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Tom - please review and respond or instruct me as to your wishes.

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From: Beryl Date: 4/5 19 87
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2	[illegible], C. T.	
1	Mansur, G. F.	
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	Hall, D.	
	Hinchman, W.	
	Jansky, D.	
	Johnston, B.	
	Joyce, C.	
	Lamb, B.	
	Lasher, S.	
	Lyons, W.	
	McCrudden, M.	
	Nelson, R.	
	Owen, B.	
	Raish, L.	
	Robinson, K.	
	Scalia, A.	
~~1~~	~~Smith, L.~~	
3	Thornell, J.	
	Urbany, F.	
	Ward, D.	

Remarks:

DEPARTMENT OF STATE

Washington, D.C. 20520

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BY HAND

MEMORANDUM

August 19, 1971

Tom - should this be announced by WH ~~Staff~~.

To: OST - Dr. David
OTP - Dr. Mansur
NASC - Mr. Anders
NSC - Mr. Guhin
DOD - Dr. Mountain
NASA - Mr. Frutkin

From: SCI/SAM - R. T. Webber, Acting Director
R. Webber

Subject: Draft message on post-Apollo and launch assurances

Reference: Kissinger memorandum of August 18, 1971

The referenced memorandum (copy attached) forwards the President's requests with regard to cooperative aspects of the post-Apollo program. It is particularly urged that we give first priority to "the prompt resolution of European concerns about launch assurances", and that these assurances not be contingent on European participation in a joint program of development of the STS.

The attached telegram reflects substantial input from all interested agencies and bureaus.

Under Secretary Johnson wishes to get this telegram out early next week, so I would greatly appreciate your concurrence/comments by noon of Monday, August 23.

Enclosures:
1. Copy of Kissinger memorandum of August 18, 1971.
2. Draft Cable to European posts.

cc: J - Mr. Peck

SCI/SAM:RTWebber:mbl ~~CONFIDENTIAL~~

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E.O. 12958, Sec. 3.4
Dept. of State Review
By S. Worrel Date 5/26/2010

S/S

THE WHITE HOUSE

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August 18, 1971 This is consistent with OTP views.

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MEMORANDUM FOR

THE SECRETARY OF STATE

action

SUBJECT: Post-Apollo Space Cooperation with the Europeans and Launch Assurances

In response to your memorandum of March 23, regarding European participation in the United States post-Apollo space program, the President has asked me to confirm his support for continued pursuit of opportunities for international space cooperation in general and specifically with the Europeans.

Unresolved questions about the character and degree of European participation are critical to a final decision by the U.S. and the Europeans regarding possible cooperation in development of a space transportation system (STS). There is not sufficient basis for a final decision on European participation in such development. Moreover, there is as yet no final U.S. commitment to development of a space transportation system.

In order to permit further progress in defining a suitable framework for cooperation, the first priority of the U.S. should be the prompt resolution of European concerns about launch assurances. Discussions with the Europeans about possible post-Apollo space cooperation should be reestablished at the technical level with the clear understanding that these talks involve no commitment to a particular cooperative project.

The Department of State should prepare, in coordination with other interested agencies, a reply to Minister LeFevre and the European Space Conference with these objectives and in accord with the following guidelines:

-- U.S. launch assurances for European payloads will not be contingent upon substantial European participation in a joint STS program, but will be treated separately to the degree possible.

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Authority NSC waiver
By SO NARA, Date 4/15/10

-- In the course of the technical discussions with the Europeans, there should be no statement or implication which would prejudice an independent decision by the U.S. on the desirability or schedule of STS development.

-- The purpose of these technical discussions will include the definition of possible cooperative relationships between Europe and the U.S. in a program of STS development, but should be broadened to include an exchange of views with the Europeans regarding the content of space activities in the post-Apollo era and, at an appropriate time, other potential areas for cooperation in space exploration, operations and launches. (A report on these technical discussions, including European views and interests in post-Apollo space activities, should be forwarded for the President's information no later than January 15, 1972.)

Henry A. Kissinger

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STATE

Subject: Johnson Letter to Lefevre

Ref: (a) State CA-5237, October 9, 1970 (b) State 30947, February 24, 1971 (c) Brussels 774, March 6, 1971

1. Under Secretary Johnson has written letter to The Honorable Theo Lefevre, Chairman, European Space Conference, Brussels in response to Lefevre's letter of March 3, 1971, ref (c).

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SCI:RFPackard/HPollack:mbl			J - U. Alexis Johnson

CLEARANCES: EUR, E, OTP, PM, NASA, DOD, OST, Under Secretary, NASC, NSC Staff -

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2. Letter is dated August , 1971. Text follows:

QUOTE Dear Minister Lefevre: PARA This letter is in response to yours of March 3, 1971, concerning possible European participation in the post-Apollo space program. It sets out our current views on the matters of consequence which were involved in our discussions this past February and in September, 1970. It overtakes my letter to you of October 2, 1970.

PARA I regret that it has not been possible to respond to you earlier. We felt that our mutual interests would be served best if we took sufficient time to review our position carefully in the light of your letter and of events since our discussions in February. As I stated during those discussions, our ultimate views on most of these matters remain contingent on choices yet to be made in Europe as to the measure and character of

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European participation and on further development of our own plans for the post-Apollo program.

PARA Since we have understood that the matter of greatest concern to the European Space Conference is the availability of launchers for European satellite projects, we have reviewed our position so as to meet the concerns expressed in your letter and during our earlier discussions. Our new policy in this regard is not conditioned on European participation in the post-Apollo program. I believe it should provide a basis for confidence in Europe in the availability of US launch assistance.

PARA Specifically, US launch assistance will be available for those satellite projects which are for peaceful purposes and are consistent with obligations under relevant international agreements and arrangements,

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INDENTED SUBPARA -- With respect to satellites intended to provide international public telecommunications services, when the definitive arrangements for INTELSAT come into force, the US will provide appropriate launch assistance for those satellite systems for which INTELSAT makes a favorable recommendation in accordance with Article XIV of its definitive arrangements. If launch assistance is requested in the absence of a favorable recommendation by INTELSAT, we expect that we would provide launch assistance for those systems which we had supported within INTELSAT so long as the country or international entity requesting the assistance considers that it has met in good faith its relevant obligations under Article XIV of the definitive arrangements. In those cases where launch assistance is requested in the

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absence of a favorable INTELSAT recommendation and the US had not supported the proposed system, the United States would reach a decision on such a request after taking into account the possibility that the proposed system could be modified in the light of the issues and objections raised within INTELSAT.

INDENTED SUBPARA -- With respect to future operational satellite applications which do not yet have broad international acceptance, we would hope to be able to work with you in seeking such acceptance and would favorably consider requests for launch assistance when broad international acceptance has been obtained.

PARA Such assistance would be available, consistent with US laws, either from US launch sites (through the acquisition of US launch services on a cooperative or

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reimbursable basis) or from foreign launch sites (by purchase of an appropriate US launch vehicle). In the case of launchings from foreign launch sites the US would, of course, require assurance that the launch vehicles would not be made available to third parties without prior agreement of the US.

PARA The United States is considering the timing and manner of public release of this policy. Accordingly, it is requested that there be no public disclosure of this policy without prior agreement with us.

PARA Further details as to the application of this policy are contained in the attached statement of US views on participation in the post-Apollo program.

PARA As you know, the United States has not yet taken final decisions with respect to its post-Apollo space program, nor can we predict with assurance when such

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decisions will be taken. While these matters are under consideration, advanced studies of the space transportation system are continuing.

PARA The relationship we are seeking with Europe with respect to post-Apollo space programs would, we believe, be well served if we can jointly consider the possibilities for collaboration in the context of a broader examination of the content and purposes of the space programs of the 1980s.

PARA Accordingly, we suggest broadening your earlier suggestion for a joint expert group so as to provide for consideration of the content and purposes of space activity in the 1980s in which Europe might wish to participate. The group, within the context of such a broader discussion, would consider possible technical and scientific tasks which Europe might wish to perform.

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The technical questions relevant to such participation, including management and financial matters, would be examined as well. The joint group would carry on its activities with no commitment on either side. The US representation would be led by Charles W. Mathews, Deputy Associate Administrator, Office of Manned Space Flight, NASA.

PARA This group could most usefully commence its work after the end of September when the results of NASA's current technical studies of space transportation systems become available.

is this an unnecessary emphasis on STS.

PARA I trust, Mr. Minister, that this restatement of our present views is a helpful response to the matters raised in your letter of March 3. I am pleased to

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confirm our continuing interest in cooperating with interested European nations in the further exploration and use of space. Sincerely, U. Alexis Johnson

Enclosure: Statement of US Views on Participation in the post-Apollo Program UNQUOTE

3. Text of enclosure to Ambassador Johnson's letter referred to immediate above follows: QUOTE: BEGIN TITLE Statement of US Views on Questions Posed in Minister Lefevre's Letter of March 3, 1971./ END TITLE NOTE: These views relate to the specific questions posed by Minister Lefevre in his letter of March 3, 1971, to Under Secretary U. Alexis Johnson as well as those posed by him during earlier discussions in September 1970 and February 1971. Future discussions with Europe on these questions would be in the context of a broader

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examination with Europe of the content and purposes of the space programsof the 1980s in which Europe might wish to participate as suggested in Under Secretary Johnson's letter to Minister Lefevre of August , 1971. We consider that such an examination of content and purpose should, in fact, take priority over the detailed questions which relate to joint development programs. It should be noted that the United States has not yet taken final decisions with respect to its post-Apollo space program nor can the United States predict with assurance when such decisions will be taken. END NOTE. SUB HEADING Launch Assistance and Arrangements END SUB HEADING (1.)We recognize the concern of the European Space Conference with regard to the availability of launch assistance for European payloads. In this respect, US launch assistance will be available

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for those satellite projects which are for peaceful purposes and are consistent with obligations under relevant international agreements and arrangements, subject only to the following: (a) With respect to satellites intended to provide international public telecommunications services, when the definitive arrangements for INTELSAT come into force the US will provide appropriate launch assistance for those satellite systems for which INTELSAT makes a favorable recommendation in accordance with Article XIV of its definitive arrangements. If launch assistance is requested in the absence of a favorable recommendation by INTELSAT, we expect that we would provide launch assistance for those systems which we had supported within INTELSAT so long as the country or international entity requesting the assistance considers that it has met in good faith its relevant obligations under Article XIV of the definitive

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ACTION: p. 12. Tel. to BERN, BONN, BRUSSELS, COPENHAGEN, etc. arrangements. In those cases where launch assistance is requested in the absence of a favorable INTELSAT recommendation and the US had not supported the proposed system, the United States would reach a decision on such a request after taking into account the possibility that the proposed system could be modified in the light of the issues and obligations raised within INTELSAT. (b) With respect to future operational satellite applications which do not have broad international acceptance, we would hope to be able to work with you in seeking such acceptance, and would favorably consider requests for launch assistance when broad international acceptance has been obtained. (2.) Such launch assistance would be available, consistent with US laws, either from US launch sites (through the acquisition of US launch services on a cooperative or

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reimbursable basis) or from foreign launch sites (by purchase of an appropriate US launch vehicle). It would not be conditioned on participation in the post-Apollo program. In the case of launchings from foreign sites the US would require assurance that the launch vehicles would not be made available to third parties without prior agreement of the US. (3.) With respect to European proposals for satellites intended to provide ~~their~~ international public telecommunications services, we are prepared to consult with the European Space Conference in advance so as to advise the Conference whether we would support such proposals within INTELSAT. In this connection we have undertaken a preliminary analysis of the acceptability of European space segment facilities for international public telecommunication services separate from those of INTELSAT, in terms of the conditions established

Our agreement with Pollack was to delete this sentence. It was deleted but reappeared in the attachment.

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by Article XIV, and find that the "Example of a Possible Operational System of European Communication Satellites" which was presented during our discussions in February, would appear to cause measurable, but not significant, economic harm to INTELSAT. Thus, if a specific proposal of this sort (including geographical coverage and types of services as outlined in this Example) were submitted for our consideration, we would expect to support it in INTELSAT. (4.) Those countries which had participated substantially as partners in the development of future space transportation system capabilities (by contributing individually or collectively through a single European organization at least ten percent of the resources required for its development) would have preferential access to on-board space for the launching of their payloads from US launch sites. Or, if they preferred,

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we expect that the option would be available for them to acquire a space transportation system for launchings from European launch sites. In this latter instance their use of the system would be subject only to their own obligations under relevant international agreements and arrangements. (5.) With respect to the financial conditions for reimbursable launch services from US launch sites, charges to European users would be non-discriminatory to comparable domestic use. (6.) With respect to the priority and scheduling for launching European payloads at US launch sites, we would deal with these launchings on the same basis as our own. Each launching would be treated in terms of its own requirements and as an individual case. When we know when a payload will become available and what its launch window requirements will be, we would schedule it for

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that time. We expect that conflicts would rarely arise, if at all. If there should be a conflict, we would consult with all interested parties in order to arrive at an equitable solution. On the basis of our experience in scheduling launchings, we would not expect any loss of time because of such a conflict to be significant. unnecessary

SUB HEADING: Technical Choice and Participation END

SUB HEADING: (7.) One of our major objectives in suggesting collaboration in the post-Apollo program has been to make optimum use of the resources and skills of both Europe and the US. Thus, we seek participation of a scope and character which would be useful to both the Europeans and ourselves, and share the view that these objectives might be served best, if a number of ~~Europ~~ European countries collectively underwrite the development and manufacture of a major system or a number of sub-systems, or both a major system and several sub-systems.

