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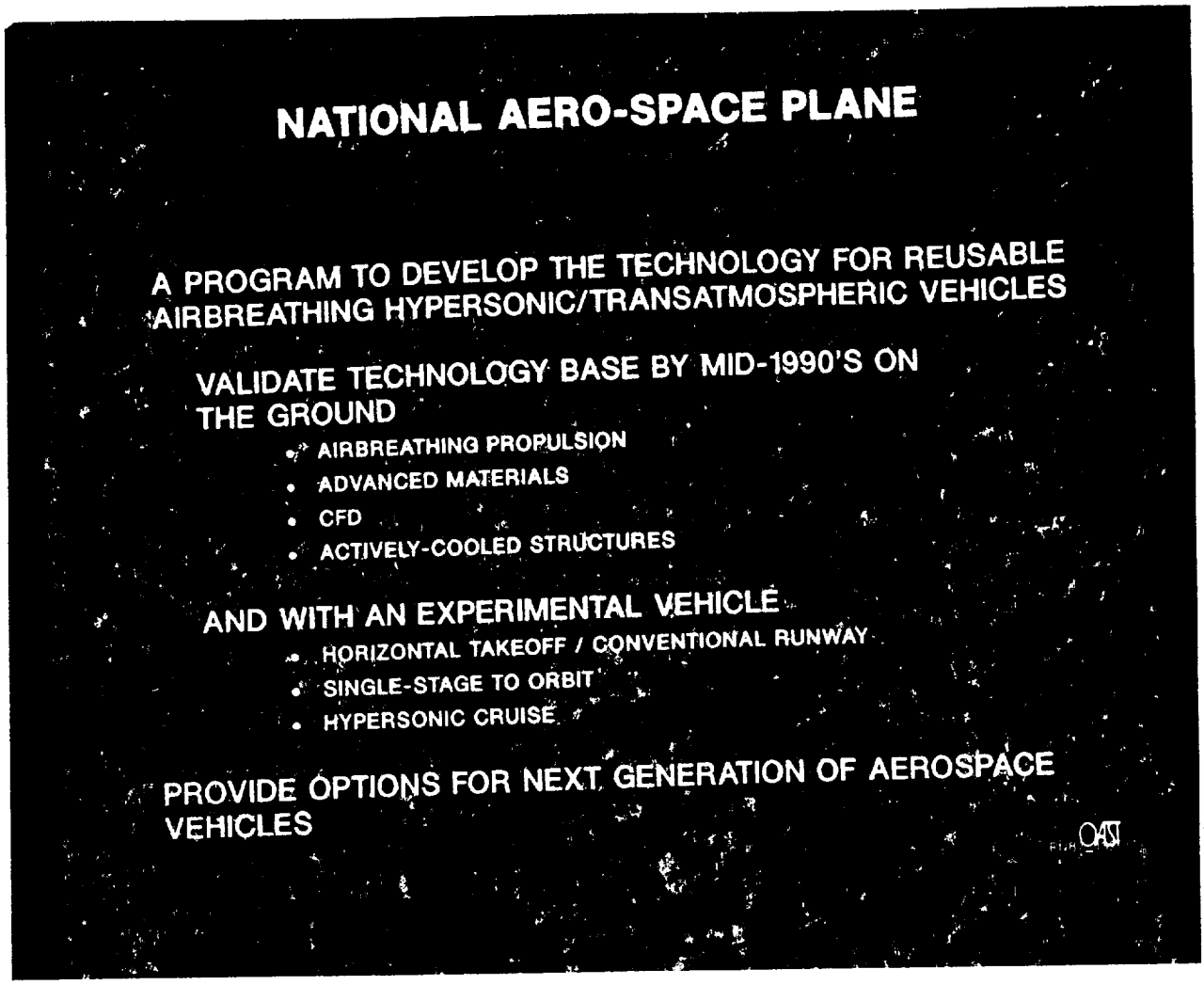
N91-28214

