

OAST

FLIGHT PROJECTS DIVISION

FLIGHT PROJECTS OVERVIEW

BY

JACK LEVINE

DIRECTOR,

OAST FLIGHT PROJECTS DIVISION

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SPACE R&T STRATEGY

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**REVITALIZE TECHNOLOGY FOR LOW EARTH ORBIT
APPLICATIONS**

**DEVELOP TECHNOLOGY FOR EXPLORATION OF THE
SOLAR SYSTEM**

MAINTAIN FUNDAMENTAL R&T BASE

BROADEN PARTICIPATION OF UNIVERSITIES

**EXTEND TECHNOLOGY DEVELOPMENT TO IN-SPACE
EXPERIMENTATION**

FACILITATE TECHNOLOGY TRANSFER TO USERS

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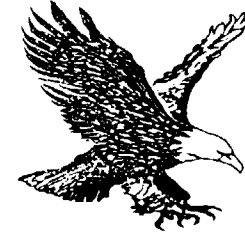
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FUNCTIONS

- COLLABORATE WITH OAST DISCIPLINE DIVISIONS IN ANALYSES, FEASIBILITY STUDIES, EVALUATIONS, & SELECTION OF POTENTIAL FLIGHT RESEARCH & TECHNOLOGY PROJECTS
- IMPLEMENT & DIRECT CONCEPT DEFINITION STUDIES
- DIRECT APPROVED FLIGHT PROJECTS
 - EXPERIMENT DESIGN & DEVELOPMENT
 - INTEGRATION OF EXPERIMENTS WITH FLIGHT TEST VEHICLE SYSTEMS
 - FLIGHT OPERATIONS
 - DATA RETRIEVAL, ANALYSIS, DISSEMINATION

CURRENT SPACE FLIGHT EXPERIMENTS



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FLIGHT EXPERIMENTS

HQ

LEAD CENTER

LONG DURATION EXPOSURE FACILITY	JOHN LORIA	—	LANGLEY
ORBITER EXPERIMENTS	RICHARD GUALDONI	—	JOHNSON
LIDAR IN-SPACE TECHNOLOGY EXPERIMENT	RICHARD GUALDONI	—	LANGLEY
ION AUXILIARY PROPULSION SYSTEM	JOHN LORIA	—	LEWIS
ARCJET FLIGHT EXPERIMENT	JOHN LORIA	—	LEWIS
TELEROBOT INTELLIGENT INTERFACE FLIGHT EXPERIMENT	CLOTAIRE WOOD	—	JPL
CRYOGENIC FLUID MANAGEMENT FLIGHT EXPERIMENT	JOHN LORIA	—	LEWIS
OUT-REACH (INDUSTRY/UNIVERSITY TECHNOLOGY EXPERIMENTS)	JON PYLE		
IN-REACH (NASA TECHNOLOGY EXPERIMENTS)	JON PYLE		
AEROASSIST FLIGHT EXPERIMENT	JOHN SMITH	—	MARSHALL

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LDEF

LONG DURATION EXPOSURE FACILITY



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OBJECTIVES:

- DETERMINE LONG-TERM SPACE EXPOSURE EFFECTS ON MATERIALS, COATINGS, & OPTICS
- MEASURE SPACE ENVIRONMENTAL PHENOMENA OVER EXTENDED TIME

STATUS:

- 34 EXPERIMENTS ADVERSELY AFFECTED BY LDEF RECOVERY DELAY
- 23 EXPERIMENTS EITHER IMPROVED OR NOT AFFECTED
 - COMPOSITE MATERIALS
 - PHASED ARRAY ANTENNA MATERIALS
 - HOLOGRAPHIC DATA STORAGE CRYSTALS
 - SOLAR ARRAY MATERIALS
 - GLASS MATERIALS
- LDEF STRUCTURE AVAILABLE FOR STUDY OF ENVIRONMENTAL EROSION & DEBRIS IMPACT
- SCHEDULED FOR RETRIEVAL - NOVEMBER 1989

LEAD CENTER CONTACT:

- ROBERT L. JAMES, JR.
LANGLEY RESEARCH CENTER
PHONE NO. (804) 865-4987

OEX

OBITER EXPERIMENT PROGRAM



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OBJECTIVES:

- OBTAIN BASIC AEROTHERMODYNAMIC & ENTRY ENVIRONMENT DATA FROM R&D INSTRUMENTATION INSTALLED IN SPACE SHUTTLE ORBITER
- FLIGHT-VALIDATE GROUND TEST RESULTS TO IMPROVE BASIS FOR DESIGN OF ADVANCED SPACECRAFT

STATUS:

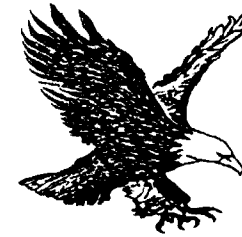
- DATA COLLECTION ON-GOING SINCE 1985 - WILL CONTINUE INTO 1990'S
- SOME EXPERIMENTS STILL TO BE DESIGNED & DEVELOPED

LEAD CENTER CONTACT:

- ROBERT SPANN
JOHNSON SPACE CENTER
PHONE # (713) 483-3022

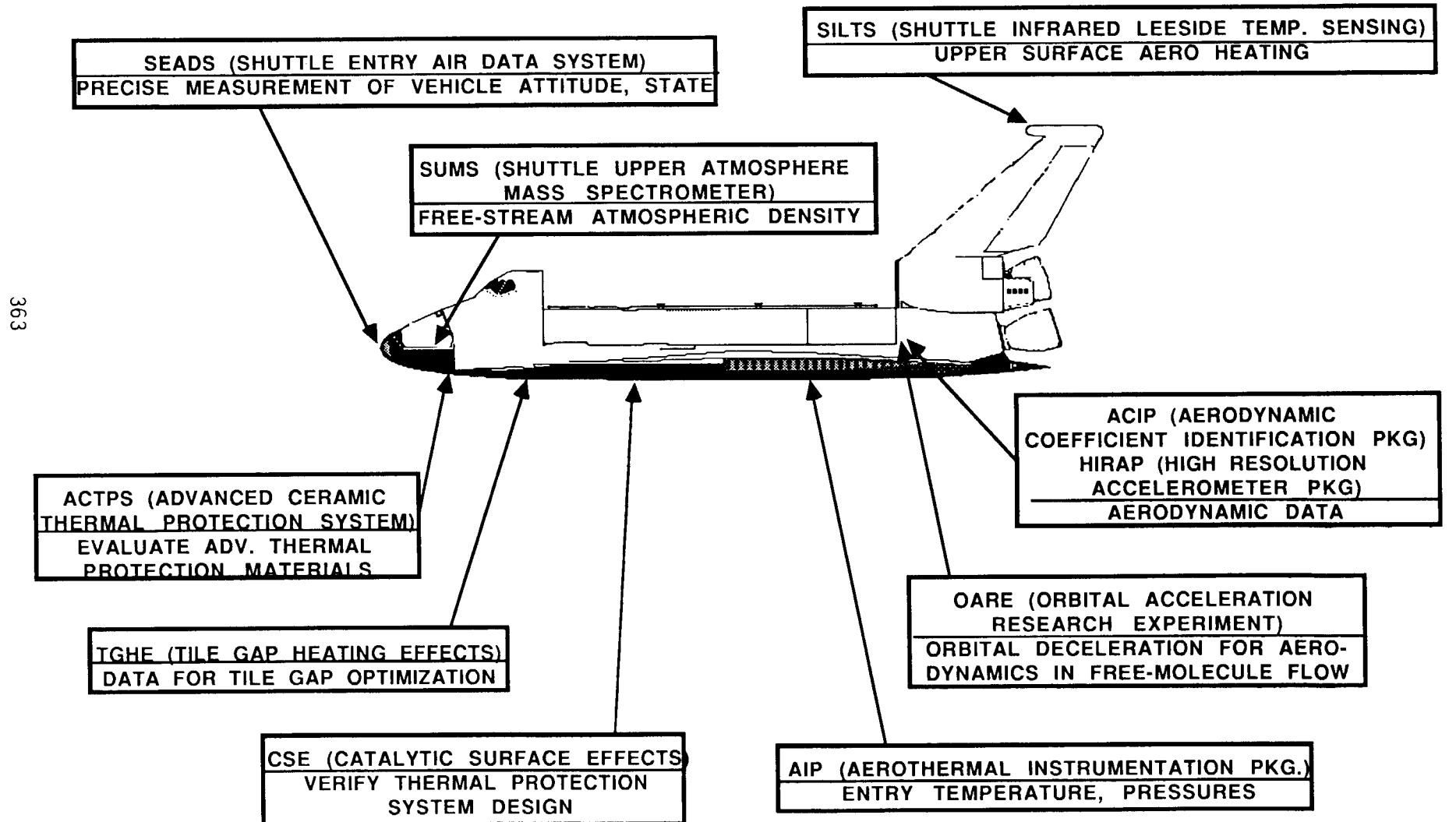
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OBITER EXPERIMENT PROGRAM



