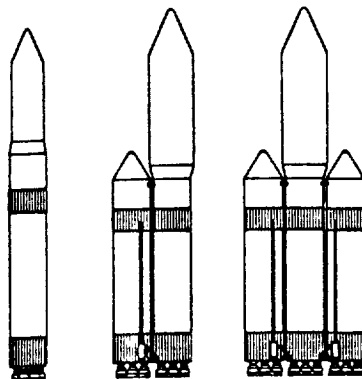


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N91-28208

ADVANCED LAUNCH SYSTEM



**SPACE TRANSPORTATION PROPULSION
TECHNOLOGY SYMPOSIUM
PENNSYLVANIA STATE UNIVERSITY**

**JAN C. MONK
GEORGE C. MARSHALL SPACE FLIGHT CENTER**

June 27, 1990

ADVANCED LAUNCH SYSTEM

U.S. SPACE TRANSPORTATION

COST

**\$3,600 per POUND (AND UP)
OVER \$4B/YR**

RELIABILITY

**OVER 5% FAILURES
DOWNTIMES: UP TO 30+ MONTHS
FAILURE COSTS ABOUT HALF LAUNCH COSTS**

CAPABILITY

**SINGLE THREAD FOR CRITICAL PAYLOADS
LITTLE OR NO MARGINS
CONSTRAINTS INCREASE PAYLOAD COST
BLOCKS FUTURE EXPANSION**

ADVANCED LAUNCH SYSTEM

U.S. SPACE TRANSPORTATION (cont.)

INVESTMENT REQUIRED

**INFRASTRUCTURE OLD/MANPOWER INTENSIVE
ELVs USE OLD DESIGNS/TECHNOLOGY**

INFRASTRUCTURE NEEDS TO BE CHANGED

**OPERABILITY AND PERFORMANCE INADEQUATE FOR
FUTURE NEEDS
P3I HAS GOOD INTENTIONS AND POTENTIAL PAYOFFS,
BUT THE INFRASTRUCTURE NEEDS TO BE CHANGED**

ADVANCED LAUNCH SYSTEM

"...BOOSTERS ARE REALLY TRUCKS...WE DON'T NEED A CADILLAC, MERCEDES, OR CORVETTE TO DELIVER OUR PACKAGES TO SPACE. WE NEED A VERY RELIABLE, MAINTAINABLE FLEET OF TRUCKS THAT CAN HAUL A VARIETY OF PACKAGES-QUICKLY AND CHEAPLY."

29 JULY 1988 E.A. ALDRIDGE, SEC AF

ADVANCED LAUNCH SYSTEM

WHAT IS ALS?

- **A NEW WAY OF DOING BUSINESS**
- **A SYSTEM CONCEPT FOCUSED ON HIGH OPERABILITY AND LOW COST**
- **DEVELOPMENT, INTEGRATION AND TRANSFER OF NEW TECHNOLOGIES**
- **EFFECTIVE DEVELOPMENT AND USE OF INFORMATION SYSTEMS MANAGEMENT**
- **SUCCESSFUL APPLICATION OF TOTAL QUALITY MANAGEMENT (TQM)**

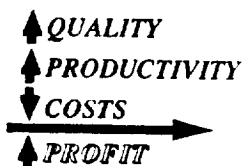
ADVANCED LAUNCH SYSTEM

Total Quality Management: THE OFFICIAL DOD DEFINITION

"Total Quality Management in the DOD is Strategy for continuously improving performance at every level, and in all areas of responsibility. It combines fundamental management techniques, existing improvement efforts, and specialized technical tools under a disciplined structure focused on continuously improving all processes. Improved performance is directed at satisfying such broad goals as cost, quality, schedule, and mission need and suitability.

