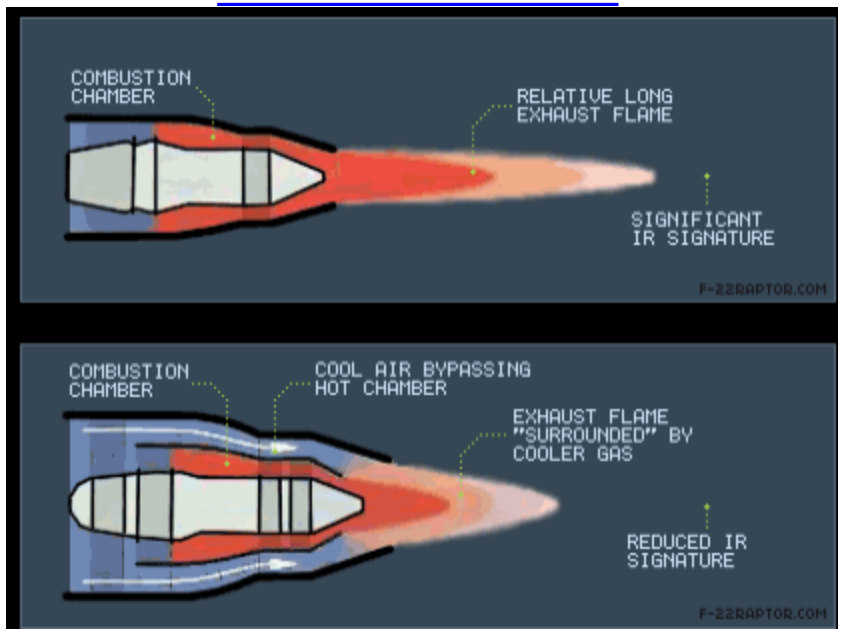
Supercruise – Two P&W F119-PW-100 produce almost as much thrust in dry operation (23,500 lbf) than the F-15 P&W F100 engines with afterburner (25,000 lbf). Max Thrust (wet) is 35,000+ lbf.

P&W - F119-PW-100



Radar Absorbing Paint

Stealth – Radar absorbing material, internal weapons bay.



Reduced IR Signature

F-22 Mission: Air-to-Air

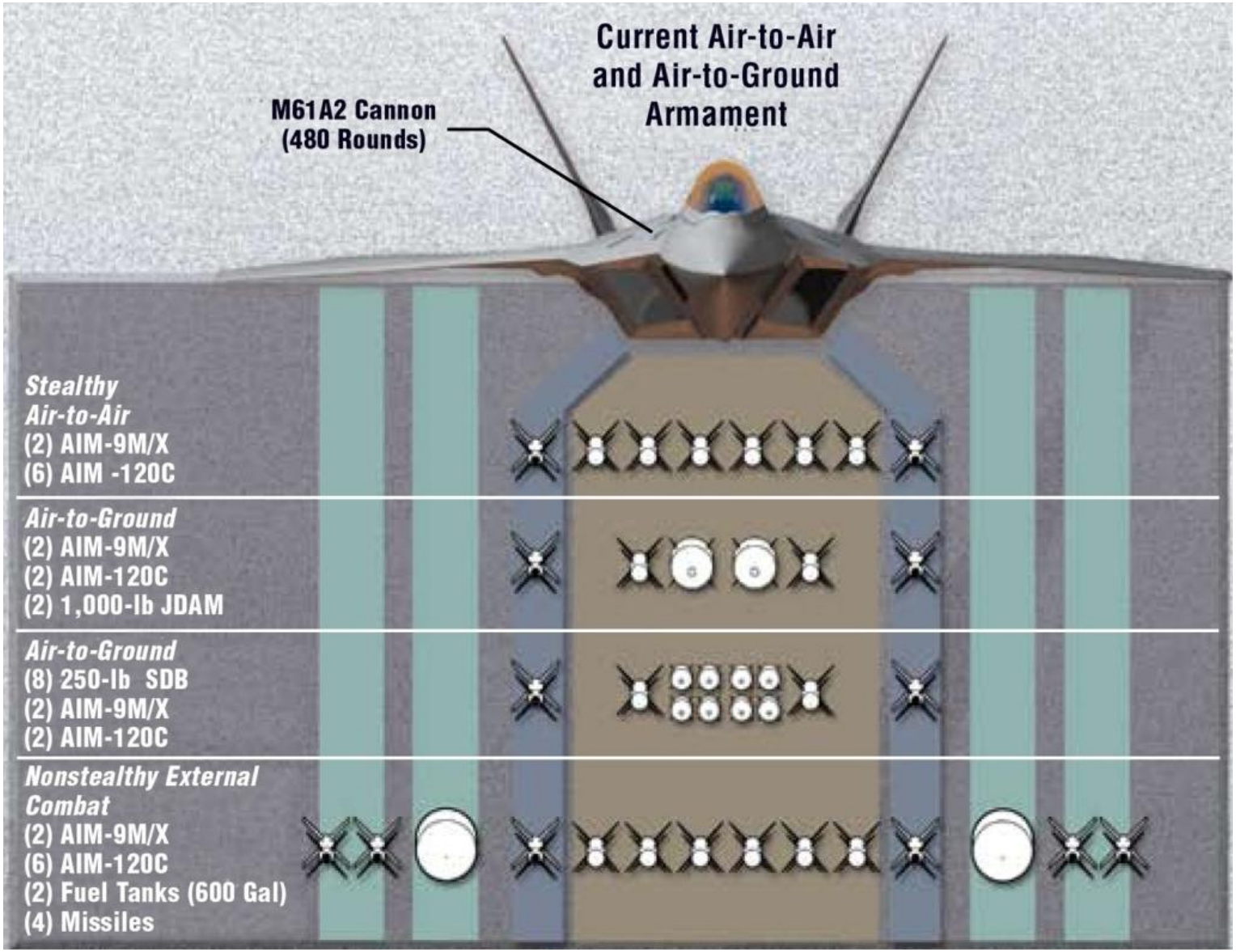
Beyond Visual Range (BVR) Engagements – first look, first shot, first kill.

