NATIONAL AERO-SPACE PLANE PROGRAM

THE HONORABLE D. ALLAN BROMLEY

Statement Before the

Subcommittee on Technology and Competitiveness of the Science, Space, and Technology Committee

and the

Subcommittee on Research and Development of the Armed Services Committee

U.S. HOUSE OF REPRESENTATIVES

March 12, 1991

Rick
Michelle

"Document Control"

TYPE: INFORMATION DOCUMENT NUMBER: 9200965
ORIGINATOR: 02 STATUS C DIRECTORATE STATUS
****

FROM: MONETTA, DOMINIC: OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH/ENGINEERING

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 03/12/92

SUBJECT: MINUTES OF THE SEVENTH NASP STEERING GROUP MEETING.

****

DIRECTORATE ASSIGNED: STAFF ASSIGNED:

ACTION REQUIRED: STAFF ACTION:

****

SENDER'S DUE DATE:

OSTP DUE DATE: STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

****

COPIES TO: D. Allan Bromley
Michelle Van Cleave

****

WHITE HOUSE TRACKING #: CONTACT PERSON:
PHONE: EXT:

REMARKS:

OSTP RECEIVED: 03/25/92 DEPT RECEIVED:
FILE: NATIONAL SECURITY

CENTRAL FILES:

When used for Inspector General reports, dissemination is prohibited except as authorized by AR 20–1.

Criminal statutes and regulations provide penalties for unauthorized removal or disclosure of safeguarded records.

CONSERVE PAPER

REUSE THIS LABEL

FOR

OFFICIAL USE

ONLY

Use to safeguard unclassified information exempted from disclosure to the public under the Freedom of Information Act in accordance with AR 340-17.

This cover sheet will be removed when documents are destroyed, filed, mailed, or when protective markings are removed. By itself, this cover sheet requires no protection

DA LABEL 87
APR 82

EDITION OF FEB 73 WILL BE USED UNTIL EXHAUSTED.
U.S. GOVERNMENT PRINTING OFFICE : 1985 O - 489-646

965

OFFICE OF THE DIRECTOR OF
DEFENSE RESEARCH AND ENGINEERING

WASHINGTON, DC 20301-3030

MEMORANDUM FOR MEMBERS OF THE NATIONAL AERO-SPACE PLANE (NASP)
STEERING GROUP

SUBJECT: Minutes of the Seventh NASP Steering Group Meeting

The final version of the minutes of the January 13, 1992, meeting is attached.

Dominic J. Monetta
Executive Secretary
NASP Steering Group

Attachment

Distribution:
Mr. Yockey
Dr. Reis
Mr. Estess, NASA
Dr. Bromley, OSTP
Mr. Cann, ASN(RD&A)
Mr. Welch, SAF/AQ
Amb. Cooper, SDIO
Dr. Denman, DARPA
Mr. Petersen, NASA

Withdrawal/Redaction Sheet
(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
01a. Minutes	Minutes of Seventh Meeting of NASP Steering Group (8 pp.)	1/13/92	(b)(1)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: O'Neil, John F., Files
Subseries: Government Organization Files
WHORM Cat.:
File Location: National Aero-Space Plane Program [1 of 2]

Date Closed:	6/1/2010	**OA/ID Number:**	62098-006
FOIA/SYS Case #:	2005-0336-F	**Appeal Case #:**	
Re-review Case #:		**Appeal Disposition:**	
P-2/P-5 Review Case #:		**Disposition Date:**	
AR Case #:		**MR Case #:**	
AR Disposition:		**MR Disposition:**	
AR Disposition Date:		**MR Disposition Date:**	

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

P-1 National Security Classified Information [(a)(1) of the PRA]
P-2 Relating to the appointment to Federal office [(a)(2) of the PRA]
P-3 Release would violate a Federal statute [(a)(3) of the PRA]
P-4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
P-5 Release would disclose confidential advice between the President and his advisors, or between such advisors [a)(5) of the PRA]
P-6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

C. Closed in accordance with restrictions contained in donor's deed of gift.

PRM. Removed as a personal record misfile.

Freedom of Information Act - [5 U.S.C. 552(b)]

(b)(1) National security classified information [(b)(1) of the FOIA]
(b)(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
(b)(3) Release would violate a Federal statute [(b)(3) of the FOIA]
(b)(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
(b)(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
(b)(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
(b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
(b)(9) Release would disclose geological or geophysical information

"CORRESPONDENCE TRACKING"

TYPE: INFORMATION DOCUMENT NUMBER: 9120316

****

FROM: SIEWERT, RAYMOND F.

TO: MEMBERS IF NASP

DATE OF CORRESPONDENCE: 01/30/91

SUBJECT: MINUTES OF THE SIXTH NASP STEERING GROUP MEETING

****

ASSIGNED TO:

ACTION REQUIRED:

****

SENDER'S DUE DATE: OSTP DUE DATE:

DATE COMPLETED:

****

COPIES TO: D. Allan Bromley
Rick Yannuzzi

****

WHITE HOUSE TRACKING #: CONTACT PERSON:

REMARKS:

DATE RECEIVED: 02/04/91 FILE: BROMLEY-NASP

012316

OFFICE OF THE DIRECTOR OF
DEFENSE RESEARCH AND ENGINEERING

WASHINGTON, DC 20301

RECEIVED
91 FEB 4 AM 11:01
OFFICE OF THE DIRECTOR

MEMORANDUM FOR MEMBERS OF THE NATIONAL AERO-SPACE PLANE (NASP) STEERING GROUP

SUBJECT: Minutes of the Sixth NASP Steering Group Meeting

The final version of the minutes of the November 21, 1990, meeting is attached.

Raymond F. Siewert

Raymond F. Siewert
Executive Secretary
NASP Steering Group

Attachment

Distribution:
Mr. Yockey
Mr. Thompson, NASA
Mr. Aldrich, NASA
Dr. Bromley, OSTP
Dr. Herzfeld
Mr. Cann, ASN(RD&A)
Mr. Welch, SAF/AQ
Dr. Reis, DARPA
Amb. Cooper, SDIO
Dr. Schneiter

Withdrawal/Redaction Sheet
(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
01b. Minutes	Minutes of Sixth Meeting of NASP Steering Group (7 pp.)	11/21/90	(b)(1)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: O'Neil, John F., Files
Subseries: Government Organization Files
WHORM Cat.:
File Location: National Aero-Space Plane Program [1 of 2]

Date Closed:	6/1/2010	**OA/ID Number:**	62098-006
FOIA/SYS Case #:	2005-0336-F	**Appeal Case #:**	
Re-review Case #:		**Appeal Disposition:**	
P-2/P-5 Review Case #:		**Disposition Date:**	
AR Case #:		**MR Case #:**	
AR Disposition:		**MR Disposition:**	
AR Disposition Date:		**MR Disposition Date:**	

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

P-1 National Security Classified Information [(a)(1) of the PRA]
P-2 Relating to the appointment to Federal office [(a)(2) of the PRA]
P-3 Release would violate a Federal statute [(a)(3) of the PRA]
P-4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
P-5 Release would disclose confidential advice between the President and his advisors, or between such advisors [a)(5) of the PRA]
P-6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

C. Closed in accordance with restrictions contained in donor's deed of gift.

PRM. Removed as a personal record misfile.