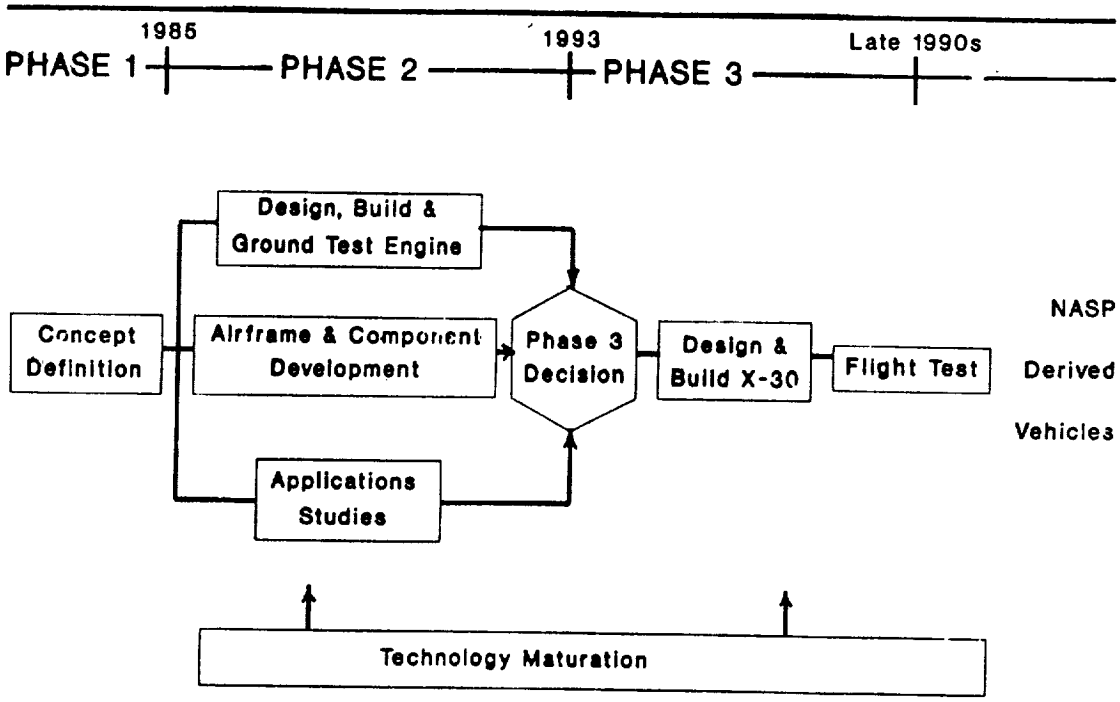
NATIONAL AERO-SPACE PLANE (NASP) PROGRAM

PENNSYLVANIA STATE UNIVERSITY
JUNE 26-29, 1990

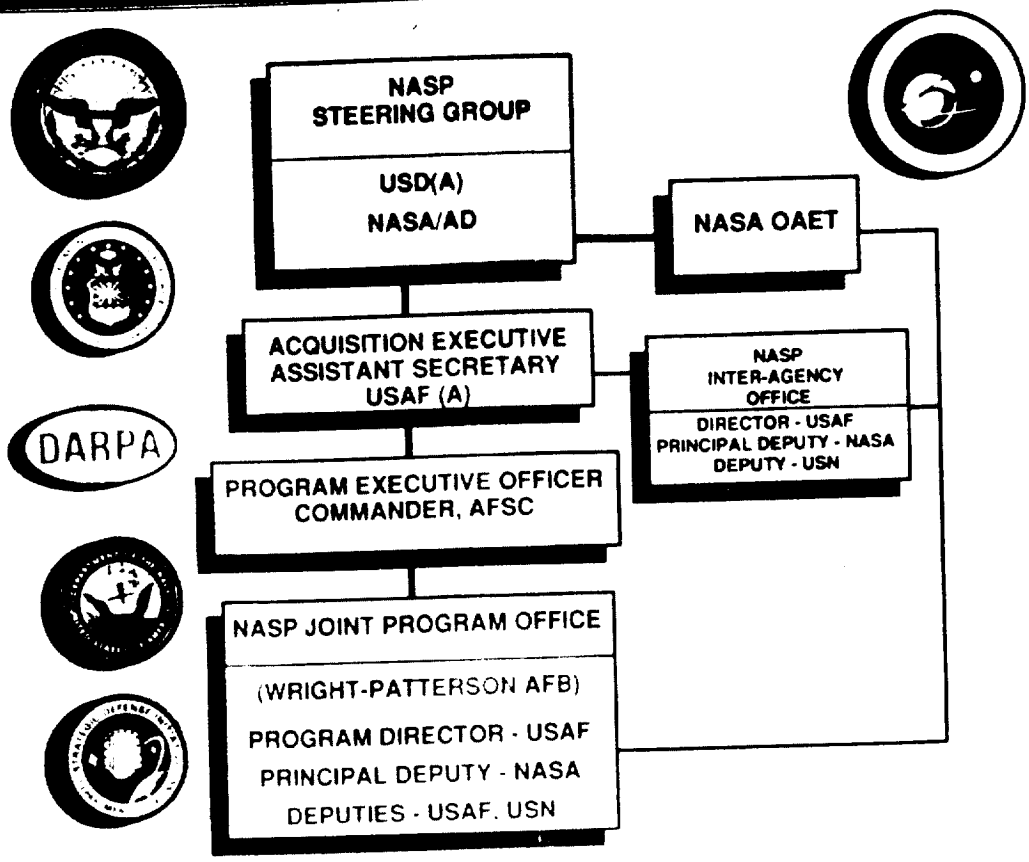
MING H. TANG
Deputy Director, NASP NIO
Pentagon