First Strike – this is actually somewhat misleading due to radar issues…

Vympel R-27P

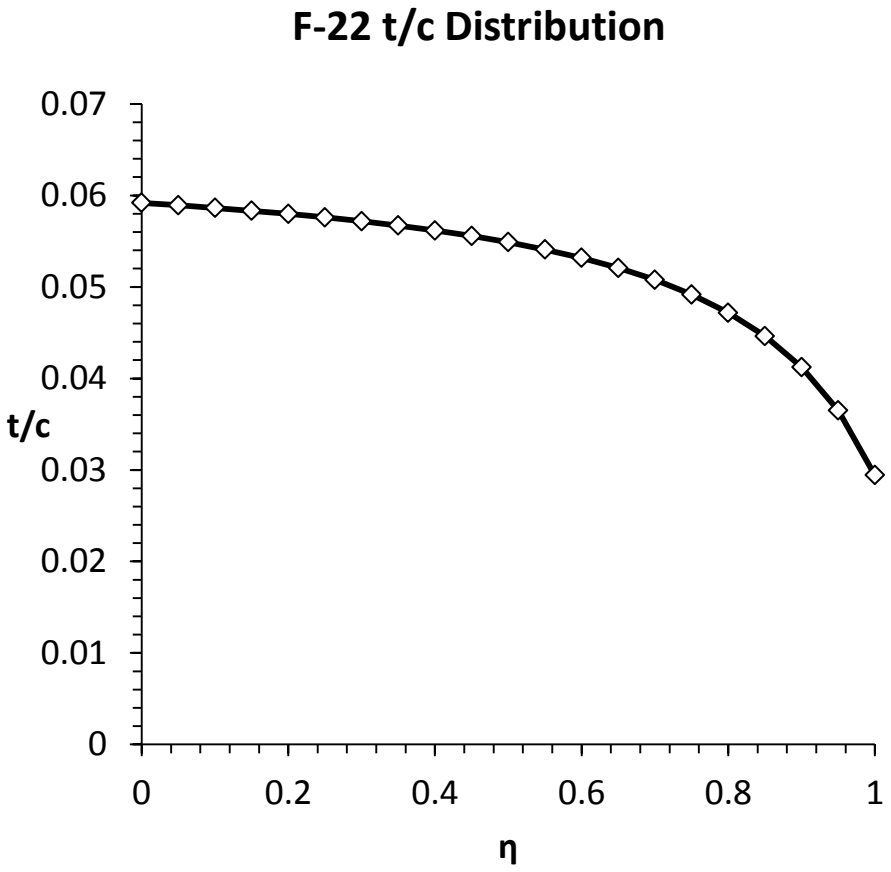
AIM 120C AMRAAM

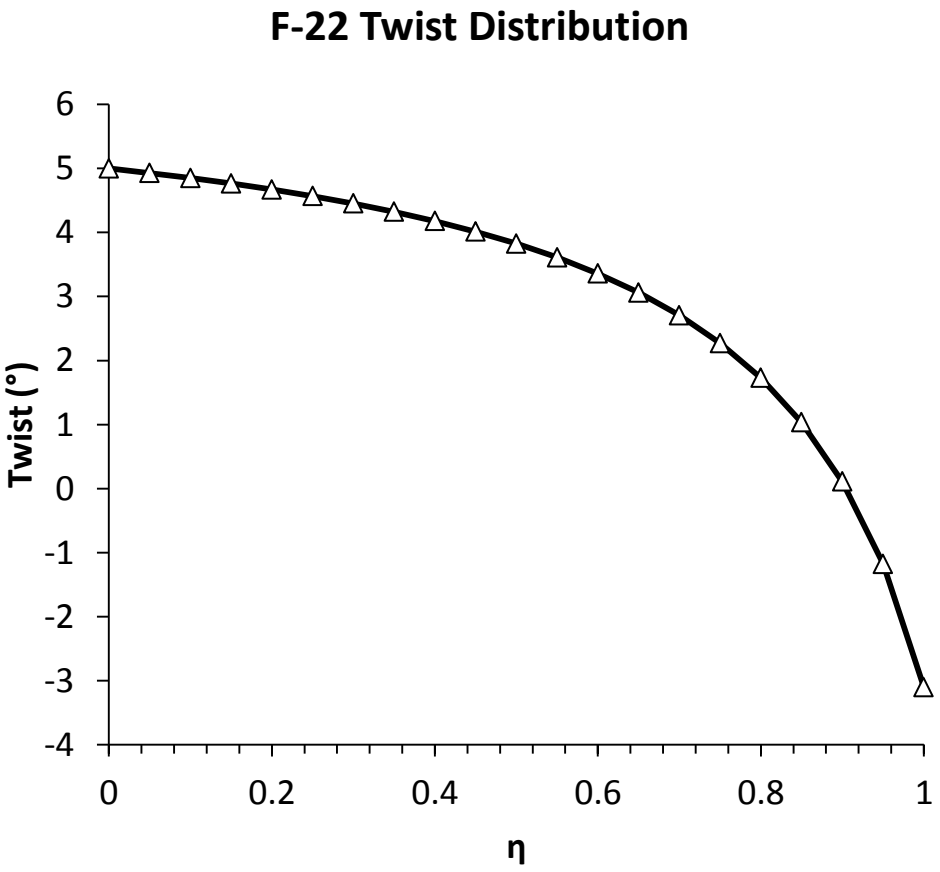
