Request For Proposal

Unmanned Advanced Tactical Fighter IOC 2040

1. Purpose:

Advanced autonomous air dominance fighter for IOC 2040 featuring supercruise and short takeoff and landing.

2. Mission Requirements

The designer should meet or exceed all mission requirements, or present arguments for any deviation. Note: a valid argument is if one requirement unduly drives the design and has a weak operational requirement.

Low observability requirements must be the same or better than the F-22. This applies to visual, radar, infra-red and acoustic signatures (this implies that all payload must be stored internally).

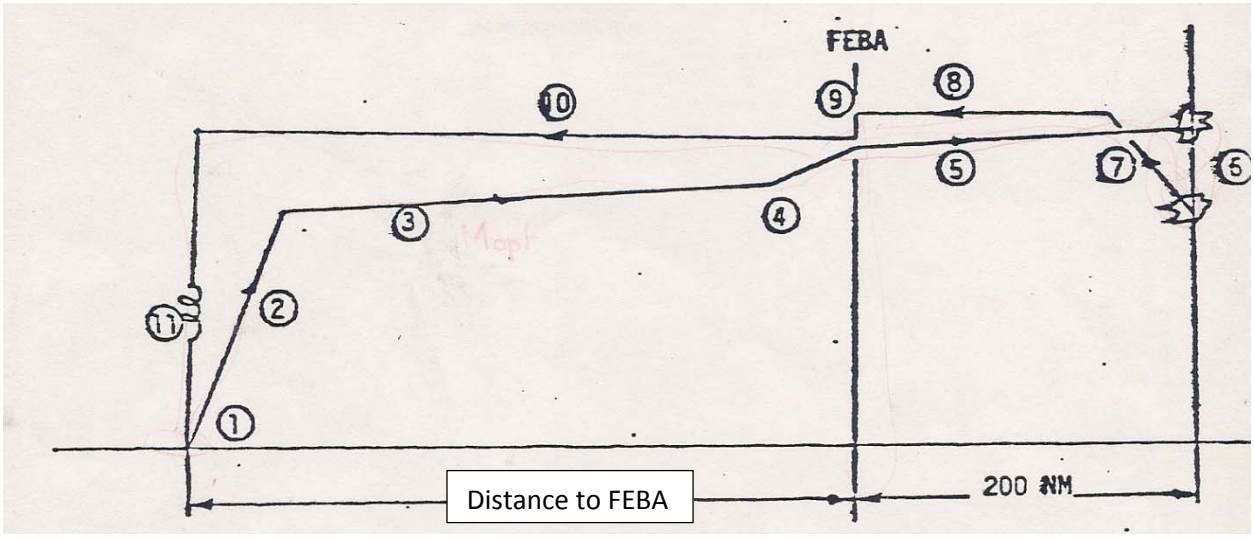
Vulnerability of the aircraft to battle damage must also be the same or better than that of the F-22.

Configurations to be evaluated are

Config	Distance to FEBA [nm]	Number of AIM-120C (N)
1	300	6
2	600	6
3	300	10
4	600	10

Each aircraft type will also carry 2 X AIM-9M missiles.

3. Air-to-Air Mission Profile:



FEBA = Forward Edge of Battle Area

1. Takeoff: 15 minutes at minimum power; 1 minute at maximum dry power. Sea level, standard day conditions.
2. Climb: Climb at maximum dry power; climb path for minimum fuel consumption, no distance credit
3. Cruise at optimum subsonic Mach number and altitude. Distance to FEBA is defined in Section 2.
4. Accelerate to penetration cruise Mach number and altitude at maximum power.
5. Penetrate at Mach 1.6. Contractor has the option to select altitude based on minimum fuel consumption or survivability considerations.
6. Engage combat. Fuel consumed shall be computed for an aircraft weight based on 50% stores, 100% ammo, available fuel and one 360^0 turn at 6.0 g at Mach 1.6
7. Accelerate at maximum power from Mach 0.8 and 30,000 ft MSL to Mach 1.8 and cruise altitude.
8. Cruise at Mach 1.8 and contractor specified altitude with all missiles expended and ½ ammo.
9. Descend to optimum subsonic Mach number and altitude with no range credit.
10. Cruise at optimum subsonic Mach number and cruise altitude.
11. Loiter for 20 minutes at Mach number for minimum fuel consumption and 20,000 ft MSL.
12. Descend and land.

4. Air-to-Air Combat Conditions

Condition	Mach	Alt	Requirement	Evaluate	Aircraft Weight*
a. Accelerate	0.8 -> 1.6	30,000 ft	50 sec		Full weapons
b. Supersonic turn	1.6	40,000 ft	Sustained 6.0 g		½ AIM-120Cs, Both AIM-9Ms
c. Subsonic turn	0.9	30,000 ft	Sustained 4.5 g		
d. Subsonic P_s	0.9	30,000 ft	550 ft/sec		
e. Accelerate	0.9 -> 1.8	40,000 ft	#	Time	Both AIM-9Ms
f. Supersonic turn	1.8	40,000 ft	550 ft/sec #	'g's	
g. Supersonic turn	1.2	30,000 ft	550 ft/sec #	'g's	
h. Cruise at dry power	1.6	45,000 ft	550 ft/sec #	Yes/No	Full weapons

*Fuel weight at start of combat # Contractor shall evaluate capability of selected design

5. Weights

Payload

The number of AIM-120C (AMRAAM) missiles (N) is defined in Section 2

N X AIM-120C missiles @ 356 lb/unit	N X 356 lb
N X AIM-120C racks @ 165 lb/unit	N X 165 lb
2 X AIM-9M missiles @ 190 lb/unit	2 X 190 lb
2 X AIM-9M racks @ 90 lb/unit	2 X 90 lb

Empty Weight

For initial sizing use the empty weight relationship $W_e/W_o = AW_o^C$

A =1.775

C = -0.1118

This may be modified with the use of advanced composite materials.

6. STOL Requirements

The STOL requirement is 4000 ft of available runway length for both takeoff and landing. Takeoff operation will be evaluated at ISA Standard Day conditions at 3000 ft MSL altitude. Landing performance will be evaluated assuming icy runway at Standard Day conditions at 3000 ft MSL altitude and end-of-mission landing weight (no missiles, 1/2 ammo expended, reserve fuel). Assume coefficient of friction equal to 0.04 and 0.1 respectively. For landing you may consider the use of brake reversers which will be assumed to achieve a braking effect equivalent to that of brakes on a dry runway.

7. Crew

None

8. Structure

Nine g limit load

9. Engine

Use scaled (rubber engine) afterburning turbofan with scale 1 performance characteristics defined in Raymer Appendix E.1. Designer can consider a thrust reverser (assume 50% reverser efficiency in dry power) to reduce landing ground roll.