Freedom of Information Act - [5 U.S.C. 552(b)]

(b)(1) National security classified information [(b)(1) of the FOIA]
(b)(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
(b)(3) Release would violate a Federal statute [(b)(3) of the FOIA]
(b)(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
(b)(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
(b)(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
(b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
(b)(9) Release would disclose geological or geophysical information

Withdrawal/Redaction Sheet
(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
02. Report	Value of NASP (11 pp.)	2/18/92	(b)(1)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: O'Neil, John F., Files
Subseries: Government Organization Files
WHORM Cat.:
File Location: National Aero-Space Plane Program [1 of 2]

Date Closed:	6/1/2010	**OA/ID Number:**	62098-006
FOIA/SYS Case #:	2005-0336-F	**Appeal Case #:**	
Re-review Case #:		**Appeal Disposition:**	
P-2/P-5 Review Case #:		**Disposition Date:**	
AR Case #:		**MR Case #:**	
AR Disposition:		**MR Disposition:**	
AR Disposition Date:		**MR Disposition Date:**	

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

P-1 National Security Classified Information [(a)(1) of the PRA]
P-2 Relating to the appointment to Federal office [(a)(2) of the PRA]
P-3 Release would violate a Federal statute [(a)(3) of the PRA]
P-4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
P-5 Release would disclose confidential advice between the President and his advisors, or between such advisors [a)(5) of the PRA]
P-6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

C. Closed in accordance with restrictions contained in donor's deed of gift.

PRM. Removed as a personal record misfile.

Freedom of Information Act - [5 U.S.C. 552(b)]

(b)(1) National security classified information [(b)(1) of the FOIA]
(b)(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
(b)(3) Release would violate a Federal statute [(b)(3) of the FOIA]
(b)(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
(b)(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
(b)(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
(b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
(b)(9) Release would disclose geological or geophysical information

NASP STEERING GROUP PREBRIEF

For Dr. D. Allan Bromley, Director, OSTP

8 January 1992

Ming H. Tang
NIO - Pentagon
Vincent L. Rausch
NASP Directorate, NASA HQ

ISSUES AND CONCERNS

OAST

ISSUES	STATUS
• FUNDING	• NASA APPROPRIATERS DISAPPROVED $15 MILLION REPROGRAMMING FOR 1992; COMMENTS "NO FUNDING WEDGE AVAILABLE"
	• DoD AUTHORIZATION COMMITTEES TO FOLLOW NASA COMMITTEES' LEAD FOR FY 93
	• FUTURE OF PROGRAM DEPENDS ON STRONG FY 93 APPROPRIATION; WILL REQUIRE MAJOR EFFORT BY NASA AND ADMINISTRATION
• ENGINE DESIGN/PERFORMANCE	• TIGER TEAM MAKING SIGNIFICANT FLOW-PATH CHANGES; IMPROVED DESIGN TO BE COMPLETED BY MID-JANUARY
• OPTIONS FOR PHASE III	• PROGRAM MANAGEMENT SEEKING GUIDANCE FROM NASP QUARTERLY TECHNICAL REVIEW AND NASP STEERING GROUP