F-22 Mission: Weapons Configuration



Advanced Geometry

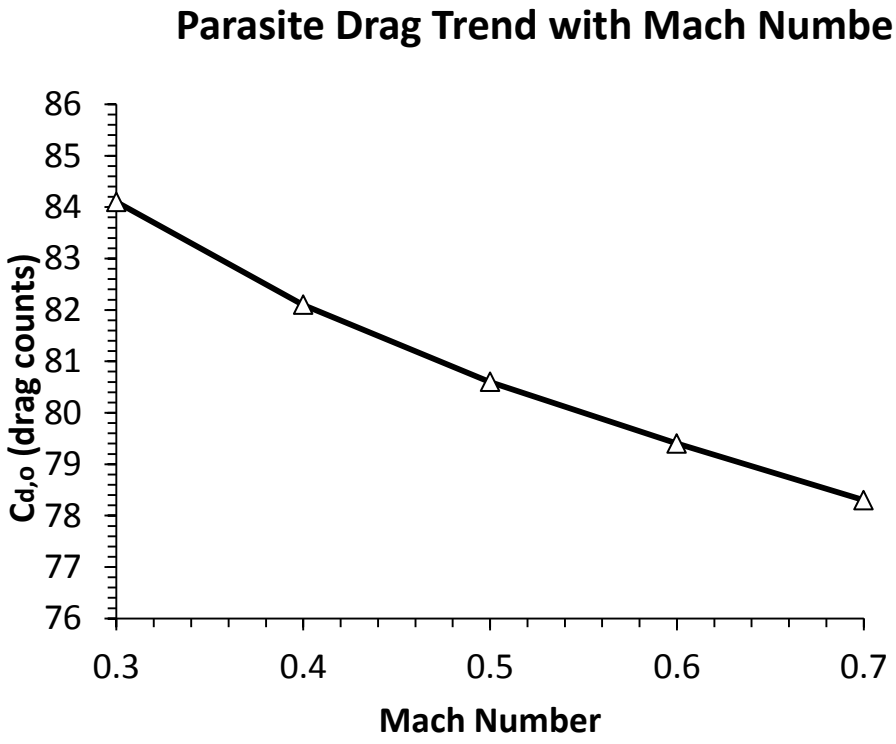
- Root Airfoil: NACA 64A?05.92 (5^{o} twist)
- Tip Airfoil: NACA 64A?04.29 (-3.1^{o} twist)