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The deciding factors would be European interests and European-US agreement on the technical and managerial viability of the choices made. (8.) When appropriate tasks have been defined and their allocation agreed, we would want to recognize for an agreed period of time the interests of each party in the production of those systems or sub-systems which it develops successfully. Either party might, however, undertake parallel effort short of production of systems or sub-systems for which the other had undertaken development responsibility. Proprietary rights to inventions, innovations, technical data and copyright should be protected, but provision should be made for their sale or exchange among participants in the development of these systems on the basis of non-exclusive royalty-free licenses when desirable for furthering the agreed collaborative program. Arrangements for use of such proprietary rights for purposes outside the agreed

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ACTION: p.18 Tel. to BERN,BONN,BRUSSELS, COPENHAGEN, etc. program should be made according to normal commercial practice. (9.) Our suggestion for collaboration in the post-Apollo program is also open to non-European countries (particularly Canada, Australia, and Japan). We do not yet have a clear view as to the measure of their interests. In principle, we would expect the third countries to participate in aspects of the program which did not duplicate those which the Europeans might previously have decided to undertake. Should third country participation require some degree of involvement in the European effort as well as our own, we would, of course, seek agreement with the Europeans. Third country participation would not in any event be at the expense of Europe's proceeding with tasks for which a firm European commitment had been established. SUB HEADING Management and Financial Considerations END SUB HEADING: (10.) We consider that the

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European role in decision-making and management should be commensurate with the measure and character of European participation. In addition, we expect that Europe would be associated with the over-all management process of any development program in which Europe participated meaningfully. The views of European representatives would be taken fully into account. However, since it is likely that the US input to and use of a major development program would be significantly greater than the European input and use, general decision-making and responsibility for management would necessarily rest with the US, except as noted in paragraph (11.) below. (11.) Any decisions which directly affect European cost ceilings or which imply new European tasks would be subject to mutual agreement. This would apply wherever management decisions would alter agreed European tasks and raise

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European costs. It is not intended to permit the possibility of unilateral vetoes in the case of normal overruns which must be expected by contractors and subcontractors in discharging agreed tasks of the character under consideration here. (12.) We recognize that defining financial commitments and establishing acceptable limits for them will be a serious and difficult matter for both the Europeans and ourselves. The initial financial commitments should be clearly understood on both sides, including the need to allow for design changes which are directed by actual experience in the development program. There would be need to provide for reasonable contingency levels which Europe should be prepared to underwrite, as well as for the possibility of cost overruns which exceed such contingency levels. Appropriate arrangements and alternatives for such situations should be incorporated in any basic agreement

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governing European participation in the post-Apollo program. (13.) In the event Europe decides to undertake the development of a separable major system, it would of course have full responsibility as prime contractor for that task. In those cases where European contractors undertake the development of sub-systems, we believe that effective program integration would require that this be done as direct subcontractors to American prime ~~contractors~~/ contractors. (14.) In addition, wherever there is a basis for European use of the space transportation capabilities of the 1980s, we would expect Europe to take part in mission planning and experimental programs in generous proportion to their use. (15.) As indicated during the discussions in September and February we strongly prefer that European participation be organized on a multilateral basis, i.e.: that the basic program and technical arrangements be between a single US organization (NASA) and a

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ACTION: p. 22 Tel. to BERN,BONN,BRUSSELS,COPENHAGEN, etc. single European organization representing the European countries which choose to participate. While bilateral arrangements would be possible, we would wish to defer consideration of arrangements with individual European countries, or separate combinations of countries, until it becomes clear whether satisfactory and timely European-wide multilateral arrangements are possible. The arrangements among the European participants within that single organization would, of course, be for the Europeans to decide. SUB HEADING Access to Information END SUB HEADING (16.) If we are to assure optimum use of the resources and skills of both Europe and the US, including the use of existing technological capabilities and the ability to generate new technology, it is clearly necessary that each party have detailed access to the technical data and facilities needed to accomplish

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its specific tasks under the agreed collaboration. In addition, if the parties are to have an understanding of the total program sufficient to assess the expected results of their own efforts and to share in the management and use of future space transportation capabilities it will be necessary for them to have general access to all technology and facilities in the over-all development of the program. (a) By "detailed access" we mean access to design, development and production data, including production know-how. (b) By "general access" we mean access to information on the over-all system under joint development, including design, functional and systems operation data. (17.) While this would not assure that all participating countries would acquire all of the detailed information including production know-how generated in the total program, it would assure

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that each party would acquire that detailed information needed to fulfill the tasks which it undertakes. This would protect data, on both sides, which is normally proprietary even between contractors of the same nationality within the same national program. All participants would acquire general information adequate to their understanding of the over-all program. Such general access to technology across the entire program would, in fact, constitute a considerable transfer of information beyond that available to non-participants. ~~$/¢¢/~~ Since the conditions for detailed access would apply to all participants including the US (i.e.: each participant would provide only that detailed information relevant to, and needed for the tasks of the other), we feel that these arrangements provide an equitable basis for each participant to benefit to the extent of his investment

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and participation. Thus each party would, in effect, set for himself the extent of his acquisition and development of production know-how. (18.) The sharing among participating European partners of technology made available under ~~the~~ these arrangements to European participants would be a matter for the Europeans to arrange among themselves within the single European organization established for their participation. (19.) Both general and detailed access to technical data and facilities should be pursuant to terms of a government-to-government agreement providing assurance that these technical data would not be transferred to countries not participating in the agreement. Data which might be sensitive in terms of national security considerations could be exchanged, but handled within agreed security safeguards. END ~~ENTIRE~~ ~~EXCLOSURE~~/ QUOTE.

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4. COMMENT FOR POSTS. It has become evident that the matter of greatest concern to the ESC is assured availability of launchers for European satellite projects, and it is our view that the new policy set forth above achieves this goal. It important to note that launch assistance we are prepared to furnish is not rpt not conditioned on European participation in post-Apollo program.

5. Enclosure to Johnson letter (para 3, above) also reiterates our offer made at February meeting with ESC representatives to consult with ESC in advance so as to advise them whether we would support within INTELSAT European proposals for satellites intended to provide international public communications. . At February meeting, Europeans presented a document entitled "Example of a Possible Operational System of

We agreed with Pollack that these assurances should be given verbally and not in writing

this should be a verbal instruction

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ACTION: p. 27. Tel to BERN, BONN, BRUSSELS, COPENHAGEN, etc European Communication Satellites". Analysis of this example led to conclusion that we would support such a proposal if it were submitted to INTELSAT.

6. The new policy reserves to the US decisions with respect to "future operational satellite applications which do not yet have broad international acceptance". In maintaining this reservation, we have in mind applications such as direct broadcasting satellites which do not yet have the broad international acceptance necessary to assure that this application will not be source of international tensions.

7. Letter to Lefèvre also endorses Lefevre's suggestion that joint expert group be established to consider technical and scientific tasks which Europe might wish to perform as part of joint program. Enclosure to this letter (para 3, above) gives US views on a number of

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ACTION: p. 28. Tel to BERN, BONN, BRUSSELS, COPENHAGEN, etc. aspects of such joint efforts, such as management, information exchange, proprietary rights and financial matters. These detailed views do not differ in most respects from those set forth in refs (A) and (B); it is important to note, however, a significant shift in emphasis in prefatory Note to the Enclosure (para 3) through suggestion that joint expert group expand its assignment so as to give priority attention to content and purposes of space programs of the 1980s in which Europe might wish to participate. Joint expert group is to carry on its activities with no commitment on either side.

ACTION REQUESTED

8. For BRUSSELS Pass Under Secretary Johnson's letter to Lefevre as soon as feasible. Call Lefevre's attention to paragraph of this letter requesting that there

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ACTION p. 29. Tel to BERN, MBONN, BRUSSELS, COPENHAGEN, ETC be no public disclosure of launch assistance policy without prior agreement with us. Ask that his response be sent through diplomatic channel. Advise Department and other action addressees when delivery has been made.

9. FOR OTHER ACTION ADDRESSEES: On the day after receiving Brussel's confirmation that Lefevre has received the letter, approach foreign ministries and other space-related ministries at highest appropriate level to explain the importance of our new launch assurance policy. Repeat caveat to Brussels (para 8) re our desire to avoid publicity at this time. We hope this new policy will be widely accepted by the European nations as a satisfactory basis for confidence in the availability of US launch assistance. END

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THE WHITE HOUSE

WASHINGTON

~~CONFIDENTIAL~~

August 18, 1971

MEMORANDUM FOR

THE SECRETARY OF STATE

SUBJECT: Post-Apollo Space Cooperation with the Europeans and Launch Assurances

In response to your memorandum of March 23, regarding European participation in the United States post-Apollo space program, the President has asked me to confirm his support for continued pursuit of opportunities for international space cooperation in general and specifically with the Europeans.

Unresolved questions about the character and degree of European participation are critical to a final decision by the U.S. and the Europeans regarding possible cooperation in development of a space transportation system (STS). There is not sufficient basis for a final decision on European participation in such development. Moreover, there is as yet no final U.S. commitment to development of a space transportation system.

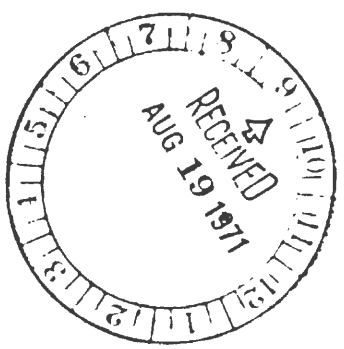
In order to permit further progress in defining a suitable framework for cooperation, the first priority of the U.S. should be the prompt resolution of European concerns about launch assurances. Discussions with the Europeans about possible post-Apollo space cooperation should be reestablished at the technical level with the clear understanding that these talks involve no commitment to a particular cooperative project.

The Department of State should prepare, in coordination with other interested agencies, a reply to Minister LeFevre and the European Space Conference with these objectives and in accord with the following guidelines:

-- U.S. launch assurances for European payloads will not be contingent upon substantial European participation in a joint STS program, but will be treated separately to the degree possible.

~~CONFIDENTIAL~~

DECLASSIFIED
Authority NSC waiver
By SO NARA, Date 4/15/10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-- In the course of the technical discussions with the Europeans, there should be no statement or implication which would prejudice an independent decision by the U.S. on the desirability or schedule of STS development.

-- The purpose of these technical discussions will include the definition of possible cooperative relationships between Europe and the U.S. in a program of STS development, but should be broadened to include an exchange of views with the Europeans regarding the content of space activities in the post-Apollo era and, at an appropriate time, other potential areas for cooperation in space exploration, operations and launches. (A report on these technical discussions, including European views and interests in post-Apollo space activities, should be forwarded for the President's information no later than January 15, 1972.)

Henry A. Kissinger

Wednesday 8/18/71

5:30 Dr. Mansur advises the Pollack matter has been resolved.

OFFICE OF TELECOMMUNICATIONS POLICY
WASHINGTON

Tom - Herman still has problems as of this morning. We are focusing on my amendment #3. All of the proposed changes of my memo are similar in effect and do not alter the substance of the agreement but do alter the cosmetics so as not to offend Intelsat partners with ensuing USG decisions.

JM.

Please call Pollack ASAP as he wishes to present his views.

August 18, 1971

MEMORANDUM FOR

Mr. Herman Pollack
Department of State

Several views concerning the draft Le Fevre letter have been expressed by Bert Rein, Ambassador Washburn, and yourself.

Let me add the views of OTP and summarize those which affect our opinion.

1. We concur with the position in which there is a 2/3 affirmative finding.

2. The draft of 13 August, as stated, unilaterally substitutes the judgment of the USG for the collective opinion of Intelsat for projects which we support. While it is difficult to conceive of a case wherein the USG would support a project in the absence of substantial support from other member nations, nevertheless the draft may be interpreted as being contrary to the spirit of the agreement and may produce a negative reaction.

3. We believe that the alternate proposal (12 August) expressed by Bert Rein is somewhat misleading and proposes a stronger commitment than is desirable or necessary. Specifically, the sentence beginning with "Rule of thumb. . ." represents in our view a statement that may be misinterpreted when applied to specific projects.

Accordingly, we would recommend adoption of one of the following changes, selected on the basis of a judgment of being most acceptable to the Europeans.

1. Delete the sentence beginning "Rule of thumb. . . faith consultation." and adopt the remainder of Bert Rein's proposal.

2. Amend the sentence to read, "Ordinarily, those projects serving geographically contiguous areas and which command a simple majority would be launched if the request were maintained after good faith consultation."

3. Adopt the SCI draft of 13 August except amend the sentence on page 2, sixth line from bottom to read:

   "If launch assistance is requested in the absence of a 2/3 favorable recommendation by Intelsat but with substantial favorable support, we expect that we would provide launch assistance for those systems which we had supported within Intelsat so long as the country or international entity requesting the assistance considers that it has met in good faith its relevant obligations under Article XIV of the definitive arrangements."

4. Adopt the SCI draft except to delete the paragraph on page 4 which states, "In this connection . . . proposals in Intelsat."

The proposal to establish an expert group to define areas of European cooperation should prove useful. However, we think it is essential for the USG to develop a comprehensive policy concerning space cooperative activities and related matters, [e.g., export of technology]. Proposals for cooperative activities should be carefully formulated so as to achieve substantive interaction with the European space community in research and development but in a framework which is consistent with U. S. private interests and other national objectives. Our concurrence with the draft, "Statement of Views in the Post-Apollo Program," of 18 August is predicated on development of such policy.

G. F. Mansur
Deputy Director

cc: Amb. Washburn
Bert Rein
Mr. Whitehead
Dr. Mansur
Mr. Thornell - hr Doyle

GFMansur:jm 8/18/71

THE WHITE HOUSE

WASHINGTON

August 16, 1971

Dear Herman:

Though, as you know, I am dubious about the launch assurance (or lack of same) aspect of the proposed reply to Lefevre, I have no objection to it as a first negotiating position. However, on Post-Apollo, I prefer putting the emphasis of the "joint expert group" on content and purposes of the program rather than "arrangements" and "participation." It is too early in my opinion to concentrate on these matters. They should be made definitely secondary at this stage since our Post-Apollo program is as yet ill-defined and not committed. Overemphasis on the shuttle is particularly evident in the "Statement of U. S. Views" dated August 13, 1971. In my opinion, that document should not be transmitted, nor should the letter until the emphasis is reversed.

Cordially,

/s/ Ed

Edward E. David, Jr.
Science Adviser

Mr. Herman Pollack
Director
International Scientific and Technological Affairs
Room 7831
Department of State
Washington, D. C. 20520

cc: Dr. Henry Kissinger, WH
Dr. James Fletcher, NASA
Mr. Peter Flanigan, WH
Mr. Clay Whitehead, OTP


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DEPARTMENT OF STATE

Washington, D.C. 20520

August 16, 1971

MEMORANDUM FOR THE DIRECTOR, OTP

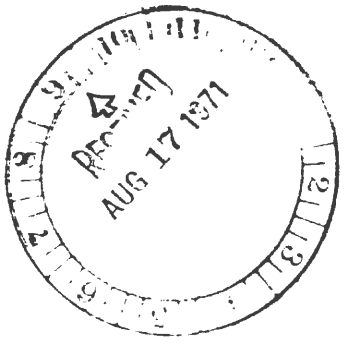
SUBJECT: Position on Launch Assistance for a European Public Telecommunications Satellite

REFERENCES: (A) Draft letter of reply to Minister Lefevre
(B) Mr. Rein's memorandum to Mr. Pollack, August 12, 1971
(C) Paris telegram 13776, August 12, 1971

The alternative formula suggested in Reference B, in my view, has two advantages:

1) It assures the Europeans that the U.S. is ready and willing to provide launch for any project that does not encounter serious opposition from other INTELSAT partners (i.e. a simple majority). And even in the latter case, we might well launch after good-faith consultation. This, I believe, will satisfy the Europeans -- particularly in their current relaxed frame of mind as outlined in Reference C.

2) It is saleable to COMSAT and the FCC, whereas the formula in Reference A (whereby we will launch if the requester feels he has met his INTELSAT obligations) will engender difficulties with COMSAT, FCC and Senator Pastore.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After the successful INTELSAT Opening-for-Signature on August 20, the ambiance will be even more favorable. I believe the moderates, including Germany, will be receptive to the Reference B formula. Especially with the elimination of the pre-condition of Post Apollo participation.

Abbott Washburn
Chairman, U.S. Delegation
INTELSAT Conference

Attachment:

Mr. Rein's memorandum to Mr. Pollack, Aug. 12, 1971.

INTELSAT - Amb Washburn

SCI - Mr. Pollack

August 12, 1971

E/TT - Bert W. Rein

Reply to Lefevre

As I told you yesterday, I have grave doubts whether your draft position on launch of satellites for international public telecommunications services is wise or workable.