Increasing user satisfaction is the overriding objective." DOD 5000.51-G (DRAFT)

SIMPLY, TQM IS A MOVEMENT TO CURE THE TRADITIONAL MANAGEMENT PARADOX:



1. Improve quality
2. Costs decrease because of less rework, fewer mistakes, fewer delays, snags; better use of machine time and material
3. Productivity improves
4. Capture the market with better quality and lower price
5. Stay in business
6. Provide jobs and more jobs

-Dr. W. Edwards Deming

ADVANCED LAUNCH SYSTEM

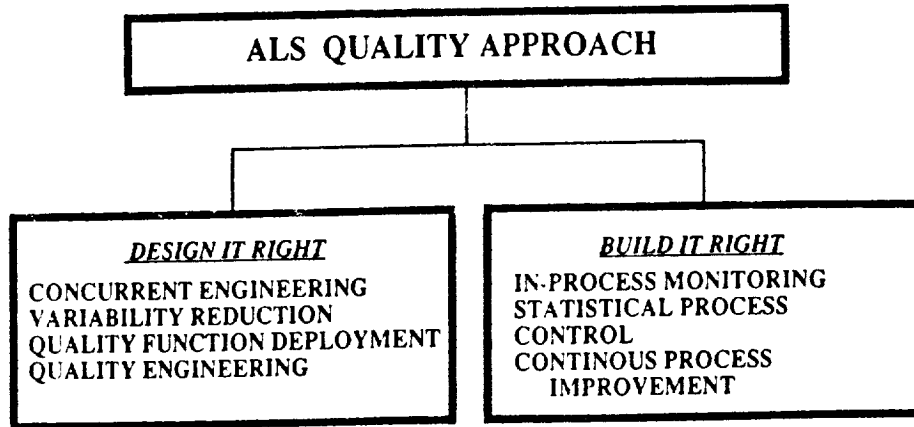
DEFINITION OF QUALITY

- MEETING LAUNCH NEEDS AT THE LOWEST COST TO THE TAXPAYER
- ALS PROGRAM IS SYNONOMOUS WITH THE TQM GOALS
 - RELIABILITY
 - LOW COST
 - ROBUST

**IF TQM DIDN'T EXIST -- WE'D INVENT IT
TQM IS ESSENTIAL TO THE SUCCESS
OF ALS**

ADVANCED LAUNCH SYSTEM

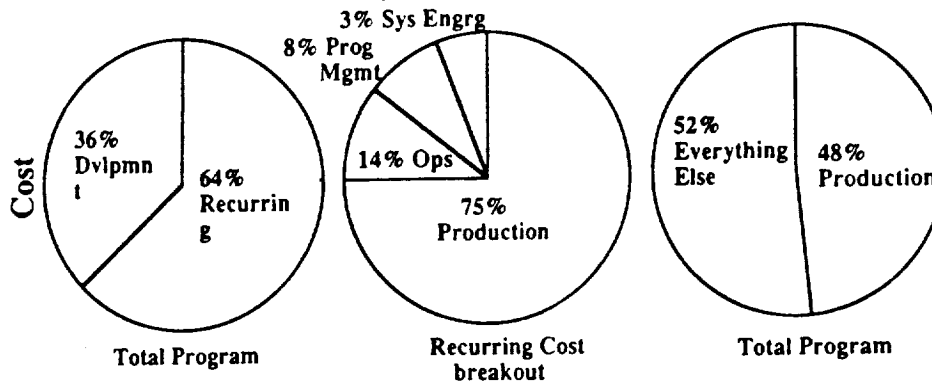
THE GOAL IS TO DEVELOP A ROBUST DESIGN



ADVANCED LAUNCH SYSTEM

ALS Goals are Improved Reliability and Reduced Cost

Process Knowledge is a key to both areas.



