X-WING POTENTIAL FOR NAVY APPLICATIONS

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(No paper received; presentation material only)

SUMMARY

X-Wing Potential For Navy Applications

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The X-Wing will provide a VTOL Aircraft which has a low disc loading hover capability, similar to a conventional helicopter, combined with a high subsonic cruise speed capability. As a result, it will hover with low fuel flow rates which make extended hover duration missions practical. Its low hover power requirements also permit hovering and low speed flight on only one engine in a high speed twin-engine aircraft design.

The NASA/DARPA/Sikorsky RSRA/X-Wing program is developing flightworthy X-Wing hardware. The program has now completed all design activity and the majority of its component fabrication. Three key development tests activities are underway: the full size Propulsion System Test Bed, the Vehicle Management Systems Laboratory, and the Powered Wind Tunnel Model. The first flight is scheduled for October 1986.

A design study has been performed on an X-Wing Concept Demonstrator Aircraft which is based on the RSRA/X-Wing components, combined with two MTE engines and a new fuselage. The resulting aircraft has a 51-foot rotor diameter, weights 24000 pounds, and has a cruise speed of 400 knots.

Potential Navy mission take advantage of X-Wing's low disc loading and high speed capability. Missions include ASW, AEW, Forward Pass, and SAR. The logical evolution of the X-Wing concept is from the RSRA program to a Concept Demonstrator Program to a Production Aircraft.