Your proposal would shift the focus of U.S. limitation on assistance from the collective judgment of INTELSAT to the unilateral judgment of the USG. In cases where the USG supported the project, you would have us disregard entirely the views of our INTELSAT partners. The "relevant obligations" under Article XIV are strictly procedural and can, in good faith, be met even if there is overwhelming opposition to the project. I doubt the wisdom of a policy which justifies launch assistance limitations on the basis of our INTELSAT interests and then disregards the collective nature of INTELSAT and the role of its collective membership in defining the standards of the agreement.

In cases where the US was unable to support the project, your proposal would limit launch assistance to projects receiving 2/3 support in INTELSAT. The Europeans will certainly take exception to this as they have previously and press the question why the standard of meeting relevant obligations in good faith cannot be applied in this case. Were this standard to be applied, (and it seems an inevitable fallback), we would have no safeguard for our INTELSAT interests either in the preservation of the system from destructive competition or in adhering to the expressed judgments of our partners on the propriety of particular projects.

As an alternative, I would propose the following statement applicable to all cases regardless of the position of the USG.

(a) If the project commands 2/3 support the US will launch upon request;

(b) If the project commands less than 2/3 support the

US will consult with the requesting country or countries under the following guidelines. Consultations will center on the nature of the project, its state of development, the investment undertaken or planned, the possibility of modification of the project, the views expressed in the INTELSAT Assembly by all Governments including the USG, and the INTELSAT vote. As a rule of thumb, those projects which commanded a simple majority would be launched if the request were maintained after good faith consultation. Those projects which commanded less than a simple majority would be launched if the USG, taking into account all items of the consultation, and especially looking toward the possibility of modification, was persuaded that there was compelling justification for the requesting country or countries to go forward in the face of INTELSAT's expressed failure to approve the project.

This formulation is consistent with our proposed Article XIV compromise and our statement that we would not necessarily reject proposals receiving less than a majority vote. It emphasizes the judgment of our INTELSAT partners and permits us, even where there is a majority, to attempt to persuade the Europeans to modify projects not entirely satisfactory to INTELSAT.

My talks with foreign ministry officials and ESRO staff during INTELSAT and our recent aeronautical satellite conferences lead me to believe that this position would sell. It may appear tougher in cases which we support, but a majority is almost certain in such cases. It is a good deal more forthcoming in cases which we do not support. It is internally consistent and will encourage the Europeans to make a decision on acceptance rather than probe for further concessions.

I believe that Ambassador Washburn fully supports these views.

cc: INTELSAT - Amb. Washburn
J - Amb. Johnson

E/TT:BWRein:fbp

BUREAU OF INTERNATIONAL SCIENTIFIC
AND TECHNOLOGICAL AFFAIRS

August 13, 1971

MEMORANDUM FOR: OST - Dr. David
NASA - Dr. Fletcher
OTP - Dr. Whitehead

SUBJECT: Letter to Minister Lefevre

Attached is the latest draft of a proposed response from Ambassador Johnson to Minister Lefevre. I believe it to be consistent with the decisions resulting from the meeting with Dr. Kissinger on Monday of this week. We have not yet received the memorandum from Dr. Kissinger reporting those decisions but understand that it is currently pending signature.

So as to enable this letter to be ready fo. dispatch at the end of next week I would be grateful for your concurrence or comments as early as possible on Monday, August 16.

Herman Pollack
Director

Attachment:

Proposed response.

DRAFT August 13, 1971

Dear Minister Lefevre:

This letter is in response to yours of March 3, 1971, concerning possible European participation in the post-Apollo space program. It sets out our current views on the matters of consequence which were involved in our discussions this past February and in September, 1970. It overtakes my letter to you of October 2, 1970.

I regret that it has not been possible to respond to you earlier. We felt that our mutual interests would be served best if we took sufficient time to review our position thoroughly in the light of your letter and of events since our discussions in February. As I stated during those discussions, our ultimate views on most of these matters remain contingent on choices yet to be made in Europe as to the measure and character of European participation and on further development of our own plans for the post-Apollo program.

Since we have understood that the matter of greatest concern to the European Space Conference is the availability

The Honorable
Theo Lefevre, Chairman,
European Space Conference,
Brussels, Belgium.

of launchers for European satellite projects, we have reviewed our position in this regard so as to meet the concerns expressed in your letter and during our earlier discussions. Our new policy in this regard is not conditioned on European participation in the post-Apollo program. It should provide a basis for confidence in Europe in the availability of US launch assistance.

Specifically, US launch assistance will be available for thœ satellite projects which are for peaceful purposes and are consistent with obligations under relevant international agreements and arrangements, subject only to the following:

-- With respect to satellites intended to provide international public telecommunications services, when the definitive arrangements for INTELSAT come into force, the US will provide appropriate launch assistance for those satellite systems for which INTELSAT makes a favorable recommendation in accordance with Article XIV of its definitive arrangements. If launch assistance is requested in the absence of a favorable recommendation by INTELSAT, we expect that we would provide launch assistance for those systems which we had supported within INTELSAT so long as the country or international entity requesting the assistance

considers that it has met in good faith its relevant obligations under Article XIV of the definitive arrangements. In those cases where launch assistance is requested in the absence of a favorable INTELSAT recommendation and the US had not supported the proposed system, the United States would reach a decision on such a request after taking into account such factors as the vote within INTELSAT, the issues and considerations raised within INTELSAT, the possibility that the proposed system could be modified in the light of those considerations, and the nature and state of development of the project.

-- With respect to future operational satellite applications which do not yet have broad international acceptance, we would hope to be able to work with you in seeking such acceptance and would favorably consider requests for launch assistance when broad international acceptance has been obtained.

Such assistance would be available, consistent with US laws, either from US launch sites (through the acquisition of US launch services on a cooperative or reimbursable basis) or from foreign launch sites (by purchase of an appropriate

US launch vehicle). In the case of launchings from foreign launch sites the US would, of course, require assurance that the launch vehicles would not be made available to third parties without prior agreement of the US.

In this connection, we confirm the statement made during our discussions in February that we would be prepared, if the European Space Conference wished to do so, to consult in advance concerning European proposals for satellites intended to provide international public telecommunications services so as to advise the Conference whether we would support such proposals in INTELSAT.

The United States is considering the timing and manner of public release of this policy. Accordingly, it is requested that there be no public disclosure of this policy in Europe without prior agreement with us.

Further details as to the application of this policy are contained in the attached statement of US views on participation in the post-Apollo program, along with our views on other matters dealt with in your letter and our earlier discussions, i.e.: technical choice and participation, management and financial considerations, and access to information.

As you know, the United States has not yet taken final decisions with respect to its post-Apollo manned space program, nor can we predict with assurance when such decisions will be taken. While these matters are under consideration, advanced studies of the space transportation system are continuing.

The relationship we are seeking with Europe with respect to post-Apollo space programs would, we believe, be well served if we can pursue jointly the possibilities of collaboration and the broader examination of the post-Apollo era.

Accordingly, we agree, as you suggest, that it would be desirable to establish a joint expert group to define areas of European participation; to consider and recommend specific arrangements concerning management and financial matters such as exclusive production rights, proprietary rights, costs, responsibilities, and contracting arrangements and alternatives (including reciprocal subcontracting); and to consider also specific arrangements concerning access to information relevant to the selected areas of European participation. The US representation on this group will be led by Charles W. Mathews, Deputy Associate Administrator, Office of Manned Space Flight, NASA.

This group which would proceed without pre-commitment by either side, could make its own arrangements to meet and commence its work as soon as the chief European representative is designated.

Additionally, during the course of the fall, senior NASA officials will be exchanging views with European space leaders on the content and purposes of future activities in space to be served by the space transportation system or other programs that may be developed in the future.

I trust, Mr. Minister, that this restatement of our present views is a clear and useful response to the matters raised in your letter of March 3. I am pleased to confirm our continuing interest in cooperating with interested European nations in the further exploration and use of space.

Sincerely,

U. Alexis Johnson

Enclosure:

Statement of US Views on Participation
in the post-Apollo Program

DRAFT August 13, 1971

Tom - This redrafted on 15th to change focus from space transportation system to broader discussions. PM

Statement of US Views on Participation in the Post-Apollo Program

NOTE: These views as to participation in the post-Apollo program and related matters concern the considerations raised in the letter of March 3, 1971, from Minister Lefevre, President of the European Space Conference, to Under Secretary U. Alexis Johnson and during earlier discussions in September, 1970 and February, 1971. They are contingent upon choices yet to be made in Europe as to the measure of European participation and upon further development of US plans for the post-Apollo program. It is noted that the United States has not yet taken final decisions with respect to the post-Apollo program.

Technical Choice and Participation

1. One of our major objectives in suggesting collaboration in the post-Apollo program has been to make optimum use of the resources and skills of both Europe and the US. Thus, we seek participation of a scope and character which would be useful to both the Europeans and ourselves, and share the view that these objectives might be served best, if a

number of European countries undertook collectively the development and manufacture of a major system or a number of sub-systems, or both a major system and several sub-systems. A major system could involve a coherent portion of the space shuttle or a research and applications module or a reuseable space tug or any combination of these. The deciding factors would be European interests and European-US agreement on the technical and managerial viability of the choices made.

2. When these tasks have been defined and their allocation agreed, we would want to recognize for an agreed period of time the interests of each party in the production of those systems or subsystems which it develops successfully. Either party might, however, undertake parallel research short of production of systems or subsystems for which the other had undertaken development responsibility. Proprietary rights to inventions, innovations, technical data and copyright should be protected, but provision should be made for their sale or exchange among participants in the development of these systems on the basis of non-exclusive royalty-free licenses when desirable for furthering the agreed collaborative program. Arrangements for use of such proprietary rights for purposes outside the agreed program should be made according to normal commercial practice.

3. Our suggestion for collaboration in the post-Apollo program is also open to non-European countries (particularly Canada, Australia, and Japan). We do not yet have a clear view as to the measure of their interests. In principle, we would expect third countries to participate in aspects of the program which did not duplicate those which the Europeans might previously have decided to undertake. Should third country participation require some degree of involvement in the European effort as well as our own, we would, of course, seek agreement with the Europeans. Third country participation would not in any event be at the expense of Europe's proceeding with tasks respecting which a firm European commitment had been established.

Management and Financial Considerations

4. We consider that the European role in decision-making and management should be commensurate

with the measure and character of European participation. In addition, we expect that Europe would be associated with the overall management process in the development of the space transportation system.

The views of European representatives would be taken fully into account. However, since it is apparent that the U.S. input to the development of this system and the U.S. use of this system when developed will be significantly greater than the European input and use, general decision-making and responsibility for management of the post-Apollo program would necessarily rest with the U.S., except as noted in paragraph 5 below.

5. Any decisions which directly affect European costs or European tasks would be subject to mutual agreement. This would apply wherever management decisions would alter agreed European tasks and raise European costs. It is not intended to permit the possibility of a unilateral veto in the case of normal overruns which are experienced by contractors and subcontractors in discharging tasks to which they had previously agreed. We recognize the need for provisions to govern cases where changes in specifications would create different requirements than those to which the parties had committed

themselves in the initial agreement.

6. We recognize that defining financial commitments and establishing acceptable limits for them will be a serious and difficult matter for both the Europeans and ourselves. The initial financial commitments should be clearly understood on both sides. There will have to be arrangements to protect both parties against inequitable burdens arising from cost escalations, including, in addition to the effects of design changes referred to in paragraph 5 above, the possibility of cost overruns which exceed reasonable contingency levels which Europe should be prepared to underwrite. Appropriate arrangements and alternatives for such situations should be incorporated in the basic agreement governing European participation in the post-Apollo program.

7. In the event Europe decides to undertake the development of a separable major system, it would of course have full responsibility as prime contractor for that task. In those cases where European contractors undertake the development of subsystems, we believe that effective program integration would require that this be done as direct sub-contractors to American prime contractors.

8. In addition, wherever there is a basis for European use of the space transportation system, we would expect Europe to take part in mission planning and experimental programs in generous proportion to their use.

9. As indicated during the discussions in September and February we strongly prefer that European participation be organized on a multilateral basis, i.e.: that the basic program and technical arrangements be between a single US organization (NASA) and a single European organization representing the European countries which choose to participate. While bilateral arrangements would be possible, we would wish to defer consideration of arrangements with individual European countries, or separate combinations of countries, until it becomes clear whether satisfactory European-wide multilateral arrangements are possible. The arrangements among the European participants

within that single organization would, of course, be for the Europeans to decide.

Access to Information

10. If we are to assure optimum use of the resources and skills of both Europe and the US, including the use of existing technological capabilities and the ability to generate new technology, it is clearly necessary that each party have detailed access to all technical data and facilities needed to accomplish its specific tasks under the agreed collaboration. In addition, if the parties are to have an understanding of the total program sufficient to assess the expected results of their own efforts and to share in the management and use of the space transportation system, it will be necessary for them to have general access to all technology and facilities in the overall development of the program.

a. By "detailed access" we mean access to design, development and production data, including production know-how.

b. By "general access" we mean access to information on the overall space transportation system, including design, functional and systems operation data.

11. While this would not assure that all participating countries would acquire all of the detailed information including production know-how generated in the total program, it would assure that each party would acquire detailed information needed to fulfill the tasks which it undertakes. This would protect data, on both sides, which is normally proprietary even between contractors of the same nationality within the same national program. All participants would acquire general information adequate to their understanding of the overall program. Such general access to technology across the entire program would, in fact, constitute a considerable transfer of information beyond that available to non-participants. Since the conditions for detailed access would apply to all participants including the US (i.e.: each participant would provide only that detailed information relevant to, and needed for the tasks of the other), we feel that these arrangements provide an equitable basis for each participant to benefit to the extent of his investment and participation. Thus each party would, in effect, set for himself the extent of his acquisition and development of production know-how.

12. The sharing among participating European partners of technology made available under these arrangements to European participants would be a matter for the Europeans to arrange among themselves within the single European organization established for their participation.

13. Both general and detailed access to technical data and facilities should be pursuant to terms of a government-to-government agreement providing assurance that these technical data would not be transferred to countries not participating in the agreement. Data which might be sensitive in terms of national security considerations could be exchanged, but handled within agreed security safeguards.

Availability of Launch Assistance

14. We recognize the concern of the European Space Conference with regard to the availability of launch assistance for European payloads. In this respect, US launch assistance will be available for those satellite projects which are for peaceful purposes and are consistent with obligations under relevant international agreements and arrangements, subject only to the following:

a. With respect to satellites intended to provide international public telecommunications services, when the definitive arrangements for

INTELSAT come into force the US will authorize appropriate launch assistance for those satellite systems for which INTELSAT makes a favorable recommendation in accordance with Article XIV of its definitive arrangements. If launch assistance is requested in the absence of a favorable recommendation by INTELSAT, we expect that we would provide launch assistance for those systems which we had supported within INTELSAT so long as the country or international entity requesting the assistance considers that it has met in good faith its relevant obligations under Article XIV of the definitive arrangements. In those cases where launch assistance is requested in the absence of a faovrable INTELSAT recommendation and the US had not supported the proposed system, the United States would reach a decision on such a request after taking into account such factors as the vote within INTELSAT, the issues and considerations raised within INTELSAT, the possibility that the proposed system could be modified in the light of those considerations, and the nature and state of development of the project.

b. With respect to future operational satellite applications which do not yet have broad inter-

to work with you in seeking such acceptance and would favorably consider requests for launch assistance when broad international acceptance has been obtained.