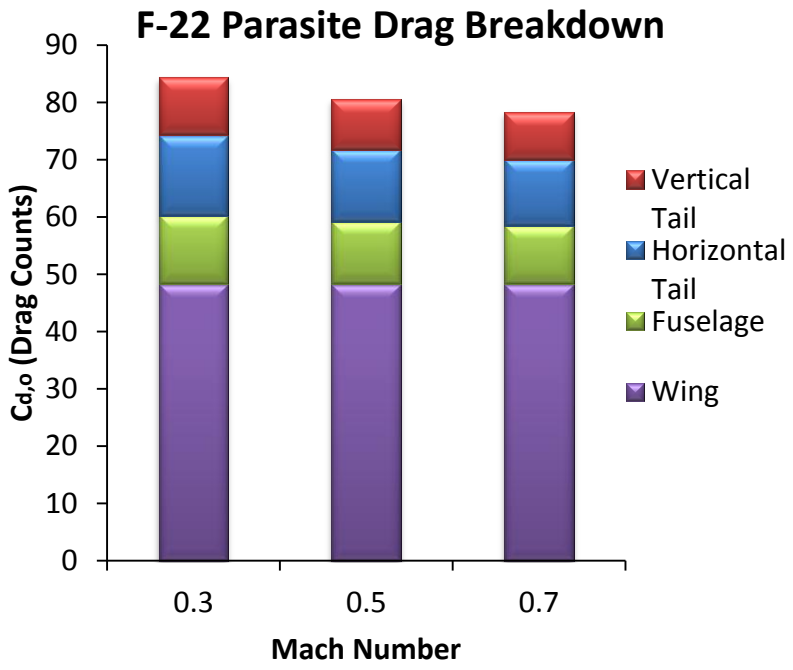




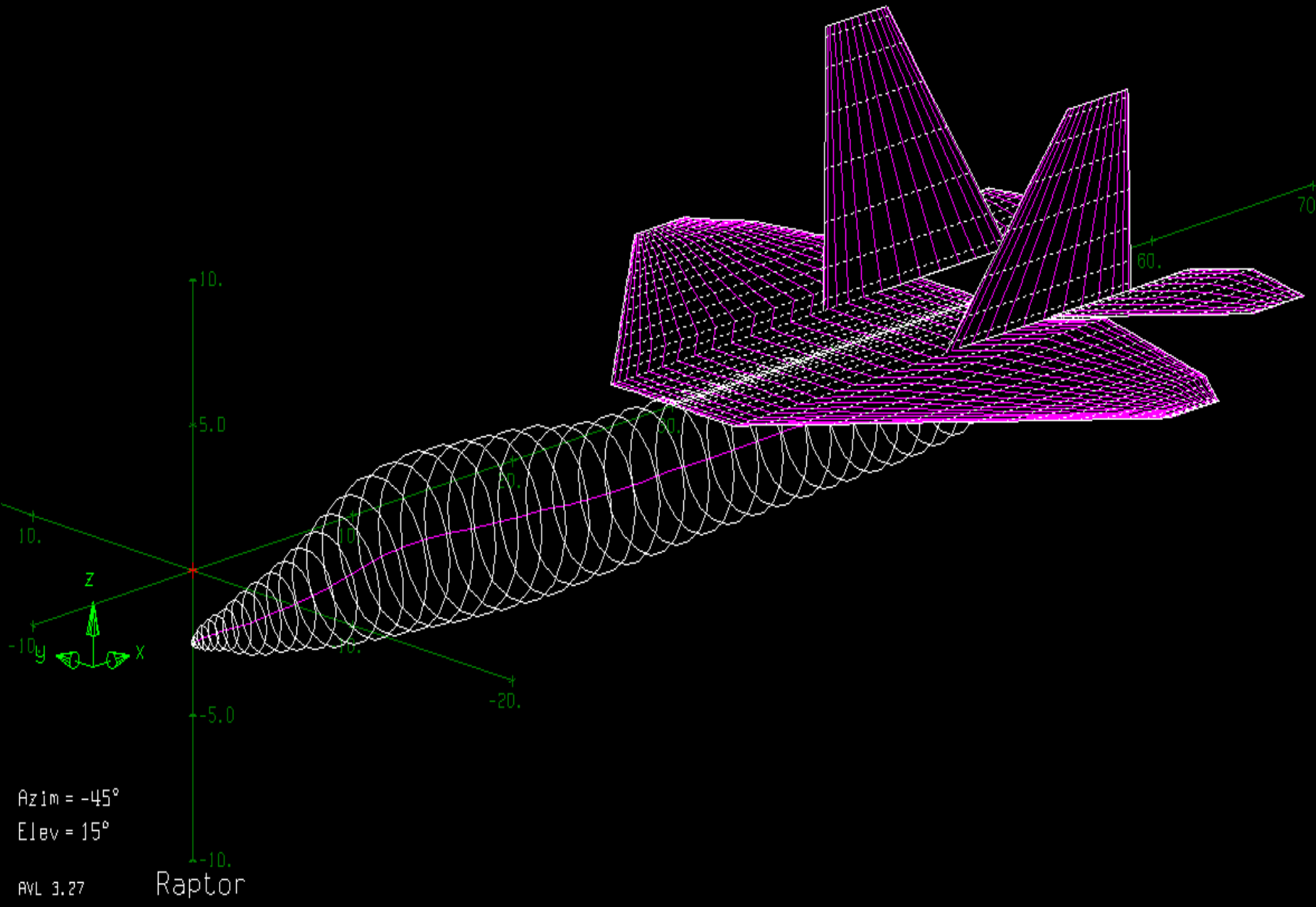
Drag Buildup

- Analysis (XFOIL+FRICTION) yielded a $C_{D,0}$ of 0.00805, which was within 2% of the published value (0.0082).





