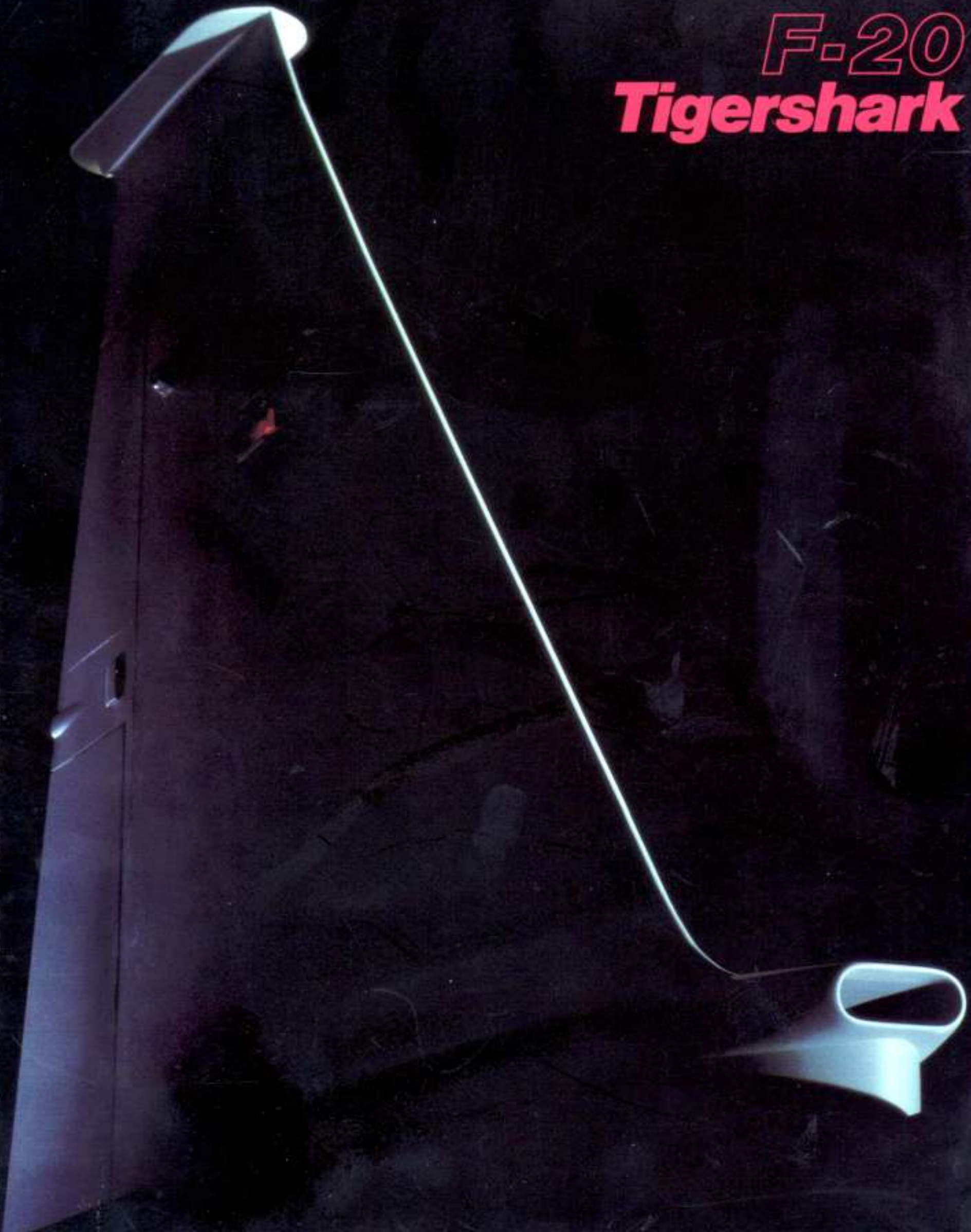


F-20
Tigershark



F-20 Tigershark

F-20: A HIGH PERFORMANCE FIGHTER

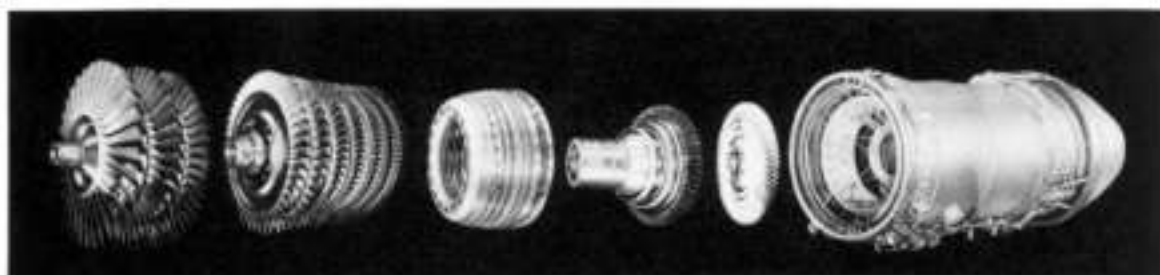
Northrop's single-engine Tigershark brings together a proven airframe design, a new military engine and advanced avionics. The result — an exceptionally high performance, versatile tactical fighter.

Unsurpassed handling qualities such as unrestricted angle-of-attack in the air superiority configuration and head-up maneuvering capability are characteristics of the Tigershark. The handling qualities are matched to the designed-in performance cap-

abilities of the Tigershark. Acceleration is fast — at 10,000 feet, the F-20 will go from 0.3M to 0.9M in just 28 seconds. At 30,000 feet, the F-20 will go from 0.9M to 1.2M also in just 28 seconds.

Low detectability due to small size, lack of engine smoke and low IR/radar signatures contribute to a high survivability rate for the Tigershark operating in a wide variety of tactical missions.

F404-GE-100 ENGINE



The General Electric 18,000-pound thrust engine is the basis for the Tigershark's exceptional takeoff, climb, acceleration, mach number, ceiling and turn performance. Four-second acceleration from idle to maximum power, rapid deceleration, stall-free operation and reliable air-starts are outstanding characteristics of the F404.

The engine achieves top performance with fewer turbo machinery stages, frames, bearings and parts than other modern fighter engines using state-of-the-art materials. Modular design simplifies maintenance while component interchangeability minimizes spare engine requirements. The result is fast turnaround and low support costs.

The F404 has undergone an unprecedented amount of mission-oriented testing, more extensive than has ever been required of any other military engine.