NASP PROGRAM SCHEDULE

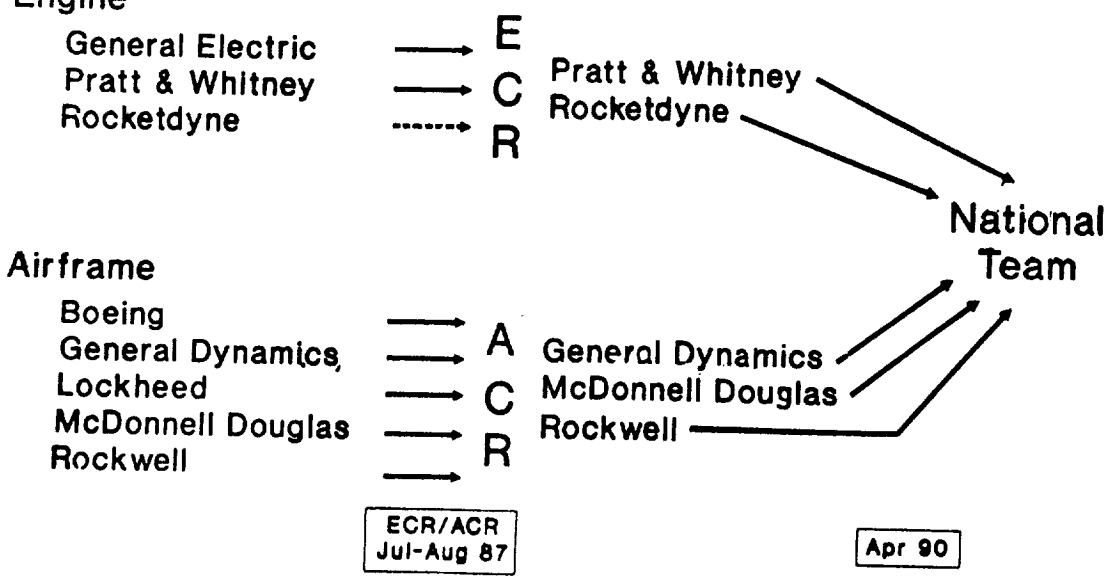


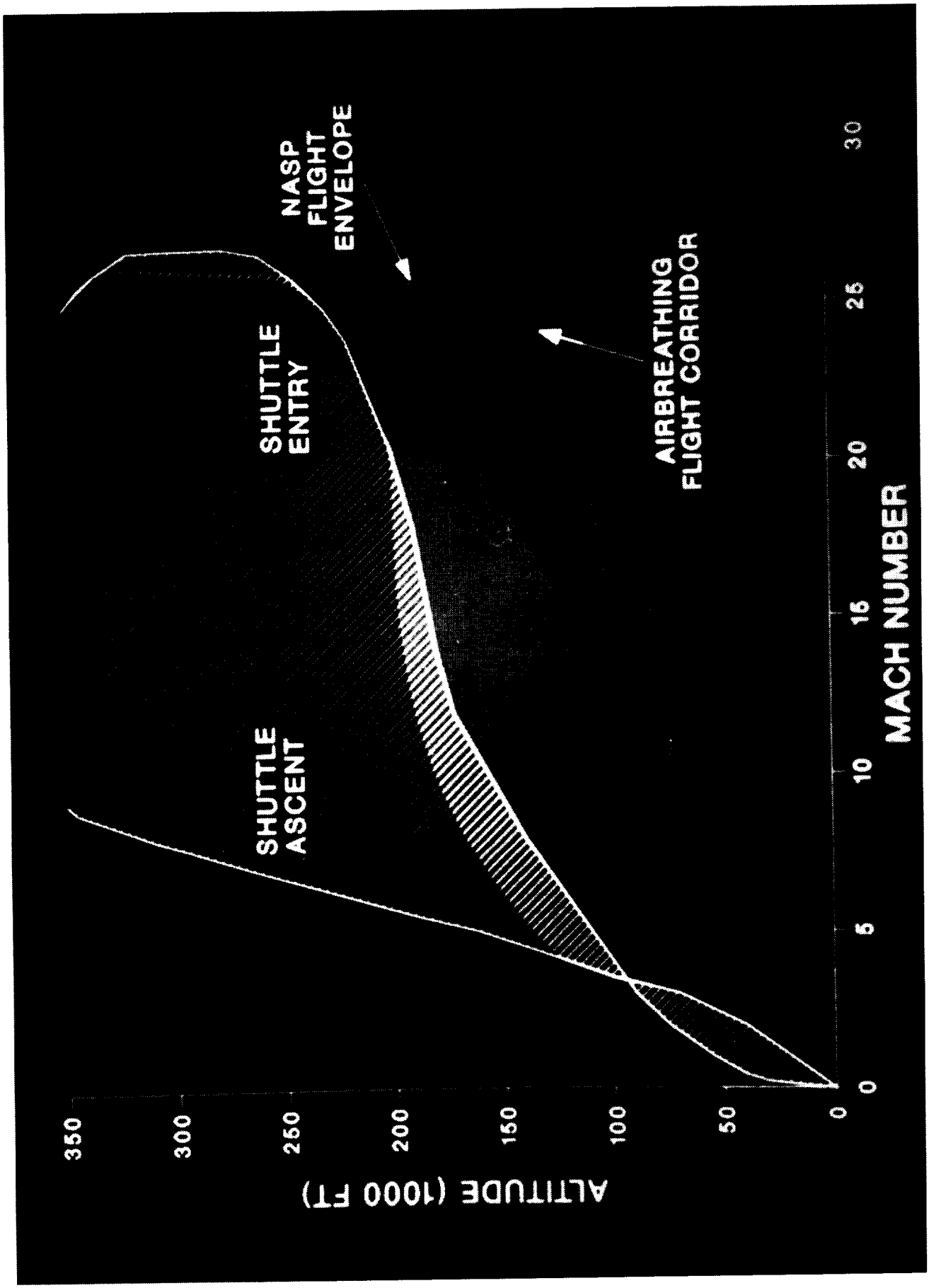
NATIONAL AERO-SPACE PLANE PROGRAM ORGANIZATION



Competitive Strategy

Phase 2



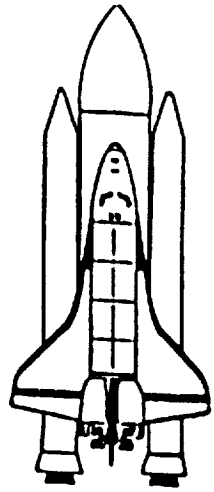

ALTITUDE (1000 FT)
350
300
250
200
150
100
50
0
0
5
10
15
20
25
30
MACH NUMBER
SHUTTLE ASCENT
SHUTTLE ENTRY
NASP FLIGHT ENVELOPE
AIRBREATHING FLIGHT CORRIDOR

AEROSPACE PLANE SHUTTLE COMPARISONS

AEROSPACE PLANE

- SINGLE STAGE TO ORBIT
- AIR-BREATHING PROPULSION
- HORIZONTAL TAKE-OFF FROM CONVENTIONAL RUNWAY
- ORBIT ON Ddemand
- ALTERNATE MISSION: HYPERSONIC CRUISE

SPACE SHUTTLE



- MULTI-STAGE VEHICLE
- ROCKET PROPULSION
- VERTICAL TAKE-OFF - SPECIALIZED LAUNCH REQMTS
- WEEKS FOR LAUNCH PREPARATION
- NO ALTERNATE MISSION CAPABILITY

NASP CONFIGURATION MATRIX

WING / BODY

Advantages
- -Low speed aero
- -Tankage design

Disadvantages
- -Wing/inlet coupling
- -Overexpanded flow to inlet

BLENDED BODY

Advantages
- -Precompression efficiency
- -Structural weight

Disadvantages
- -Low speed aero
- -Elliptical tanks

CONICAL ACCELERATOR

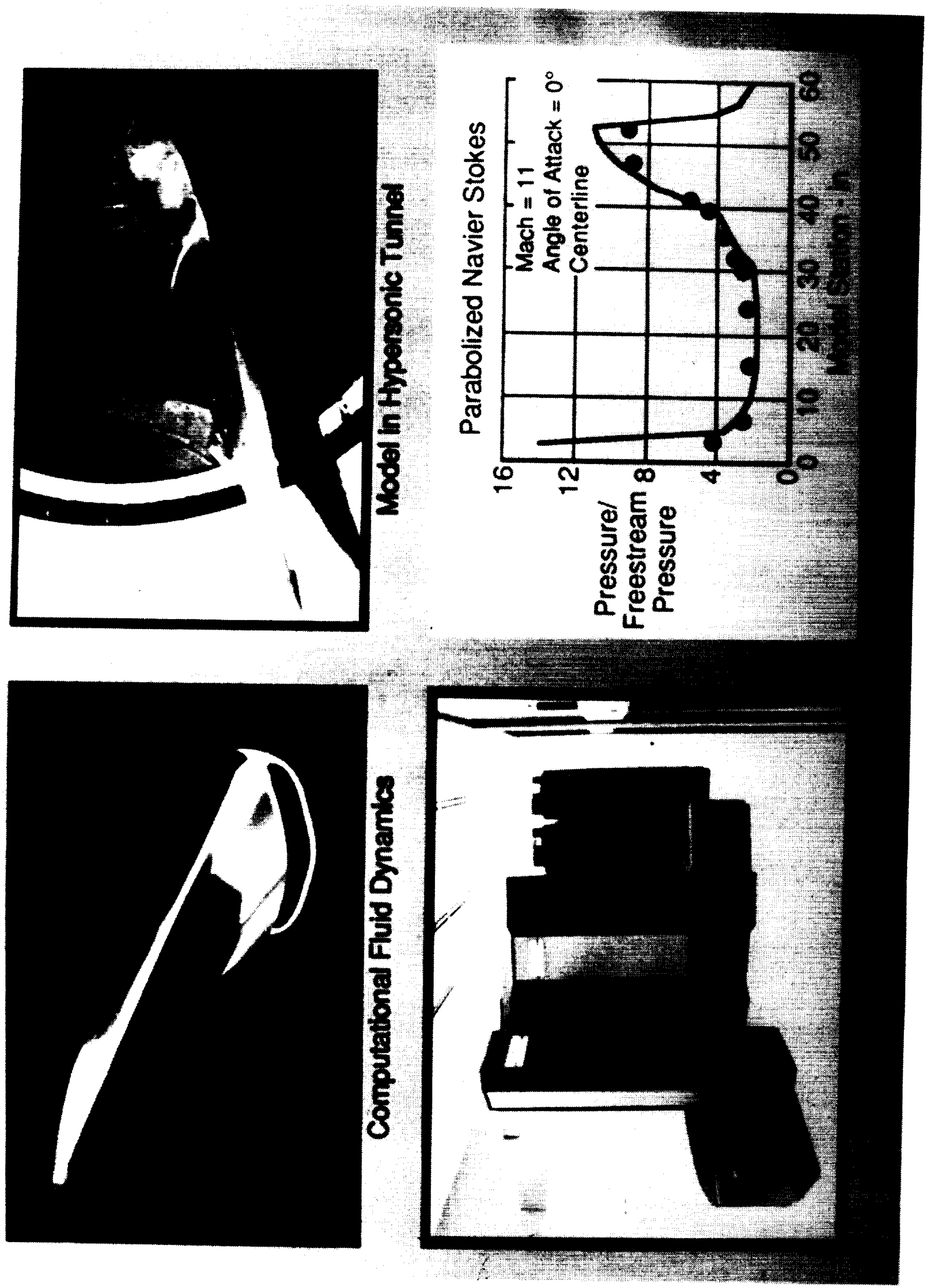
Advantages
- -Thrust margin
- -Precompression efficiency
- -Tankage design