AVL Model



F-22 Thrust Vectoring

Low Angle of Attack

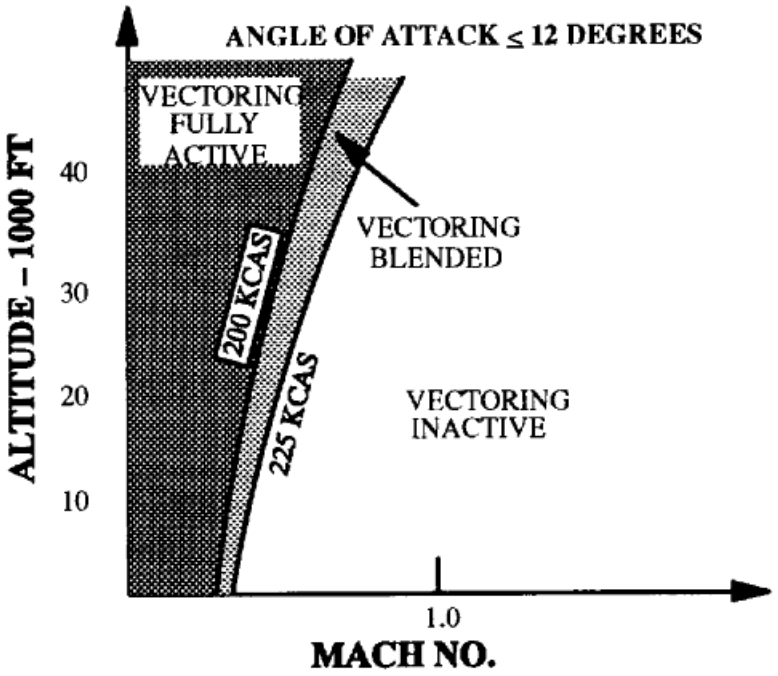


Figure 4. Thrust Vectoring System Operation Below 12 Degrees Angle of Attack

High Angle of Attack

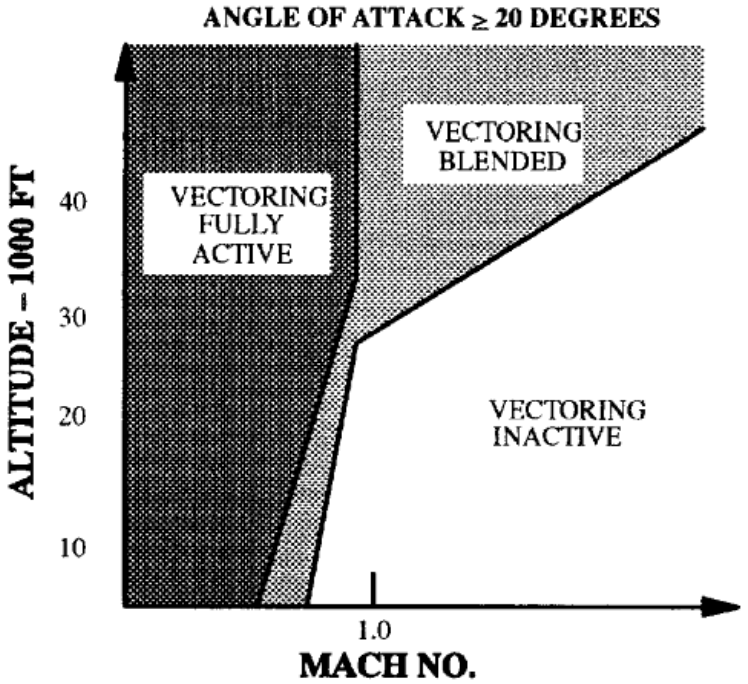