Reliability

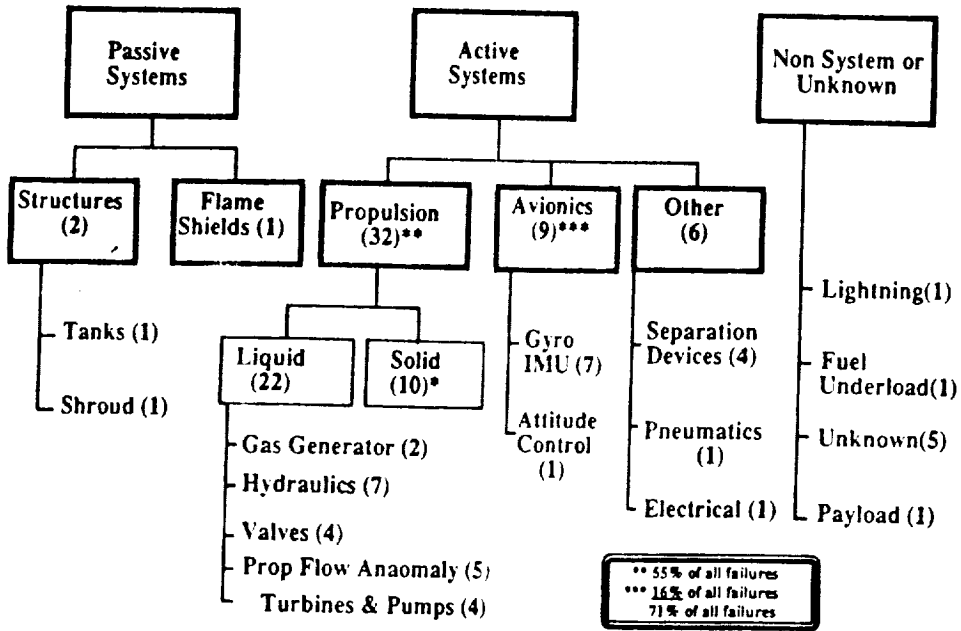


The system is only as reliable as its weakest link.