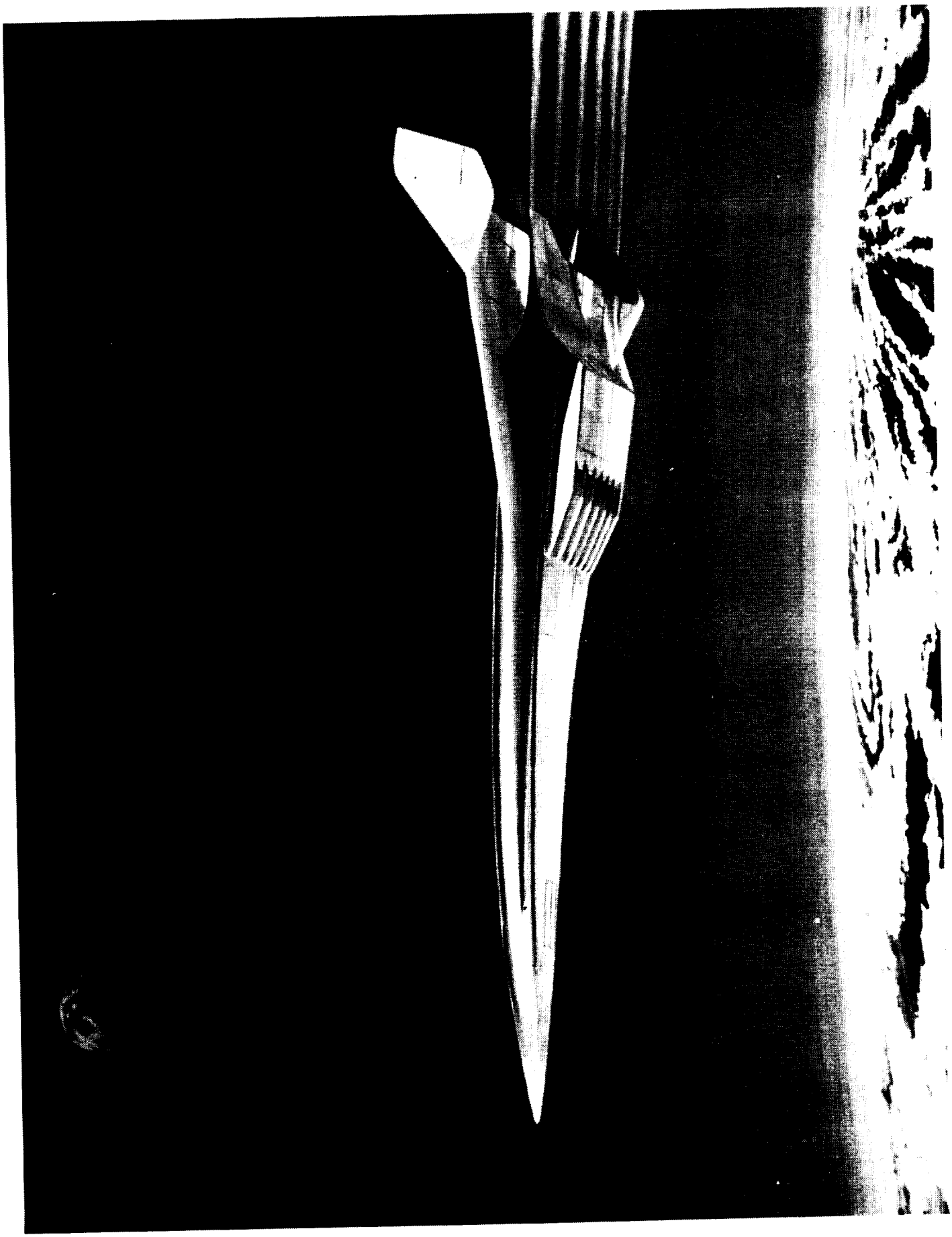
Disadvantages
- -Sensitivity to angle of attack
- -Cruise efficiency