In all situations, the F404 has met or exceeded all specification requirements. The engine operates over its full power regime with no flight restrictions.

GE F404 CHARACTERISTICS

- As much as 20% growth potential
- 201 Navy field measured mean-flight-hours-between-failures
- Modular construction
- 0.44 maintenance manhours per flight hour per engine
- Stall-free operation
- Smokeless
- 3 fan stages
- 7 compressor stages
- 7,700 fewer parts than J79
- Nearly half the weight of J79
- No field trim required

F-20 ADVANCED AVIONICS

The Tigershark's integrated digital avionics system gives it around-the-clock mission capability, including operations in adverse weather. The major elements of the system are the General Electric multimode coherent radar and head-up display, Honeywell laser inertial navigation set, Bendix digital display and control set and a Teledyne Systems mission computer that functions as the heart of the Tigershark's weapon system.

HANDS-ON, HEAD-UP FIGHTER —

These advanced technology features decrease the pilot's workload, particularly during critical phases of air-to-air and air-to-ground combat operations. Hands-on stick and throttle (HOSAT) control configuration allows the Tigershark pilot to navigate, detect targets and deliver weapons without taking his hands off the flight controls. During the crucial seconds of combat operation, weapons, target and flight data are projected at eye level on the head-up display (HUD), mounted atop the instrument panel. Other communications between the pilot and the F-20's integrated digital avionics system are conducted through the redundant two digital display indicator (DDI) screens located at either side of the top of the instrument panel, and the data entry panel located just below the HUD.