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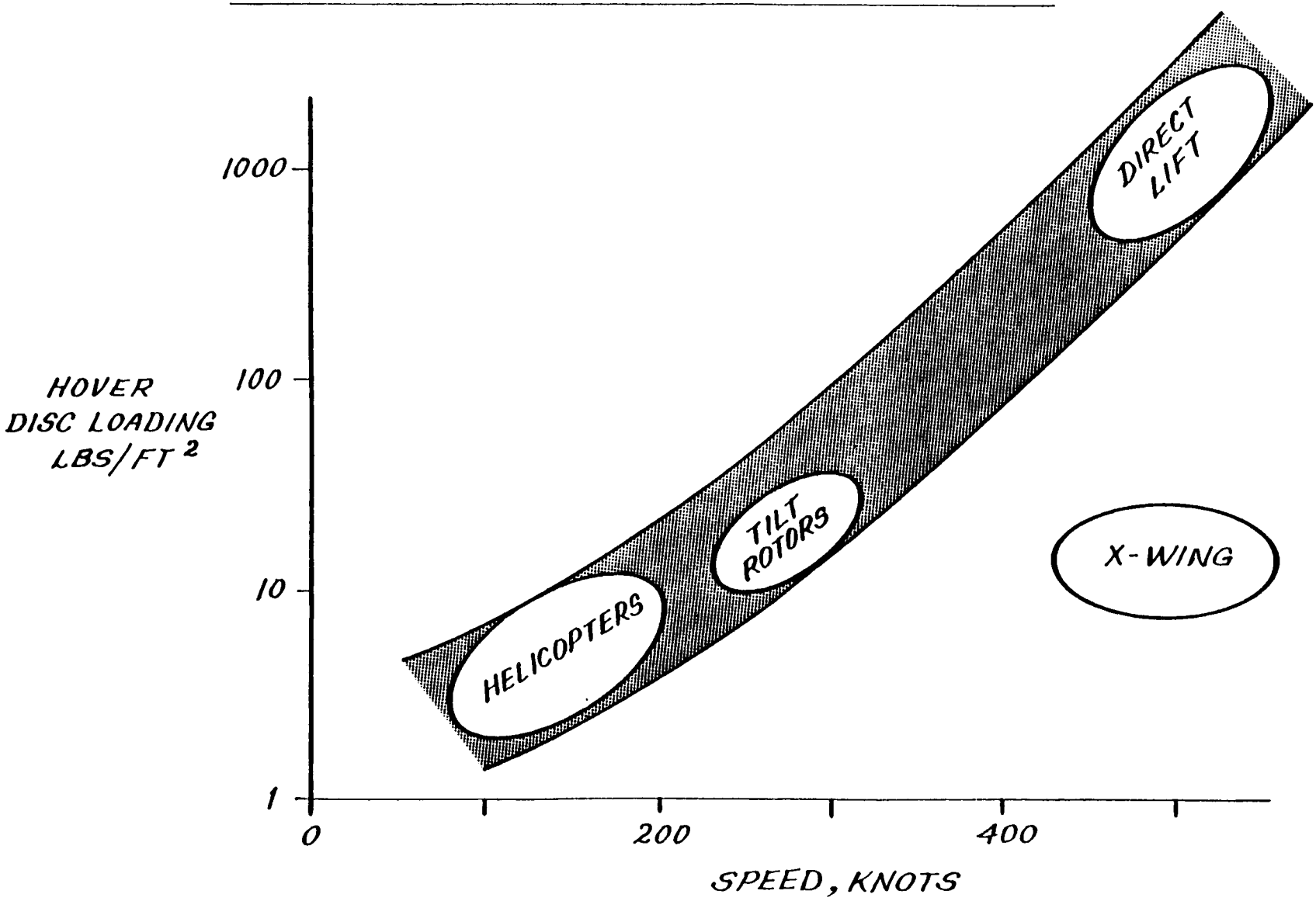