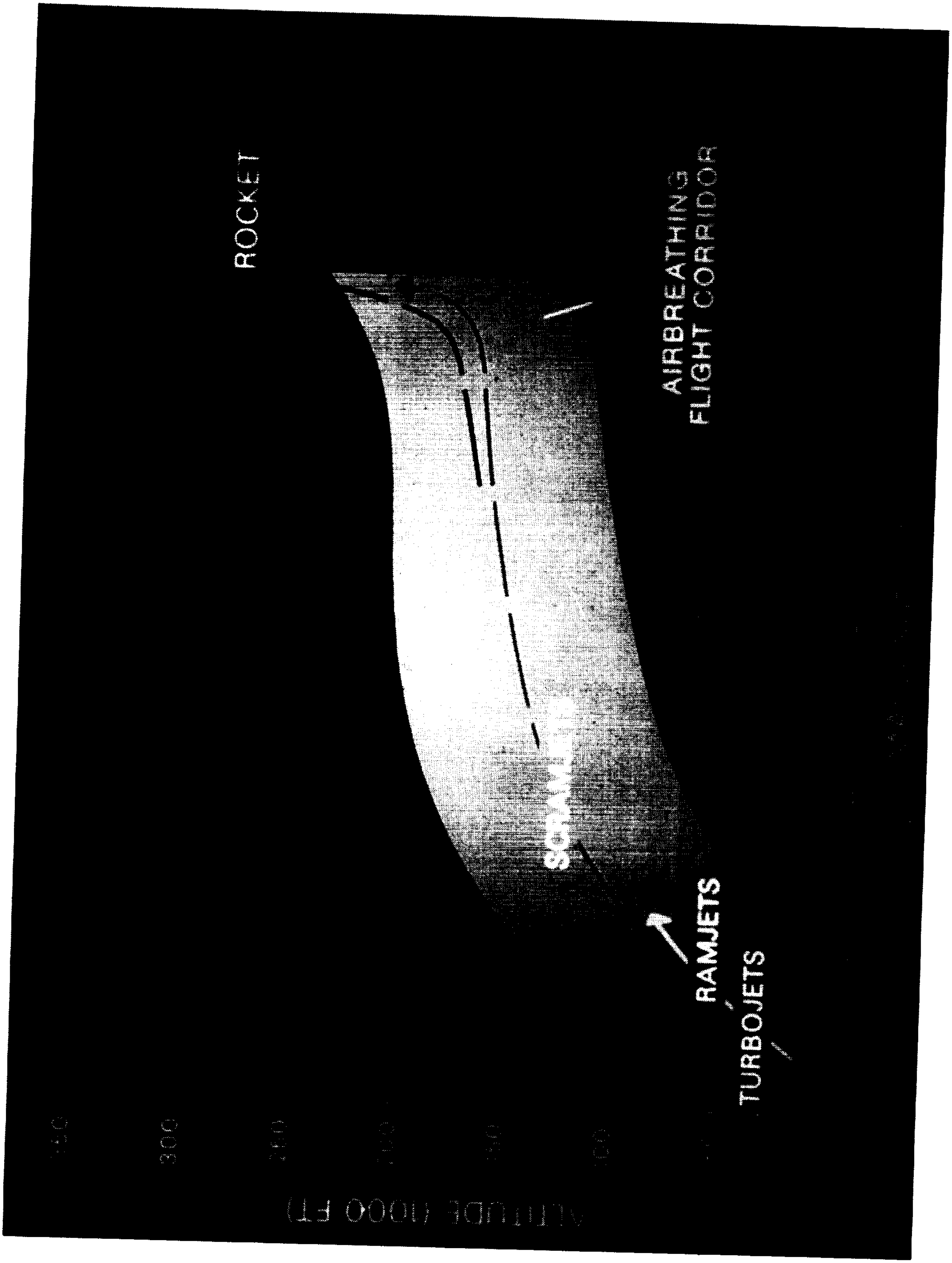
CONFINED FLOW FIELD

Advantages
- -Precompression efficiency
- -Aero efficiency

Disadvantages
- -Structural weight
- -Thermal protection
- -Off-design sensitivity



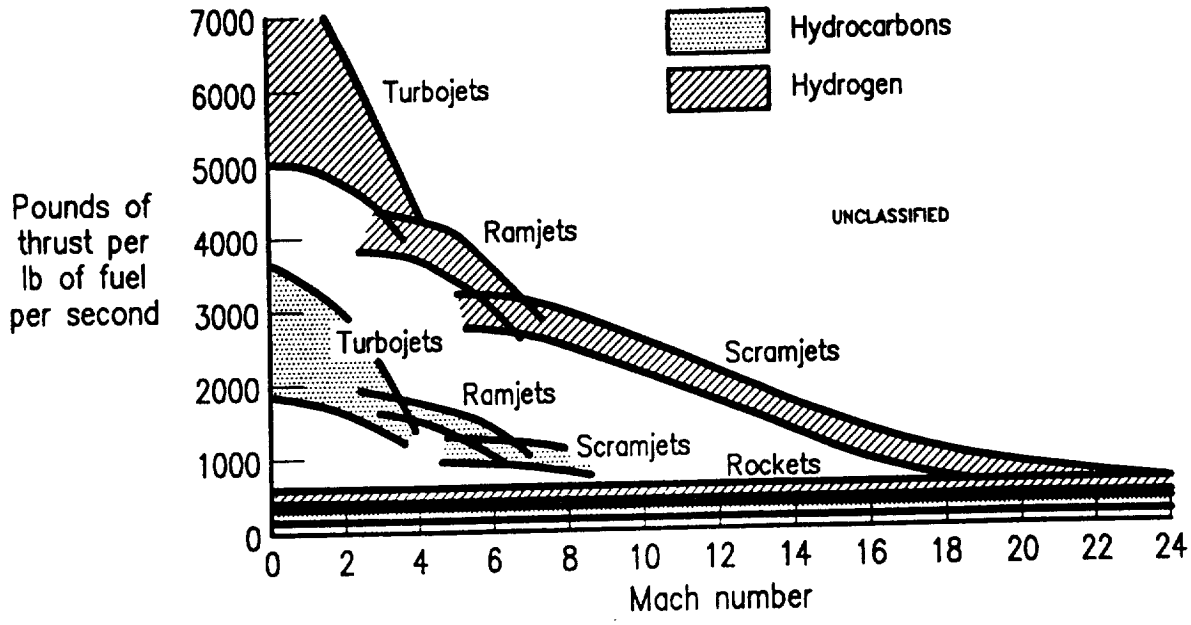



ROCKET
AIRBREATHING
FLIGHT CORRIDOR
RAMJETS
TURBOJETS

UNCLASSIFIED

PROPULSION OPTIONS (U)