Figure 5. Thrust Vectoring System Operation Above 20 Degrees Angle of Attack

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F-22 Thrust Vectoring

Pitching Moment

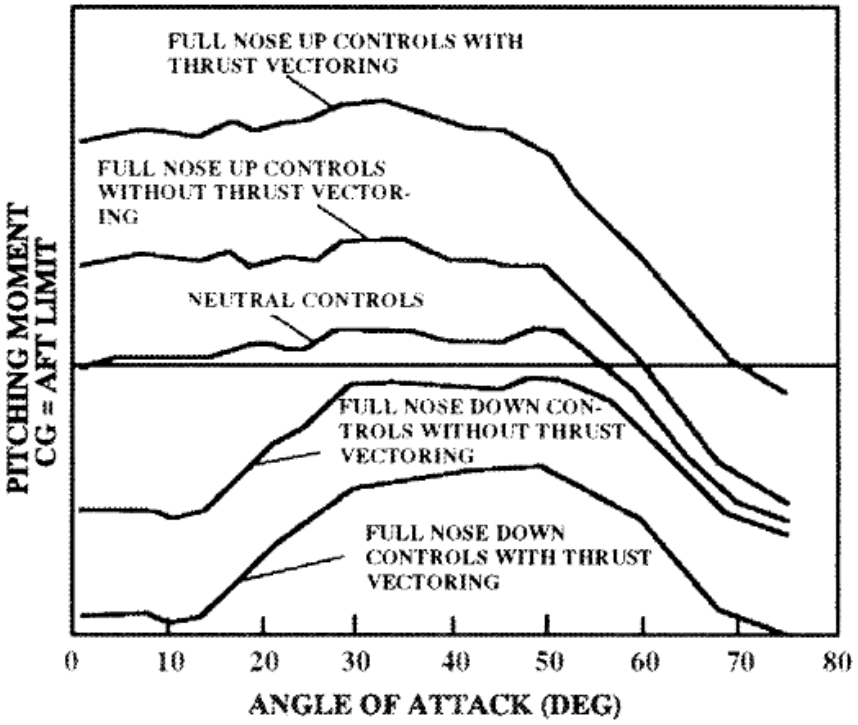

Figure 8. Pitching Moment vs. Angle of Attack

Roll

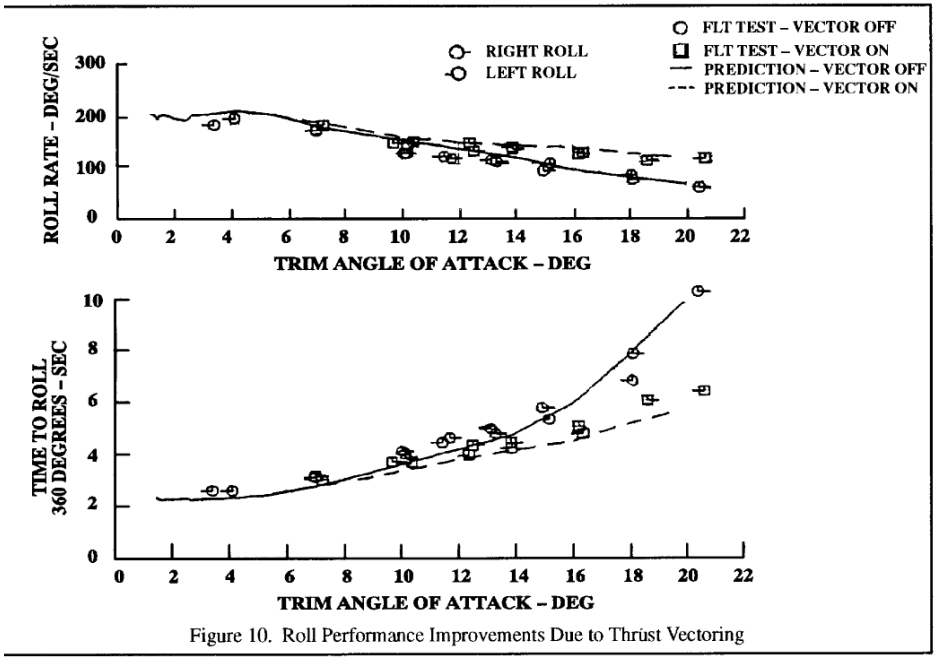