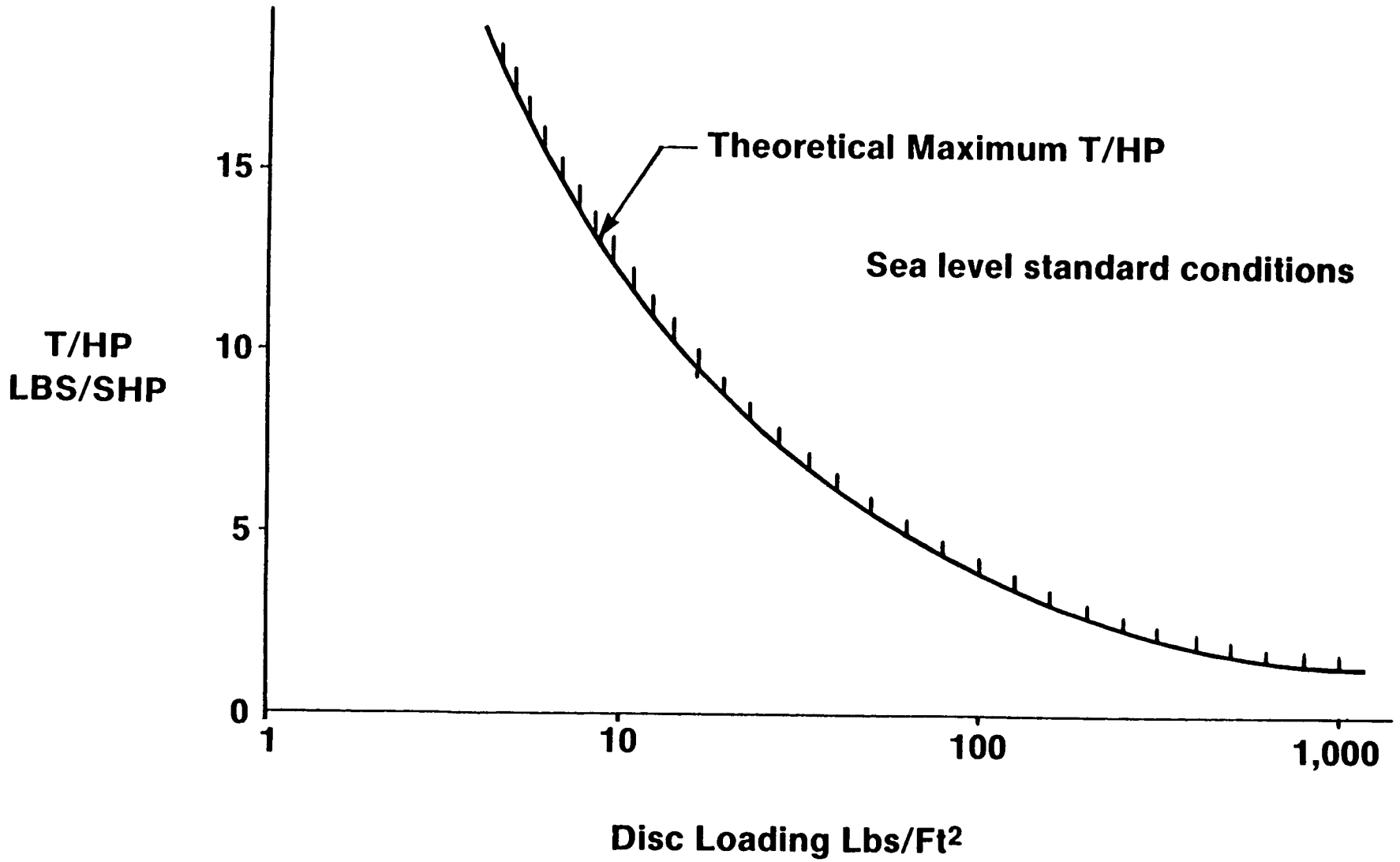
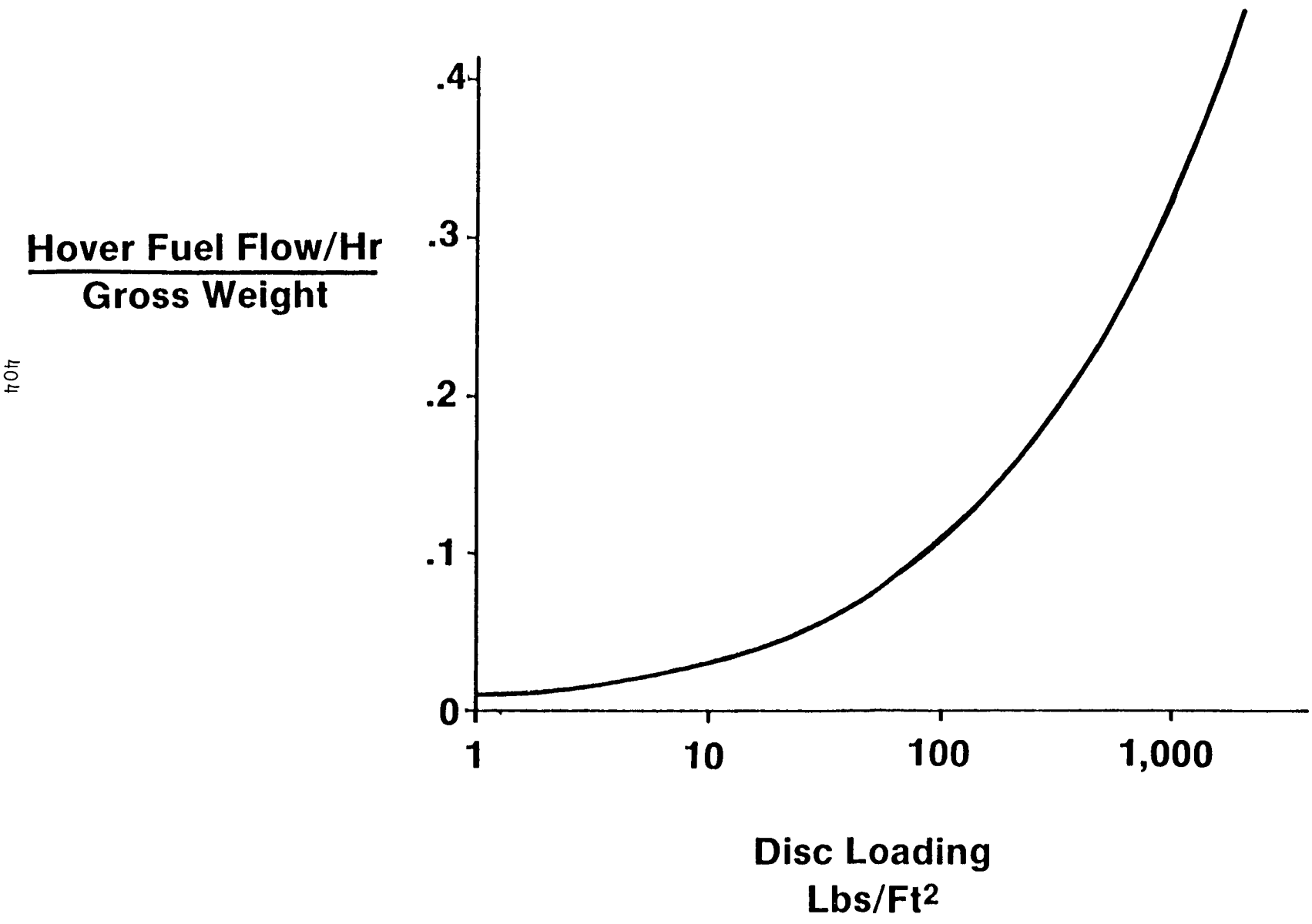
HOVER DISC LOADING vs. MAX SPEED



