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SPACECRAFT ON-BOARD PROPULSION

FOCUSED TECHNOLOGY

INTEGRATED TECHNOLOGY PLAN EXTERNAL REVIEW

JUNE 27, 1991

FOCUSED TECHNOLOGY

AGENDA

- INTRODUCTION
- PLANETARY DUAL MODE
 - CONCEPT
 - IMPACTS
 - PROGRAM
- SPACE STATION H/O AND H₂O/GAS RESISTOJET
 - CONCEPT
 - IMPACTS
 - PROGRAM
- SUMMARY

SPACECRAFT ON-BOARD PROPULSION

FOCUSED TECHNOLOGIES

INTRODUCTION

- **FOCUSED TECHNOLOGY PROGRAMS PROPOSED FOR:**
 - **PLANETARY DUAL-MODE RETRO & "DELTA V"**
 - **SPACE STATION DRAG MAKEUP**

SPACECRAFT ON-BOARD PROPULSION

PLANETARY DUAL-MODE PROPULSION

CONCEPT

- **NTO/N₂H₄, 100LBF-CLASS ROCKET(S) FOR MAJOR RETRO & "DELTA V"**
- **N₂H₄ 1LBF-CLASS ROCKETS FOR ACS**
- **SINGLE N₂H₄ TANK FOR 100LBF & 1LBF ROCKETS**
- **LIGHTWEIGHT ADVANCED TANKS**

TECHNOLOGY IMPACTS

PLANETARY DUAL-MODE PROPULSION

- STUDY CONDUCTED BY JPL FOR MMII CLASS MISSION
 - CRAF USED TO QUANTIFY IMPACTS
- SPECIFIC TECHNOLOGIES EVALUATED
 - DUAL MODE (NTO/N₂H₄) ROCKET
 - ADVANCED PROPELLANT TANKS

TECHNOLOGY IMPACTS

PLANETARY DUAL-MODE PROPULSION

BENEFITS EVALUATED (1)

- INCREASED SPECIFIC IMPULSE (308 → 325)
- REDUCED RESERVE REQUIREMENTS
- REDUCED TANKAGE
 - ELIMINATE MONOPROPELLANT ACS TANK
 - REDUCED VOLUME & MASS
- NON QUANTIFIED
 - CONTAMINATION REDUCTIONS