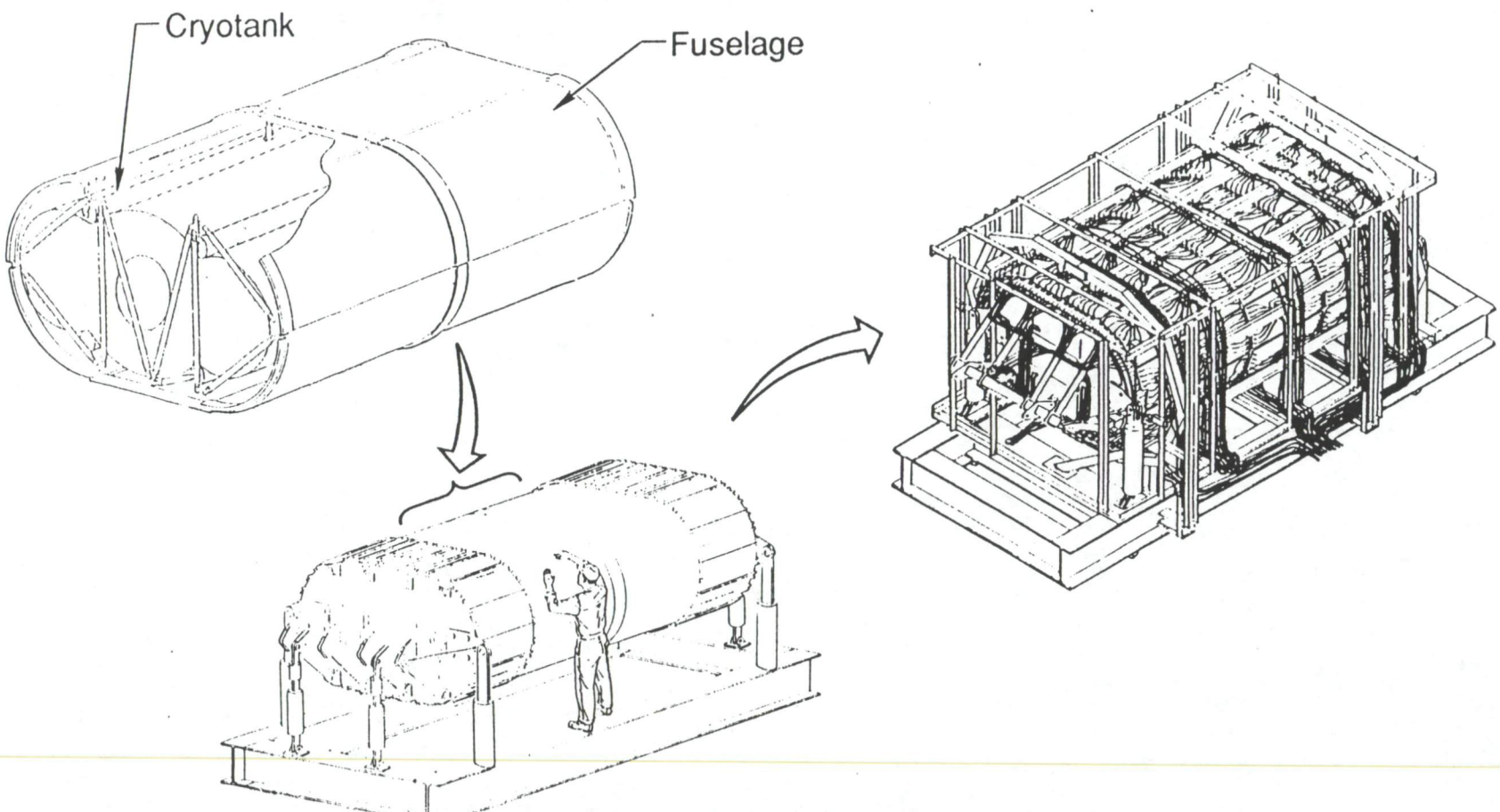
STEERING GROUP MEETING AGENDA

- TECHNICAL STATUS
- PHASE 3 PLAN
- PHASE 2D RESTRUCTURE

OUTLINE

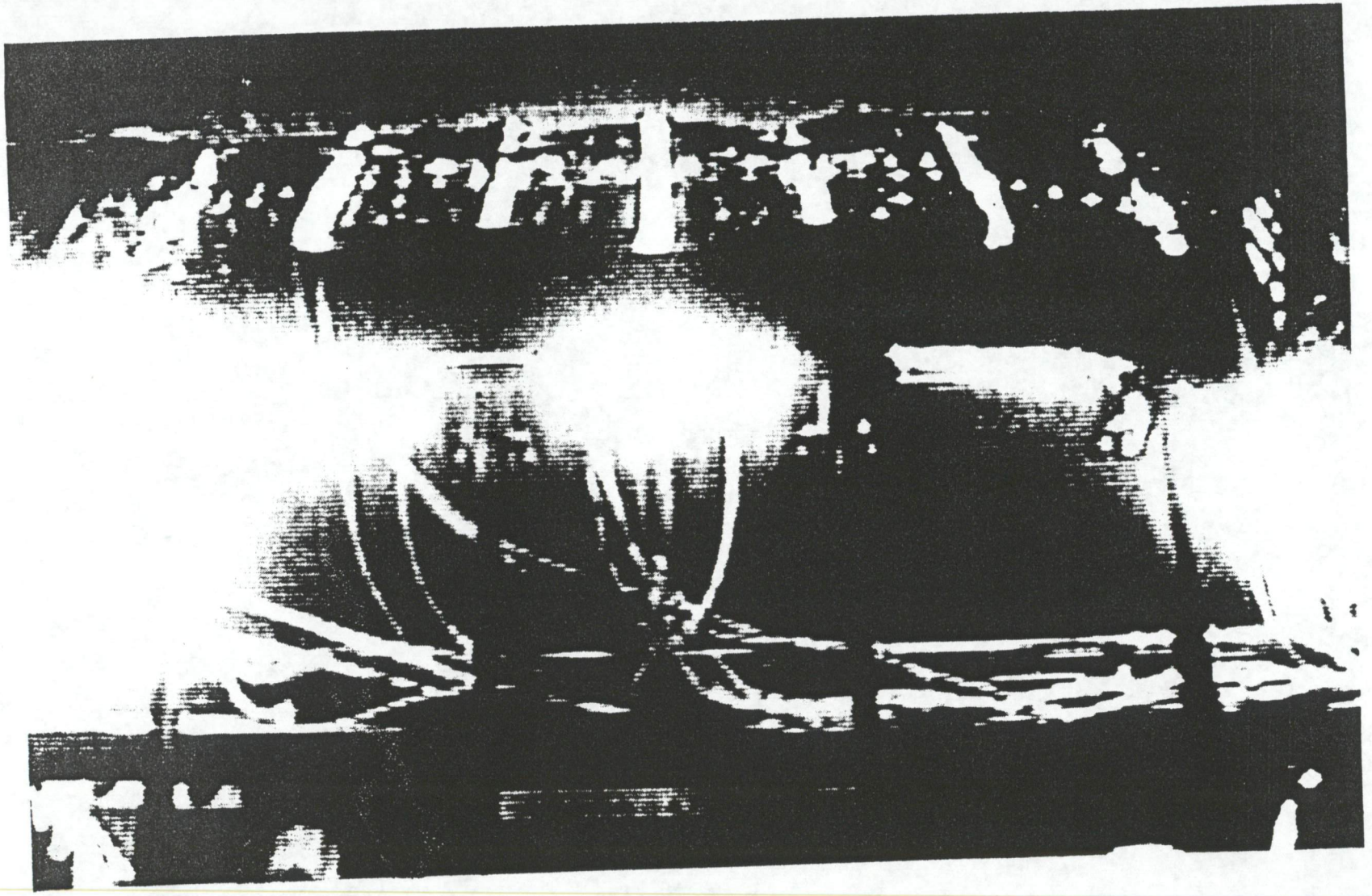
- Technology activities
- Tracking milestone status
- Design activities since last reviews
  - Air vehicle
  - Engine

Our Task D Activity Is Focused on Fabrication and Testing of an Integrated Fuselage and LH_2 Tank(U)



~~NASP COMPETITION SENSITIVE – MDC~~

TMC Fuselage/Tank Successfully Tested to 1,300°F(U)



GP12-0200-17/rds

NASP Task D
Integrated Tank-Fuselage Testing

Testing in pressure chamber with inert atmosphere (14.7 psi He)

Pressure in tank not to exceed 7 psid

Cryogen will be LN2 for all test cycles except last cycle (LH2)

Simulate the following flight conditions:

- Mach .8, maximum mechanical load, room temperature
- Mach 6, maximum conrrugation gradient, 768 F
- Mach 10, maximum surface temperatures, 1300 F
- Maximum LH2 tank pressures, 7 psid

TASK D STATUS

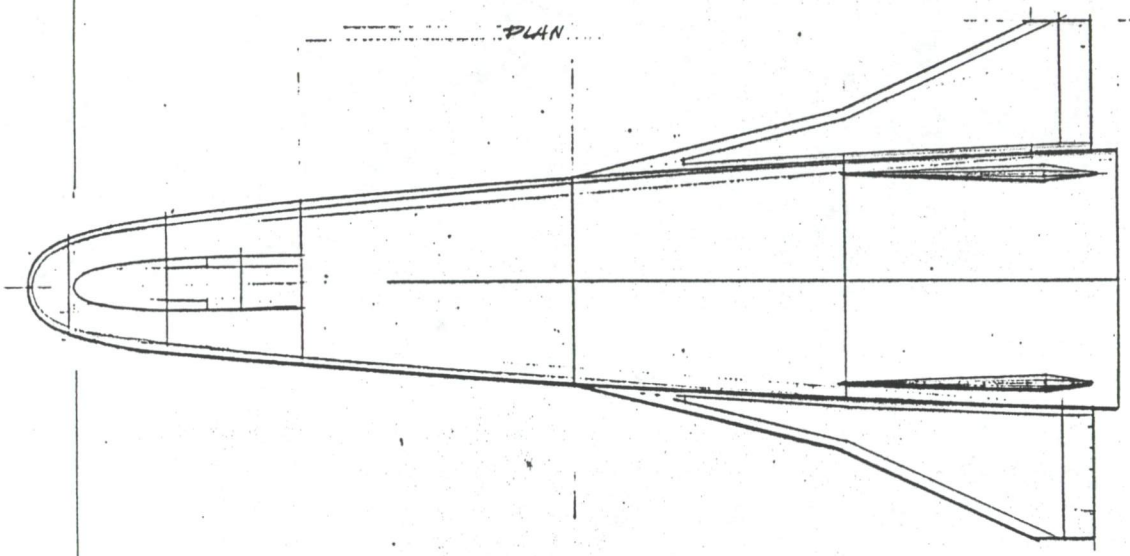
- Meeting objectives
  - Obtain data to validate analytical tools
  - Gain experience in high temp-cryo testing
  - Demonstrate feasibility of design concept
- Results to date
  - 15 of 18 tests completed
  - No structural failures
  - No test terminated due to exceedance of predicted structural behavior
  - Some anomalies still to be understood relative to deflections under thermal load
- Hydrogen testing initiated; 500° F test completed
- Conduct of cycling test at risk for funds