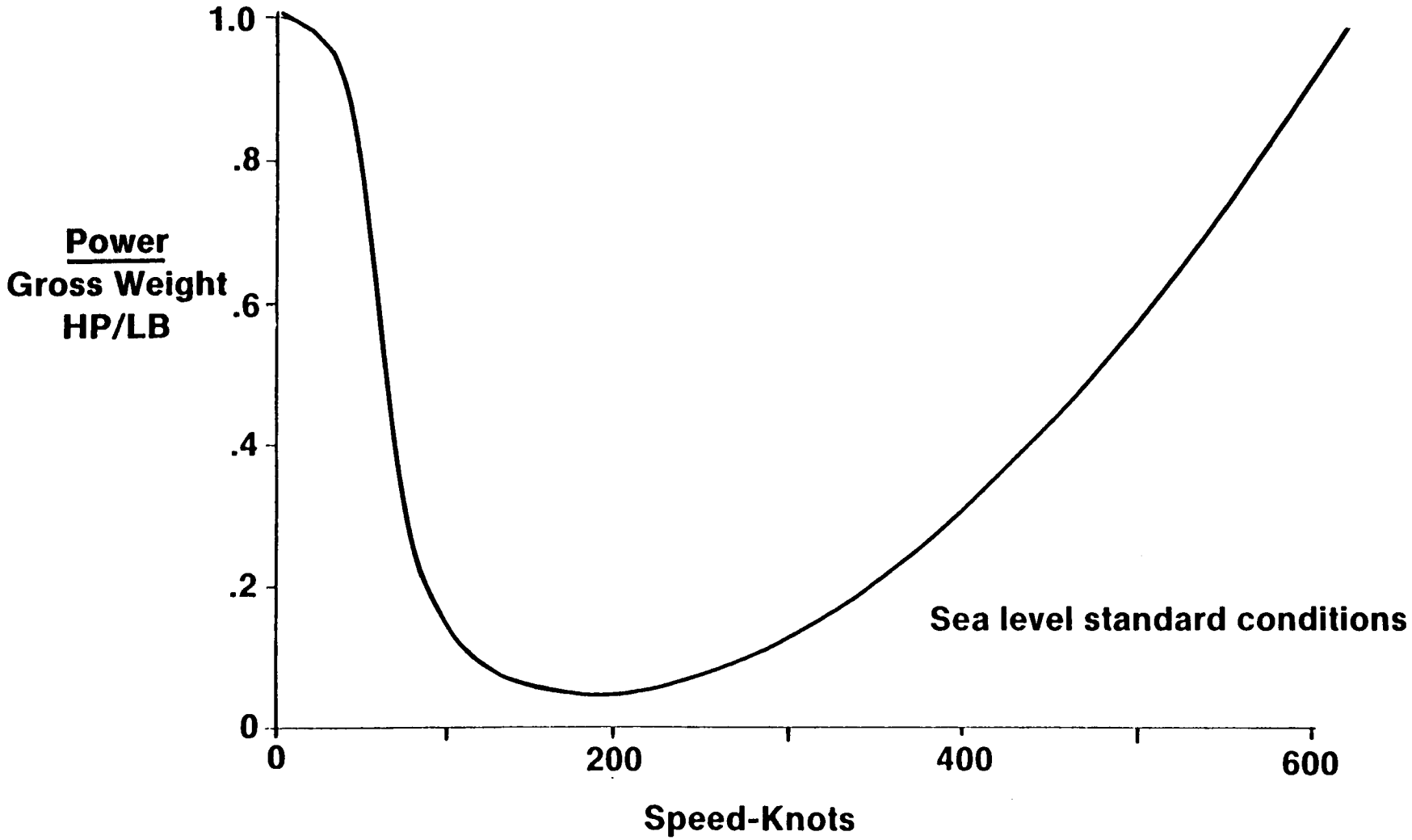
MAXIMUM THRUST PER HORSEPOWER



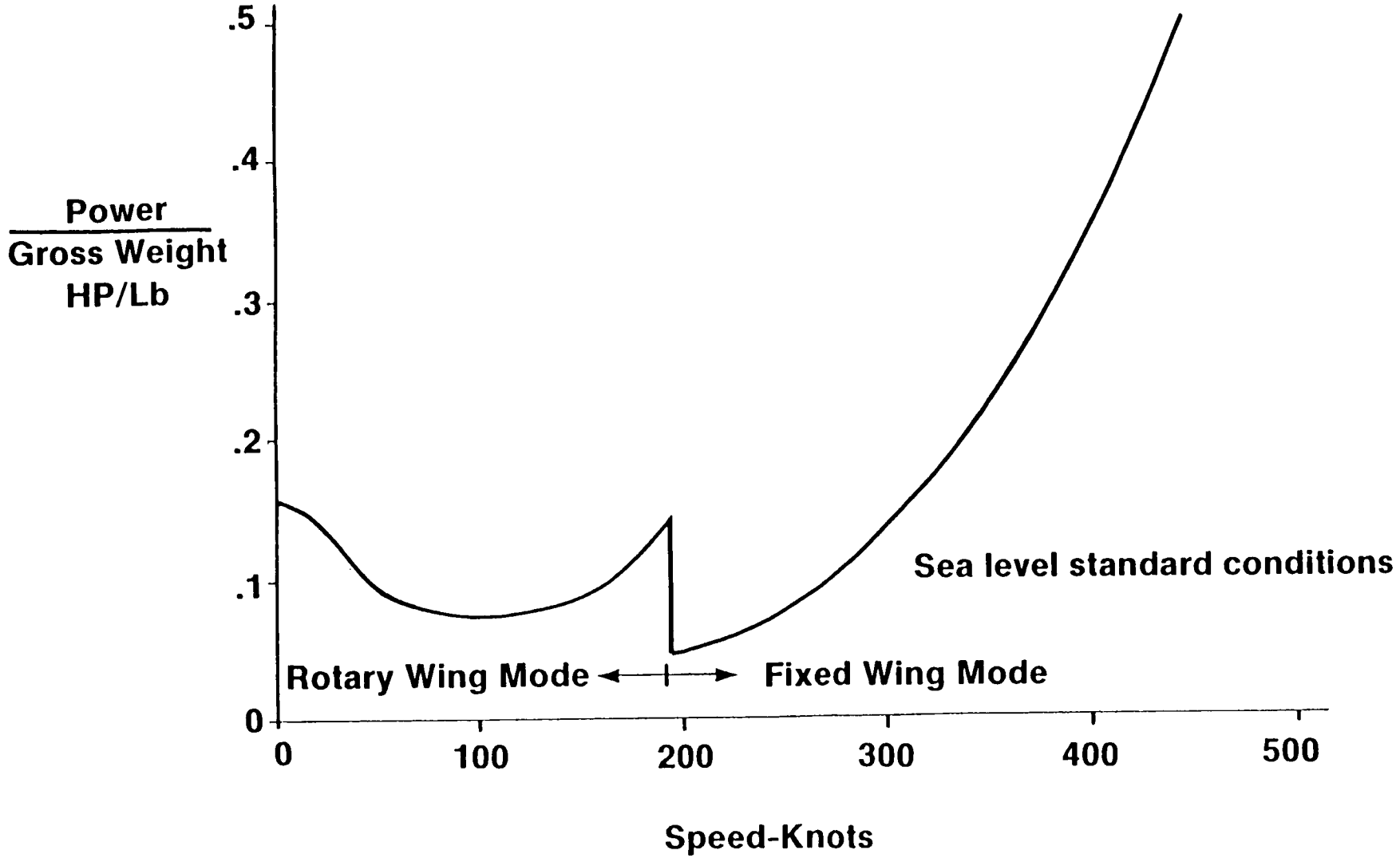
VTOL AIRCRAFT FUEL FLOW



POWER REQUIRED: DIRECT LIFT VTOL



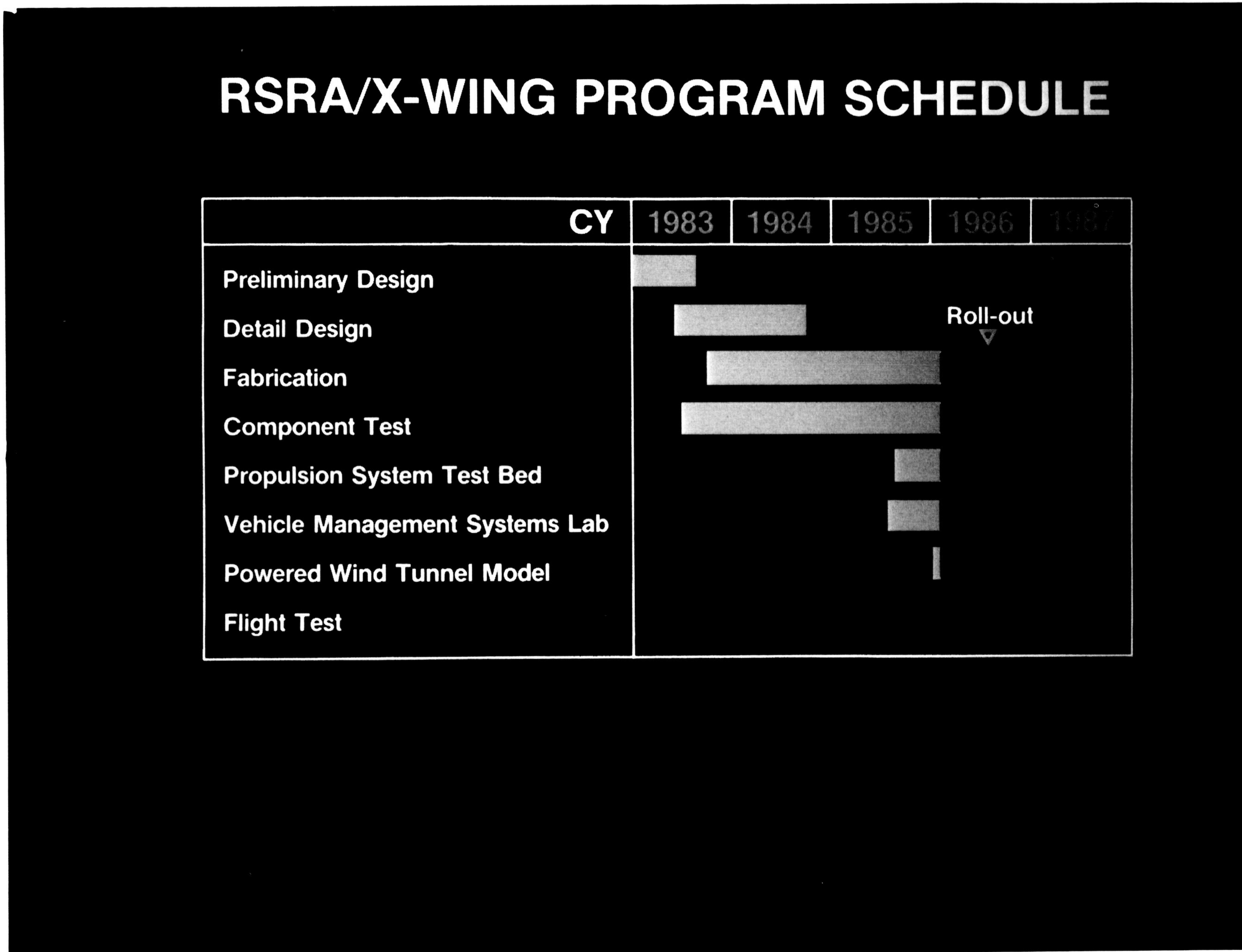