15. Such launch assistance would be available, consistent with US laws, either from US launch sites (through the acquisition of US launch services on a cooperative or reimbursable basis) or from foreign launch sites (by purchase of an appropriate US launch vehicle). It would not be conditioned on participation in the post-Apollo program. In the case of launchings from foreign sites the US would require assurance that the launch vehicles would not be made available to third parties without prior agreement of the US.

16. With respect to European proposals for satellites intended to provide international public telecommunications services, we are prepared to consult with the European Space Conference in advance so as to advise the Conference whether we would support such proposals within INTELSAT. In this connection we have undertaken a preliminary analysis of the acceptability of European space segment facilities for international public telecommunication services separate from those of INTELSAT, in terms of the conditions established by Article XIV, and find that the "Example of a Possible Operational System of European Communication Satellites",

which was presented during our discussions in February, would appear to cause measurable, but not significant, economic harm to INTELSAT. If a specific proposal of this sort (including geographical coverage and types of services as outlined in this Example) were submitted for our consideration, we would support it in INTELSAT.

17. With respect to the use of the space transportation system when it becomes operational, those countries which had participated substantially as partners in its development (by contributing individually or collectively through a single European organization at least 10% of the resources required for its development) would have preferential access to space abroad a US space transportation system for the launching of their payloads from a US launch sites. Or, if they preferred, we expect that the option would be available for them to acquire a space transportation system for launchings from European launch sites. In this latter instance their use of the system would be subject only to their own obligations under relevant international agreements and arrangements.

18. With respect to the financial conditions for reimbursable launch services from US launch sites, charges to European users would be non-discriminatory to comparable domestic use.

19. With respect to the priority and scheduling for launching European payloads at US launch sites, we would deal with these launchings on the same basis as our own. Each launching would be treated in terms of its own requirements and as an individual case. When we know when a payload will become available and what its launch window requirements will be, we would schedule it for that time. We expect that conflicts would rarely arise, if at all. If there should be a conflict, we would consult with all interested parties in order to arrive at an equitable solution. On the basis of our experience in scheduling launchings, we would not expect any loss of time because of such a conflict to be significant.

European Crop

Monday 9/20/71

11:00 Will you want these memoranda in final yet?

Forget

8/31/71 Draft memo to President re aerosol

8/10/71 Memo for Kissinger

DRAFT
CTWhitehead:jm
8/10/71

MEMORANDUM FOR DR. KISSINGER

I am not completely worn down to a practitioner of "the art of the possible." I would like to explore a little further the question of how we play an offer of launch assurances. It seems to me that that was not very well aired at our meeting yesterday, but deserves to be. The central question, however, is probably one only you and the President can usefully meditate on, so I submit it for what it is worth.

It is certainly true that the simplest course of action in terms of our short-range objectives is to devise a formula to limit launch assurances that will placate the Europeans. However, I agree with Ed David that anything remotely smelling of U.S. veto will be a red flag for the Europeans and that only a major concession by us in some other area such as space shuttles cooperation would induce them to come off their opposition to such "assurances."

A much more exciting approach would be for the United States to announce unilaterally as a major initiative the provision of very sweeping launch assurance on a world-wide basis. It struck me that there will be a number of benefits in doing this. In spite of the fact that one is always wary of giving up flexibility and freedom of action, the major advantages seem to be:

(1) International relations benefits for the U.S.

(2) Pretty firm consolidation of the role of U.S. as principal provider of launch services.

(3) Elimination of most grounds for arguing that the U.S. has undue dominance in space, thereby making much more difficult a backlash against the U.S. in international forums and space agreements.

As indicated in the meeting, I am forced institutionally to speak out for the communications satellite interests, but it does seem that an initiative of this type and the benefits above would outweigh anything detriment I can foresee to our communications posture. The bureaucracy will supply many reasons why an initiative such as this would be undesirable. I think you and the President should know that Ed and I do not share most of those misgivings and feel that an initiative such as this is not only eminently practical but probably in our best interests. Knowing that, I would be interested in your reaction as to whether this is something that should pursued or dropped.

CTW

DRAFT/JThornell/GFMansur/tw

August 31, 1971

MEMORANDUM FOR THE PRESIDENT

Due to conflicting objectives of the FAA, the Department of State, and my Office, I find it necessary to seek your approval and support for actions I plan to implement immediately that will carry forward the Administration's policy of equal competitive opportunities in the international market place, will reaffirm a long standing policy for provision of communications services by the private sector, will offer investment incentives to the communications industry, and will have significant impact on employment in U.S. aerospace industry.

The details of the current situation on the aeronautical satellite communications program are contained in the enclosed "OTP White Paper", but the issues are much broader than the program. To summarize -- the basic alternatives are to:

a. Support tentative agreements between the FAA and Europe that benefit US-European space cooperation, but which establishe an ineffective and inefficient institutional structure with procurement rules that inhibit competition, requires technology sharing for the benefit of European aerospace industry, and offers little incentive for U.S.

industry investment; or

b. Redirect the FAA/European agreement to explicitly conform to U.S. policy and support U.S. industry at the risk of European rejection of a proposal to modify the agreement and the U.S. undertaking the program unilaterally. I have selected a course of action supporting alternate b., and it is my firm opinion that the interest of the United States will be best served with this approach.

The U.S. airlines, the communications industry, and the aerospace industry have stated strong opposition with most aspects of the current program, and I feel that these industries are looking to our actions in this matter as a test of the Administration's sincerity in promoting private sector initiatives.

This matter has been coordinated with Peter Flanigan and Henry Kissinger, both of whom concur in the approach. I, therefore, request your approval of the attached letters to the Secretaries of State and Transportation.

Clay T. Whitehead

Tom Whitehead

will be extremely difficult to squeeze into one page —

JA

complete draft package will be ready Monday.

MEMORANDUM TO THE PRESIDENT

Due to a situation within the bureaucracy concerning conflicting objectives of the FAA, the Department of State, and my Office, I find it necessary to seek your approval and support for actions I plan to implement immediately that will carry forward the Administration's policy of open competition in the international market place, will reaffirm a long standing policy for provision of communications services by the private sector, will offer investment incentives to the communications industry, and will have significant impact on employment in U.S. aerospace industry.

The details of the current situation on the aeronautical satellite communications program which warrant the planned action are contained in the enclosed "OTP White Paper", but the issues are much broader than the program. To summarize - the basic alternatives are to (a) support agreements between the FAA and Europe that provide immediate European foreign relations benefits but establish an extremely poor precedent of an ineffective and inefficient institutional structure,

will contain the complete story and the specific plan of action

operates under procurement rules that inhibit competition, requires technology sharing for the benefit of European aerospace industry, and offers no incentive for U.S. industry investment; or (b) redirect the FAA/European agreement to explicitly conform to U.S. policy and support U.S. industry at the risk of European rejection of the proposal to modify the agreement and the U.S. undertaking the program unilaterally. I have selected a course of action supporting alternate (b) and it is my firm opinion that the interest of the United States will be best served with this approach.

The U.S. airlines, the communications industry, and the aerospace industry have stated outright opposition or strong displeasure with most aspects of the aeronautical satellite program under the tentative agreements, and I feel that these industries are looking to our actions in this matter as a test of the Administration's sincerity in standing up to the Europeans in their behalf.

This matter has been coordinated with Peter Flanigan and

Henry Kissinger both of whom concur in the proposal. I therefore request your approval of the attached letters to the Secretaries of State and Transportation.

Monday 8/9/71

MEETING
11:30
8/9/71

9:30 Mr. Gubin's office called. The 11:30 meeting will be held in the Situation Room in the White House. Attendees: Dr. George Low (for Mr. Fletcher), Dr. David, Alexis Johnson Herman Pollack, Dr. Kissinger, Dr. Gubin, and perhaps Dr. Nouriter.

Friday 8/6/71

MEETING
8/9/71
11:30

3:00 Called Gen. Haig's office and left word you and Mr. Flanigan think that Don Rice should be included in the meeting with Kissinger on Monday. If they have any problems with this, they will call.

Thursday 8/5/71

MEETING
8/9/71
11:30

3:30 Marge called. Mr. Flanigan was invited to a meeting in Dr. Kissinger's office to discuss Post-Apollo Space Cooperation. He cannot go and would like you to go in his place.

3:40 Called Marge and told her you will be there.

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

MEMORANDUM FOR THE PRESIDENT

SUBJECT: NASA Budget for FY 1973 and the Future Manned Space Program

Background

Commitments to be made in settling NASA's FY 1973 budget will determine the future civilian space program. Depending on FY 1973 decisions, future funding levels for NASA can vary by $200 million in FY 1973 and more than $1 billion in FY 1976.

These FY 1973 budget decisions involve the type of manned space flight programs to follow Apollo and Skylab. In addition, an immediate decision involved is whether to complete the last two Apollo flights. These decisions must be faced for FY 1973 because:

- The lead times are gone to decide what to do after Apollo.
- Industry wants decisions one way or another, particularly on the Space Shuttle--on which contractors have been doing design studies for the last 18 months.
- Adjusting space spending and turning NASA's capabilities to other domestic problems requires a 2-3 year phasing.

This memorandum:

- describes NASA's proposed manned space flight program;
- develops an alternative to the NASA proposal;
- provides summary cost, schedule and employment data; and
- recommends next steps in arriving at decisions.

NASA Program

NASA's minimum proposed program would increase annual spending from the present $3.2 billion to nearly $4 billion in FY 1976.

The major elements of NASA's program include:

- a new Space Shuttle transportation system;
- three earth orbital manned flights in the mid-1970's using the remaining inventory of Apollo boosters and spacecraft;
- completion of Apollo 16, 17 and Skylab; and
- retention of all the major research and development center capability (albeit with reduced staffing at each site) built to support a program level of $6 billion--about twice the present program.

Revised Program

An alternative to NASA's program would make all the post-Apollo manned flights proposed by NASA, but would reduce the costs in FY 1973 to $3 billion from the present $3.2 billion and to less than $3 billion in 1976.

The major changes from NASA's proposal are:

- a smaller and less costly Space Shuttle;
- cancellation of Apollo 16 and 17, because we understand that is your wish; and
- reduction in the size of NASA institutional base after Calendar 1972.

Each of these changes will be covered in further detail in the remainder of this memorandum.

The Space Shuttle

a. Why a Space Shuttle? NASA believes a reusable space transportation system from earth to orbit is key to

providing man a productive role in space and reducing the cost of operating in space after 1979.

The shuttle is a transportation system to move payloads into earth orbit and back. It provides benefits by reducing the cost of putting a payload in orbit through its reusability features and by reducing payload costs by allowing recovery and repair in lieu of replacement for satellites in orbit that wear out or fail. Any shuttle would make some advances in technology and retain a U.S. manned space flight program into the 1980's. The question is, since we already have the capability to put manned and unmanned payloads into earth orbit using expendable boosters, how much should we be willing to pay for a shuttle?

Last year NASA was proposing a $10-12 B shuttle. In response to questions from OMB and OST about whether the benefits justified such a large investment, NASA has since designed a $6 B shuttle which can do all the missions of the larger, more expensive one because it has exactly the same payload capability. (We think both costs are underestimated, perhaps by 50%, i.e., cost overruns are likely on both but more likely on the more expensive version.)

In either case, NASA would plan to replace all of the U.S. expendable booster programs with the Shuttle. Thus, one program, the Shuttle, would dominate NASA for the coming decade, as did Apollo in the 1960's. This would make efforts to reorient NASA to domestic pursuits more difficult, and tend to starve unmanned earth applications missions for resources.

The Shuttle alternative that is chosen must balance costs, benefits and subjective considerations.

b. What are the Options? NASA, NASA contractors, OST, PSAC and OMB have all given consideration to alternatives to NASA's large Space Shuttle proposal. In summary these alternatives run the gamut from:

- large systems with both reusable powered orbiters and boosters ($12 B) to

- small systems with an unpowered reusable orbiter and a nonreusable launch vehicle ($2-3 B).

Operating costs vary from a high of $30 million per launch for the lowest investment cost option to a low of $5 million per launch for the highest investment cost option.

The revised program proposed in this memorandum would develop a smaller reduced cost version of a manned reusable Shuttle with an investment of $3-4 billion over the next 6-7 years--less than one-third NASA's original proposal. This Shuttle would:

- provide a new thrust to the manned space flight program at much less cost than currently spent on Apollo and Skylab;

- advance technology and continue obtaining operational experience with reduced technical and cost overrun risks;

- capture nearly all of the payload benefits of the redesigned larger shuttle at half the investment cost;

- retain the reliable Titan III expendable booster to launch the few largest payloads that would not fit the smaller shuttle. These include space telescopes and large intelligence satellites. (This may be desirable in any event since, for national security purposes, we may not want all our eggs in one basket.)

- preserve the option to decide in the late 1970's whether to develop a bigger Shuttle.

One complication of the smaller shuttle option is that the recently awarded engine contract with Rocketdyne division of North American Rockwell would be terminated. However, Rocketdyne would likely win one of the two separate engine contracts to be awarded for the smaller shuttle.

Additional Earth Orbital Missions

Using the inventory of launch vehicles and spacecraft left over from the Apollo program, NASA would (a) initiate a $275 million rendezvous and docking mission with a Soviet space laboratory in 1975 and (b) add two earth survey missions (1974 and 1976) for $375 million.

- Unless new missions are approved, there will be a 4½ year gap in U.S. manned space flight from the completion of the Skylab experimental space station (12/73) to the first orbital flights of the Shuttle (1978). During this period the Soviets are expected to conduct a vigorous manned space program emphasizing small space stations in earth orbit.

- Soviet docking mission would primarily be justified on the basis of international cooperation.

  · Soviets appear to be very interested in mission.

  · Would reduce presently scheduled gap in U.S. manned space flight to 2½-3 years (1975-78).

  · Pictures of earth resources taken during the flight would not justify cost of mission.

- Value of the two additional earth survey missions in 1974 and 1976 primarily to maintain some manned flight capability.

  · Science and applications return could be obtained at less cost using unmanned systems.

  · Would reduce gap in manned space flight to 2 years (1976-78).

- The Revised Program recommended in this memorandum would conduct the three earth orbital missions to fill in the gap in U.S. manned space flight and to provide opportunities for international cooperation. These missions, of course, also provide work for the aerospace industry.

Apollo 16 and 17

NASA would complete the currently scheduled manned space flights including the last two visits to the moon in 1972.

- Apollo 16 and 17 provide about 50% of the useful surface time and about 40% of the experiments programmed in the entire Apollo program for an incremental cost of $125 million.

- Only opportunity for samples from highland site (oldest area important to understanding age and evolution of moon and earth).

HAK.

- The Revised Program would cancel Apollo 16 and 17 because despite their scientific return and near-term employment impact (6,200 on 12/72), they would no longer be considered to be worth the risk and cost involved. About $115 million would be saved in 1973. However, Dr. David believes the scientific return is of high priority and favors retention of Apollo 16 and 17 in all program options.

- It is difficult to offset fully by 12/72 the employment loss resulting from cancellation of Apollo 16 and 17. Accelerating the Shuttle would be very costly, would undercut our efforts to make it a sound program, and probably would not be a very effective job creator within time period. However, the addition of the Soviet docking mission and two other earth orbital missions adds 1,300 jobs in California, which offsets all but 900 of the Apollo 16/17 jobs lost in California.