Fuel consumption comparison



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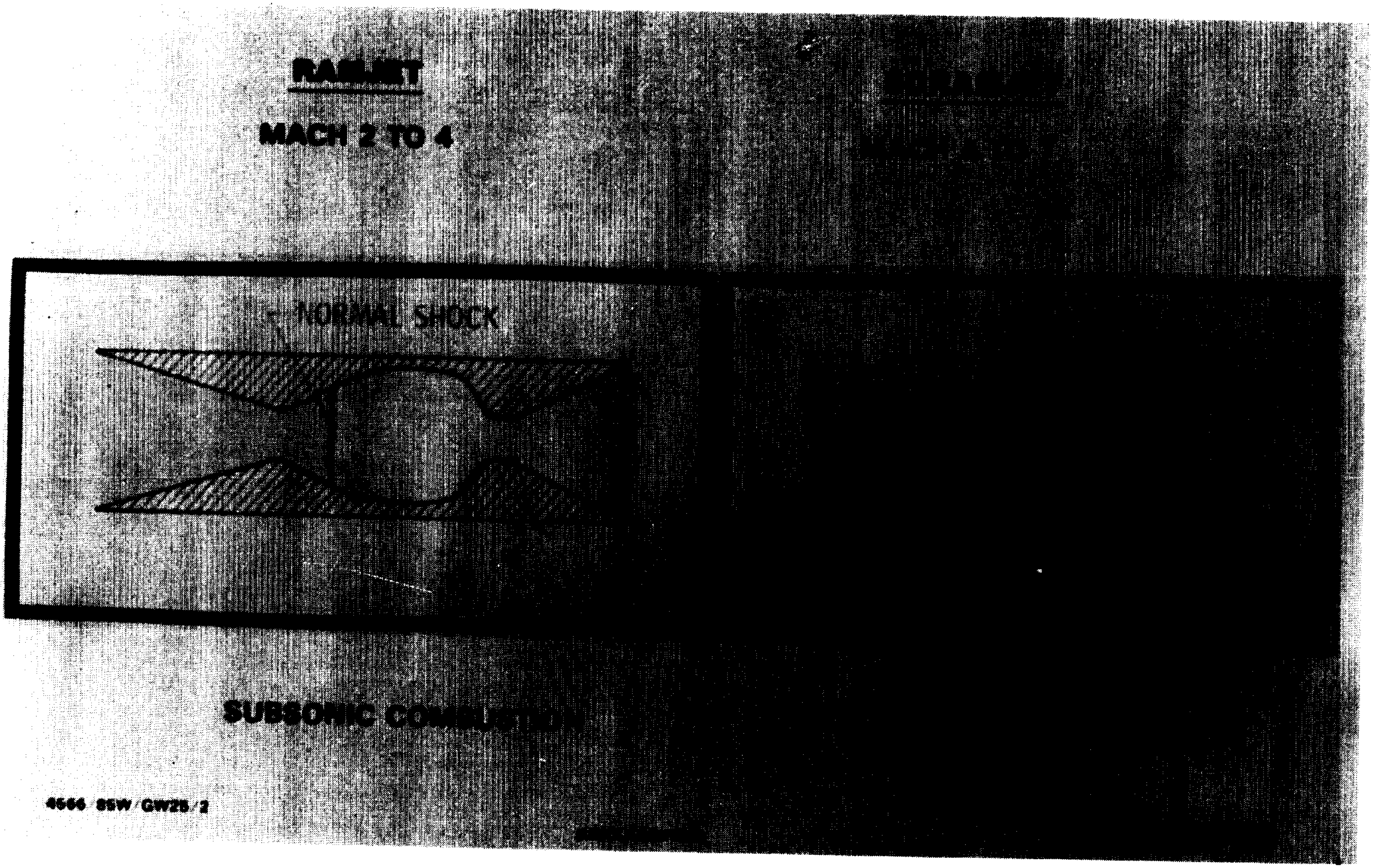
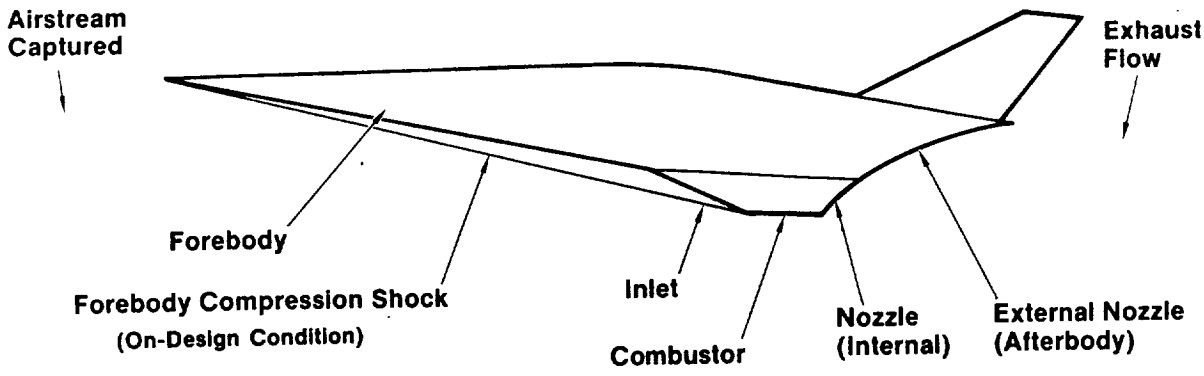