DESIGN STATUS

CURRENT STATUS

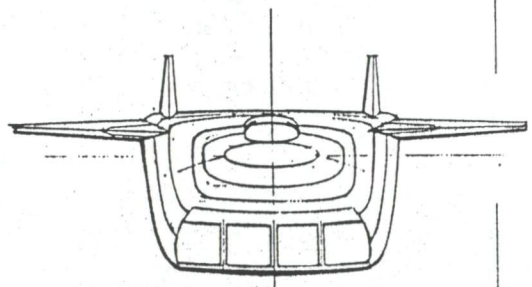
- Vehicle (201A status)
  - Near end of design Cycle #2
  - Forebody planform optimization
    - Updated calculations confirm improvement
      - -- In some cases less than predicted
    - Sensitivities better understood
    - Trends since pre-teaming consistent with updated post-teaming information
      - -- Heavier materials drive to narrower engine and higher $S/V^{2/3}$
      - -- Less rocket reliance drives for drag reduction

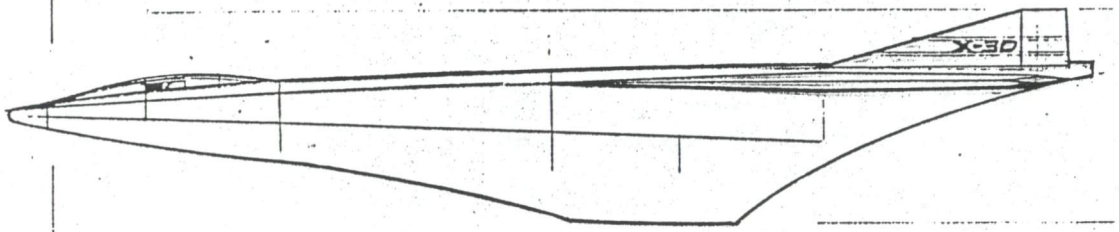
PLAN



- SLIGHTLY ELLIPTICAL FWD X SECTION
- FWD UNDERBODY ROUNDED.
- MORE CAMBER TO FUSELAGE TOP & SIDES.

FRONT VIEW





SIDE ELEVATION

NASP - 3-VIEW ROUGH PG. 1 OF 2
(SURFACE FLIGHT VIEWS, PG. 7)

CONFIGURATION 201A

CHANGES FROM 201

- Multi-variable trade study lines adopted
  - Sideview optimization
- Conformal shaped fuel tanks
- Extended crew bump
- Some design margin added
  - Control power
  - Tail scrape angle
- Engine 21A lines
  - Rocketdyne-type fuel injectors top and bottom
  - Lengthened to address ramjet problem

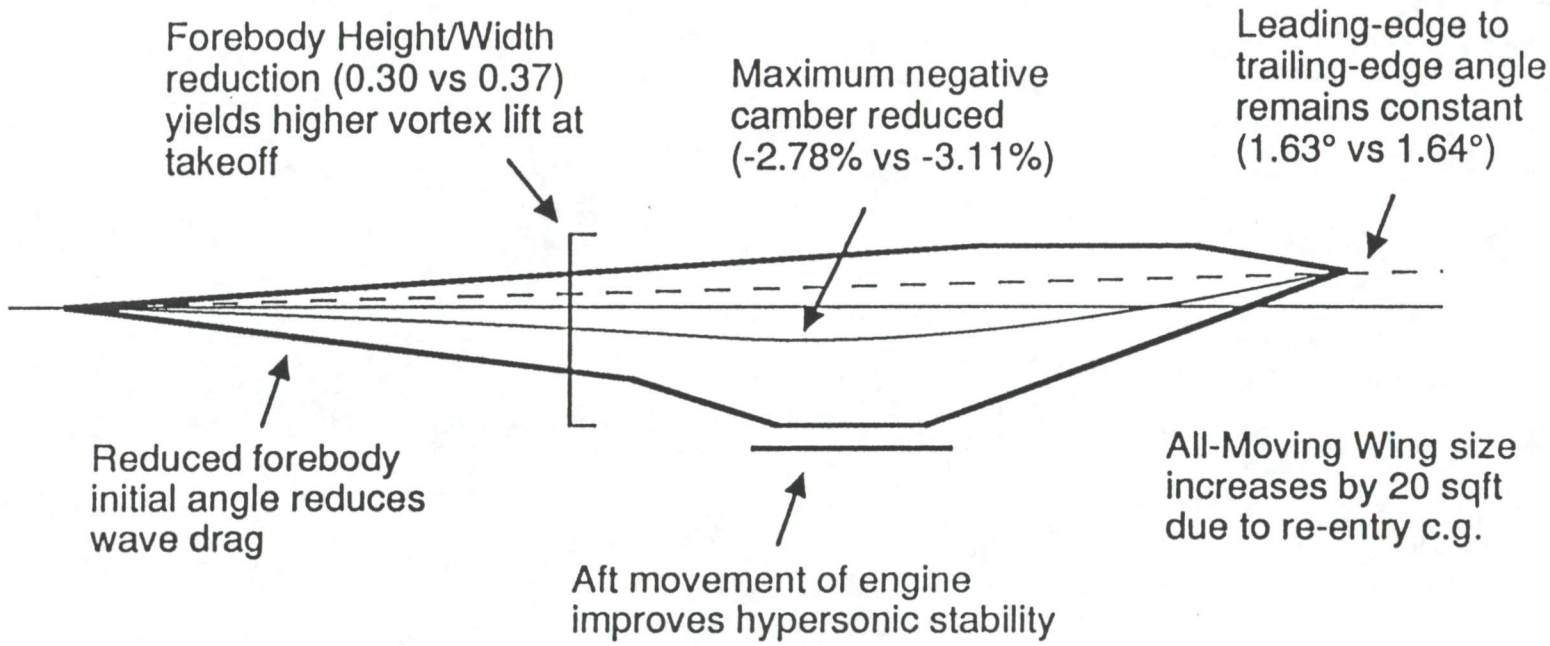
UNCLASSIFIED

CURRENT STATUS
(continued)

- Vehicle (continued)
  - ●● Lines optimization expanded beyond planform
    - Multi-variable trade study
      - -- Initial forebody angle
      - -- Shock-on-lip Mach
      - -- Axial engine location
      - -- Nozzle chordal angle
    - Projected benefits to TOGW
  - ●● Structures
    - Updated design analysis
    - Selected conformal fuel tank over multi-bubble
      - -- Driven by less manufacturing risk
      - -- Weight penalty not totally offset by better volumetric efficiency

UNCLASSIFIED

Vehicle #19 Aerodynamic Features (U)