NASA's Institutional Base

NASA's research, development, launch, tracking facilities and associated staffing were built to sustain a space program at $6 billion in 1966 dollars, more than double in real terms the $3.2 billion of today.

Beginning in calendar 1973 the revised program proposed in this memorandum would provide the basis for substantially reducing NASA's institutional base. It is estimated that

$300 million annually could be saved by 1976 by shutting down (a) one of two manned space flight development centers and (b) one space science research center. No mention of these changes need be made publicly before early 1973 but an understanding should be set now with top NASA leadership.

The net job loss could be zero if $300 million worth of NASA's capabilities, particularly the professional manpower, were phased over the next 2-3 years into new domestic technology initiatives designed to reorient NASA to non-space objectives.

Summary Analysis of Programs

Visible manned space flight - Both programs would continue a highly visible U.S. manned space flight program.

Balanced Program - Revised Program would avoid future program imbalance which would result if a single large project (the Space Shuttle) were allowed to predominate in the competition for available resources.

Exploration, science and practical application - Except for the loss of scientific data from Apollo 16 and 17, the two programs would provide comparable return during the 1970's.

Advancement of technology - Revised Program would advance the technology of manned reusable spacecraft at a somewhat slower pace but with less technical risk and less risk of large cost overruns. Revised Program would permit funding to be diverted from space technology to new technological initiatives of more direct benefit to people on earth.

International cooperation - Both programs would allow opportunities for international cooperation, including a Soviet docking mission and possible flights with foreign astronauts.

Lower cost program - Revised Program would respond to the popular interest in cutting space spending and would allow NASA's oversized institutional base to be reduced.

Attachments I, II, and III show, respectively, the budget impacts, flight schedules, and employment impacts of the two programs.

Conclusions

1. Revised Program would provide a well-balanced, productive, and reasonably economical space program.

2. Within our overall priorities, Revised Program represents a better balance between space and other areas of technology development.

Recommended Next Steps

OMB and OST proceed to work with NASA on the reorientation of the space program along the lines of the Revised Program, with major elements as follows:

	Approve	Disapprove
1. Initiate reduced-cost smaller Space Shuttle program.....	_____	_____
2. Conduct Soviet docking mission..	_____	_____
3. Conduct other manned earth-orbital missions.....	_____	_____
4. Cancel Apollo 16 and 17.....	_____	_____

Attachments

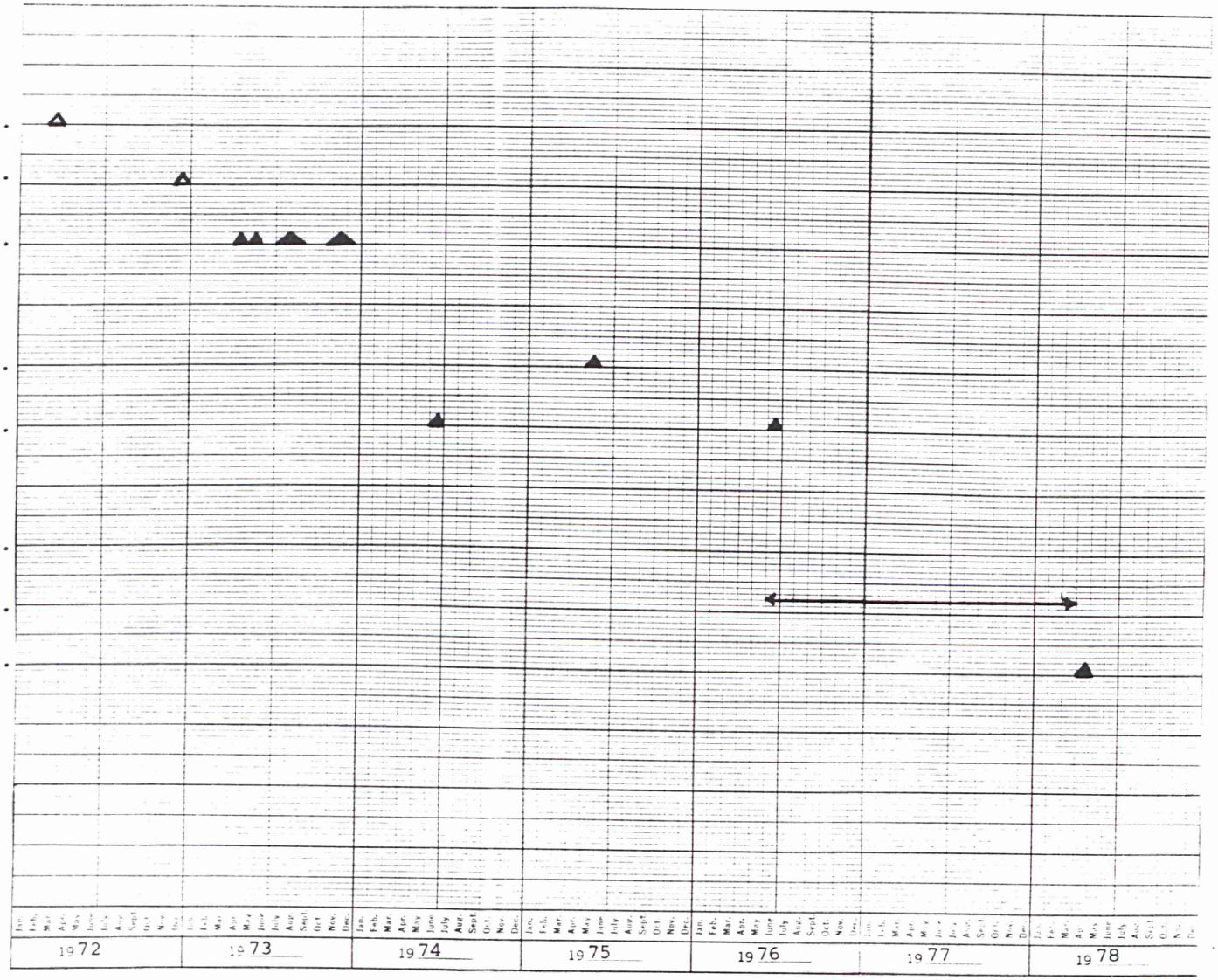
Attachment I

Budget Summary

	1973	1974	1976	Total Cost (1973 to Completion)
	(Outlays-millions of $)			
NASA Proposal				
. Initiates large Space Shuttle	95	400	1,200	$6-10 B
. Conducts 1975 Soviet docking	10	90	40	275 M
. Conducts other earth orbital missions	20	20	180	375 M
. Continues Skylab and Apollo 16 and 17	835	500	-	1.5 B
Revised Program changes NASA proposal as follows:				
. Develops smaller, cheaper Shuttle	-25	-100	-700	$3-4 B
. Cancels Apollo 16 and 17.	-115	-10	-	xxx
. Resizes NASA's institutional base	-	-60	-300	xxx
Total Space Program Based On:				
NASA Proposal	3,245	3,350	3,800	
Revised Program	3,040	2,950	2,700	

Attachment II

U.S. Manned Space Flight Schedule



△ = Cancelled under Revised Program

▲ = Continued under NASA Proposal and Revised Program

Attachment III

Employment Summary

	6/72	12/72	6/75
	(Number of Jobs)		
NASA Proposal			
. Initiates large Space Shuttle	2,600	3,400	35,000
. Conducts 1975 Soviet docking	-	300	5,000
. Conducts other earth orbital missions .	-	1,300	3,000
. Continues Skylab and Apollo 16 and 17 .	37,000	33,500	-
Revised Program - changes NASA proposal as follows:			
. Develops smaller, cheaper Shuttle	-200	-700	-17,500
. Cancels Apollo 16 and 17	-3,800	-6,200	-
. Resizes NASA's institutional base	-	-	-13,000
Total Employment Based On:			
NASA Proposal	138,600	136,500	150,000
Revised Program	135,000	129,250	110,000

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EXECUTIVE OFFICE OF THE PRESIDENT

OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

DATE: November 3, 1971

REPLY TO ATTN OF: EST:NASA

SUBJECT: FY 1973 budget decisions for NASA

Mr. Rice

As you requested after the Space and General Research Director's Review session, we have prepared the attached papers concerning NASA's FY 1973 budget:

1. Summary - An illustrative NASA program (FY 1972-1977) with the tentative program assumptions discussed on October 22 (outlays and employment impact shown separately).

2. Shuttle - A paper describing the tentative decision and exploring possible problems in its implementation.

3. Apollo - A summary of the employment, outlay, and programmatic effects of possible options for Apollo.

4. Earth orbital flights - A paper describing the options for manned earth orbital flight using Apollo spacecraft, including a docking with a Soviet Salyut space laboratory.

Program Assumptions for the Illustrative NASA Program

The following assumptions are used in Attachment I-A:

- Apollo 16 and 17 would be cancelled because, despite their scientific return, they would no longer be considered to be in the national interest.

- The Skylab experimental space station would be continued to provide data on man's ability to live and work in space.

- After Skylab, the gap in scheduled manned space flight (12/73-1978) could be filled with up to three manned earth orbital missions using Apollo hardware (1974-1976), including a docking with a Soviet space laboratory.

- A smaller version of the manned reusable shuttle (perhaps unpowered with an expendable booster) would be developed

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for a research and development cost of about $2.5-$3.0 B (first manned orbital flight about 1978). (Note: Attachment I provides a tentative estimate of one such option.)

- The Grand Tour of the outer planets would be cancelled and less sophisticated missions flown to Jupiter and Saturn.

- Viking Mars orbiter/lander continued.

- High Energy Astronomical Observatory (HEAO) continued.

- NERVA nuclear rocket program would be cancelled because it would not have any missions at this level of funding.

- NASA's institutional base would be resized by closing Marshall Space Flight Center (MSFC) in 1/74 and the Jet Propulsion Laboratory (JPL) in 1/75. MSFC would be expendable because it would not be needed for the type of shuttle program now envisioned. JPL could be shut down after it completes fabrication of the orbiters for the Viking program. Lewis Research Center would be reduced by about 25% in 7/73, but its unique aeronautical R&D facilities would be kept operational.

Such a program would reduce the NASA budget below $3 B by FY 1974 (1971 dollars) and yet preserve a balanced manned and unmanned space program. NASA's institutional base would be made commensurate with the size of its overall program. FY 1973 outlays of $3,039 M compare to a planning ceiling of $2,975 M.

Major Problems

There are several major problems involved in implementing the illustrative NASA program described in Attachment I:

1. How and when do we achieve NASA's agreement to develop a shuttle option which would reduce investment costs?

   Rather than attempting to describe a particular design option (which we are, of course, not equipped to do), Attachment II defines the criteria which would be provided to NASA. If we are to proceed this fall with a

decision to develop a system meeting these criteria, top level NASA management should be brought into the decision process as soon as possible. NASA's involvement is needed to better define this option in terms of design, costs, feasibility, and next steps for the contractor teams.

2. Can a sensible program be developed which would a) cancel Apollo 16 and 17 and b) keep near-term employment levels up?

   Although several alternatives are presented in the attached paper on Apollo, none of them appear to be very attractive from the standpoint of achieving productive employment for workers laid off as a result of a cancellation of Apollo 16 and 17. Skylab doesn't need more workers. Employment on new projects would build up too slowly to be of much help. Apollo program options which would lessen the unemployment and cost savings impact do not have convincing programmatic rationales. Attachment III has the details.

3. How and when do we achieve NASA's agreement to resize its institutional base?

   While none of these actions would directly impact the FY 1973 budget, at least a tentative understanding about future Center closures should probably be worked out with Dr. Fletcher at this time. In particular, a decision to proceed with a shuttle program could be conditioned on the need to shut down the Marshall Space Flight Center (MSFC). If a small unpowered shuttle is selected, it would have neither orbiter engines nor a reusable booster, which just about eliminates any need for MSFC. The shutdown of Marshall could provide about 40% of the funds required for a reduced cost shuttle.

4. Should the FY 1973 budget contain $22 M of BA ($10 M outlays) to initiate a $275 M rendezvous and docking mission with the Soviets in 1975 using Apollo spacecraft in earth orbit?

   Dr. Kissinger's memorandum of October 22 for Mr. Shultz (attached) contained the following statement: "Because of the upcoming summit meeting with the Soviets, any recommended budgetary action concerning this proposed joint docking experiment should be forwarded for the President's decision so that he can weight all relevant considerations, including the budgetary factors."

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The proposed docking mission has low programmatic priority and would result in few programmatic benefits. While the docking mission could not be justified on programmatic grounds, NASA believes that such a flight would have exciting and worthwhile international implications as well as help minimize the scheduled gap between Skylab and the Space Shuttle (12/73-1978). The justification for the docking mission would have to depend primarily on a judgment that it would make a major contribution to the international objectives of the United States. The Soviets appear to be very interested in the proposed mission. In addition, if a manned space program during the mid-1970's were considered mandatory, the docking mission could reduce the presently scheduled gap in manned space flight from about 4½ years to about 2½ years for $275 M. Attachment IV analyzes this possible mission as well as other options for manned earth orbital flights in the 1970's.

Conclusions

1. A policy decision should be made on whether or not the tentative program assumptions in Attachment I represent the preferred course for the future space program.

2. Dr. Fletcher's inputs should be obtained soon.

3. As soon as an OMB decision is reached regarding the joint docking mission with the Soviets, a memorandum outlining the various considerations should be prepared and submitted to the President through Dr. Kissinger's office.

Daniel H. Taft

Daniel H. Taft
EST Division

Attachments

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Attachment IC

Illustrative NASA Program
Employment Impact

	6/71	6/72	12/72	6/73	6/74	6/75
NASA Ongoing Program (Contractor and Civil Service) ..	143,950	136,600	133,100	126,400	105,000	92,000
Cancel Apollo 16 and 17		-3,800	-6,200	-1,900	-	-
Conduct Soviet docking mission (1975)		-	+300	+1,300	6,000	6,000
Add two earth orbital missions (1976 and 1977)		-	-	+700	800	800
Move up two earth orbital missions (to 1974 and 1976)		-	+1,300	+1,400	1,000	1,000
Initiate reduced cost shuttle program (tentative OMB estimate)		+2,400	+2,700	+3,000	+16,000	+17,000
Cancel Grand Tour of outer planets		-600	-900	-1,100	-3,600	-5,800
Fly current spacecraft to Jupiter and Saturn		+300	+300	+500	+600	+1,400
Cancel NERVA and advanced nuclear propulsion technology		-	-400	-600	-600	-600
Resize NASA's Base						
. Shutdown Marshall, Huntsville, Ala. (1/74 - after Skylab) .		-	-	-	-8,300	-8,300
Transfer 500 top Marshall technical experts to MSC		-	-	-	+500	+500
. Shutdown JPL, Pasadena, Calf. (1/75 - after Viking orbiters fab.)		-	-	-	-	-5,900
Continue Deep Space Tracking Network		-	-	-	-	+800
Transfer 400 top JPL planetary experts to Langley or Goddard		-	-	-	-	+400
. Reduce Lewis Research Center, Cleveland, Ohio (7/73)		-	-	-	-830	-830
Other FY 1973 Budget actions		-	-950	-1,200	-500	-500
Total employment	143,950	134,900	129,250	128,500	116,070	97,970
Contractor	(114,100)	(107,400)	(101,950)	(101,650)	(94,970)	(76,870)
Civil Service	(29,850)	(27,500)	(27,300)	(26,850)	(21,100)	(21,100)

1/ Shuttle included in NASA Ongoing Program only on 6/71.