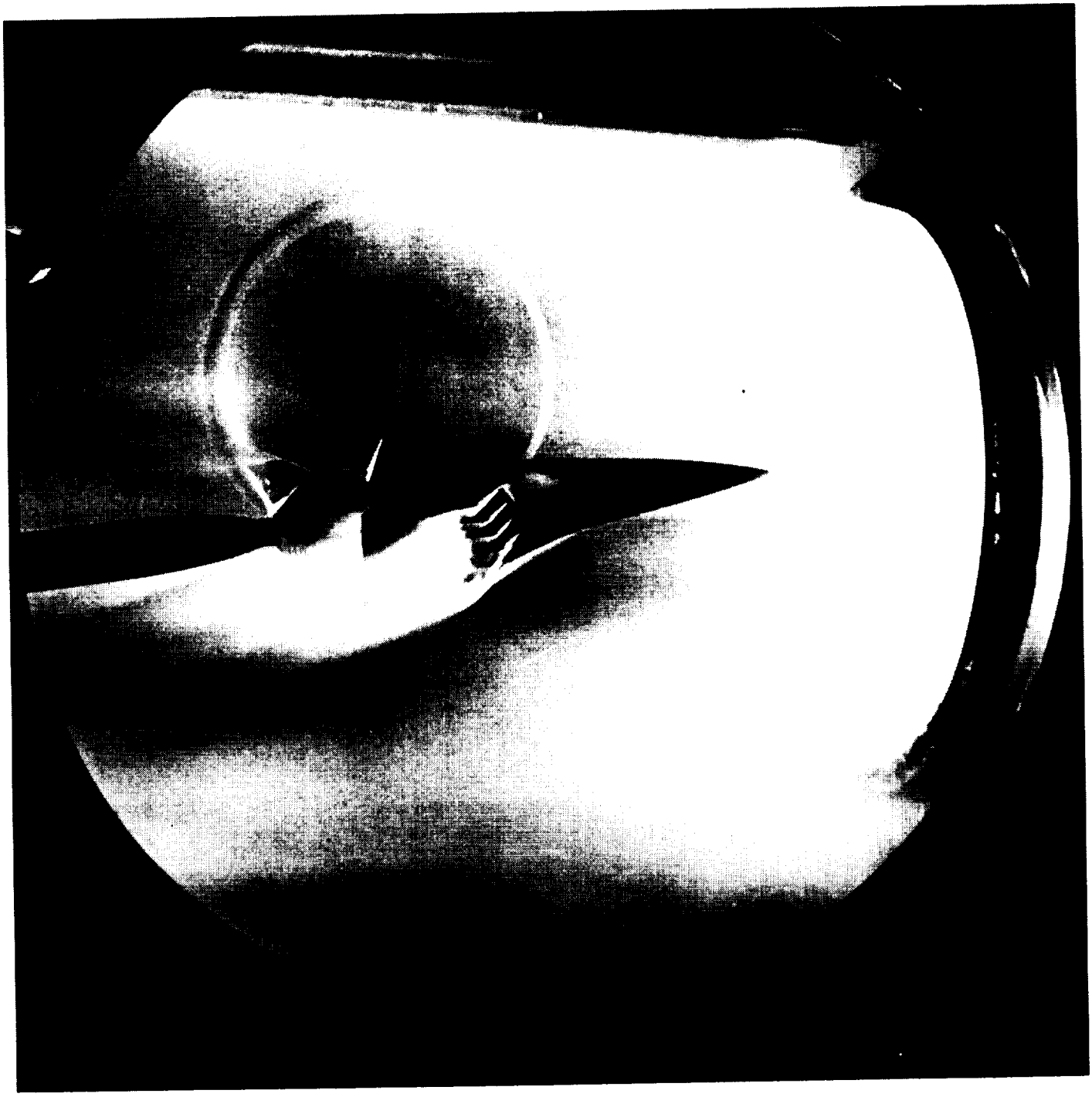
Propulsion Concept
High-Speed Scramjet



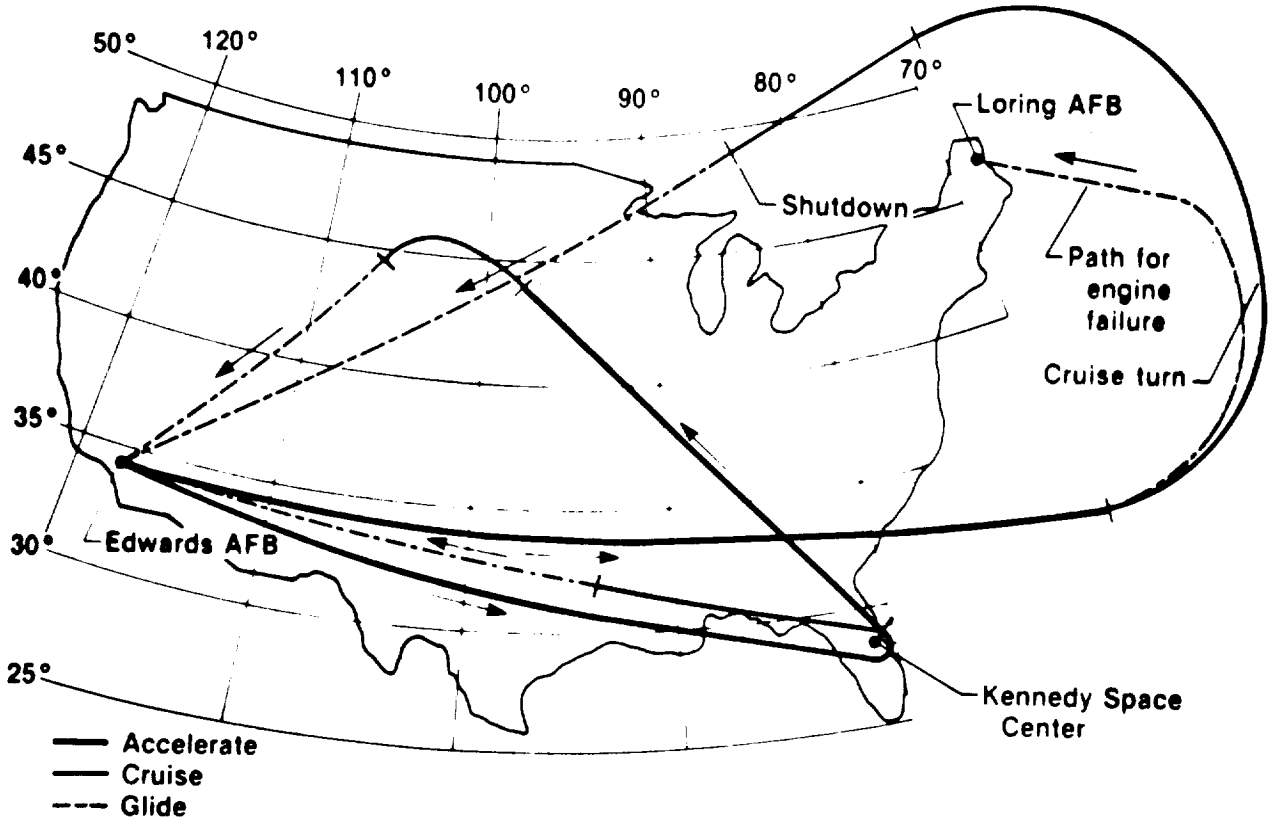
Rockwell International
Rocketdyne Division

UNCLASSIFIED

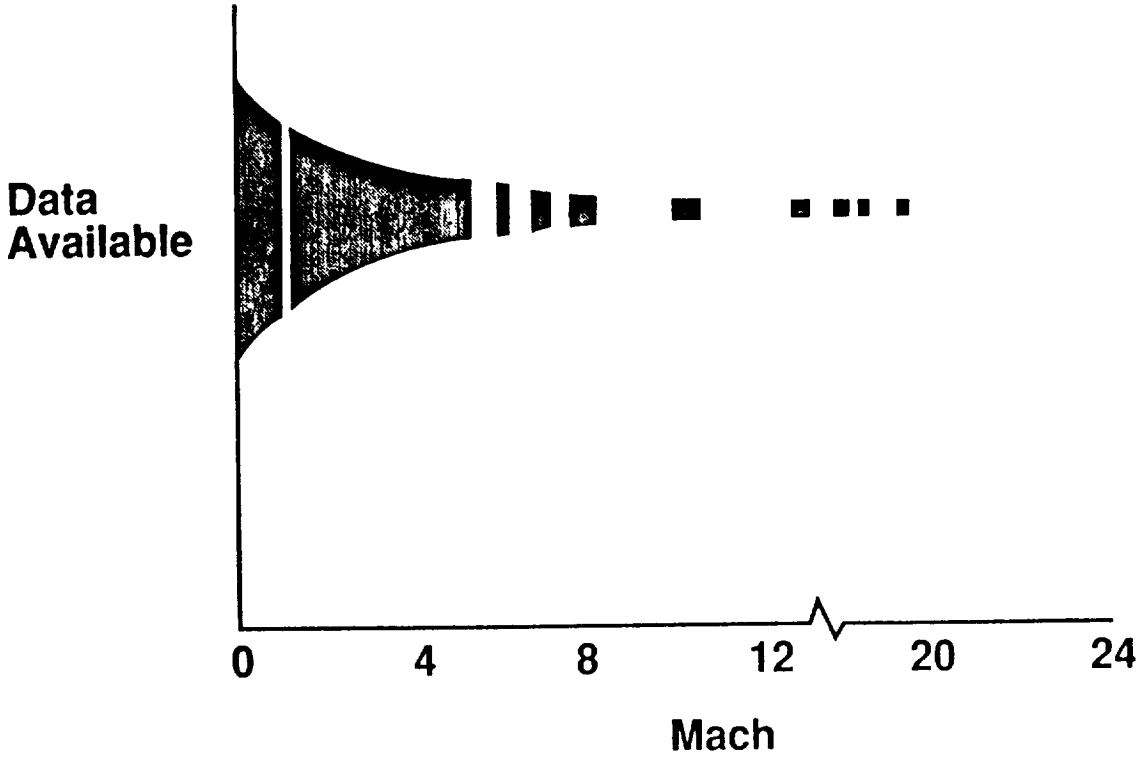
NASP
ROCKETDYNE



Ground Track for Envelope Expansion (U)