ADVANCED LAUNCH SYSTEM

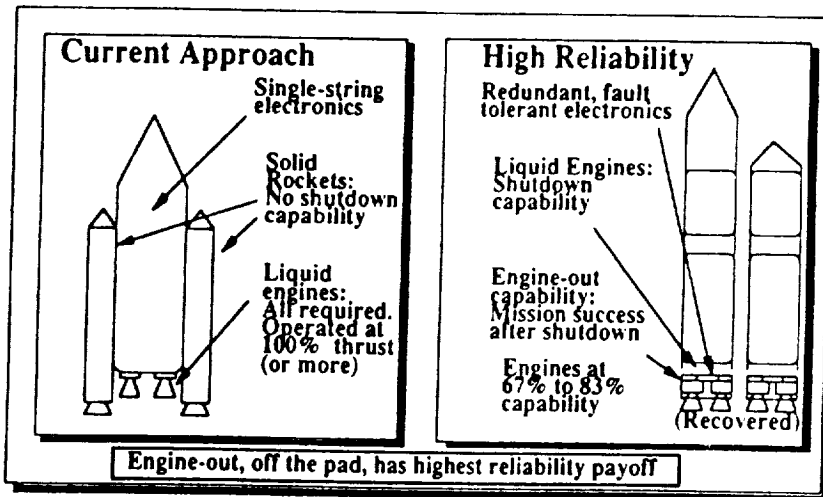
SUB SYSTEM SOURCES OF FAILURE

1966-1987



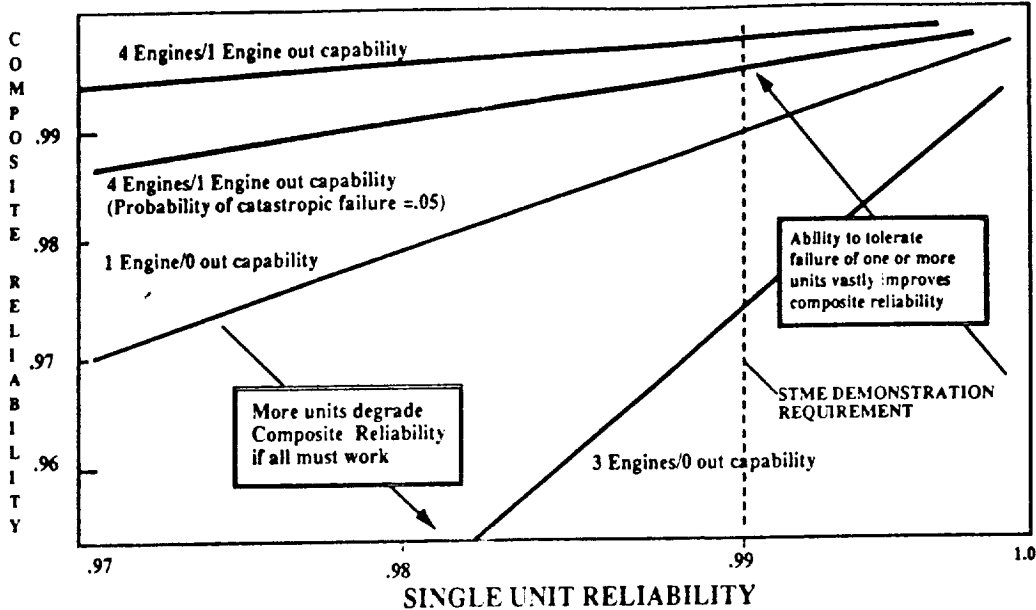
ADVANCED LAUNCH SYSTEM

DESIGN FOR RELIABILITY



ADVANCED LAUNCH SYSTEM

Vehicle Engine Out Capability Provides A Significant Improvement In System Reliability



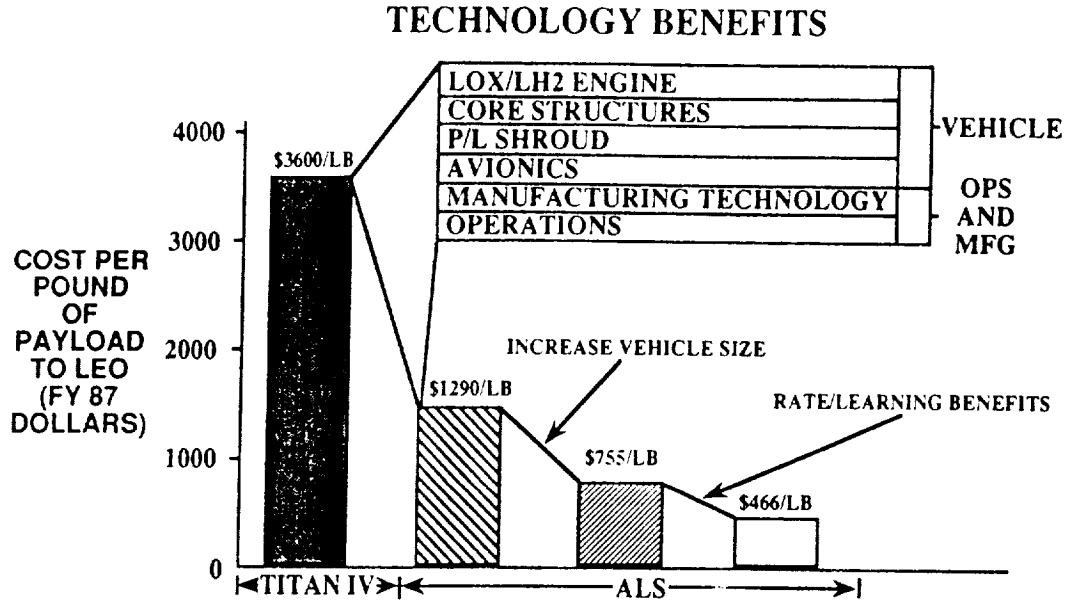
ADVANCED LAUNCH SYSTEM

FULL ENGINE-OUT CAPABILITY WITH HOLD DOWN FOR PRE-RELEASE ENGINE VERIFICATION SIGNIFICANTLY INCREASES FLIGHT RELIABILITY

- VEHICLE ENGINE OUT CAPABILITY REDUCES THE ENGINE RELIABILITY REQUIREMENT TO AN ACHIEVABLE VALUE
- ADDITIONAL RELIABILITY CAN BE ACHIEVED BY IMPLEMENTATION OF HOLD-DOWN
 - HISTORY INDICATES THAT 35-50 PERCENT OF ENGINE FAILURES OCCUR DURING START