Attachment II

Initiate Reduced Cost Shuttle Program

Program Criteria

- Research, Development, Test and Evaluation (RDT&E) costs - Should be no more than 50% of the RDT&E costs which NASA has projected for the Mark I/II system (i.e. $2.5-3.0 B including development vehicles). (Note: By keying on NASA's RDT&E costs (rather than total investment including Air Force costs and project management costs), we use a number which NASA will recognize and hopefully avoid definition problems).

- Launch costs - Should be no more than estimates for Big Gemini/Titan III system (i.e. maximum of about $30 M per launch).

- Advancement of technology - Should advance the technology of manned, reusable spacecraft.

- Manned flight - Should be a manned system.

- Capabilities - Not important that the system capture the entire potential traffic model. Project can be regarded as primarily a technological development effort which would provide the same capability as the Big Gemini/Titan III system plus some of the benefits of the Mark I/II shuttle (e.g. experience in payload recovery, on-orbit maintenance and refurbishment, sortie missions).

  Other possible criterion - Should allow a manned space center to be shut down about 1/74.

The design option which would best fit the above criteria would probably be a small unpowered shuttle orbiter launched by a Titan III-L expendable booster. However, NASA may propose other options.

The RDT&E cost estimate of $2.5-3.0 B is a rough estimate by the PSAC Panel Chairman which is closely comparable to the estimate prepared by Martin (Denver) for a 12' x 40' glider launched by a Titan III-L ($2.5 B).

FY 1973 budgetary impact (Illustrative Option)

	NASA Request		Tentative OMB Est.	
	BA	BO	BA	BO
R&D	200	90	125	70
Construction	28	3	13	2
Total	228	93	138	72
Less FY 1972 engine facilities	-	-	-13	-2
Total	228*	93	125*	70

* In addition, about $75 M of carryover of unobligated balances will be available for the Shuttle.

The tentative OMB estimate is intended to provide an illustrative FY 1973 funding and outlay estimate if a small unpowered shuttle is selected to meet the criteria listed above. In this case, the NASA request could be reduced because the small unpowered shuttle would not require a) engines for the orbiter and b) a reusable booster. In this option, the development of the expendable Titan III-L launch vehicle (estimated by Martin to cost a total of about $200 M) would be required. The following table summarizes the FY 1973 estimates (BA in millions of dollars):

	NASA Request	Tentative OMB Est.
Research and Development		
Orbiter	79	80
Booster	53	-
Engine	48	-
Program Support	20	20
Titan III-L	-	25
Total R&D	200	125
Construction of Facilities		
Development facilities at Manned Spacecraft Center (MSC)	9	9
Development facilities at Marshall Space Flight Center (MSFC)	9	-

	NASA Request	Tentative OMB Est.
Manufacture, assembly, and checkout facilities	6	-
Other facilities	4	4
Total C of F	28	13

Problems

1. How and when to involve NASA in the decision process

   - NASA should have an opportunity to make inputs on overall decision, system design, costs, role of contractors, timing of next steps, and related matters.

   - Only highest level NASA officials should be involved.

2. How to characterize the nature of this decision in the FY 1973 budget

   - Option One - A long-term commitment to the concept of reusability, with the small unpowered shuttle as the initial step.

   - Option Two - A test of the effectiveness of reusability to see whether additional steps are later warranted.

3. Timing of Request for Proposals (RFPs) from industry and timing of contractor selection

   - Study contracts with four industrial teams (North American Rockwell/General Dynamics; McDonnel Douglas/ Martin; Grumman/Boeing; and Lockheed) have been extended through 4/30/72.

   - Since industry is probably at least matching NASA's funding of $.8 M per month for each team, industry is anxious for an expeditious selection process.

   - Alternative timetables for the contract process could be as follows:

	Alt. A	Alt. B
Four teams study alternatives for small shuttle	1-4/72	1-7/72
NASA select configuration and release Request for Proposals	5/72	8/72
NASA select contractors	9/72	12/72

4. What to do with the Rocketdyne high pressure engine contract (neither an unpowered orbiter or the Titan III-L would require a new high pressure engine).

   - Spending is currently being held to about $1 M per month.

   - If a small unpowered shuttle is selected, the contract could either be cancelled or reoriented to a separate technology effort (which would probably require a re-competition). Such a technology effort would have to be justified as a long-term program which might later be applicable to a powered orbiter or a reusable booster.

   - Cutback or cancellation of Rocketdyne contract would have an employment impact in So. California (about 450 people currently employed).

   - Rocketdyne has stated that it will be unable to continue in business without the shuttle engine contract.

Apollo/Skylab Program Options

Current Status

Mission	Launch Date
Apollo 16	3/72
Apollo 17	12/72
Skylab	
. First launch	4/73
. Revisit	7/73
. Revisit	10/73

	12/71	6/72	12/72	6/73
Baseline Employment	(54,700)	(52,000)	(47,700)	(38,300)
Apollo	12,300	11,200	9,600	2,300
Skylab	22,400	21,800	19,900	18,200
Launch support	4,000	4,000	4,000	4,000
Operating base	16,000	15,000	14,200	13,800

Cost	FY 1972	FY 1973	FY 1974
Outlays ($ in M)	1,200	1,100	650

Impact of Options	Employment Reductions 6/72	Employment Reductions 12/72	Outlay Savings FY 72	Outlay Savings FY 73	Outlay Savings FY 74
A. Cancel Apollo 16 and 17	-3,800	-6,200	-10	-117	-9
So. California	(-1,500)	(-2,200)			
New York	(-1,400)	(-2,000)			
Texas	(-100)	(-200)			
Southeast	(-400)	(-600)			
Other	(-400)	(-1,200)			
B. Defer Apollo 16 to 12/72; cancel Apollo 17	-500	-1,000	-5	-25	0
C. Cancel Apollo 16 and 17; conduct manned orbital earth resources mission around 12/72	-500	-2,000	0	-35	-10

	Employment Reductions		Outlay Savings		
	6/72	12/72	FY 72	FY 73	FY 74
D. Cancel Apollo 16 and 17; preserve option to fly missions later .	-1,000	-2,500	-5	-40	-20

Analysis of Options

A. Cancel Apollo 16 and 17

- Savings of $150-170 M possible
- Unemployment increased rapidly in impacted areas
- Potential accident avoided
- Unique lunar science gains foregone

B. Defer Apollo 16 to 12/72; cancel Apollo 17

- Savings of $20-40 M possible
- Unemployment effect greatly alleviated
- Some unique lunar science could be conducted
- No convenient rationale for a delay so close before a launch

C. Cancel Apollo 16 and 17; conduct manned orbital earth resources mission around 12/72

- Savings of $20-50 M possible
- Unemployment effect alleviated - practically no unemployment impact in So. California (only Long Island greatly affected)
- Lunar science foregone
- Difficult to develop a worthwhile earth resources mission in this time period - mission not defined at all

D. Cancel Apollo 16 and 17; preserve option to fly missions later (capabilities at factories and launch area would be maintained as contingencies)

- Savings of $30-70 M possible if missions not flown
- Unemployment impact alleviated
- Would cost $175 M to fly missions if option exercised around 12/72
- Difficult to conceive of a convincing rationale for such an action

Skylab

Additional manpower could not be productively employed on Skylab. The critical path for Skylab hardware is very congested. It is highly doubtful that the launch date could be moved up by more than one month, even if additional personnel were utilized. One of the major problems is the physical limitations involved in crowding more workmen into the already congested Skylab modules.

Possible New Programs

The following table summarizes the employment and dollar impact of possible program initiatives for NASA:

	Employment			FY 1973	Total
	12/71	6/72	12/72	Outlays	Cost
Accelerated Mark I/II Shuttle	2,300	4,400	8,800	$230 M	$10-12 B
Mark I/II Shuttle (NASA Req)	2,300	2,600	3,400	93 M	10-12 B
Reduced cost shuttle	2,300	2,400	2,700	70 M	3-4 B
Single Soviet docking mission ..	-	-	300	10 M	275 M
Three accelerated earth orbit missions (including Soviet docking) ..	-	1,100	2,200	40 M	650 M

The accelerated Mark I/II shuttle require reprogramming of $15 M in FY 1972 and would add about $200 M (BA) to NASA's FY 1973 request. This option would require the selection of a design by 12/71 and the award of a development contract by 4-5/72. In addition, a high pressure engine would have to be added to the Mark I shuttle to achieve such an employment increase.

The above table shows that only a very costly new initiative (e.g. accelerated Mark I/II Shuttle), with maximum possible acceleration and major additional FY 1972 and FY 1973 funding could significantly impact employment levels by 12/72.

Public Reaction

It is not clear what public reaction would be to cancellation of Apollo 16 and 17. While major segments of the public favor reducing spending on space, there may be some reluctance to cancel Apollo 16 and 17 in view of the returns associated with Apollo 15. In the event of a space catastrophe, public reaction to the Soviet mishap this summer should serve as a guide. Sympathy was expressed but there was no major call either to abandon manned flight or to criticize manned flight proponents.

Conclusions

1. There is no easy way to cancel both Apollo 16 and 17 and keep near-term employment up.

   - New programs would not have sufficient employment impact by 12/72, unless very costly commitments made.
   - Skylab cannot productively use more people.
   - Options B-D (which lessen Apollo unemployment and cost savings impact) do not have convincing programmatic rationales.

2. Option B would be the least objectionable alternative if a rationale could be developed (e.g. "We are cancelling Apollo 17 because other national programs have higher priority. In order to make the last trip to the moon as productive as possible, we are delaying Apollo 16 to December 1972. This will allow scientists to examine further the material returned by Apollo 15 and to make changes in the activities of the astronauts or the preferred landing site.")

Attachment IV

Earth Orbital Flights

Current Mission Status	Flight Date
Last Skylab Revisit (56 days)	10-12/1973
First Manned Shuttle Flight	1978-79
Potential gap in U.S. manned space flight - 4½ to 5½ years	

Options

Flight Description	Launch Date(s)	Outlays in M FY 73	Outlays in M Total	Minimum Gap (yrs)	New Employment by 12/72
A. Baseline (Skylab)	1973	-	-	4½	-
B. Skylab Revisit	1974	0	100	3½	-
C. Soviet Rendezvous ..	1975	10	275	2½	+300
D. Three CSM					
1. Minimize gap	75-76-77	10	700	1	+300
2. Skylab inspection	74-75-76	30	650	2	+1600
3. Accelerated program	74-75-76	40	650	2	+2200

Employment Impact

	6/72	12/72	6/73	12/73
A. Baseline	52,000	47,700	38,300	29,000
Cancel 16 & 17	-3,800	-6,200	-1,900	-500
New baseline	48,200	40,800	36,400	28,500
B. Skylab 74 visit	-	-		+2,000
C. Soviet Rendezvous	-	+300	+1,300	+3,200
D. Three CSM				
1. Minimize gap	-	300	2,000	3,500
2. Skylab inspection	-	1,600	3,400	4,300
3. Accelerated program	1,100	2,200	3,800	4,000

Analysis of Options

A. Baseline (Complete Skylab in 12/73)
- Skylab 4 is last approved manned flight before shuttle
- Begins manned flight gap of 4½ years minimum

- Allows major restructuring of manned flight base
- Prestige role of manned flights in 1974-78 is unclear; a 15 year old capability may be relatively unimportant to domestic and foreign public by 1974
- Soviets are likely to have an active manned flight program emphasizing Salyut space laboratories in the mid-1970's

B. Conduct Skylab revisit (Skylab 5) in 6/74
- Could be done with minimum modifications to spacecraft
- However, augmentation for an earth resources mission would require major hardware changes and increase costs by $60 M
- Extends current program 6 mos. at cost of approximately $75-100 M
- Skylab may no longer be habitable

C. Soviet Rendezvous
- Justified primarily on grounds of international cooperation with the Soviets
- Would also divide in half the scheduled 4 year gap in manned space flight
- Program criticized as an expensive stunt by OST
- Nothing new would be learned of programmatic value
- Mission in 1975 builds up slowly - long lead work on new docking airlock and earth resources maneuvering capability is needed

D. Three Earth Orbital Missions

- Gap minimizer
  - In addition to the Soviet rendezvous, this option also provides two subsequent earth resources flights in 1976 and 1977
  - Last flight would occur only one year prior to shuttle
  - Avoids near-term rapid build-up (and outlays)
  - Although manned earth resources missions are of low scientific priority, this option would maximize potential returns
  - Maintains a visible manned program and keeps teams together

- Skylab inspection
  - In addition to the Soviet rendezvous, this option provides one flight before and one flight after the Soviet rendezvous
  - First flight would inspect and/or dock with Skylab; subsequently conduct a 14-day earth resources mission
  - Three missions would be: 1974 - Skylab inspection; 1975 - Soviet rendezvous; 1976 or 1977 - Earth resources
  - There is no programmatic urgency to a 1974 mission
  - Combined FY 1973 and 74 outlays are $30-40 M greater than option C or D (gap minimizer)
  - Near-term earth resources mission is poorly defined

- Accelerated program
  - Same as Skylab inspection but reprograms FY 1972 Apollo funding to increase lead time
  - Employment and outlays in next 18 months increase sharply
  - No programmatic justification for accelerated schedule

Conclusions

1. Seriousness of a gap in manned flight cannot be substaniated on programmatic grounds. The scientific return would be meager. There is no intrinsic urgency for these missions.

2. However, if for reasons of national prestige a manned space program is considered mandatory during the mid-1970's, these options could provide the cheapest method of conducting manned space flight.

3. A Soviet rendezvous is justified only on the basis of international political cooperation and national prestige. Although spectacular, it would have little programmatic value and similar objectives could probably be achieved by other means at much less cost.

4. Unemployment effects of the scheduled Apollo/Skylab phase-down would be reduced to a more gradual decline, particularly in the near term.

5. All of the options can be achieved without the services of the Marshall Space Flight Center.

33766

THE WHITE HOUSE

WASHINGTON

LIMITED OFFICIAL USE

October 22, 1971

MEMORANDUM FOR

George P. Shultz
Director
Office of Management and Budget

SUBJECT: US/USSR Space Cooperation

I understand that the subject of funding for a proposed US/USSR joint docking mission is currently under consideration within your budget review process. I am also aware of the concern expressed in your memorandum, of August 10, on this subject.

Because of the upcoming summit meeting with the Soviets, any recommended budgetary action concerning this proposed joint docking experiment should be forwarded for the President's decision so that he can weigh all relevant considerations, including the budgetary factors.