Compared to current generation fighters, the Tigershark cockpit presents a simpler, less cluttered display to the pilot.

RADAR — The Tigershark's advanced General Electric multimode coherent radar is the first new fighter radar of the 80s. Its modular design features interchangeable units, allowing the Tigershark to be readily configured upward to a variety of mission capabilities.

- Air-to-air modes
 - Look-up search and track
 - Look-down search and track
 - 80 nm search and track range
 - Auto acquisition in three air combat modes
 - Velocity search

- Air-to-surface modes
 - Doppler beam sharpening
 - Air/ground ranging
 - Freeze
 - Real beam ground mapping
 - Expanded real beam ground map
- Sea modes
- 200 hours contractor guaranteed mean (operating)-time-between-failures
- Inherent growth capability
- Modular

INERTIAL NAVIGATION SET — The Honeywell ring laser gyro INS — 22 seconds stored heading alignment time — gives the Tigershark the fastest scramble time of any fighter.

The laser gyro technology replaces conventional gimballed systems with significant improvements in performance and reliability.

- Extremely fast alignment times, independent of temperature and humidity
- 2,000 hours contractor guaranteed mean (operating)-time-between-failures
- No moving parts to wear out
- Navigation error rate less than 1 nm per hour (CEP)

DIGITAL DISPLAY SYSTEM — The Bendix digital display system is fully redundant, so that no single-point failure will cause the loss of more than one display. The modular construction of the system simplifies maintainability, ensuring rapid fault isolation and repair. The system consists of:

- Dual digital display indicators — to display radar, navigation and stores management information
- Data entry panel — for inputting pre-takeoff mission data
- Data processor — electronics necessary to control displays for DDI and HUD

MISSION COMPUTER — The mission computer controls the F-20's avionics system. With a memory of 64,000 words plus growth potential and a processing speed of 648,000

operations per second, the Teledyne Systems mission computer provides solutions for gun and missile firing and bomb release. It has a contractor guaranteed mean (operating)-time-between-failures of 2,100 hours. Other functions of the mission computer include:

- M-39 guns solution
- AIM-9 launch computations
- CCIP guns/rockets/bombs delivery
- CCRP bombs delivery
- Multiplex bus controller

HEAD-UP DISPLAY — All information pertinent to navigation, air-to-air combat and air-to-surface weapon delivery is integrated and the symbology displayed at a central point that allows the pilot to maintain visual reference forward through the canopy windscreen. Primary reference displays and data for IFR flight are also presented on the HUD. The Tigershark's General Electric HUD features:

- 19.7° horizontal x 16° vertical instantaneous field-of-view, 22° circular total field of view.
- Display modes
 - Navigation
 - Guns
 - AIM-9 missiles
 - CCIP/CCRP
- Declutter selection

OPTIONS*

- Track while scan
- Beacon
- Surface moving target track
- Ground moving target indication
- 4 or 6 AIM-9 missiles
- BVR missiles
- 30mm gun pod
- Conformal countermeasures system
- Retractable air refueling probe
- Arresting hook

*With approval of U.S. Government

F-20 TIGERSHARK FACTS SUMMARY

PERFORMANCE HIGHLIGHTS

(With two AIM-9 missiles)

Maximum speed Mach 2 class
Sea level rate of climb 53,800 feet/minute
Combat ceiling at 1.4M 55,000 feet
Takeoff distance 1,475 feet
Takeoff distance,
maximum weight 3,550 feet
Scramble order to liftoff 59 seconds
Time to 40,000 feet from
brake release 2.3 minutes
Acceleration time
0.3M (165 KCAS) to
0.9M (505 KCAS) at
10,000 feet 28 seconds
0.9M to 1.2M at
30,000 feet 28 seconds
Sustained turn rates:
0.8M/15,000 feet 13.1 degrees per second
0.9M/30,000 feet 7.6 degrees per second
1.2M/30,000 feet 5.3 degrees per second
Maximum instantaneous
turn rate 15,000 feet 21.1 degrees per second
Structural design load
factor 9g
1g Ps at
0.9M/10,000 feet 710 feet per second

