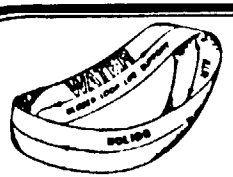

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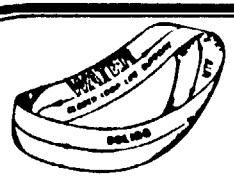
PHYSICAL/CHEMICAL CLOSED-LOOP LIFE SUPPORT

JAMES G. LAWLESS, PhD

CHIEF, ECOSYSTEM SCIENCE AND
TECHNOLOGY BRANCH

SEPTEMBER 13, 1988



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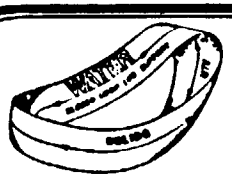
PROGRAM OBJECTIVES

- PROVIDE A PHYSICAL/CHEMICAL LIFE SUPPORT TECHNOLOGY BASE TO ENABLE FUTURE LONG DURATION HUMAN SPACE MISSIONS
- PROVIDE AGENCY FOCUS FOR A MULTI-CENTER PHYSICAL/CHEMICAL LIFE SUPPORT R AND T PROGRAM
- ESTABLISH A PHYSICAL/CHEMICAL LIFE SUPPORT R AND T DEVELOPMENT INFRASTRUCTURE AMONG NASA, INDUSTRY AND UNIVERSITIES

JUSTIFICATION

CLOSURE OF AIR & WATER LOOPS HAS THE POTENTIAL FOR AN ORDER OF MAGNITUDE REDUCTION IN THE MASS OF LIFE SUPPORT EXPENDABLES AND ASSOCIATED TRANSPORTATION REQUIREMENTS



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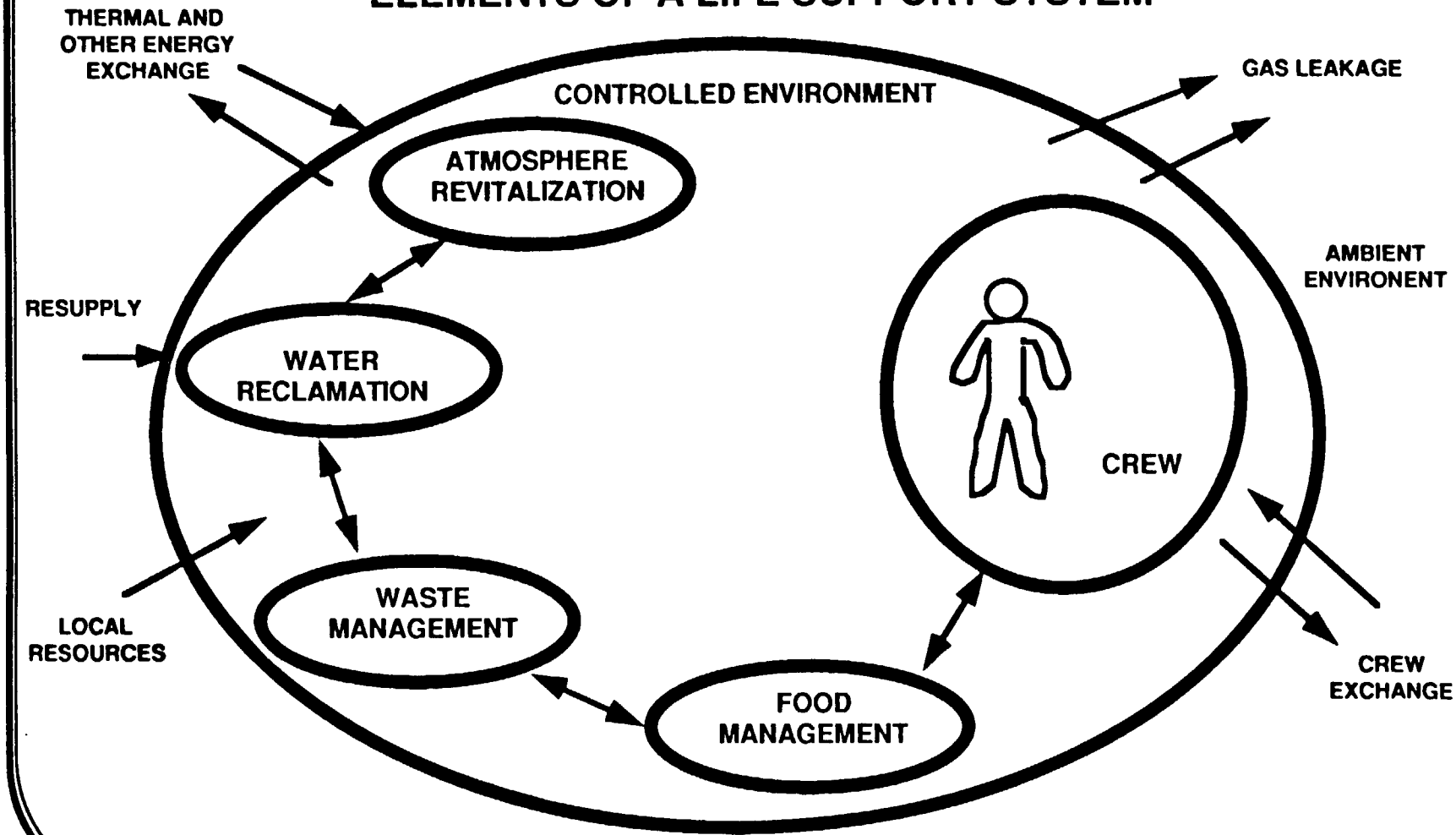
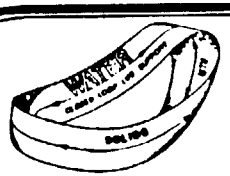
ELEMENTS OF A LIFE SUPPORT SYSTEM





