SENIOR INTERAGENCY GROUP (SPACE)
SPACE LAUNCH POLICY WORKING GROUP

ISSUE PAPER
ON
FY84 BUDGET ISSUES

ISSUE: Should Orbiter production capability, in the form of the initiation of a fifth Orbiter, be supported in the FY84 budget?

BACKGROUND:

By 1969, NASA had adopted a program plan to develop a manned Space Transportation System (STS) based largely on reuseable components; this system was conceived to provide cost-effective, routine, manned access to space. Economics and politics, as well as technology, were all critical factors in the decision process that led to President Nixon's approval of the STS development in 1972.

As a part of this decision, all Expendable Launch Vehicles (ELV's), with the exceptions of the Scout and Saturn V vehicles, were to be phased out. The cost effectiveness of the STS was predicated on maximum utilization of the Shuttle over its operational life.

The question of the number of Orbiters required for an effective STS fleet was the subject of intense scrutiny by NASA, Congress, and various Administrations for most of the 1970's. Original planning envisioned a five Orbiter fleet. The estimates of STS demand and the numbers of Orbiters to fulfill a given demand have fluctuated continuously throughout the program. These fluctuations have lead to a series of reviews of the question of fleet size.

In preparation for the FY 1977 budget, the Office of Management and Budget (OMB) undertook a review of the STS mission model and studied how many Orbiters beyond the first two were needed. To support the OMB review, NASA and the DOD jointly reviewed the requirements for Orbiters and issued a position statement that five Orbiters were essential to meet National requirements. Following the OMB review, the Administration did decide that five Orbiters were essential to the Space Transportation System.

In 1977, under the Carter Administration, the question of the number of Orbiters was studied again by OMB. The resulting Administration's position was that only funding for a four-Orbiter fleet would be requested by NASA. During subsequent consideration of the fifth Orbiter question in 1978, the Congress decided that (1) a five Orbiter fleet was an option which should be kept open, and that (2) interrupting production of Orbiters between the fourth and fifth Orbiter would have cost penalties. In February 1980, NASA testified before Congress that, due to slips in all parts of the STS program, a delay in fifth Orbiter funding until FY 1982 would probably not cause substantial penalties. As a result of fifth Orbiter funding deletion from subsequent NASA budgets, the production start has become an FY 1984 budget issue.

The STS was conceived, developed and supported to universally service the U.S. military and civil government needs, the U.S. and foreign commercial needs, as well as selected foreign government needs. The commercial and foreign government flights were a critical factor in the economic analysis that showed the STS was a cost effective alternative to our proven and established ELV capability.

This concept was based upon U.S. policy of providing launching services to commercial and foreign entities in keeping with:

The National Aeronautics and Space Act - which provides NASA the authority to provide such services,

The COMSAT Act which requires NASA to provide such services to COMSAT upon request, and

The President's Launch Assistance Policy of 1972 - which states that the U.S. would provide, on a non-discriminatory, cooperative or reimbursable basis, satellite launch assistance to other countries or international organizations.

The current policies, National Space Policy (NSDD-42) and Space Assistance and Cooperation Policy (USDD-50) reaffirm these previous policies. The National Space Policy directs that the STS will be the primary U.S. government launch system and that U.S. Government ELV's will be maintained until the capabilities of the STS are sufficient to meet its needs and obligations. Implementation of these policies through the use of existing U.S. Government launch capabilities to serve these customers has generated, to date, approximately $2.4 billion dollars in launch service revenues ($1.0 billion from overseas).

The fourth Orbiter is currently scheduled for December 1984 delivery. Unless a decision is made to continue Orbiter production in FY 84, the production facilities, personnel, subcontractors and vendors will be released.

DISCUSSION:

The sale of STS services to foreign and commercial customers was a critical factor in the economic analysis that concluded that the STS would be cheaper than ELV's for the U.S. Gvernment in the long run. If this principle is violated, the economic viability of the STS as the sole U.S. Government launch system is in question. Abandoning the reimbursable market would constitute an abrupt change in policy and would place the entire burden of STS operations on the U.S. Government. This change, or any commercialization options that result in increased operations cost to the U.S. Government should be avoided.