1g Ps at
0.9M/30,000 feet 370 feet per second
Ferry range
Maximum external fuel
tanks retained 1,880 nautical miles

ARMAMENT

Two 20mm M-39 guns, 450 rounds
Two AIM-9 missiles
Seven store stations, more than 9,000-pound load carrying capacity

SPECIFICATIONS

(With two AIM-9 missiles)

Length 47 feet, 4 inches
Wing span 27 feet, 11.9 inches
Height 13 feet, 10 inches
Internal fuel 5,050 pounds
Maximum external fuel
(usable) 6,435 pounds
Takeoff weight 18,540 pounds
Combat thrust-to-weight
ratio 1.12
Combat weight, 50% fuel 16,015 pounds
Maximum weight 28,000 pounds

COST EFFECTIVE . . . BY DESIGN

The new Tigershark exemplifies the Northrop tradition of maintaining a favorable cost/capability relationship in tactical fighter systems.

Two concepts which have been incorporated in the Tigershark are modular design with growth and built-in-test. In the modular approach, functional groups of equipment are interchangeable and individually replaceable.

The Tigershark's engine, radar and air conditioning system are examples of this flexible design approach. Built-in test provides early indicators to pilots and maintenance technicians that a malfunction or system degradation exists.

RELIABILITY — Analyses for the Tigershark show a mean-flight-hours-between-failures of 4.2 hours. The Tigershark is expected to have

an excellent operational readiness rate of over 80% and a consistently high mission reliability.

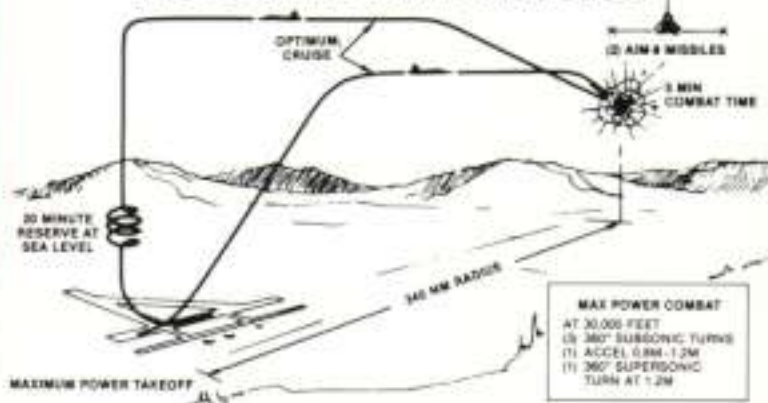
MAINTAINABILITY — The Maintenance Index (MI) for the Tigershark is 9.4 direct maintenance manhours per flight hour. The flexible engine maintenance afforded by the interchangeable modular design and on-condition maintenance concept are key factors for the low MI.