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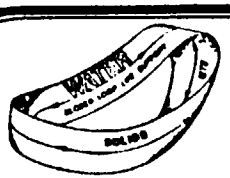
IMPLEMENTATION

- BASE R & T
- PATHFINDER



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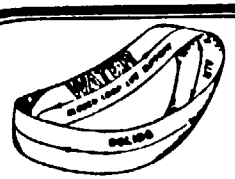
R & T BASE PROGRAM

- AIR, WATER, WASTE PROCESSING RESEARCH
- PROCESS SIMULATION TECHNIQUES
- MONITORING AND CONTROL INSTRUMENTATION FOR AIR, WATER QUALITY, AND CONTAMINATION



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PATHFINDER PROGRAM ELEMENTS

MODELING AND ANALYSIS

BIOREGENERATIVE SCIENCE AND TECHNOLOGY (OSSA)

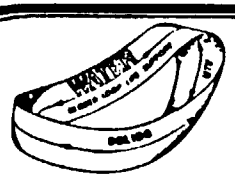
- WATER RECLAMATION SYSTEMS
- SOLID WASTE MANAGEMENT SYSTEMS
- AIR REVITALIZATION SYSTEMS
- THERMAL CONTROL SYSTEMS
- FOOD MANAGEMENT SYSTEMS

PHYSICAL/CHEMICAL PROCESSING TECHNOLOGIES

PORTABLE LIFE SUPPORT TECHNOLOGY

INTEGRATED SYSTEMS

MISSION SCENARIOS



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MAJOR THRUSTS

WATER RECLAMATION

- Processing technology
- Contaminant control
- Subsystem analytical modeling & validation

WASTE MANAGEMENT

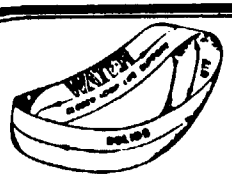
- Composition and definition
- Handling & processing
- Subsystem analytical modeling & validation

AIR REVITALIZATION

- CO_2 removal
- Oxygen generation
- Trace contaminant control
- Subsystem analytical modeling & validation

INTEGRATED SYSTEMS

- System requirements
- Systems analysis & assessment
- System test & validation



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Pathfinder P/C Closed Loop Life Support Technology Development