WIND TUNNEL DATA AVAILABLE FOR NASP (U)



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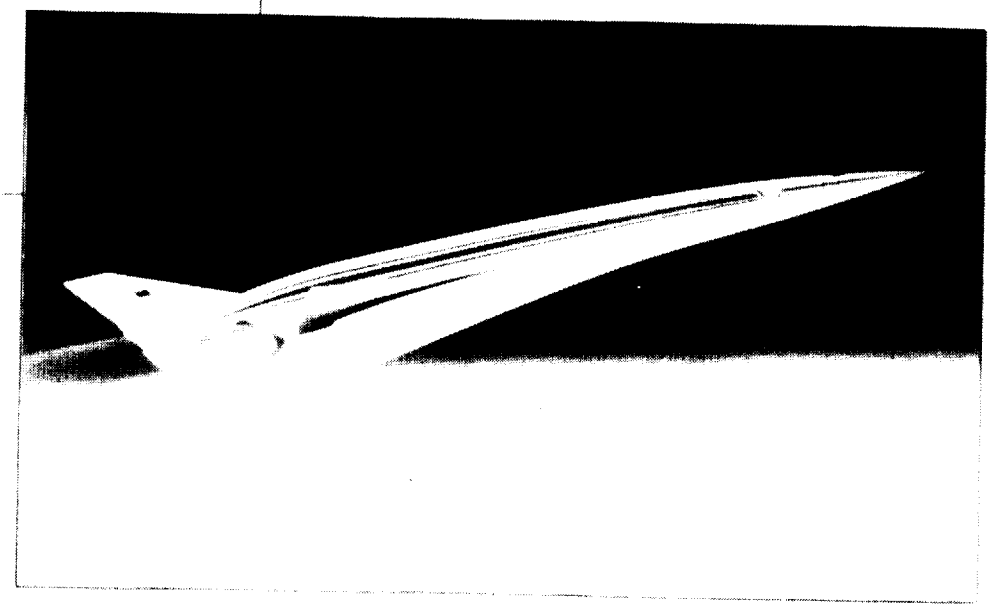
X-15



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NASA

OAST

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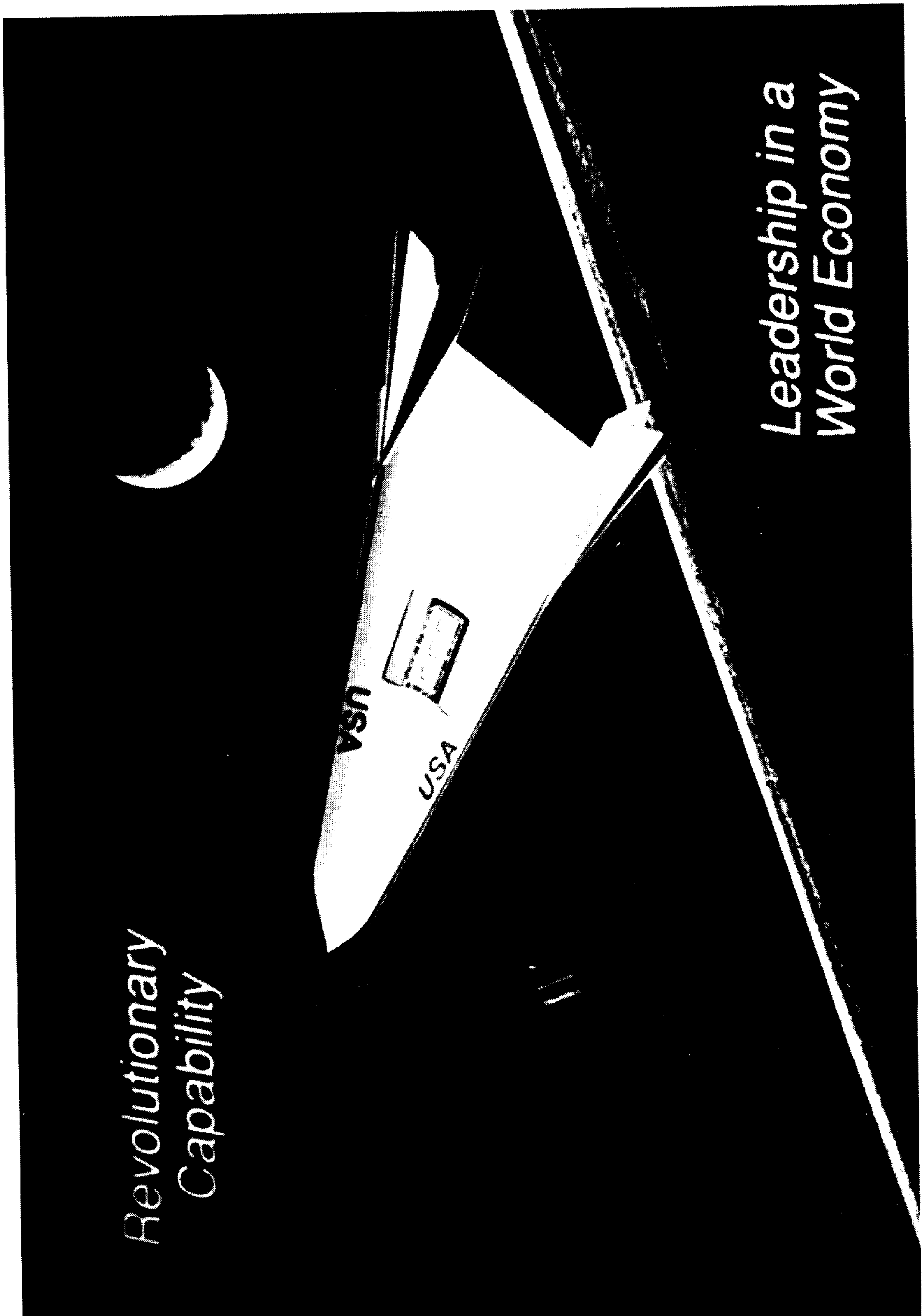
Revolutionary
Capability
USA
USA
Leadership in a
World Economy

SECTION 1.4

PROPULSION SYSTEMS OPTIONS-

FUTURISTIC SYSTEMS

PRESENTATION 1.4.1

NUCLEAR AND SOLAR ELECTRIC PROPULSION