

# **HAVE DOUGHNUT TACTICAL EVALUATION**



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# **HAVE DOUGHNUT TACTICAL EVALUATION**



## ***Purpose***

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- **Evaluate the effectiveness of existing tactical maneuvers by USAF and USN combat aircraft against the MiG-21**
- **Exploit the tactical capabilities of the MiG-21 in an air-to-air environment**
- **Optimize existing tactics and develop new tactics as necessary to defeat the MiG-21**
- **Evaluate the design, performance, and operational characteristics of the MiG-21**



# ***TAC Evaluation*** **Evaluation Aircraft**

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## ■ **Offensive and Defensive Evaluation**

- **F-4C/D/E**
- **F-105D/F**
- **F-111A**
- **F-100D**
- **F-104D**
- **F-5A**

## ■ **Defensive Evaluation**

- **RF-101**
- **RF-4C**
- **B-66**

**1968 TAC Inventory Versus the MiG-21F-13**



# ***TAC Evaluation***

## **MiG-21F Limitations and Deficiencies**

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- **Poor forward and rearward visibility**
  - Limited forward by sight glass, bulletproof glass, and windscreen
    - F-4 and F-105 normally are acquired at 3-5 miles range
  - Limited rearward by seat flap, narrow canopy, and structure
    - 50-degree blind cone in rear
- **Low airspeed limit below 15,000 ft**
  - 0.98 Mach or 595 KIAS
    - Buffet severe at and above these airspeeds and aircraft is unusable as a weapon system
- **Weapon system**
  - 30mm cannon limited to 60 rounds
  - Severe pipper jitter precludes tracking corrections during firing
  - Sight precesses excessively
    - Target tracking impossible over 3 Gs
  - Range only radar susceptible to chaff and jamming



# ***TAC Evaluation***

## **MiG-21F Limitations and Deficiencies**

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- **High longitudinal control forces below 15,000 ft**
  - Above approximately 510 KIAS cannot command a high pitch rate
- **High airspeed bleed-off at high G**
  - Bleed-off is excessive, but it does improve the turn radius
- **Poor engine acceleration response to throttle movement**
  - Idle to Military Power takes 14 seconds on the ground
  - Formation flight difficult
    - Requires combined use of speedbrakes and throttle movement
- **Afterburner puff above 15,000 ft gives away visual cue**
  - White puff of unburned fuel when going in and out of afterburner
- **Poor directional stability**
  - Excessive pilot effort for air-to-ground tracking in turbulence

**Some serious exploitable limitations and deficiencies**



# ***TAC Evaluation***

## **F-4C/D/E**

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- **The F-4 can control the engagement below 15,000 ft**
  - **Can exploit the MiG-21 airspeed limitation and airspeed bleed-off at high G**
  - **Orient the attack towards the MiG-21 blind cone and operate in the vertical to defeat the MiG-21**