POWER REQUIRED: X-WING



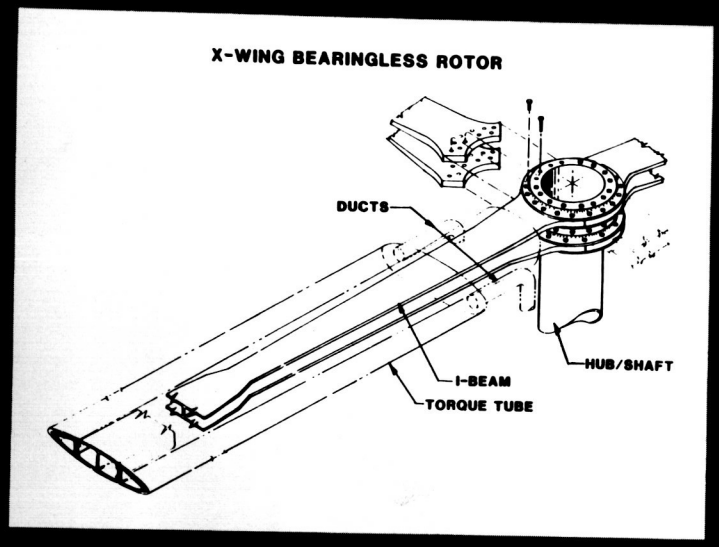
RSRA/X-WING FLIGHT DEMONSTRATOR

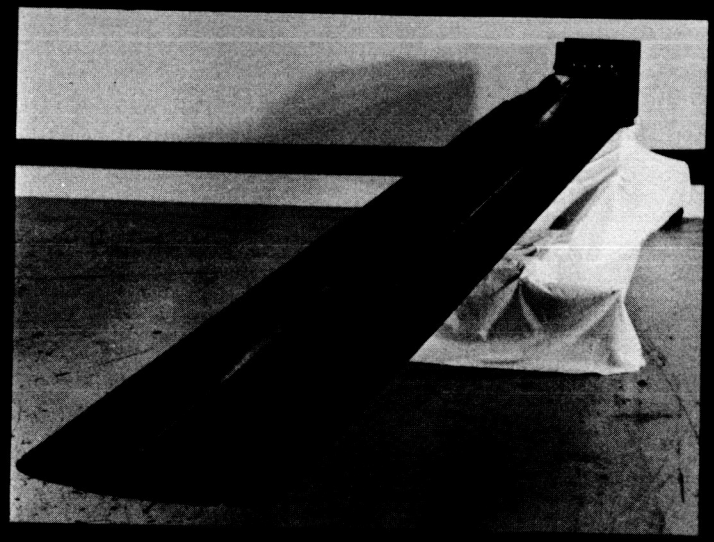
Program Objectives

- Demonstrate key advanced X-Wing technologies in flight
  - Stiff, bearingless, stoppable, composite rotor