Henry A. Kissinger

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Attachment IA

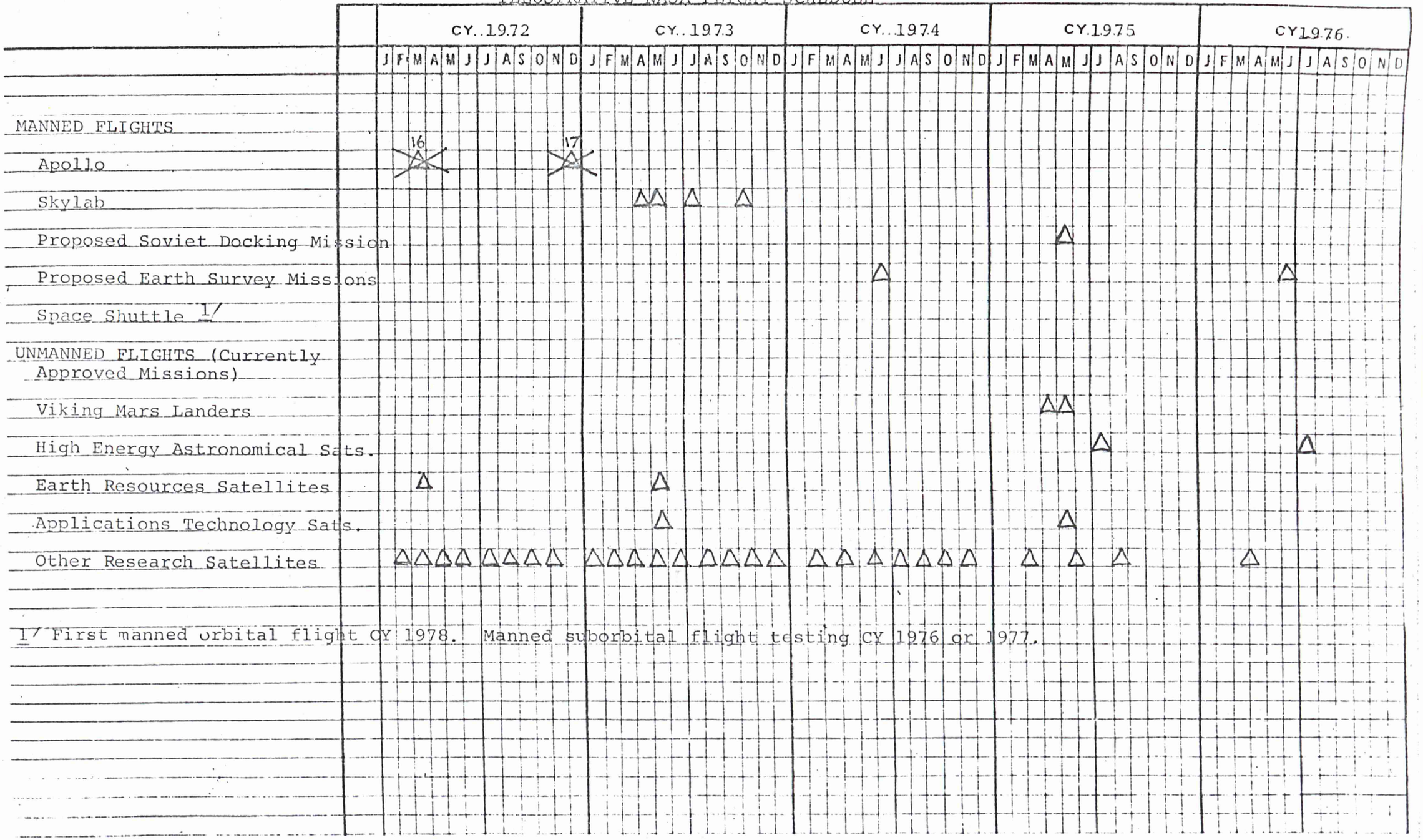
Illustrative NASA Program
Outlays ($M)

	1972	1973	1974	1975	1976	1977
NASA Ongoing Program 1/	3,181	3,100	2,700	2,300	2,300	2,300
Cancel Apollo 16 and 17 (See Attachment III for other options)	-10	-117	-9			
Conduct Soviet docking mission (1975)	+5	+10	+90	+135	+40	
Add two earth orbital missions (1976 and 1977)		-	+10	+45	+150	+160
Move up two earth orbital missions (to 1974 and 1976)		+20	+10	+30	+30	-100
Initiate reduced cost shuttle program (tentative OMB estimate)	-	+70	+300	+415	+420	+500
Cancel Grand Tour of outer planets	-	-20	-90	-145	-130	-110
Fly current spacecraft to Jupiter and Saturn	-	+10	+15	+35	+30	+25
Cancel NERVA and advanced nuclear propulsion technology	-	-5	-15	-15	-15	-15
Resize NASA's Base						
. Shutdown Marshall, Huntsville, Ala. (1/74 - after Skylab)	-	-	-50	-190	-190	-190
Transfer 500 top Marshall technical experts to MSC (e.g. propulsion, cryogenics, guidance)	-	-	+3	+12	+12	+12
. Shutdown JPL, Pasadena, Calf. (1/75 - after Viking orbiters fab.)	-	-	-	-30	-132	-132
Continue Deep Space Tracking Network	-	-	-	+5	+20	+20
Transfer 400 top JPL planetary experts to Langley or Goddard	-	-	-	+2	+10	+10
. Reduce Lewis Research Center, Cleveland, Ohio (7/73 - close down Plumbrook Station and reduce space electric power activities)	-	-	-10	-20	-20	-20
Other FY 1973 Budget actions		-29	-14	-14	-15	-15
Total Outlays	3,176	3,039	2,940	2,565	2,510	2,445

1/ The runout costs of NASA's on-going programs assuming no new starts in FY 1973 and no additional funding for the Space Shuttle beyond FY 1972. Starting in FY 1974, Space Science and Applications and Advanced Research and Technology are projected at about the current level of activity.

Attachment IB

ILLUSTRATIVE NASA FLIGHT SCHEDULE



1/ First manned orbital flight CY 1978. Manned suborbital flight testing CY 1976 or 1977.

OFFICE OF SCIENCE AND TECHNOLOGY
WASHINGTON, D.C.

October 21, 1971

To: Mr. Whitehead

The attached is privileged information. Please do not duplicate or distribute this document.

RCD

Russell C. Drew
Technical Assistant

IDA
INSTITUTE FOR
DEFENSE ANALYSES

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Alexander H. Flax, President

PRIVILEGED

October 19, 1971

Dr. Edward E. David
Executive Office of the President
Office of Science and Technology
Washington, D. C. 20506

Dear Ed:

The Space Shuttle Panel has now had several meetings over a period of two months and I believe it would be useful to give you an interim report on our current impressions and opinions regarding the NASA Space Shuttle Program. Even during this brief period, as a result of ongoing technical and cost trade-off studies and program changes to accommodate changing FY-73 budget and peak year funding guidelines and constraints, the shuttle configuration and program phasing have been undergoing continuous revision. While, in my opinion, the searching examination and revision of the program which has been taking place has been, for the most part, healthy, it has limited the extent to which the Panel has been able to review in depth the merits of particular approaches and the plausibility of the economic and other justifications for the changing program plans.

Given the diversity of scientific and technical backgrounds, interests, and value systems represented among the Panel members, I am sure you will not be surprised to learn that up to this time, we are far from achieving any degree of unanimity regarding the attractiveness, utility, desirability, or necessity of the space shuttle system or, for that matter, on the virtues of alternatives to it. Nevertheless, there are some areas of fairly general agreement and some points of disagreement which I believe are worth reporting in order to help illuminate the critical issues.

Most of the members of the Panel doubt that a viable shuttle program can be undertaken without a degree of national commitment over a long term analogous to that which sustained the Apollo program. Such a degree of political and public support may be attainable, but it is certainly not now apparent.

PRIVILEGED

Planning a program as large and risky (with respect to both technology and cost) as the shuttle, with the long-term prospect of fixed ceiling budgets for the program and for NASA as a whole, does not bode well for the future of the program. Already some decisions regarding the shuttle system and program have been taken which introduce additional hazards to the success of the program technically, operationally, and economically in order to reduce projected peak-year funding requirements.

For this and other reasons, most Panel members feel that serious consideration must be given to less costly programs which, while they provide less advancement in space capability than the shuttle, still continue to maintain options for continuing manned spaceflight activity, enlarge space operational capabilities, and allow for further progress in space technology.

The attachment contains a more detailed discussion of questions considered by the Panel under the headings:

I. Space Shuttle Objectives, Benefits and Viability
II. Shuttle System and Program
III. Shuttle Cost, Economics and Risks
IV. Space Program Assessment
V. Alternative Programs

Although I have tried in this letter and the attachment to reflect the consensus of the Panel, there has been no opportunity for the members to review and comment on them and they should therefore be considered to be in the nature of a Chairman's report on Panel activities.

Sincerely,

Alexander H. Flax

Attachment

I. Space Shuttle Objectives, Benefits and Viability

First, it is appropriate to report a view which I believe represents a consensus of the Panel. The space shuttle system (in its various manifestations as they have evolved over the past several months) represents a technical synthesis which, to a remarkable degree, integrates into a single vehicle system and proposed mode of operation the means for potentially achieving improvements and advances relevant to virtually all foreseeable future space program objectives including:

1) Reduction in recurring launch costs at all projected levels of unmanned activity not involving sharp reductions from present levels.

2) Attainment of a capability for recovery and reuse of payloads, thereby making possible long-term savings in payload costs.

3) Attainment of a versatile capability for on-orbit adjustment, maintenance, modification, replenishment, and refurbishment of unmanned space vehicles, which must be viewed, not merely as a cost saving potential, but also as opening the way to new and different space activities and new ways of conducting present activities.

4) Retention of a large payload launch capability to earth orbit after phasedown of the Saturn/Apollo launch and support complexes, which may be of future importance to either the civil or military programs.

5) Provision of an option for support of future lunar program activities and with assembly in space techniques, for future large planetary missions.

6) Attainment of a capability for transportation of men to and from space stations in a relatively undemanding and unstressful environment at relatively low recurring cost.

7) Acquisition of a low-orbit space rescue capability for space stations and other manned programs.

All of these benefits can be obtained in greater or less degree by developing systems other than the shuttle but it is difficult, if not impossible, to devise a single system other than the shuttle which would so adequately provide all of them. Further, by virtue of the fact that the shuttle is a system designed around man as an operator, it is difficult to conceive of a better way to achieve ready, safe, and easy access to space activity by man. Thus, the merit of the shuttle development is greatly enhanced if there is the expectation of a future space program in which frequent and extensive manned activity is an essential feature.

If an enthusiastic, optimistic, and expansionary view is taken of the probable growth of the nation's military and civilian space programs over the next twenty years and particularly if continuing growth in the manned program (e.g. space stations, lunar and planetary exploration, and the evolution of, as yet, undefined roles for man in space) is envisioned, the development of the space shuttle as proposed by NASA is undoubtedly the most important and valuable major new space program which could be undertaken at this time. However, both the investment and economic risk in the program are high and the payoffs may only materialize in the more distant future if space activities, and particularly manned activities, reach or exceed levels currently anticipated by most members of the Panel. A sustained sense of national commitment to the program and its objectives will be necessary to assure continuing support during the long period of high expenditures for development, facilities and production before any real payoff is obvious.

II. Shuttle System and Program

The reviews and revisions of space shuttle configuration and program plans which have been taking place over the past few months have resulted in a number of significant changes to the proposed program. Some of these changes represent adoption of better technical or economic choices than were made in earlier versions of the shuttle based on more complete analyses and design studies which became available later. Clearly in this category was the decision to lower the recoverable booster staging velocity to 7,000 ft/sec, permitting the use of a heat-sink booster which should be simpler, cheaper to develop and produce, and more economical to operate.

Once this reduction in staging velocity was adopted for the recoverable booster, there was a reconsideration of whether the booster engines should be the same high pressure $H_2/0_2$ engines planned for the orbiter or $RP/0_2$ engines essentially based on the F-1 engine technology used on Saturn I-C. It appears now that the decision is definitely to use the F-1 engines although they were never originally designed for reusability or automated on-board checkout which are the underlying themes of the shuttle program. Following this decision, the current trend seems to be to favor use of the Saturn I-C airframe design (suitably modified, beefed-up and reconfigured with added wings, tail, etc.). This supposedly advantageous configuration for the recoverable booster may well be a chimera and the real merits of proceeding with the SI-C airframe as a skeleton (or phantom shape) for the recoverable booster needs to be carefully assessed.

In the course of evolving the orbiter design, a configuration with external (droppable from orbit) $H_2/0_2$ tanks has evolved. This has the effect of making a smaller, lighter, less expensive orbiter vehicle. However, the drop tanks are expended on every flight which makes the cost per flight heavily dependent on the (presently indeterminate) cost of the tanks.

Under the pressure of peak-year funding constraints, NASA has evolved a Mk I/ Mk II approach to the shuttle. The principal impact of the Mk I approach is on the orbiter which would initially use the J-2 $H_2/0_2$ engine from the Saturn program (or an improved version, the J-2(S)) in place of the high-pressure $H_2/0_2$ engine for a loss of about 30 points of specific impulse. This would "save" about $400-500 million of RDT&E cost for development of the high pressure engine until the Mk II phase. However, the loss in performance (10,000# in polar orbit for the J-2 or 24,000# for the J-2(S) vs. 40,000# for the high-pressure engine), the problems of reuse and checkout time and cost with engines designed for expendable launch vehicles, and the necessity to redesign, integrate, and test a second engine for the orbiter later in the program, make this aspect of the Mk I/Mk II approach a very dubious course of action. The Panel questioned the wisdom of proceeding in this way.

Other reductions in orbiter costs projected in the proposed Mk I/Mk II program related to using existing aircraft avionics hardware and techniques wherever possible and using the existing components and technology of hypergolic storable propellants for the altitude control system rather than $H_2/0_2$.

These substitutions probably reduce development risk and uncertainty; the direct effect on costs is probably difficult to state accurately although NASA has taken an estimate of such reductions into account in its projected lower cost of the Mk I/Mk II program.

The orbiter thermal protection system has still not been chosen because the promising Reusable External Insulation is still in the laboratory experimentation phase and it is too early to predict with confidence which, if any, of the various insulations, coatings, and attachment schemes will meet the desired orbiter objectives for durability in operations as well as adequacy of thermal protection, weight, moisture absorption, etc. For the Mark I orbiter a lightweight ablator material is proposed as an interim thermal protection system. This, of course, has an adverse effect on refurbishment and operating costs.

The net estimated effect of all interim systems on the Mk I orbiter on operating costs is to raise the cost per flight from $5.5 million to $9.0 million. It is apparent that at the present stage of evolution of the Mk I system, this is a very tentative figure, quite possibly low.

In order to hold down expenditures during the years of peak funding, NASA proposes to delay the development of the recoverable space tug (orbit to orbit shuttle) so that it would not become operational until 1985, unless the Europeans, the Air Force, or some other independent source of funds undertakes to develop it. In the cost analysis, this reduces benefits from launch of payloads to synchronous orbit since they must use expendable upper stages until the tug is available. Also, economic benefits from recovery and reuse of synchronous

payloads cannot be achieved until the tug becomes available.

An option still being looked at for the shuttle program is the possible use of a parachute recovered pressure-fed booster in place of the fly-back recoverable booster. The use of a pressure-fed design leads to relatively thick tank walls which may be amenable to reentry loads, parachute retardation, and sea impact. The questions of reusability in light of refurbishment cost and number of reuses still remain to be explored in detail. If such a parachute-recoverable booster proves to be technically and economically feasible, it would be of considerable interest whether or not a shuttle program proceeded and would, in fact, make some of the alternatives to the shuttle program more attractive economically.