Figure 10. Roll Performance Improvements Due to Thrust Vectoring

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High Alpha Maneuvers

Heading Reversal

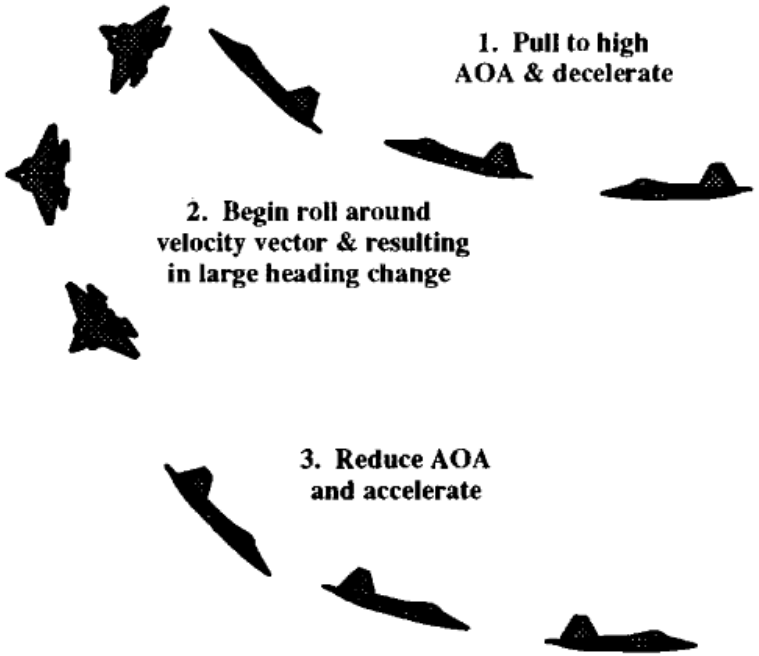


Figure 15. High Angle of Attack Heading Reversal Maneuver

Nose Pointing