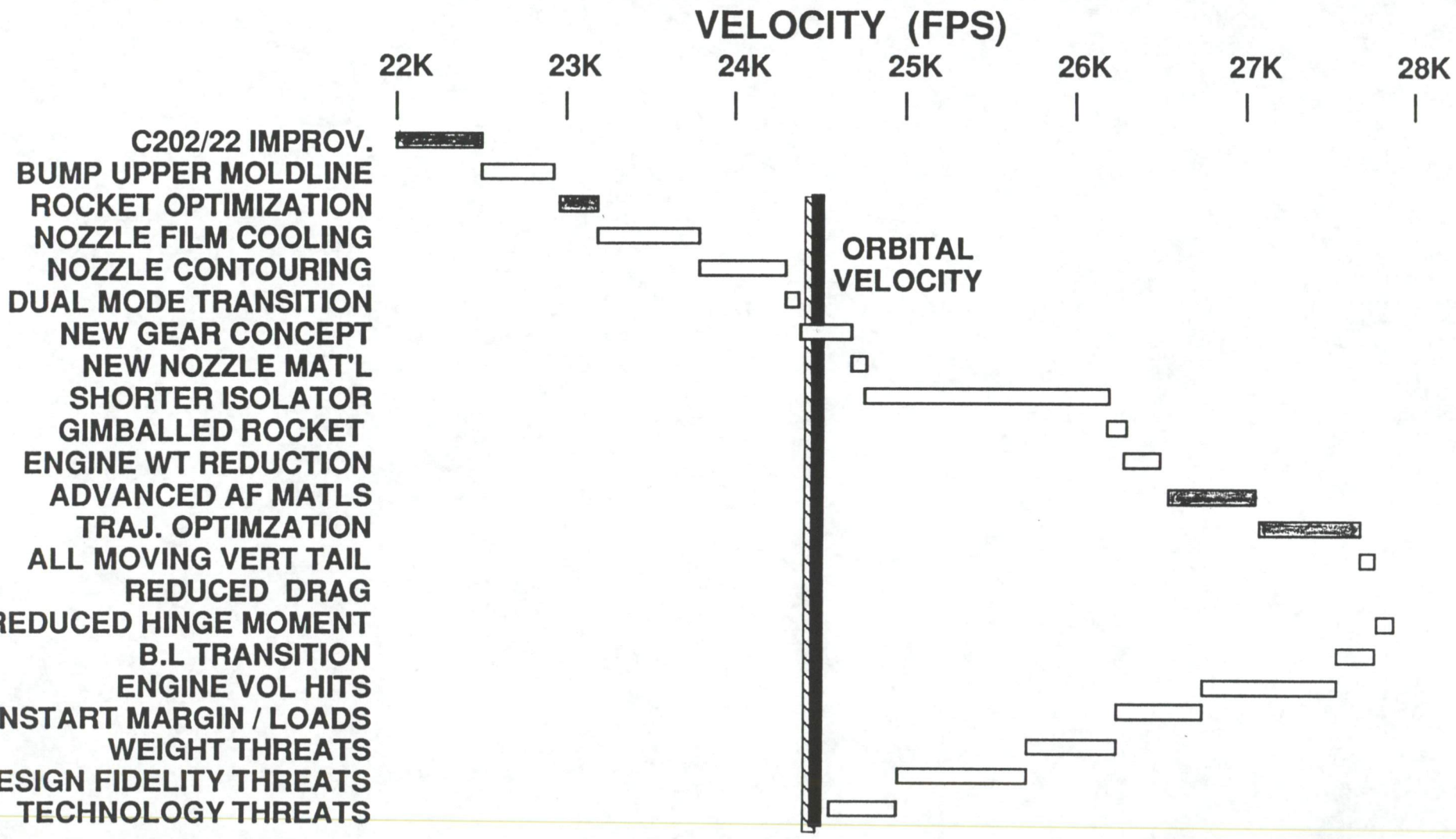
CURRENT STATUS
(continued)

- Vehicle (continued)
  - ●● Ramjet fix incorporated
    - Longer engine to accommodate isolator
    - Larger RJ area ratio to allow more fuel before choking
  - ●● Increased vehicle fidelity
    - Degraded external burning effectiveness to match wind tunnel data
    - Some margin included
      - -- Control power
      - -- Tail scrape
    - Volume increase for subsystem packaging
    - Increased consumables
    - Increased fidelity of subsystem weights
  - ●● Increased TOGW

constant int = 340,000

UNCLASSIFIED

PROSPECTS FOR CLOSURE (U)



UNCLASSIFIED

NPO-91500-AC-NL12

UNCLASSIFIED

BIG PICTURE WEIGHT PERSPECTIVE
WEIGHT STATUS SUMMARY

- Currently high TOGW projections
  - More conservatism than before
  - Ultimate balance between improvements and threats TBD
  - Historic weight growth partially reflected in weight threats
- Potential for achieving SSTO capability
  - Still high if thinking in terms of achievable Mach for demonstrator X-vehicle (ΔV)
  - Higher technology such as materials could improve TOGW projections
  - Empty weight levels not unreasonably high by conventional aircraft standards
  - Performance uncertainty margins not yet addressed for SSTO vehicle
    - Could be accommodated in a non-SSTO flight test vehicle having design and uncertainty margins

UNCLASSIFIED

X-30 PROGRAM STUDIES

X-30 PROGRAM STUDIES

REFERENCE PROGRAMS

- REPRESENT THE NASP PROGRAM AS IT WAS ORIGINALLY ENVISIONED
- TWO SLIGHTLY DIFFERENT PROGRAM VARIATIONS

PROGRAM "A"	MARGINS ADDED → SAME MATERIALS, FUNCTIONS, ENGINES	PROGRAM "B"
TOGW - 325K LBS		TOGW - 425K LBS

- TWO SSTO AIRCRAFT IN EACH PROGRAM
- FLIGHT DATES
  - FIRST FLIGHT - 2000
  - SSTO DEMO - 2002/3
- COST ESTIMATES (FY92$)
  - PROGRAM "A" - $10.9B
  - PROGRAM "B" - $12.4B

X-30 PROGRAM STUDIES

REQUIREMENT FOR OPTIONS

- AF/NASA/SPACE COUNCIL LEADERSHIP HAS CONTINUALLY ASKED FOR OPTIONS
- PMD REQUIRES THAT OPTIONS BE EXPLORED
  - WEIGHT MARGINS
  - VOLUME MARGINS
  - VEHICLE SCALING
  - REVISED ORBITAL PARAMETERS
- IT WAS ALWAYS ENVISIONED THAT OPTIONS WOULD BE PRESENTED AT THE PHASE 3 DECISION POINT
- POTENTIAL REASONS FOR ADOPTING OPTIONS
  - REDUCE YEARLY COSTS
  - INCORPORATE LESSONS LEARNED
  - IMPROVE SCHEDULE
- OPTIONS EXPLORED ADDRESS THESE REASONS