  - Quad redundant full authority fly-by-wire control system
  - Circulation control rotor and pneumodynamic system
- Low risk approach provided by RSRA
  - RSRA wing shares lift with X-Wing
  - RSRA auxiliary jets provide propulsive force



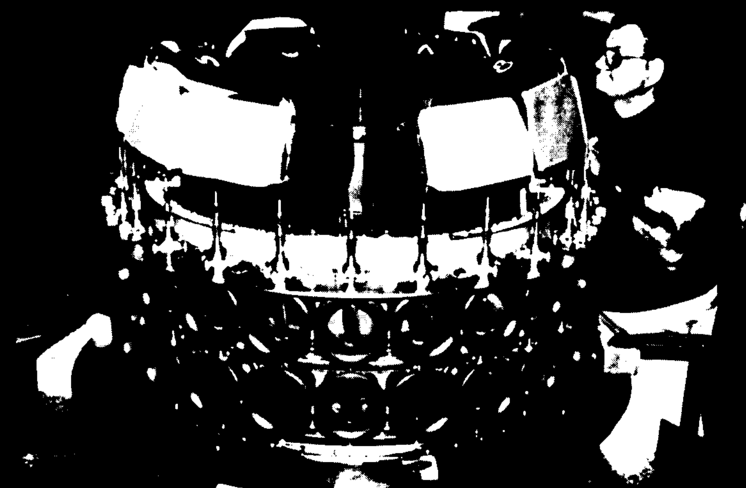
ROTOR/WING

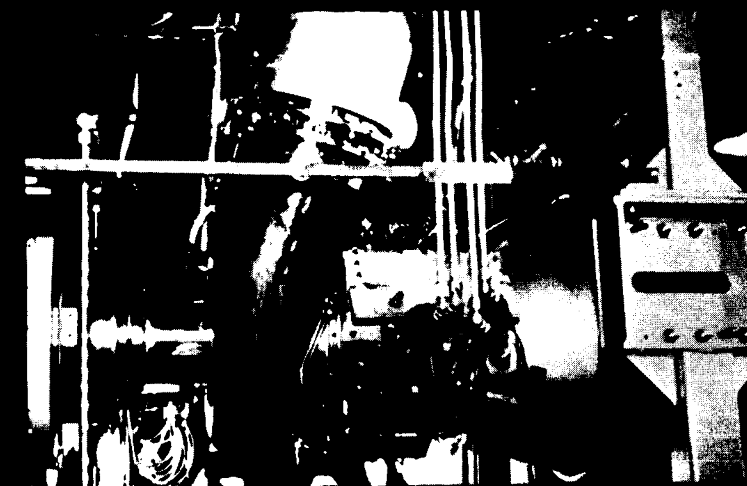




- Stoppable in flight
- Bearingless
- Circulation control aerodynamics
- Composite construction