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LITE LIDAR IN-SPACE TECHNOLOGY EXP.



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OBJECTIVE:

- EVALUATE CRITICAL ATMOSPHERIC PARAMETERS & VALIDATE OPERATION OF A SOLID-STATE LIDAR SYSTEM FROM A SPACEBORNE PLATFORM, MEASURING:
 - CLOUD DECK ALTITUDES
 - PLANETARY BOUNDARY-LAYER HEIGHTS
 - STRATOSPHERIC & TROPOSPHERIC AEROSOLS
 - ATMOSPHERIC TEMPERATURE & DENSITY (10KM TO 40KM)

STATUS:

- LASER TRANSMITTER MODULE, CASSEGRAIN TELESCOPE, & ENVIRONMENTAL MONITORING SYSTEM IN DEVELOPMENT
- FLIGHT MANIFESTED FOR 1993

LEAD CENTER CONTACT:

- RICHARD R. NELMS
LANGLEY RESEARCH CENTER
PHONE NO. (804) 865-4947

IAPS

ION AUXILIARY PROPULSION SYSTEM



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OBJECTIVES:

- EVALUATE & VALIDATE ION AUXILIARY PROPULSION SYSTEM ON A FUNCTIONAL SPACECRAFT
 - MERCURY PROPELLANT
 - 0.2 KW, 1mLB THRUST, Isp 2700
- DEMONSTRATE LONG-LIFE CONTROL OF A SPACECRAFT

STATUS:

- ON MANIFEST FOR STS FLIGHT #37 (1990) ON TEAL RUBY SPACECRAFT
- SPACECRAFT INTEGRATION & TESTING COMPLETED

LEAD CENTER CONTACT:

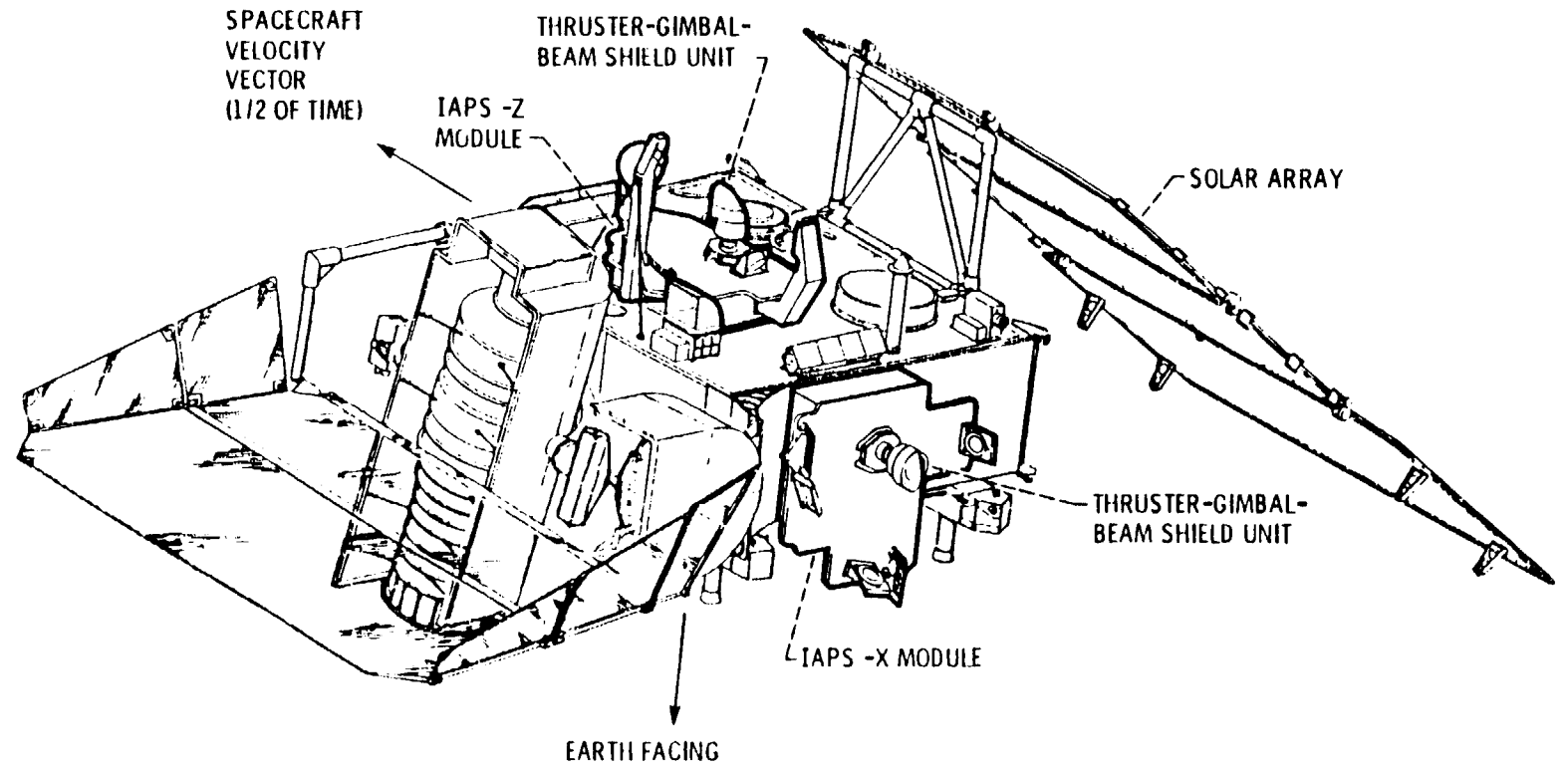
- LOU IGNACZAK
LEWIS RESEARCH CENTER
PHONE NO. (216) 433-2848

IAPS

ION AUXILIARY PROPULSION SYSTEM



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IAPS ON TEAL RUBY SATELLITE

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ARCJET FLIGHT EXPERIMENT



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OBJECTIVES:

- ASSESS ARCJET AUXILIARY PROPULSION SYSTEM OPERATION IN SPACE ENVIRONMENT
 - HY DRAZINE PROPELLANT
 - 1.4 KW, 50 mLB THRUST, Isp 450
- EVALUATE PLUME EFFECTS & THRUSTER/THERMAL INTERACTIONS ON A COMMERCIAL COMMUNICATIONS SATELLITE

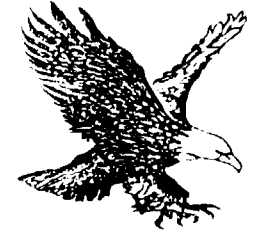
STATUS:

- PRELIMINARY DESIGN & ARCJET COMPONENT DEVELOPMENT COMPLETED
- FLIGHT HARDWARE DESIGN, DEVELOPMENT & TESTING SCHEDULED TO START IN 1989
- FLIGHT TEST TENTATIVELY PLANNED FOR 1991

LEAD CENTER CONTACT:

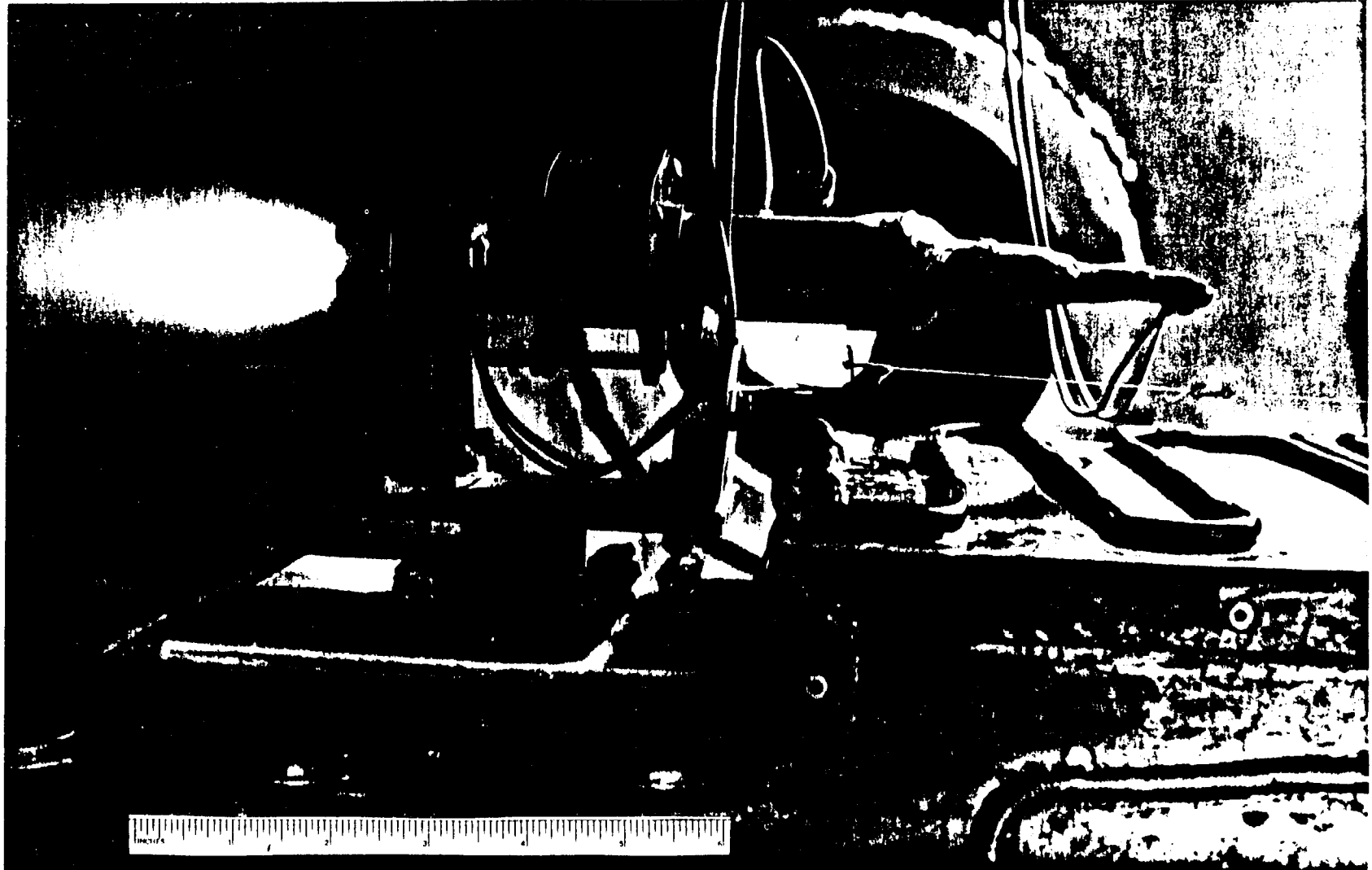
- JERRI S. LING
LEWIS RESEARCH CENTER
PHONE NO. (216) 433-2841

ARCJET FLIGHT EXPERIMENT



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TRIIFEX

TELEROBOTIC INTELLIGENT INTERFACE

FLIGHT EXPERIMENT



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OBJECTIVES:

- EVALUATE & VALIDATE TELEOPERATION OF A ROBOTIC MANIPULATOR UNDER CONDITIONS OF MICRO-G & COMMUNICATION TIME DELAYS
- VALIDATE ADVANCED SPACE TELEROBOT CONTROLS INCLUDING HIGH-FIDELITY HYBRID POSITION & FORCE CONTROL TECHNIQUES

STATUS:

- CONCEPTUAL DESIGN IN PROGRESS AT JPL
- DEVELOPMENT & INTEGRATION SCHEDULED TO START IN LATE 1988
- FLIGHT TEST PLANNED IN COMBINATION WITH GERMAN ROTEX EXPERIMENT ON SPACELAB D-2 MISSION (1991)

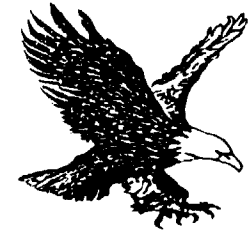
LEAD CENTER CONTACT:

- DANIEL KERRISK
JET PROPULSION LABORATORY
PHONE NO. (818) 354-2566

TRIFEX

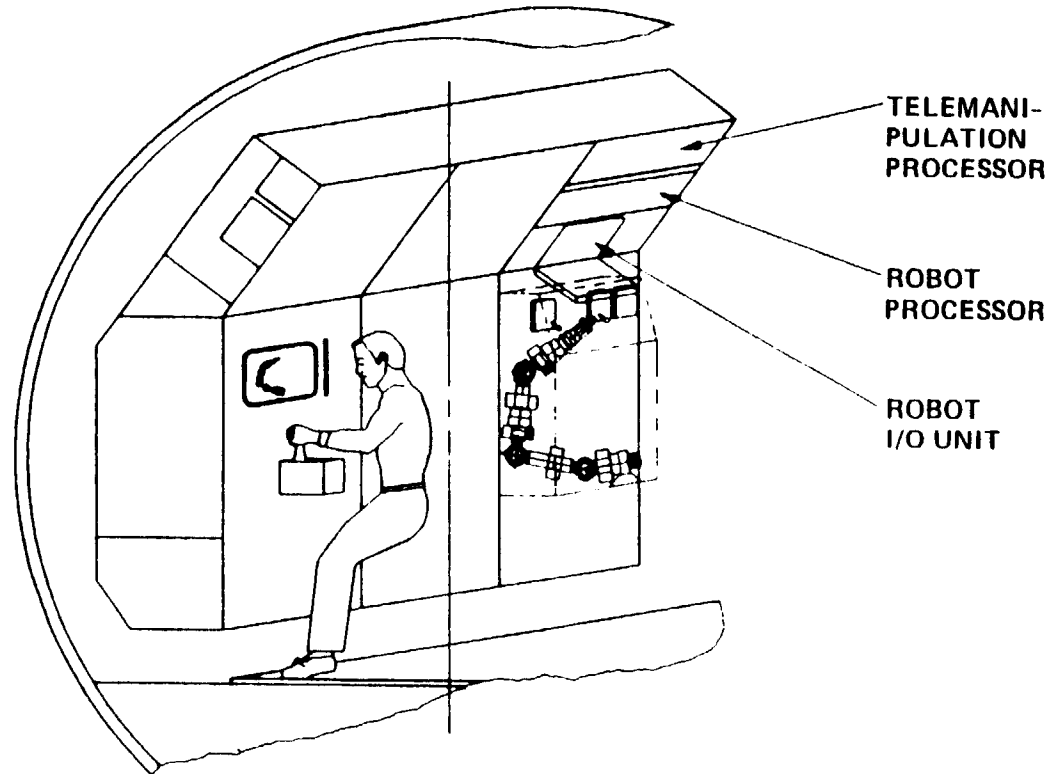
TELEROBOTIC INTELLIGENT INTERFACE

FLIGHT EXPERIMENT



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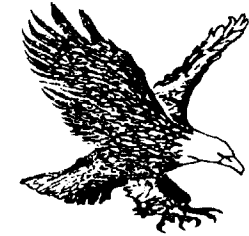


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MOCK-UP OF TRIIFEX HARDWARE ON SPACELAB D-2 MISSION

CFMFE

CRYOGENIC FLUID MGMT FLIGHT EXP.



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OBJECTIVES:

- DEVELOP TECHNOLOGY REQUIRED FOR EFFICIENT STORAGE, SUPPLY & TRANSFER OF SUBCRITICAL CRYOGENIC LIQUIDS IN LOW-GRAVITY SPACE ENVIRONMENT
- FLIGHT VALIDATE NUMERICAL MODELS OF THE PHYSICS INVOLVED

STATUS:

- CONTRACTOR FEASIBILITY STUDIES CURRENTLY UNDER WAY
- 1992 NEW START PROPOSED

LEAD CENTER CONTACT:

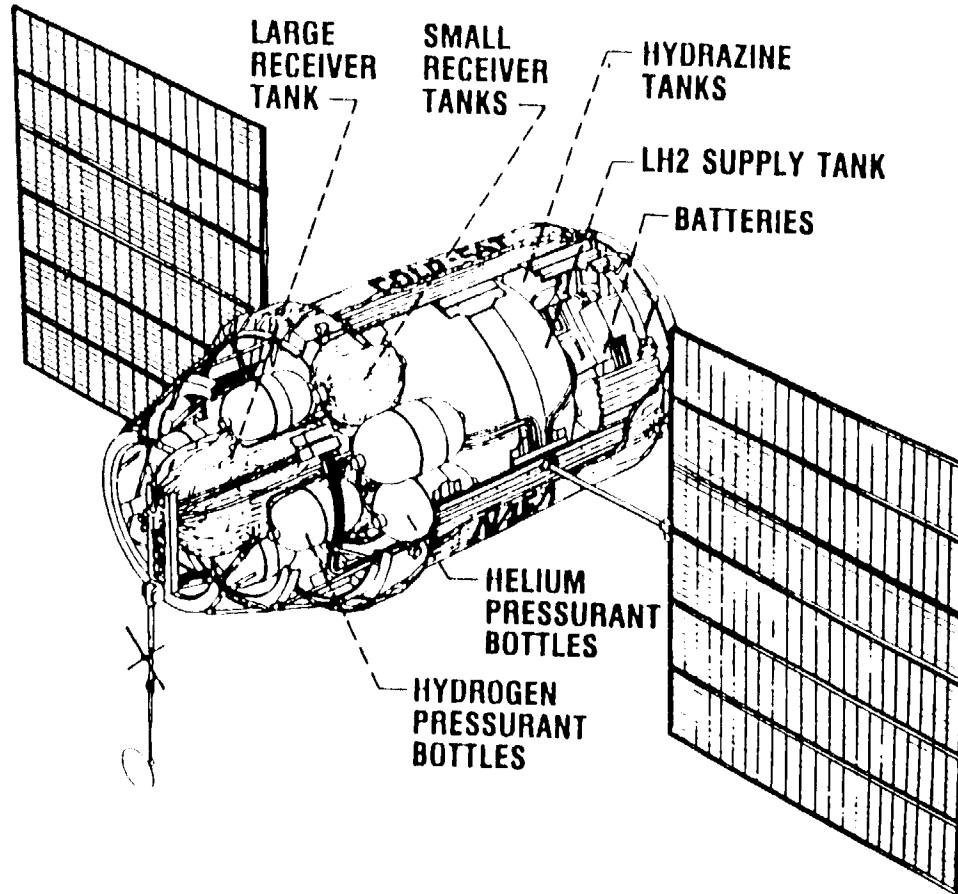
- E. PAT SYMONS
LEWIS RESEARCH CENTER
PHONE NO. (216) 433-2853

CFMFE

CRYOGENIC FLUID MGMT FLIGHT EXP.



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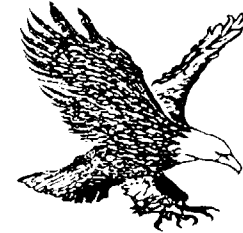


COLD-SAT SPACECRAFT

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INDUSTRY/UNIVERSITY IN-SPACE TECHNOLOGY EXPERIMENTS



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OUT-REACH PROGRAM

OBJECTIVES:

- PROVIDE FOR IN-SPACE FLIGHT RESEARCH
EVALUATION & VALIDATION OF ADVANCED
SPACE TECHNOLOGIES FOR THE INDUSTRY
& UNIVERSITY COMMUNITY

STATUS:

- 7 MAJOR THEME AREAS
- 41 FLIGHT EXPERIMENT PROPOSALS SELECTED

PROGRAM CONTACT:

JON PYLE
NASA HEADQUARTERS
PHONE NO. (202) 453-2831

NASA IN-SPACE TECHNOLOGY EXPERIMENTS



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IN-REACH PROGRAM

OBJECTIVES:

- EXPAND THE NASA IN-SPACE R&T PROGRAM BY THE PROMOTION OF SPACE FLIGHT EXPERIMENTS WITHIN THE NASA CENTERS
- FORMALIZE THE PROCESS FOR SELECTION OF CANDIDATE EXPERIMENTS IN THE SPACE STATION ERA

STATUS:

- 58 EXPERIMENT PROPOSALS SUBMITTED
- 7 FLIGHT EXPERIMENTS SELECTED FOR DEFINITION & DEVELOPMENT

PROGRAM CONTACT:

JON PYLE
NASA HEADQUARTERS
PHONE NO. (202) 453-2831

AFE

AEROASSIST FLIGHT EXPERIMENT



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OBJECTIVE:

- INVESTIGATE CRITICAL VEHICLE DESIGN & ENVIRONMENTAL TECHNOLOGIES APPLICABLE TO THE DESIGN OF AEROASSISTED SPACE TRANSFER VEHICLES

STATUS:

- PHASE B DEFINITION COMPLETE
- EXPERIMENT/INSTRUMENT COMPLEMENT ESTABLISHED
- PRELIMINARY DESIGN INITIATED

LEAD CENTER CONTACT:

- LEON B. ALLEN
MARSHALL SPACE FLIGHT CENTER
PHONE NO. (205) 544-1917

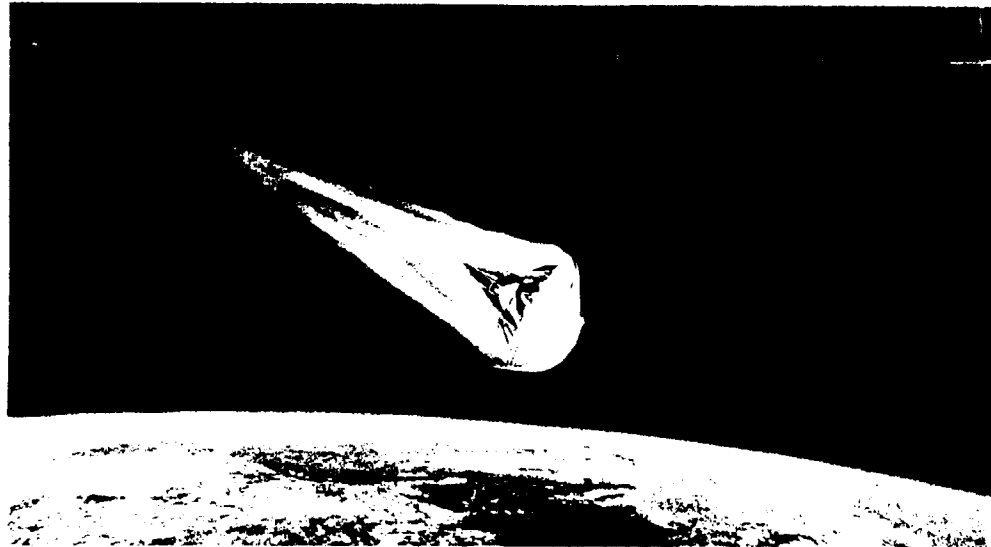
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AEROASSIST FLIGHT EXPERIMENT



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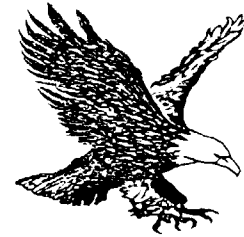
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SCIENCE & TECHNOLOGY OBJECTIVES:

- UNDERSTAND RADIATIVE HEATING WHERE THE SHOCK LAYER IN CHEMICAL NON-EQUILIBRIUM
- DETERMINE CATALYTIC EFFICIENCY WHERE NITROGEN IS MOSTLY DISASSOCIATED & SOME IONIZATION IS PRESENT IN THE SHOCK LAYER
- EVALUATE ADVANCED THERMAL PROTECTION SYSTEM MATERIALS
- VERIFY PREDICTIVE TECHNIQUES FOR THE BASE FLOW & WAKE REGION
- ASSESS CONTROL ISSUES RELATED TO ATMOSPHERIC VARIABLES WHICH AN ASTV MIGHT ENCOUNTER
- VERIFY COMPUTATIONAL CODES FOR PREDICTION OF ASTV HEATING ENVIRONMENT & AERODYNAMIC PERFORMANCE

SUMMARY



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- LONG & SUCCESSFUL HISTORY IN THE CONDUCT OF SPACE FLIGHT TECHNOLOGY EXPERIMENTS
- PROGRAM IS BEING EXPANDED TO EMPHASIZE THE DEVELOPMENT OF ADVANCED SPACE FLIGHT TECHNOLOGIES
- OAST PLANS TO PROVIDE ACCESS TO SPACE FOR THE AEROSPACE TECHNOLOGY COMMUNITY (NASA, DOD, INDUSTRY & UNIVERSITIES)