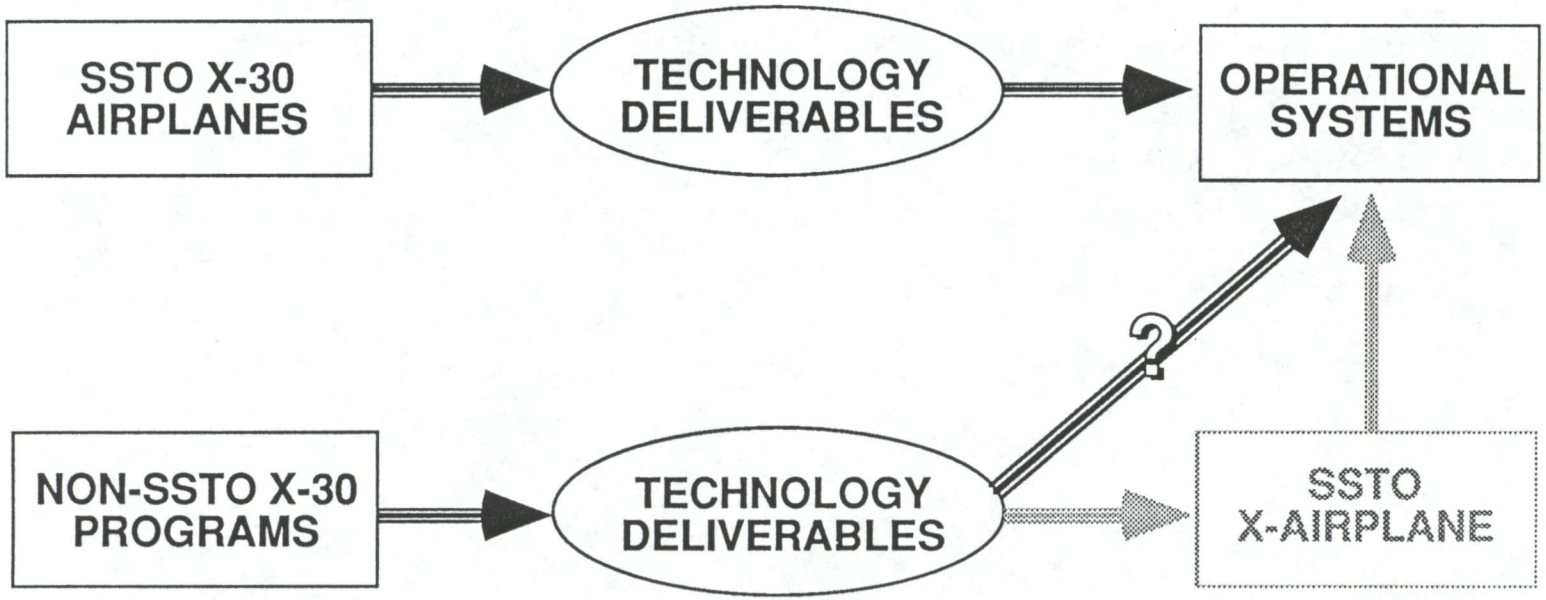
X-30 PROGRAM STUDIES

OPTIONS

ONE AIRCRAFT SSTO PROGRAM	FULL SCALE NON-SSTO PROGRAM	PARTIAL SCALE NON-SSTO PROGRAM
SSTO DESIGN	MACH 18+ DESIGN	MACH 15+ DESIGN
ESSENTIALLY A ONE AIRCRAFT PROGRAM "B"	SAME SIZE AS PROGRAM "A" BUT NOT AS CAPABLE	SMALLER VEHICLE THAT DEMONSTRATES RAM/SCRAM ENVELOPE
3 FULL SCALE SSTO ENGINES	3 FULL SCALE SSTO ENGINES	2 FULL SCALE SSTO ENGINES
ALL SSTO FEATURES DEMONSTRATED	MOST SSTO FEATURES DEMONSTRATED	MANY SSTO FEATURES DEMONSTRATED
FLIGHT DATES FIRST FLIGHT - 2000 SSTO DEMO - 2002	FLIGHT DATES FIRST FLIGHT - 1999 MAX MACH FLIGHT - 2001	FLIGHT DATES FIRST FLIGHT - 1999 MAX MACH FLIGHT - 2001
COST ESTIMATE $10.3B (FY92$)	COST ESTIMATE $8.5B (FY92$)	COST ESTIMATE $7.0 (FY92$)

X-30 PROGRAM STUDIES

THE NON-SSTO PROGRAM QUESTION



X-30 PROGRAM STUDIES

RISK ASSESSMENT

- EACH PROGRAM EVALUATED IN TERMS OF QUALITATIVE RISK
  - PERFORMANCE RISK - ABILITY 0F THE X-30 TO MEET PERFORMANCE GOALS (SSTO OR MAXIMUM MACH)
  - PROGRAMMATIC RISK - ABILITY TO ACCOMPLISH X-30 PHASE 3 COST/SCHEDULE OBJECTIVES (2 AIRCRAFT = GREEN, 1 AIRCRAFT = YELLOW)
  - FLIGHT TEST RISK - ABILITY TO SAFELY ACCOMPLISH THE X-30 PHASE 3 FLIGHT TEST PROGRAM (MUST BE GREEN)
  - SSTO TECHNOLOGY RISK - ABILITY TO SATISFY SSTO TECHNOLOGY REQUIREMENTS AFTER A SUCCESSFUL X-30 PHASE 3 GROUND AND FLIGHT TEST PROGRAM (TECHNICAL ANSWER TO THE "NON-SSTO PROGRAM QUESTION")

B	LOW
G	NORMAL FOR PROGRAM WITH AGGRESSIVE GOALS

Y	ACCEPTABLE BUT HIGHER THAN DESIRED
R	UNACCEPTABLE

X-30 PROGRAM STUDIES

PROGRAM SUMMARY

	TWO AIRCRAFT		ONE AIRCRAFT		
	"A" *	"B"	SSTO	FULL NON-SSTO	PARTIAL NON-SSTO
TOTAL COST (FY92$)	10.9 B	12.4 B	10.3 B	8.5 B	7.0 B
PEAK YEAR/COST (FY92$)	96/1.7 B	96/2.0 B	96/1.6 B	96/1.3 B	96/1.1B
FIRST FLIGHT	2000	2000	2000	1999	1999
FIRST SSTO/MAX MACH	2002	2003	2002	2001	2001
PERFORMANCE RISK	Y ↓	G ↓	G ↓	G	G
PROGRAMMATIC RISK	G	G	Y	Y	Y
FLIGHT TEST RISK	G	G	G	G	G
SSTO TECHNOLOGY RISK	B	B	B	G	Y/G