# **TAC Evaluation**

## **F-4C/D/E**

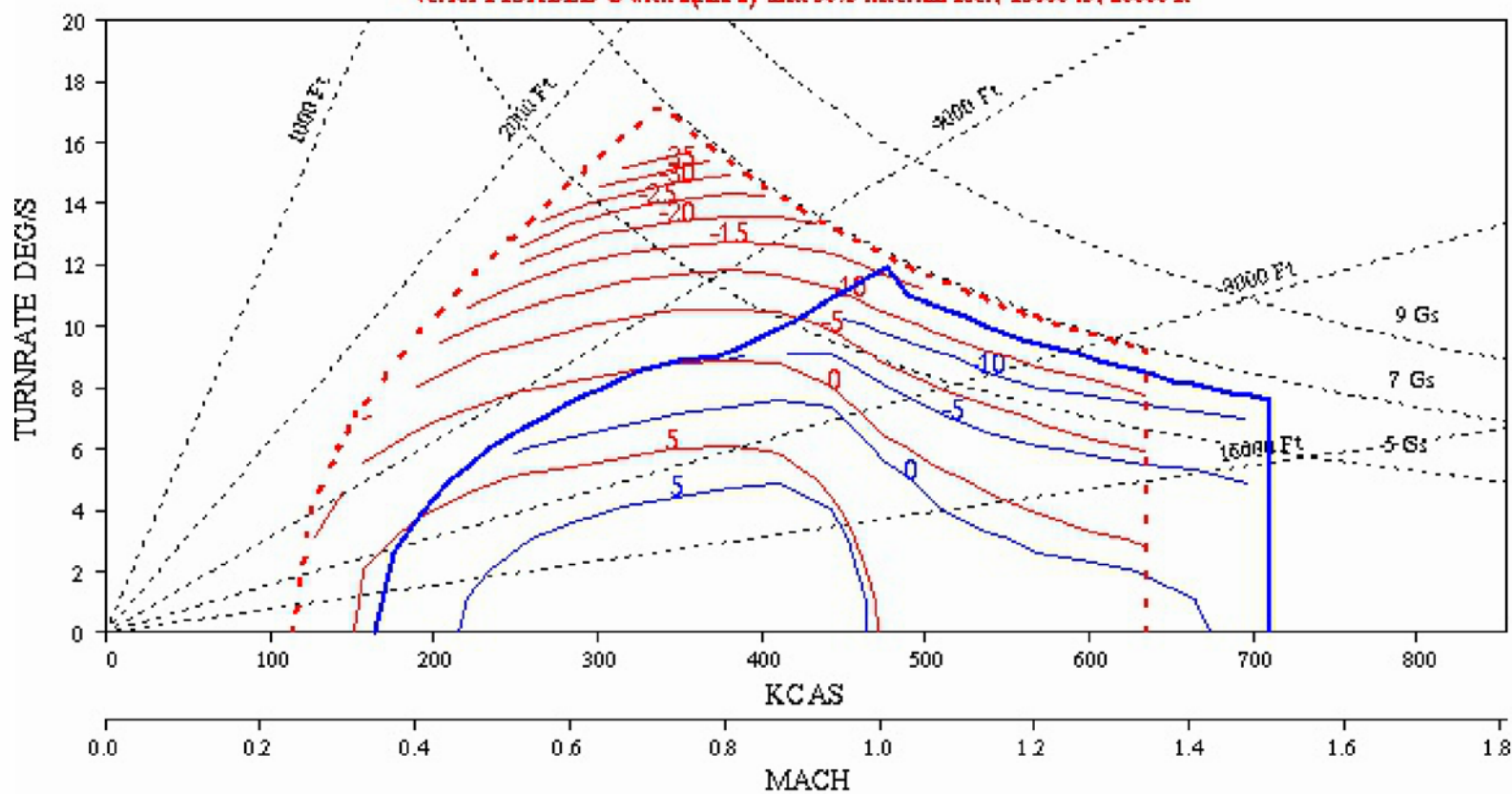
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- **F-4 level acceleration is superior up to 30,000 ft**
  - Significant advantage in military power
  - Slight advantage in afterburner power
  - Below 15,000 ft the F-4 can easily accelerate to above the useable airspeed of the MiG-21
- **Good F-4 zoom capability**
  - Significant advantage in military power up to 30,000 ft
  - Slight advantage in afterburner power up to 20,000 ft
- **MiG-21 has superior instantaneous turn capability**
  - But it loses airspeed more rapidly



Maximum Afterburning Power

**Dashed boundary is FISHBED C envelope.**





# ***TAC Evaluation***

## **F-4C/D/E**



- **Force the engagement to low altitude and keep speed**
  - **Fight below 15,000 ft and maintain at least 450 KCAS**
- **Retain a high energy level and accelerate in an unloaded condition as necessary**
- **When defensive establish maximum angle off**
- **Maneuver vertically below 15,000 ft - avoid slow speed reversals**
- **Avoid prolonged turning engagements - disengage and keep energy for possible reattack**
- **Get into the MiG-21 rear hemisphere blind cone**
- **Good visual scan needed to see the MiG-21**
- **Run away below 15,000 ft above 0.98 Mach/595 KIAS when offensive advantage or mutual support is lost**

**SPEED IS LIFE!!!**