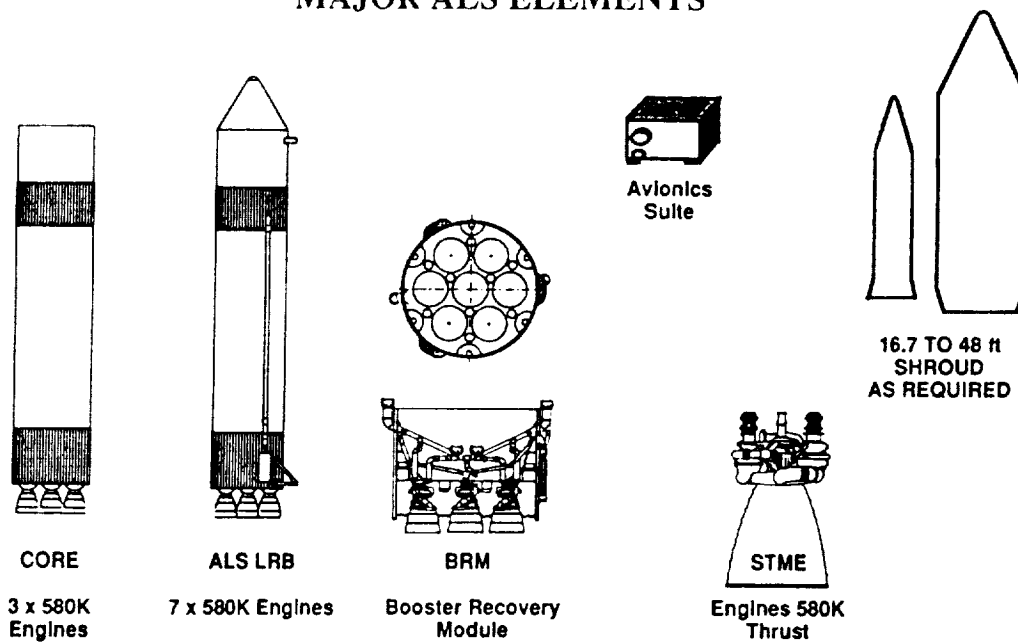
ADVANCED LAUNCH SYSTEM

PATH TO REDUCED OPERATIONS COSTS



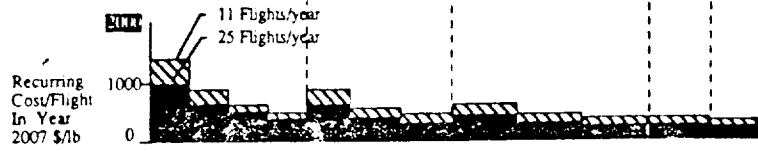
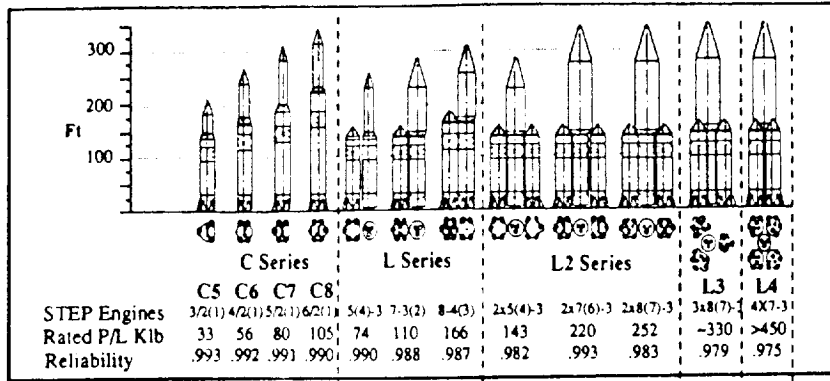
ADVANCED LAUNCH SYSTEM