PNEUMODYNAMIC SYSTEM





- Full rotor cyclic control
- Partial rotor collective control
- Higher harmonic control
- Hub moment feedback

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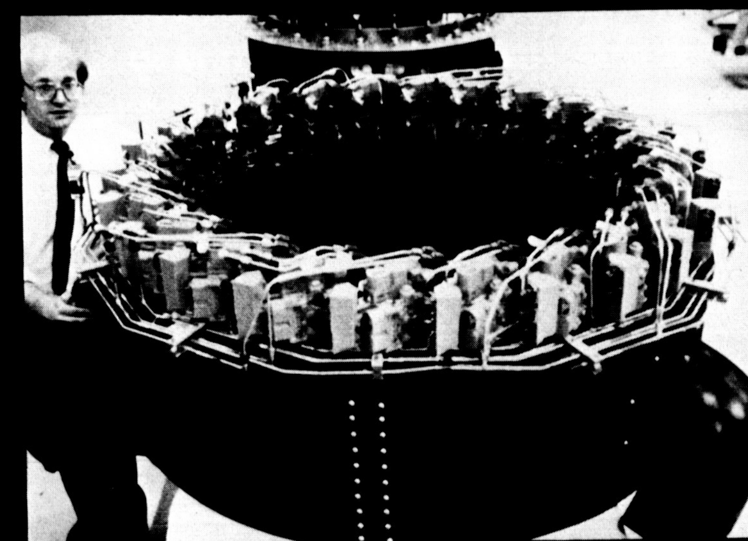
PROPULSION SYSTEM TEST BED

Purpose: Develop full-size flight hardware prior to flight

VEHICLE MANAGEMENT SYSTEM



- Full authority fly-by-wire
- Quad digital with multiprocessors
- Backup software

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VEHICLE MANAGEMENT SYSTEMS LABORATORY

Purpose: Develop full authority fly-by-wire control system prior to flight

POWERED WIND TUNNEL MODEL

Purpose: Develop
aerodynamics, dynamics,
and pneumodynamics
prior to flight.

1985 POINT DESIGN STUDY

- Based on RSRA/X-Wing component evolution
- 24,000 lb gross weight
- Two (2) MTE turboshaft engines

GROWING THREATS TO FLEET

- Quieter submarines
- Longer range anti-ship missiles
- Longer range "smart" torpedoes
- Improved modern surface ships
- New aircraft carriers
- Over-the-Horizon targeting HELOS

POTENTIAL NAVY APPLICATIONS (X-WING ON SMALL SHIPS)

- Anti-submarine warfare
- Airborne electronic warfare
- Forward pass
- Combat search and rescue

ANTI-SUBMARINE WARFARE

- Increase detection range
  - Small ship base ahead of fleet
  - Longer range vehicles
  - Dipping sonar
- Increase kill range
  - Ship-launched weapons
  - Airborne targeting
- Increase protective coverage
  - Operate from small combatants
  - Operate from cargo vessels
  - Operate from small shore bases

AIRBORNE ELECTRONIC WARFARE

- Increase detection
  - Small ship based ahead of fleet
  - Operate at high altitude
- Micro-Awacs with phased array radar
- Sensor suite for intelligence gathering
- Sensor and transmitter suite for jamming
- Common logistics major airframe components

FORWARD PASS

- Ship-launched weapons
  - Large payload
  - Longer range
- X-Wing airborne guidance
  - Mid-course corrections
  - Final guidance/targeting
- Allows lighter, longer-range X-Wing

COMBAT SEARCH AND RESCUE

- Long-range, high speed vehicle
  - Quicker rescue
  - Improved rescue survival
  - Less vulnerable
- Low downwash velocities
  - Low wind load on rescuees
  - Operation into unprepared fields
  - Precision hover over forest
- OEI capable
- Small-ship basing
  - Versatility
  - Further increased range

IMPACT OF NAVY APPLICATIONS

- Better protection of combatant fleet
- New protection for cargo fleet
- Offloads missions from carriers (CVs)
  - Increases space for fighter/attack
  - Reduces aircraft types on CV
    - Fewer shops
    - More space for spares
    - Improves logistics
- Vehicle family approach
  - Common major components
  - Minimum specialized systems