- WET MASS SAVING OF 283KG ESTIMATED FOR DUAL-MODE CONCEPT
- SIGNIFICANT CONTAMINATION BENEFITS VIA SWITCH TO N₂H₄

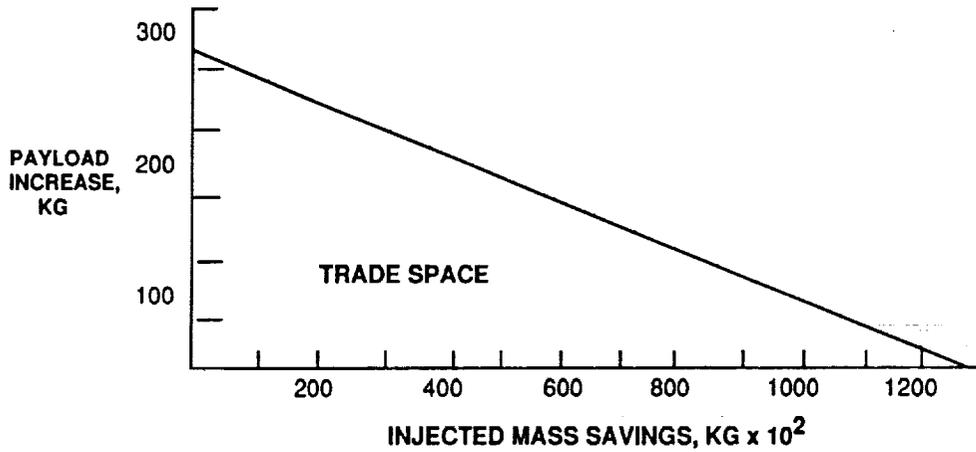
(1) CRAF USED FOR QUANTIFICATION

*320 SCA
330 probable
JRW*

TECHNOLOGY IMPACTS

PLANETARY DUAL-MODE PROPULSION

PAYLOAD MASS VS INJECTION MASS TRADE

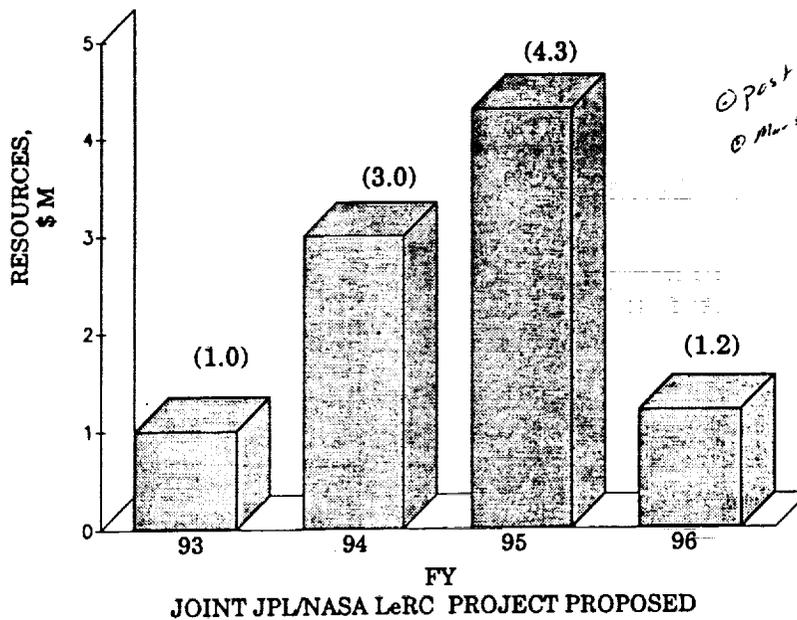


(-13000 kg wet mass)

DUAL MODE ENABLE SAVINGS UP TO:

- 283KG PAYLOAD
- 1285KG INJECTED MASS
- OR COMBINATION OF BOTH

FOCUSED TECHNOLOGY SPACECRAFT ON-BOARD PROPULSION PLANETARY DUAL-MODE PROPULSION "3X" PROJECT



TECHNOLOGY IMPACTS

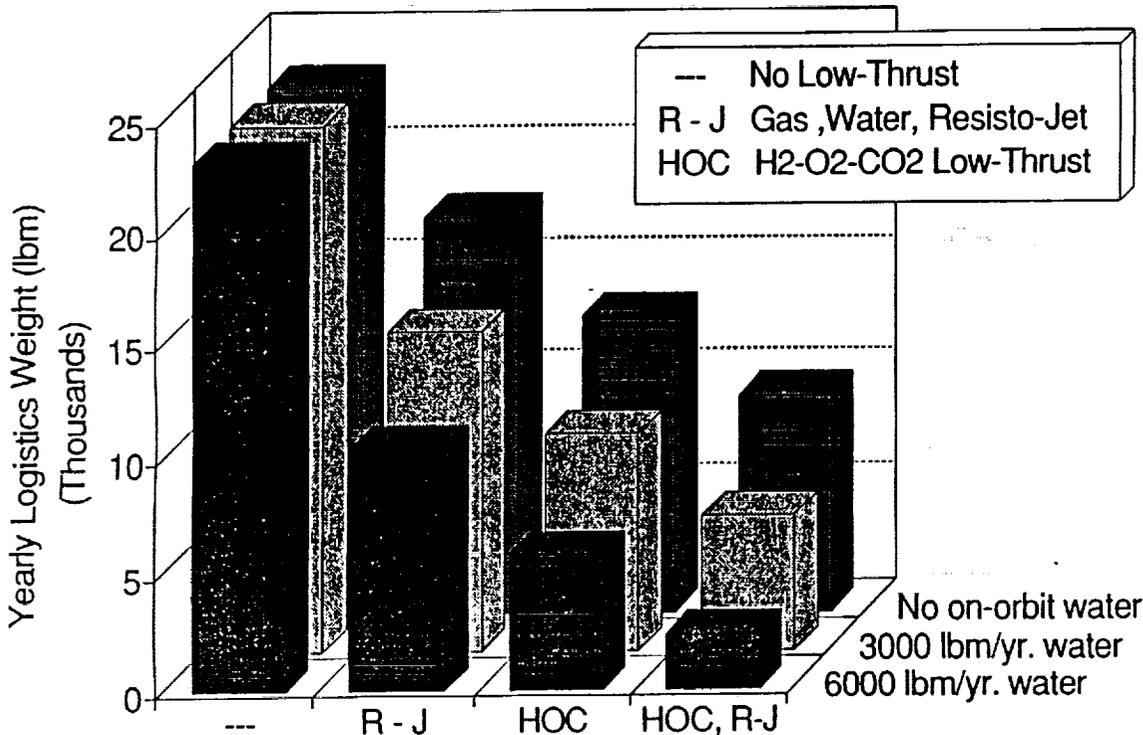
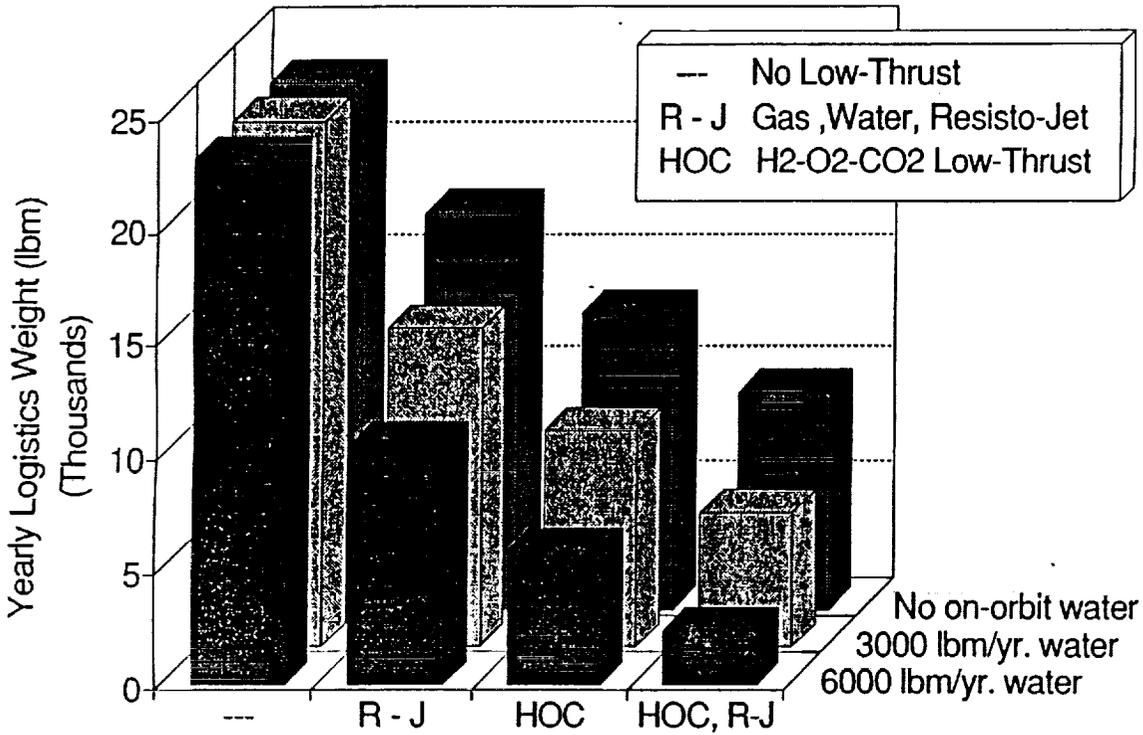
SPACE STATION PROPULSION

- **STUDIES OF RESTRUCTURED SPACE STATION CONDUCTED BY SSF PROGRAM PERSONNEL**

TECHNOLOGY IMPACTS

SPACE STATION PROPULSION

- **STUDIES OF RESTRUCTURED SPACE STATION CONDUCTED BY SSF PROGRAM PERSONNEL**



	Current Baseline	Potential Baseline
Propulsion Element Upmass	1 flight per year	1 flight per 5 years
Ground Processing (Man-Hours)	\$200 K/Year	\$200 K/ 5 Years
Dedicated SSF Hazardous Processing Facility	\$50 Million	N/A

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SPACECRAFT ON-BOARD PROPULSION

- **FOCUSED PROGRAMS**
 - **PLANETARY DUAL-MODE "3X"**
 - **ADVANCED SPACE STATION PROPULSION "STRATEGIC"**
- **MAJOR BENEFITS IDENTIFIED BY USERS:**
 - **280KG PAYLOAD FOR MMII CRAF CLASS MISSION**
 - **ELIMINATE ~ ORBITER/YEAR & N₂H₄ COF**

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