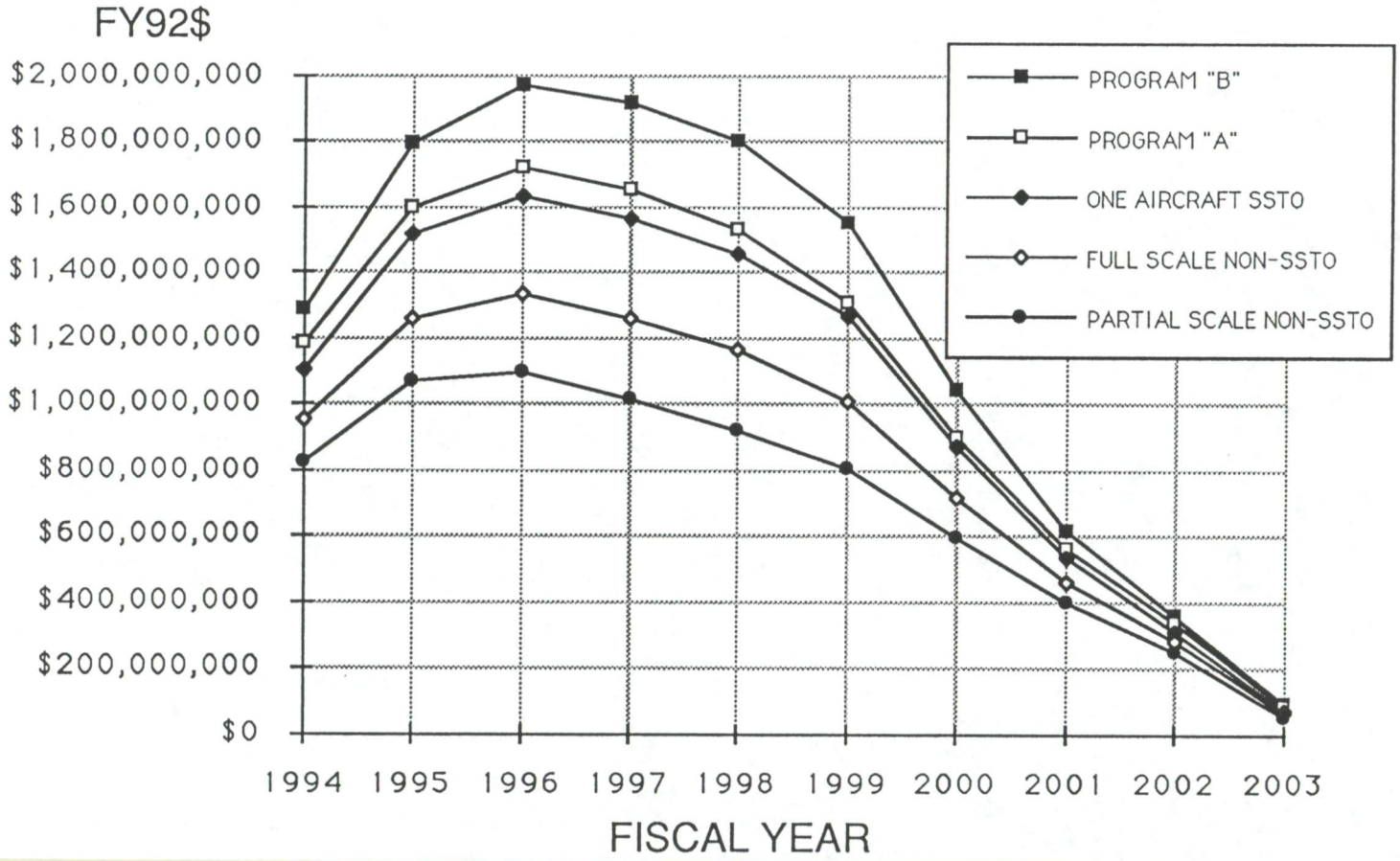
* HIGHEST CONTRACTOR CONFIDENCE IN THIS ESTIMATE

QTR CH20,1/5/92

fiscally unconstrained

X-30 PROGRAM STUDIES

FUNDING PROFILES SUMMARY



QTR CH21,1/5/92

X-30 PROGRAM STUDIES

IMPLEMENTATION STRATEGY

BACKGROUND

- ALL PROGRAMS HAVE HIGH EARLY YEAR FUNDING REQUIREMENTS AND RAMP UP

- SINCE ADEQUATE NEAR TERM FUNDS MAY NOT BE AVAILABLE, AN IMPLEMENTATION STRATEGY WAS DEVELOPED WHICH HAS POSITIVE ASPECTS
  - PROGRAM RISK REDUCED
  - "PERCEIVED" FUNDING CONSTRAINTS SATISFIED
  - TRADITIONAL DEVELOPMENT PROCESS FOLLOWED (EARLY FOCUS ON ENGINE)
  - CRITICAL DEVELOPMENT ISSUES ADDRESSED
  - PROGRESS TOWARD BUILDING THE X-30 SHOWN

- HOWEVER, THIS STRATEGY DOES HAVE SOME NEGATIVE ASPECTS
  - SCHEDULE EXTENDED
  - TOTAL COSTS INCREASED
  - MOMENTUM REDUCED
  - EXPERIENCED PERSONNEL LOST

30% NASA
70% DoD

X-30 PROGRAM STUDIES

IMPLEMENTATION STRATEGY DETAILS

- ASSUMED AVAILABLE FUNDING (Combined NASA/DOD)

FY94	FY95	FY96
$350M	$425M	$500M

- FY94 - FY96 PROGRAM CONTENT
  - COMPLETE ENGINE PRELIMINARY DESIGN
  - PREPARE REQUIRED ENGINE TEST FACILITIES
  - TEST A STRUCTURALLY CORRECT FULL SCALE FLOW PATH (POTENTIAL FLIGHT EXPERIMENTS)
  - COMPLETE OTHER TESTS IN SUPPORT OF ENGINE DESIGN
  - COMPLETE AIRFRAME/GROUND SUPPORT SYSTEM PRELIMINARY DESIGN
  - TEST SOME AIRFRAME DEVELOPMENT ITEMS WITH FINAL MATERIALS

- OVERALL ASSESSMENT

POSITIVE!!

• Welch has brought this.