For this study, conservative STS capability projections were made and compared to the STS manifest over the period FY83-88 to evaluate the adequacy of a four orbiter fleet to meet that demand. Based on four test flights and one operational flight, the projections are subject to a great many uncertainties. Nevertheless, their analysis shows that a four Orbiter fleet only marginally satisfies the manifest. Should an orbiter be lost, a three orbiter fleet cannot satisfy the STS manifest. Many highly probable, but unquantifiable,

factors were considered, but not included, in this comparison. Consequently, operations under the optimistic conditions assumed for this study are highly unlikely; prolonged operations with four orbiters is considered to be high risk until more definitive estimates of capabilities and demand are available.

Permitting the orbiter production capability to lapse at this time introduces additional risk into the program. Accidents or anomalies that require substantial rework of an individual orbiter or all four initial orbiters will certainly be prolonged as venders, sub-contractors, tooling and facilities are reinitiated and requalified. The expense to reopen and requalify selected vendors, subcontractors, and facilities will certainly be large.

DECISION OPTIONS

The NASA FY 84 budget request includes the funding to produce and deliver a fifth Orbiter. The fifth Orbiter funding is an issue in the preparation of the President's FY 84 budget request. This request, in fact, represents decisions of NASA management that production of the fifth Orbiter is the most practical and supportable alternative from available options.

These options can be grouped into four general categories--close out Orbiter production, maintain Orbiter production capability, continuing full Orbiter production, or start a Block II Orbiter definition.

I. Close Out Orbiter Production - This option offers near term budget reductions on the order of $200-300M per year. However, a decision to abandon production capability should be a last resort when the Orbiter is projected to be the longest lead time item and the critical path to STS operations. With only four test flights and one operational flight as the experience base for projections of system turnaround time, availability, reliability, maintainability and attrition, a realistic assessment of flight operations through 90 flights (end of FY 87) is extremely subjective.

   This option also limits the capability to perform major Orbiter repairs/maintenance due to the startup and recertification of people and facilities before work or major structural components could be accomplished. This has potentially serious impacts on repairs or modifications to major assemblies such as wings, mid-bodies, crew module, or vertical stablizers.

   In addition, once a subsequent decision is made to produce additional Orbiters, the startup and recertification time is added to the production time. An Orbiter can currently be delivered in approximately 5 years. Conservatively 6 to 7 years would be required once the production base is abandoned. Startup and recertification costs would be added to the costs of identifying and establishing numerous vendors and sub-contractors.

IV. Initiation of a Block II Orbiter - Without a detailed study, this option is conservatively estimated to require 7 to 9 years from initiation to delivery. This option also does not, of itself, maintain orbiter production capability which would conceivably lapse during the definition and design phase. This option also requires a commitment based on extremely limited operational experience; the ability to accurately define the requirements and improvements of a BLock II design based on this data is questionable. Since little or no serious study has been accomplished on this option, the technical and financial risks are judged to be very high.

CONCLUSIONS:

National Space Policy directs maintaining U.S. world leadership in space transportation. Maintaining world leadership requires continued, rather than periodic, commitments. These commitments require fiscal backing to implement U.S. policies. Without budget commitments, such policy statements are meaningless.

The U.S. cannot abandon its highly successful ELV capability, transition totally to the STS as its only access to space, and abandon the production base for orbiters concurrently and seriously entertain intentions of remaining a world leader in space transportation.

With only five STS flights we do not have adequate data to make reasoned and confident decisions on orbiter fleet size. We need more experience to firmly assess such critical factors as turnaround time, system availability, maintenance, attrition, and demand.

Prudence and sound management demands maintaining all STS production capabilities until we have solid assessments of the critical factors above.

To prematurely constrain ourselves to a four Orbiter fleet in the face of these many uncertainties will only erode confidence in the STS as a viable, dependable approach to space transportation. Foreign nations' perception of the U.S. as an unreliable source of launch services will be reinforced; we must offer them a service that is available and reliable to meet their needs as they, not we, perceive them. Both U.S. and foreign commercial customers will also view the STS as a high risk approach to obtaining a firm launch date. The business community is primarily concerned with schedules; significant launch delays translate rapidly into large economic penalties.