MAJOR ALS ELEMENTS



ADVANCED LAUNCH SYSTEM

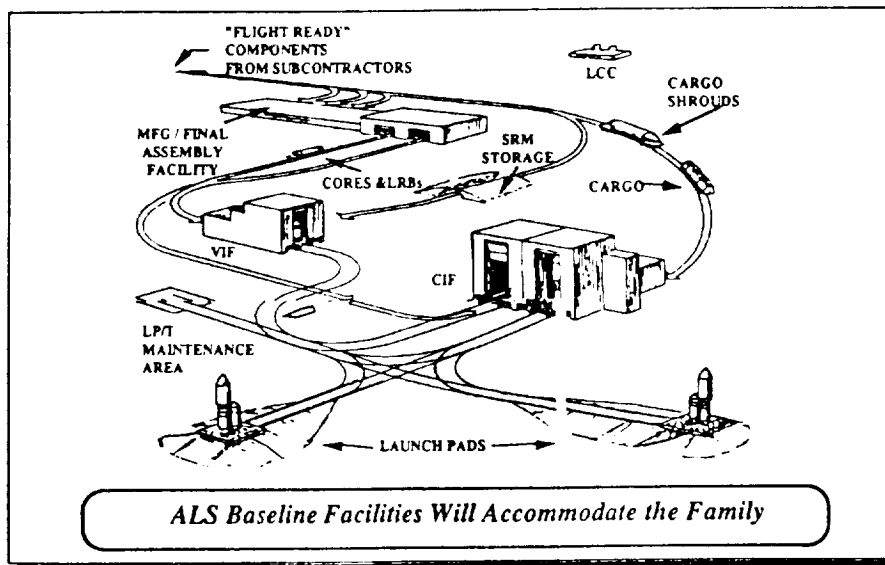
CANDIDATE ALS FAMILY MEMBERS



Select Only the Version Appropriate to Mission Needs

ADVANCED LAUNCH SYSTEM

KEY ALS FACILITIES



ALS Baseline Facilities Will Accommodate the Family

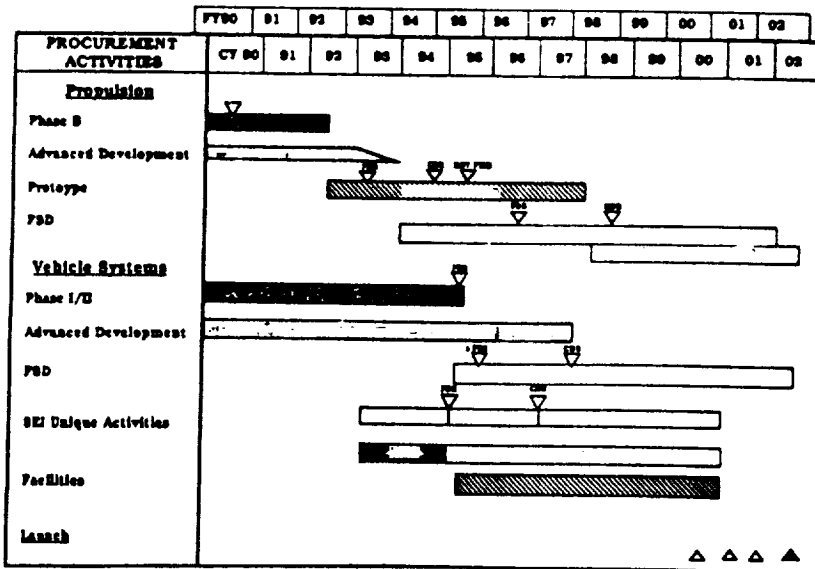
ADVANCED LAUNCH SYSTEM

BALANCED ALS PROGRAM

- **NEW PROPULSION SYSTEM (LONG LEAD)**
 - **BUILT WITH RELIABILITY, PERFORMANCE MARGIN, AND MAINTAINABILITY DESIGNED INTO THE SYSTEM**
 - **CONTINUE FIRST NEW INVESTMENT IN PROPULSION TECHNOLOGY IN MORE THAN A DECADE (AF AND NASA)**
- **NON-PROPULSION TECHNOLOGIES**
 - **SUPPORT FUTURE LAUNCH VEHICLE**
 - **SUPPORT FUTURE LAUNCH VEHICLE**
 - **COST / OPERABILITY**
 - **IMPROVE EXISTING LAUNCH VEHICLES**
 - **COST / OPERABILITY**
 - **PERFORMANCE**

ADVANCED LAUNCH SYSTEM

ADVANCED LAUNCH DEVELOPMENT PROGRAM SCHEDULE (2000 ILC)



ADVANCED LAUNCH SYSTEM

ALS CAN SATISFY THE NATION'S LAUNCH REQUIREMENTS BY PROVIDING A LOW COST, RELIABLE, ROBUST LAUNCH SYSTEM

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29 JULY 1988 E.A. ALDRIDGE, SEC AF

PRESENTATION 1.3.5

AIR FORCE SPACE SYSTEMS PROPULSION