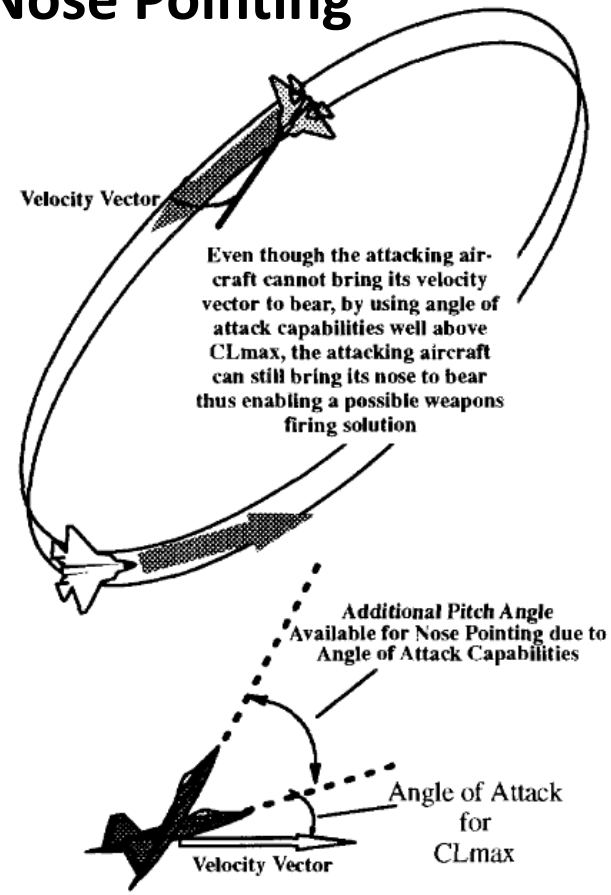
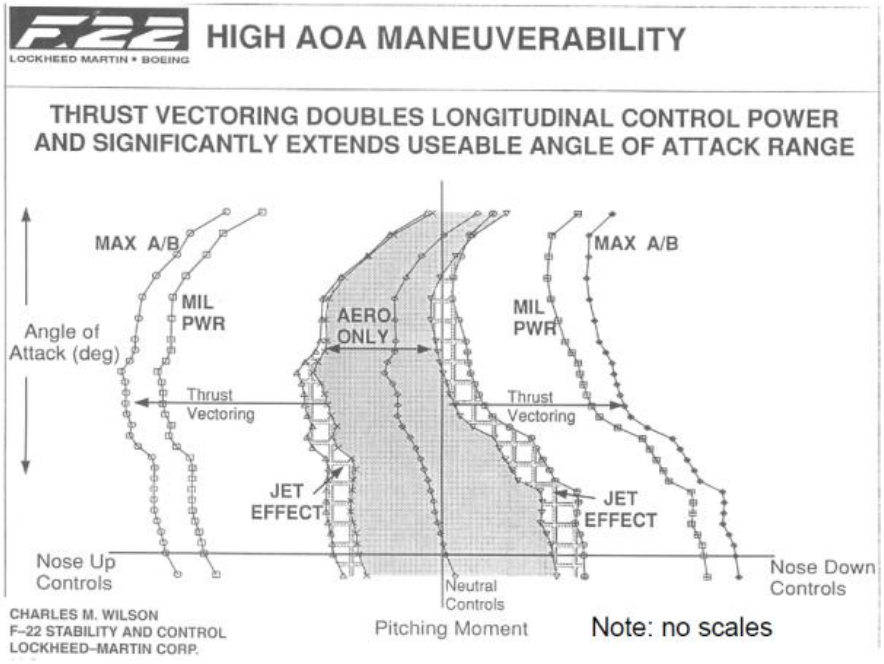


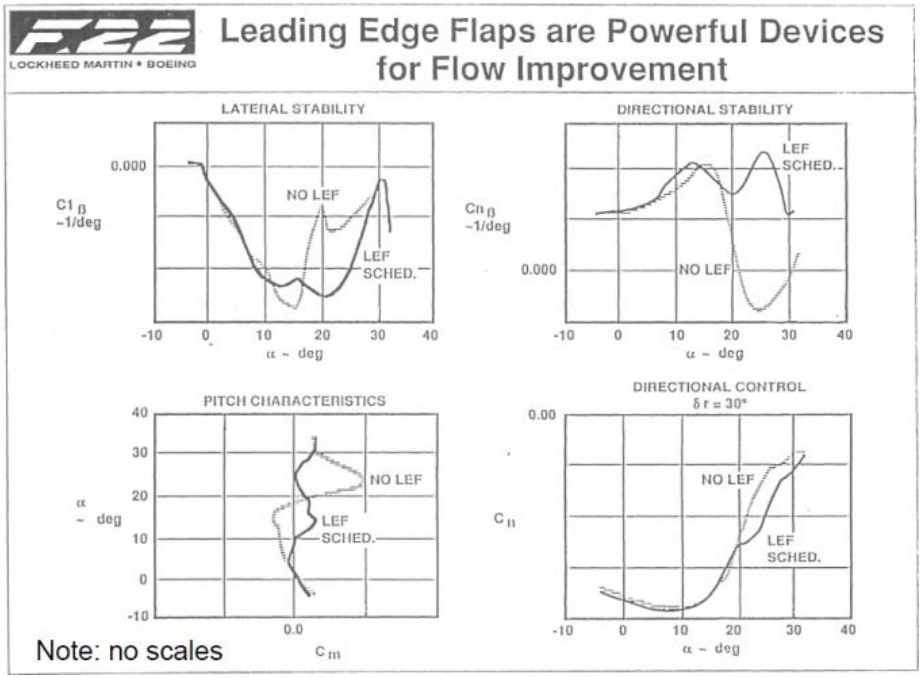
Figure 16. Nose Pointing Ability for Weapons Employment

Maneuver Controllability

Longitudinal



Leading Edge



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