PHASE 3
PLAN

PHASE 3 PLAN

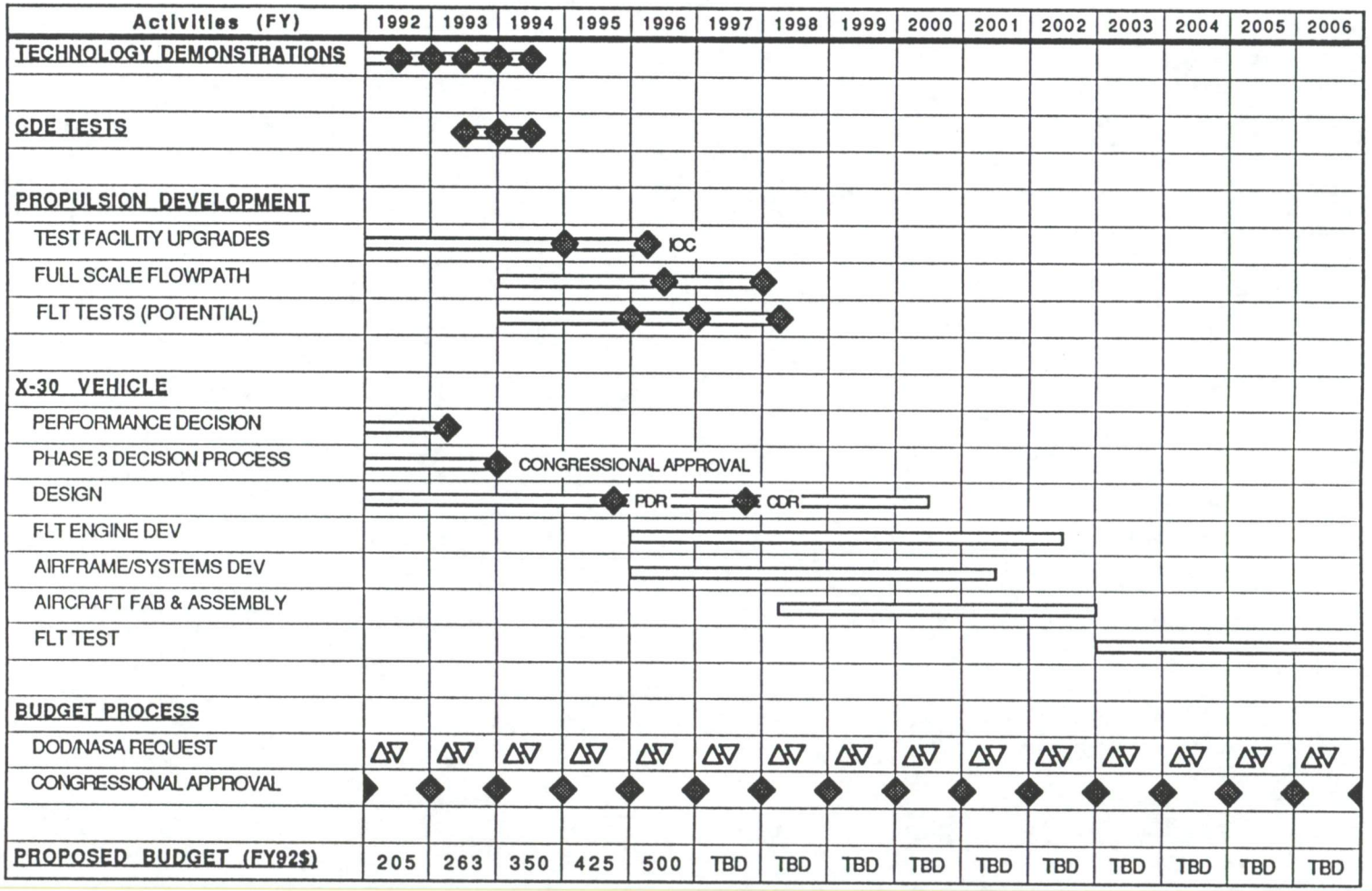
PROGRAM STRATEGY

- ADOPT PROPOSED IMPLEMENTATION STRATEGY
- SCHEDULE X-30 PERFORMANCE DECISION TO COINCIDE WITH FINAL DOD/NASA DECISION ON FY94 BUDGET (JAN 93)
  - FY92 DESIGN ACTIVITY WILL SUPPORT THIS DECISION
- USE FOLLOWING BUDGET FOR INTERIM BUDGET SUBMITTAL (AMOUNTS SHOWN ARE IN FY92$)

FY94	FY95	FY96	FY97	FY98	FY99
350K	425K	500K	TBD	TBD	TBD

NOTE: NEED QTR GUIDANCE ON TBD AMOUNTS TO BE PROPOSED TO STEERING GROUP!

PHASE 3 PLAN
OVERALL SCHEDULE



PHASE 3 PLAN

NEAR TERM EFFORTS

- CONCENTRATE ON SSTO 350K DESIGN
  - CONCEPTUAL/PRELIMINARY DESIGN
  - REFINE PROGRAM PLAN
- EVALUATE (USING X-30 SSTO ENGINES)
  - FULL SCALE NON-SSTO VEHICLE
  - SSTO NDV
- DEVELOP FY94 - FY96 PROGRAM
  - FULL SCALE FLOWPATH TEST ARTICLE DEFINITION
  - FLIGHT TEST FEASIBILITY
  - DETAILED COSTS/SCHEDULES/ACQUISITION STRATEGY
- SCHEDULE DECISIONS FOR JAN 93
  - REQUIRED X-30 PERFORMANCE
  - FY94 - FY96 PROGRAM CONTENT

PHASE 2D RESTRUCTURE

PHASE 2D RESTRUCTURE

BACKGROUND

- CAUSED BY REDUCTION OF FY92 BUDGET FROM $303.8M TO $205M
- NASA REPROGRAMMING NOT IN BASELINE
- FY93 BUDGET ASSUMED TO BE REQUESTED $263M
- FY92 RESTRUCTURING RESULTS IN
  - EXTENSION OF PHASE 2D THROUGH FY93
  - SLIP OF PHASE 3 START FROM APR 93 TO OCT 93
  - DEFERRAL, REDUCTION, OR ELIMINATION OF IMPORTANT DESIGN, TECHNOLOGY, AND FACILITY EFFORTS

PHASE 2D RESTRUCTURE

BUDGET IMPACT

ACTIVITY	FY91 BUDGET	FY92 PLAN	FY92 BUDGET	FY93 PLAN	FY94 PLAN	TOTAL
PHASE 2C CONTRACT	51.7	0	0	0	0	51.7
PHASE 2D CONTRACT	143.1	201.8	134	150	61	488
GOV WORK PACKAGES	25	36.9	30	23	8	86
TEST OPERATIONS	11.7	16.8	12	10	6	43
TEST FACILITIES	21.8	15.8	12	5	6	40
SUPPORT	16.4	11.5	10	10	10	45
SDB	1.6	1.7	1	1	1	5
PHASE 3 PLANNING	4	4	2	3	2	11
ASSESSMENTS	7.2	10	4	7	11	29
RESERVE	0.4	5.3	0	10	20	30
PROP HYP TEST FAC	0	0	0	44	40	84
PHASE 3	0	0	0	0	185	185
TOTAL	282.9	303.8	205	263	350	1101

PHASE 2D RESTRUCTURE

CONTRACT IMPACT

- DESIGN
  - SIGNIFICANT REDUCTION OF DESIGN EFFORT (30% IN FY92)
  - REDUCES SUBSYSTEMS, VMS DESIGN TO MARGINAL LEVEL
- TECHNOLOGY
  - ELIMINATES LARGE SCALE TANK EFFORT
  - REDUCES FUSELAGE STRUCTURES EFFORTS
  - REDUCES VMS, SIMULATOR EFFORTS
  - REDUCES TURBOMACHINERY EFFORT
  - REDUCES SLUSH EFFORTS
- MANAGEMENT
  - SIGNIFICANT REDUCTION IN PROGRAM MANAGEMENT AND SYSTEMS ENGINEERING

PHASE 2D RESTRUCTURE

GOVERNMENT WORK PACKAGE IMPACT

- ALL AIRFRAME DESIGN RELATED EFFORTS DELAYED OR CANCELLED
- ALL VMS EFFORTS DELAYED OR CANCELLED
- TMC PILOT PLANT EFFORT DELAYED
- INSTRUMENTATION EFFORTS SEVERELY REDUCED
- CFD EFFORT GREATLY REDUCED
- OVERALL
  - 5 EFFORTS CANCELLED
  - 18 EFFORTS POSTPONED UNTIL FY93
  - 16 EFFORTS SEVERELY REDUCED
  - 46 EFFORTS NOT IMPACTED

PHASE 2D RESTRUCTURE

TEST OPERATIONS/FACILITY IMPACT

- OPERATIONS
  - SOME AEDC/NSWC/NASA TESTING ELIMINATED
  - TEST OPERATIONS MATCHED TO REVISED CONTRACTOR NEEDS
- FACILITIES
  - ASTF UPGRADES DELAYED 1-2 YEARS
  - AMES/LANGLEY/STENNIS FACILITIES DELAYED SIGNIFICANTLY

PHASE 2D RESTRUCTURE

SUMMARY

- $99M FY92 BUDGET REDUCTION RESULTS IN 6 MONTH PROGRAM STRETCH AND TECHNOLOGY IMPACTS
- REPROGRAMMED NASA FUNDS CRITICALLY NEEDED
- ASSUMPTIONS IN FY93 BUDGET CONSERVATIVE
- CRITICAL ENGINE AND DESIGN EFFORTS WERE NOT RESTRUCTURED
- MANY IMPORTANT EFFORTS WERE DELAYED OR POSTPONED TO FY93
- PHASE 2 EXIT CRITERIA CAN BE MET BY END OF FY93 (IF FY93 REQUESTED BUDGET IS APPROPRIATED)