Any perception of the U.S. turning away from its commitment to a fully exploitable STS as we have always stated, will accelerate the transition of foreign and commercial customers from STS planning to other options. The only other launch service options realistically available will be provided by the French, the Soviets, and, potentially, the Japanese.

Turning Western and third world countries as well as commercial customers away from the U.S. is counter to all U.S. policy and interests. The development of the STS was undertaken to meet the "demand" of the entire mission model, including the sale of STS services to commercial and foreign customers. This was a critical factor in

II. Maintain Orbiter Production Capability - Two major approaches are available under this option:

A. Sustain Sub-tier Production Capabilities/Subsystem Deliverables

This approach would maintain the qualified Orbiter vendors and sub-tier subcontractors and effectively sustain the capability to product critical components and subsystems. It would not maintain major subcontractors or prime production capability, i.e., major structural assemblies.

B. Sustain All Production Capability/Major Assembly Deliverables

This option would maintain the critical vendors, sub-tier and prime subcontractors, as well as the prime contractors' production capabilities. The product of this effort would be the delivery of major system assemblies as modular spares, i.e., wings, mid-bodies, crew module, etc. An additional advantage of this option is the continuity of the generic production base required to respond to major repairs or structural maintenance requirements. It would not produce an assembled Orbiter.

III. Continue Full Orbiter Production - Two approaches to this option are:

A. Produce a Fifth Orbiter

This option clearly maintains all orbiter production skills and facilities. In addition, this approach also provides the ability to utilize the major assemblies of the fifth Orbiter as modular spares if required; this production capability also provides the ability to respond to major repairs and structural maintenance requirements.

B. Initiate Another Block Buy of Orbiters

This option also maintains the full range of Orbiter production skills and facilities while offering the most robust program. In effect, this option provides for a "full pipeline" of components, subassemblies, as well as major assemblies. This ensures a flexible and responsive repair and maintenance capability. While the block buy concept offers the economic advantage of quantity production, the cost savings do not presently appear to be commensurate with the associated large financial commitments. Selection of this option at this time also requires a commitment to maximum STS capacity before accurate demand and capability assessments can be made.

the economic analysis that concluded that the STS would be cheaper to the U.S. Government than the existing expendable systems. If this principle is violated, then the economic viability of the STS as the sole U.S. Government launch system is in doubt. Abandoning, partially or fully, the commercial and foreign market would increase the STS operating burden of the U.S. Government. Any options that result in increased operations costs to the U.S. Government should be avoided.

The STS should be exploited as it was conceived and designed; the system should be aggressively optimized (i.e., make it fully operational and cost effective) and marketed to serve our best interests--be they economic, political, or national security. Only in this way can we offset the financial commitments already made. For the U.S. Government to turn only to its own needs at this time is directly counter to all U.S. interests and will increase the costs to the U.S. Government users.

While a decision at this time to allow the Orbiter production capability to lapse is considered inappropriate because of the many uncertainties precluding definitive analysis, a decision to proceed much beyond a fifth Orbiter commitment is inappropriate for the same reasons.

A balanced, low-risk option should be selected that preserves our basic capabilities, assures maximum insensitivity to errors in projecting system capabilities, as well as demand, and maintain our most flexible options for more careful consideration when firm data is available.

RECOMMENDATIONS:

Based on the conclusions of this study, we recommend continuing the Orbiter production base. FY84 funding should be supported for the production of the fifth Orbiter.

This will productively maintain the production capability and will deliver an orbiter in FY88, if before that time firm data leads to the conclusions that a four Orbiter fleet is adequate, the unassembled components could be used as modular spares (wings, mid-bodies, crew modules, etc.) and none of the investment is wasted. Not necessarily

On the other hand, if we conclude that the demand dictates follow-on Orbiters, the production base is in place to support that decision under the most efficient conditions.