Simulation Modeling

Focused Research & Modeling

Prototype Systems Development

Phase A/B Project Commitment

Phase C/D Project Development

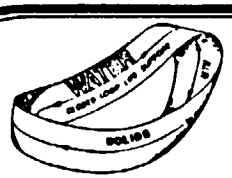
OPERATIONS

RESEARCH CENTERS - PRIMARY

DEVELOPMENT CENTERS - SUPPORT

DEVELOPMENT CENTERS - PRIMARY

RESEARCH CENTERS - SUPPORT



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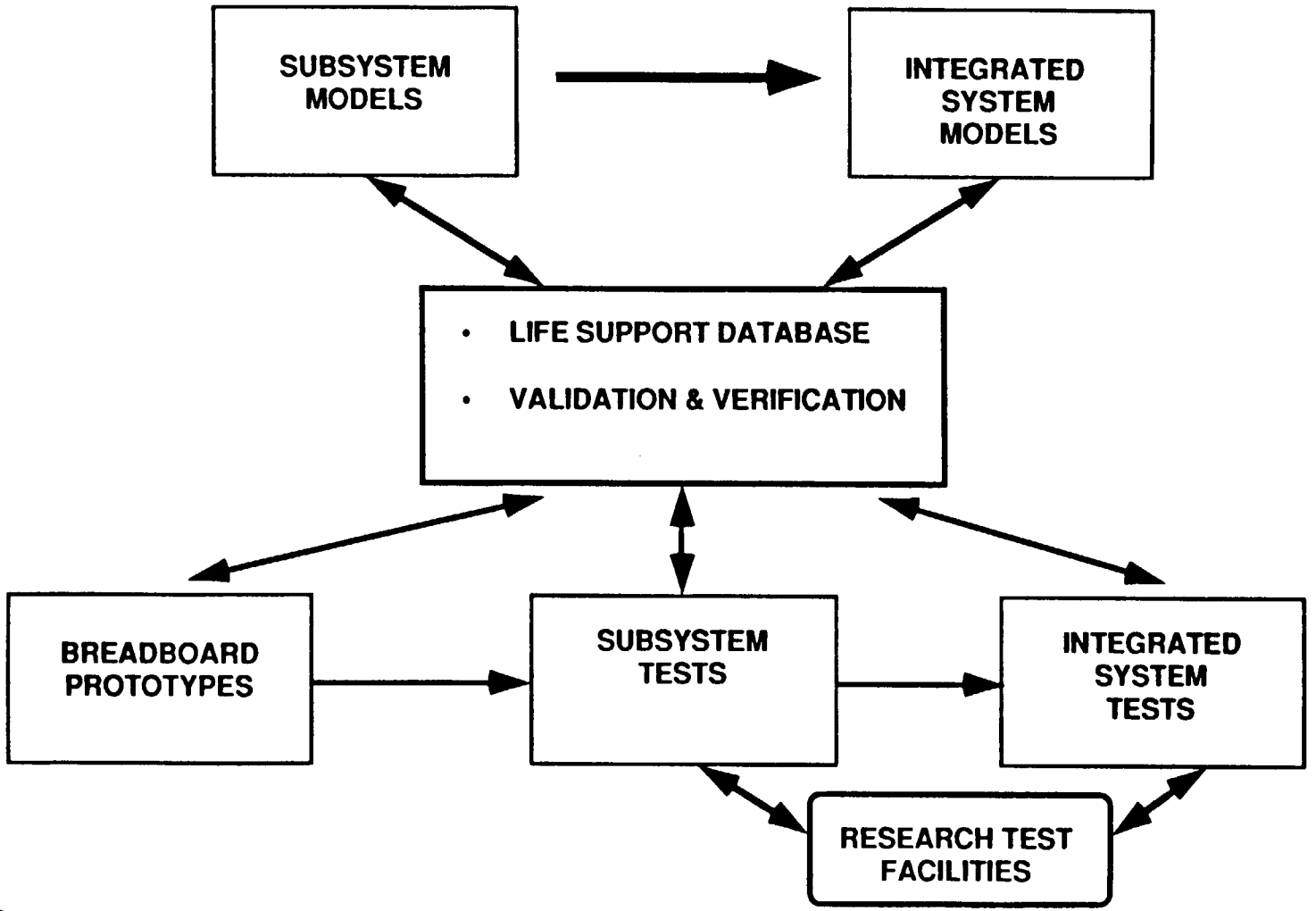
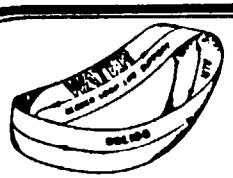
TECHNICAL APPROACH





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P/C CLOSED LOOP LIFE SUPPORT PROGRAM

OAST - RP
PROGRAM MANAGER

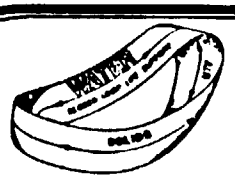
P. EVANICH

PORTABLE LIFE SUPPORT
(EVA SUIT)

LEAD CENTER FOR
PROJECT MANAGEMENT
AMES RESEARCH CENTER

W. Berry

AMES RESEARCH CENTER	MARSHALL SPACE FLIGHT CENTER	JOHNSON SPACE CENTER	JET PROPULSION LAB	LANGLEY RESEARCH CENTER
J. Lawless	R. Humphries	A. Behrend	P. Seshan	J. Hall



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PATHFINDER P/C CLOSED LOOP LIFE SUPPORT

MAJOR DELIVERABLES

	89	90	91	92
WATER RECLAMATION	Assessment		Validated Process	Technologies
WASTE MANAGEMENT	Subsystem Selection			Model Development Analysis
AIR REVITALIZATION		Subsystem Selection		Initiate Integrat. Analysis
INTEGRATED SYSTEMS	System Requirements			Subsystem Prototype Design Packages