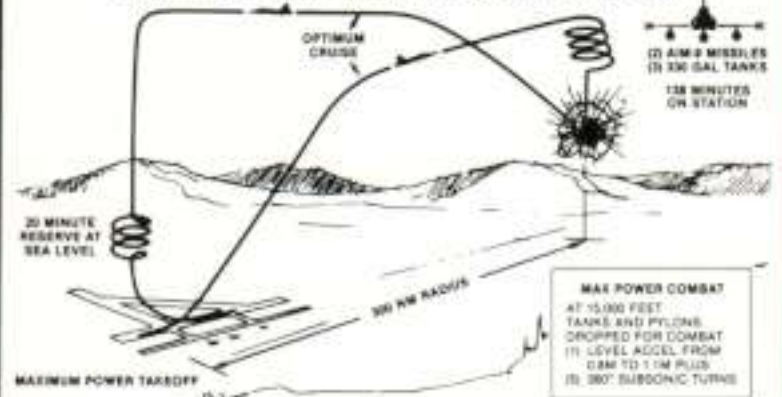
NORTHROP

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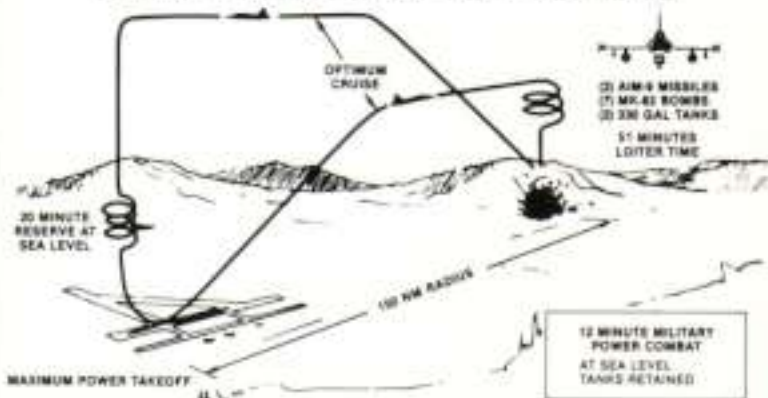
AIR SUPERIORITY MISSION



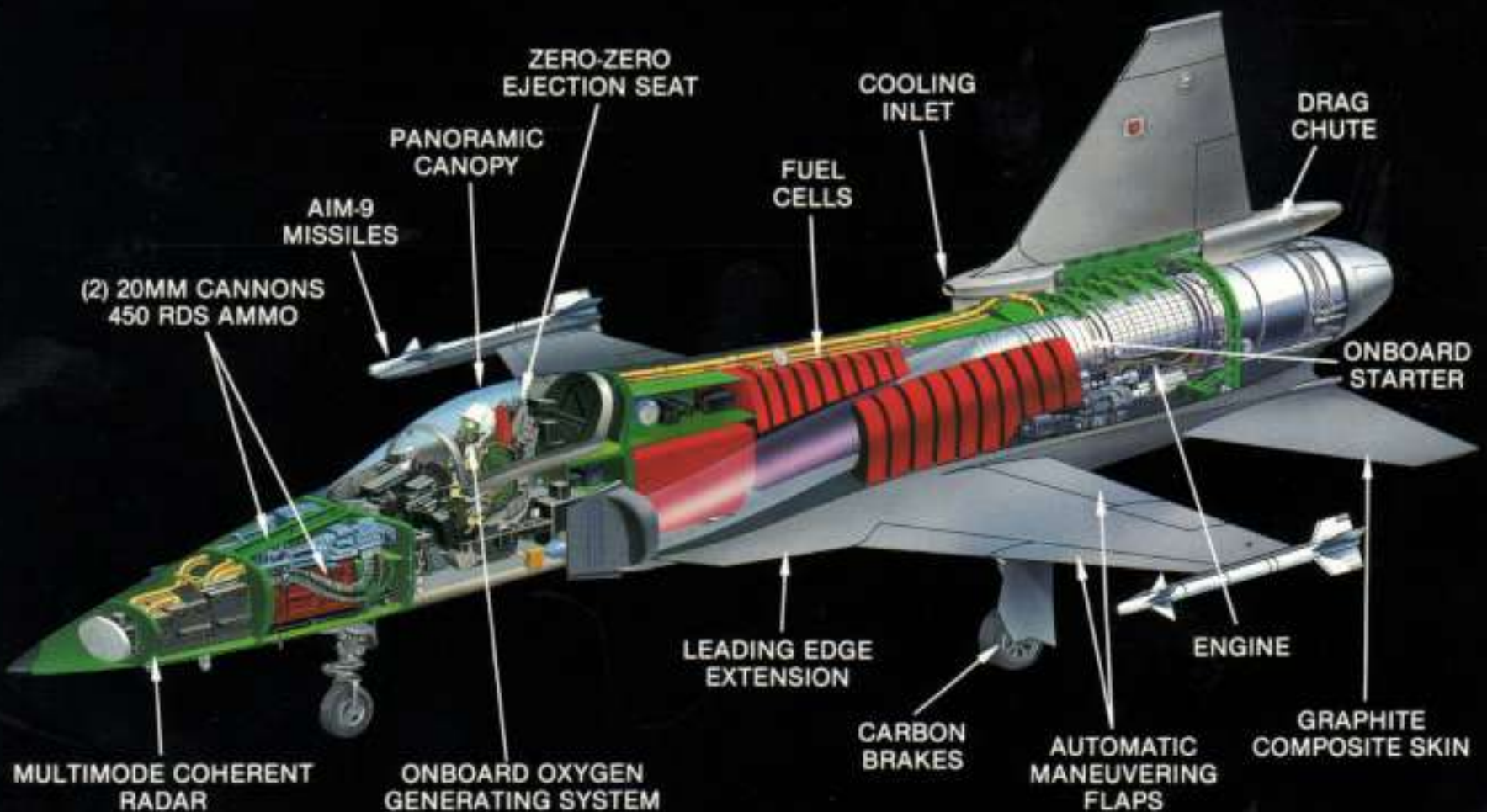
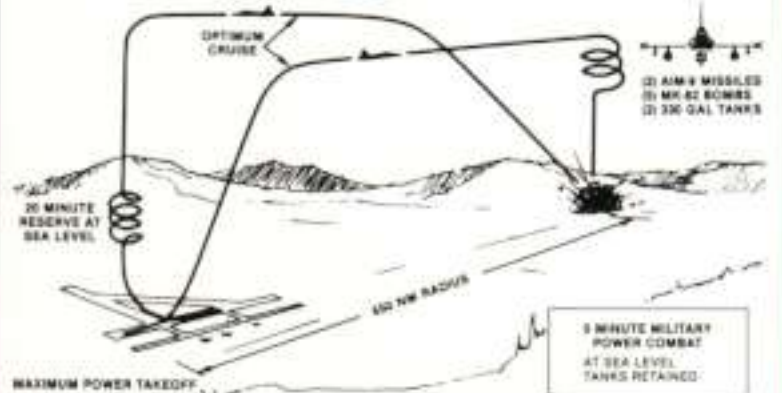
COMBAT AIR PATROL MISSION



CLOSE AIR SUPPORT MISSION



HI-LO-HI INTERDICTION MISSION



NORTHROP F-20



STORES	TIP	OUTBD	INBD	ζ	INBD	OUTBD	TIP
150-GAL TANK			•	•	•		
275-GAL TANK			•	•	•		
330-GAL TANK			•	•	•		
SIDEWINDER MISSILE	•	• or ① • or ①				• or ① • or ①	•
BVR MISSILE ①		•				•	
GROWTH BVR MISSILE ①	•	•				•	•
MK-82 LD AND SNAKEYE 500-LB BOMB		•	•	•	•	•	
MAX MK-82 LOADING, BRU-27 (MER) C/L		•	•	•	•	•	
MK-83 LD 1,000-LB BOMB			•	•	•		
MK-84 LD 2,000-LB BOMB			•	•	•		
LAU-68A/A, LAU-68B/A, SEVEN 2.75-INCH ROCKETS		•	•		•	•	
LAU-3/A, LAU-3A/A, LAU-3B/A, LAU-60/A, NINETEEN 2.75-INCH ROCKETS		•	•		•	•	
FLARE DISPENSER		•				•	
M-117 750-LB BOMB		•	•	•	•	•	
AIR-TO-SURFACE MISSILE ①		•	•		•	•	
LASER-GUIDED BOMB (HIGH-SPEED SMALL)		•	•	•	•	•	
LASER-GUIDED BOMB (LOW-SPEED SMALL)		•				•	
LASER-GUIDED BOMB FF (SMALL)		•	•	•	•	•	
LASER-GUIDED BOMB FF (LARGE)				•			
ANTISHIP MISSILES ①		•	• ②	• ②	• ②	•	
30MM GUN POD ①			•	•	•		

NOTE: ALL MUNITIONS MUST BE PURCHASED FROM AND ARE SUBJECT TO THE APPROVAL OF THE U.S. GOVERNMENT
 ① OPTION ② LONG RANGE ANTISHIP MISSILE