III. Shuttle Costs, Economics and Risks

The Panel has been impressed by the large amount of effort which has been put into cost analysis of the shuttle program and into the study of the economic cost-benefit justification for the program. Nevertheless, we are unconvinced that such analyses have sufficient credibility to serve as a primary basis for deciding to undertake such an expensive and high-risk program, although they are undoubtedly extremely valuable in making cost tradeoffs and in considering alternatives in design and program planning. We would also agree that the program objectives and plans should be analyzed in economic terms as one of the elements bearing on the decision to proceed with such a program.

On the other hand, we believe that a decision to proceed with a program such as the space shuttle should be based on an assessment of new capabilities it would provide and whether they serve the national purpose to a degree sufficient to justify the costs (necessarily uncertain). The contributions to such things as national prestige, international relations, and technological posture are by their nature largely intangible and unquantifiable, but they may be as important or more so than a 10 percent return on investment. Therefore, we do not wish to over-emphasize the purely economic justification of the shuttle. However, it is important to realize what the economic risks in a program of the magnitude of the space shuttle may be.

The complex computer-programmed cost model developed by Mathematica, Inc. under NASA contract to assimilate space and launch program data into a present value accounting system, while valuable for detailed comparisons, tends like all such models to focus attention away from essential assumptions and limitations of the model. In fact, there is ample evidence that it is difficult for space program offices and planners to clearly understand the nature of the input data required for the model. The Mathematica study dismisses cost risks by stating that "with an efficiently managed development program of the Space Shuttle and Tug System, the cost escalation experience of the early and middle 1960's should not apply to the present non-recurring cost estimates of the Space Shuttle System." The Panel cannot accept this point of view as valid. It is desirable, however, to consider the cost risks realistically with a much simpler model than that used by Mathematica, Inc. This simpler framework for cost

analysis should be considered to be primarily for the purpose of sensitivity analysis rather than to establish absolute levels of cost-benefit figures.

The small dispersion in the cost estimates for the shuttle program presented by NASA and the various contractors should not be taken to be any indication of the precision of these predictions. Rather it is, in the opinion of several of the panel members who have experience with the hazards of cost estimation in large advanced technological programs, a result of the refinement and homogenization by iteration of the cost estimating ground rules and data among all the groups engaged in the process (a "Delphi" analysis on a grand scale).

Considering all of the technological and operational unknowns involved in the shuttle development and the fact that no vehicles of similar function have ever been designed before or have ever operated over the range of flight regimes required for the shuttle, prudent extrapolation of prior experience would indicate that estimated development costs may be 30 to 50 percent on the low side. Thus, the estimates of $6.5 billion in RDT&E for the Mk I/Mk II shuttle program may range between $8.5 to $10 billion, reflecting increased program costs of $2.5 to $3.5 billion. Similar uncertainties must be considered to apply to other non-recurring costs such as production and facilities (amounting to about $4 billion). Thus a possible total cost uncertainty of about $5 billion for total program costs might be envisioned giving a high estimate of total non-recurring cost of about $15 billion.

At a launch rate of about 40 per year (DOD, NASA and other) over the 13 years used in the NASA cost model and an average payload cost of $30 million (not unrepresentative of the mix of current unmanned payloads), the total payload costs would be $15.5 billion. Thus, even if the total payload cost were saved (including those launched to Mars, Venus, etc.) over a 13-year period by recovery and reuse at zero refurbishment cost, it would, in the case of the high-end cost estimate, barely offset the cost of the shuttle program without discounting. A more realistic (although probably generous) estimate of the savings possible through payload recovery might be 50 percent of payload costs which could account for only $7.5 billion.

The other area of savings which is offered by the shuttle is in launch cost. Average launch cost with current expendable boosters is $12 million (projected into the 1978-90 era in the NASA cost model). Thus, with current expendable boosters, the annual launch cost will be $500 million. The cost of Mk II shuttle operation per flight is usually cited at $5.5 million; thus the cost for 40 flights per year will be $220 million. The saving of $280 million annually for 13 years amounts to $3.6 billion. However, a doubling of the operational cost would reduce the saving to $60 million annually or $780 million. (The possibility of launching more than one payload per shuttle flight exists, provided the desired orbits, launch dates, and volume requirements are compatible. However, this must be offset by the necessity for additional flights to recover payloads for reuse; not all of these can be considered to be convenient and compatible with flights scheduled for launch of payloads.)

The operating cost estimates of $5.5 million per flight for the shuttle, within narrow limits, must be considered to be a very rough estimate at this time, particularly for the early years of shuttle operation. The actual value will depend upon the time between overhaul of equipment not yet designed, refurbishability of thermal protection system materials not yet out of the laboratory, and on the feasibility of operating in the shuttle in an "airline" mode radically different from all past experience in space operations.

Just to note one specific area of uncertainty, the droppable hydrogen/oxygen tanks of the orbiter which are expended on every flight are currently estimated at about $35 per pound or $1.8 million per flight. However, cost estimates for production currently range from $20 to $100 per pound. Since the projected tank costs are a substantial fraction of the cost per flight of $5.5 million, the uncertainty in the latter figure due to tank costs which is seen to be from -$750,000 to +$3.2 million introduces an uncertainty of greater than 50 percent in launch costs. Further refinements in tank design and cost will no doubt be accomplished to narrow this uncertainty, but the problem is compounded many times over in the design of the components and subsystems of the shuttle.

To summarize, a payoff matrix (undiscounted) can be set up to show the effects of cost underestimates in non-recurring cost and launch costs, and the influence of increasing space traffic and average payload costs is as follows:

Savings* from Shuttle -- Billions

Recurring Cost	Launch Cost		
	Baseline	1.5 x Baseline	2 x Baseline
Baseline+	0	-1.5	-3.0
1.2 x Baseline	-2.3	-4.7	-5.2
1.4 x Baseline	-4.5	-6.0	-7.5

Traffic	Payload Average Cost	
	Baseline+	1-1/3 x Baseline
Baseline+	0	+3.0
1.25 x Baseline (50 flts/Yr)	+3.0	+6.3

*Negative values denote losses -- undiscounted

+Baseline non-recurring cost $11 billion; baseline shuttle launch cost $5.5 million per flight; 40 flights per year; $30 million average payload cost.

In consideration of the technical and operational risks and uncertainties and the sensitivity of potential savings from the space shuttle system to the resulting uncertainties in development production and operational costs, it is clear that there is little incentive to embark on the program if the aim is primarily to achieve the possible economic benefits. Rather, if the program is to

be undertaken, it must be primarily for the purpose of acquiring new capabilities, aggressively pursuing new opportunities in space, and assuring continuing national leadership in space technology and space activity. The relative economic advantages of the shuttle in an expanded space program are apparent in the second table above, since a larger number of launches and the higher cost of more advanced payload can provide savings of the same order of magnitude as the program cost risks associated with technical and operational uncertainties. The shuttle is particularly attractive if expanded and frequent manned spaceflight activities are foreseen, since in that case, costs of using expendable launch systems and Apollo type recovery will substantially increase the cost of using present technology over the figures considered above and will correspondingly increase the economic benefits of the space shuttle.

IV. Space Program Assessment

The general view of the Panel was that:

1) No significant role for manned spaceflight had been identified in space applications (military and civilian) or scientific experimentation. The NASA suggestion that the shuttle would allow scientific experimenters to conduct their activities as participants in spaceflight evoked no enthusiasm from the scientists. It must be noted here that new approaches such as the ones proposed by NASA have often not been recognized or appreciated by the putative users and beneficiaries until after they have been demonstrated, but the fact remains that at least, at present, the scientific community in the large doubts that the potential benefits of the space shuttle will be significant for science in relation to the large cost involved.

2) An option for manned spaceflight activities should be retained into the future in view of the potential contributions of manned programs to national prestige, international cooperation, space exploration (although the Panel was divided as to the relative effectiveness of manned versus unmanned exploration), and the possibility of unforeseen future needs (miliary or civilian).

3) The space shuttle program cannot be justified on a purely economic basis for the unmanned part of the space program in view of the marginal benefits which can be shown and the high risk (based on past experience with major advanced technology programs) that both recurring costs and operational costs may be sufficiently in excess of present estimates to cause economic losses rather than savings over the 13-year period of operation from 1978-90.

4) The space shuttle program must be justified on the basis of: (a) the capability it will provide for new, different and more effective utilization of space for military and civilian purposes; (b) its contribution to retaining national leadership and prestige in space technology and advanced technology generally; (c) its unique value in providing easy, safe and flexible access to space by men at relatively low cost, if a program involving intensive and frequent manned spaceflight activity is to be undertaken.

5) In order to meet these criteria for justification of the space shuttle, it is necessary to postulate expanding rather than level space budgets for DOD and NASA over the next ten years. If the shuttle is to achieve the potentials which it may offer, it must generate (as many innovations have in the past) demands for space operations well beyond those now contemplated and funds would have to be made available to develop the necessary programs for utilization of the shuttle.

6) In order to insure sustained public support for the space shuttle over the long period of high expenditures before the first flight in the face of possible cost escalation and technical difficulties, it will be necessary to obtain a

> degree of national commitment to the program and its objectives similar to that which attended the Apollo program. It seems unlikely that the aim of reducing space program costs and achieving a return on the investment ten to twenty years hence could be more than a minor factor in sustaining such a commitment.

V. Alternative Programs

The Panel considered a number of alternatives to development of the shuttle which would provide lesser capabilities and lesser potential long-range future cost savings than the shuttle program but which met to some degree the requirements for a continuing manned program and for further progress in space and spave vehicle technology. Unfortunately, the costs and technical data for such programs have not been available in anywhere near the depth and detail as for the shuttle program; this is not at all surprising in view of the massive funding and emphasis which the shuttle program has received over the past two years.

Objections can be and were raised to every alternative program on the grounds that, although it was cheaper than the shuttle program, the potential benefits were so much smaller that the cost of such programs could not be justified. Such objections effectively left only two alternatives for the next ten years: either (1) proceed with the shuttle program now or soon, or (2) drop manned spaceflight activity after Skylab A and the possible Salyut visit and do nothing new in space vehicle and space operations technology. Most of the Panel rejected these "all or nothing" views.

There were three principal alternatives to deciding now to proceed with the shuttle with a 1978-79 objective for the first manned orbital flight which gained some degree of support within the Panel. This support was subject to various qualifications such as, on the one hand, that they should be considered as preferable to the shuttle and, on the other hand, that they should be considered only if the shuttle were rejected because of budget limitations or the failure to achieve a sufficient degree of national commitment. In any case, it was agreed that all the alternatives required a good deal more technical, operational and cost analysis before they could proceed. The alternatives are as follows:

A. Defer Decision on the Shuttle

This alternative contemplates the possibility that with further studies, analyses and technology advancement, uncertainties and risks in the shuttle technical and cost areas can be reduced to a point of greater acceptability and that the national climate for generating the requisite degree of commitment to the program may be improved over the next year or two. This alternative can, of course, be combined with a period of more intensive study of other alternatives so that there would be a better basis for decision at some future time.

A deferral of decision involves lengthening the period during which the U. S. will have no option for a manned spaceflight activity. Present planning by the NASA Office of Manned Spaceflight (OMSF) calls for two Apollo flights in 1972, three Skylab flights in 1973, a Skylab revisit in 1974, and possibly Salyut docking in 1975 and 1976. If carried out on the current schedule, the shuttle

program could achieve first manned orbital flight in 1978 or 1979, giving a two or three year lapse in U. S. manned spaceflight.

If a decision on the shuttle is deferred for a year or more, the hiatus in U. S. manned activity could extend to four or five years. There is some Saturn/Apollo hardware which, if not used for backup in Skylab or Salyut docking could be used to support another Skylab (which, however, would have no backup). The continuation of the Saturn/Apollo industrial and support effort even during periods when there is little spaceflight activity is very expensive ($500 million to $1 billion annually) with present hardware and mode of operation designed to launch the very large and expensive payloads for manned lunar flights.

It does not seem economically sound to adopt a course of action which would lead to having to continue the Saturn/Apollo industrial and support base for an extended period, the duration of which is necessarily unknown at the time it is decided upon. This is particularly so because Saturn/Apollo assets are limited in number (4 Command and Service Modules will remain after Skylab and Salyut docking) and reopening manufacturing lines would further significantly increase the already high cost of this approach.

Therefore, if a shuttle decision is to be delayed beyond July 1972, if a viable continuing manned spaceflight option is to be assured without undue economic burden, it would be essential to initiate detailed engineering design and planning for one of the two alternative launch vehicle and spacecraft programs.

B. Ballistic Recovery System

This alternative involves foregoing technological innovation in launch and recovery. However, it permits a continuing manned spaceflight capability, at least for low orbit, at a cost considerably lower than presently possible with Saturn/Apollo systems.

One proposal for a new ballistic recovery system is the "Big Gemini" which is billed as a growth version of the Gemini recovery capsule, but, which to all intents and purposes, is a new spacecraft design based on Gemini technology. The vehicle is capable of reentry with 2000 pounds of payload and with a Titan III M launch vehicle can be orbited with 7,000 pounds of payload, including cargo carried in a non-recoverable cargo-propulsion module. It has a passenger capacity of nine men.

There is also a proposal to modify the Apollo command module to make it refurbishable. This would be capable of launch and recovery with four men and would be launched with a modified expendable service module similar to the one used to launch Apollo. This system could most readily be launched by a Saturn IB with which the basic command and service module hardware is already compatible.

Apparently, NASA has considered such ballistic recovery systems only as a short-term interim manned spaceflight capability to cover delays of a year or two in shuttle availability. Therefore, there has been no study of the best approach, if a longer-term program were to be pursued. The Saturn IB/Apollo

program might be the best solution if only a short period were involved, but it is probably not the best choice for a system to provide for a period of 5 to 10 years. The Big Gemini/Titan III approach is estimated to cost $.8 to $1.2 billion in RDT&E. However, annual program support costs and direct operating and refurbishment costs would be substantially lower. A careful and complete comparative study of the two system approaches and perhaps other alternatives is required before the choice could be made for this alternative.

The selection of the launch vehicle also requires more analysis. In addition to Titan III M and Saturn IB, consideration should also be given to versions of the Titan III L (large-core Titan vehicle with varying numbers and arrangements of strap-on solid rockets). The parachute-recovered pressure-fed booster might also be attractive for this program if it proves to be feasible and cost effective. Launch vehicle selection should be based not only on requirements of the manned spacecraft, but also on the payload requirements of the space station modules and experimental hardware which the manned spacecraft would presumably be supporting.

The ballistic recovery vehicles and non-recoverable launch vehicles contemplated in this alternative would be justified only if a slow-paced manned spaceflight program were contemplated (2 to 4 manned flights per year). If the annual frequency of manned flight activity rose much above 5, the cost of each flight ($50 to $150 million) would quickly become prohibitive. On the other hand, for the low flight rates, this program would require much lower initial investment than the shuttle and should provide a continuing manned spaceflight capability

at considerably lower cost than the present Saturn/Apollo systems. Except for providing a launch vehicle system of higher payload capacity in common use, this alternative would have little effect on unmanned space programs. It would provide a respectable capability to support manned space experimentation and other space station activities. The crews would, however, be subjected to the same launch and recovery accelerations and environments presently experienced by the Apollo astronauts.

C. Winged Orbital Vehicle

The third alternative for a manned spaceflight system, favored by some members of the Panel, was the development of an unpowered winged orbiter with a much smaller cargo bay and payload capacity than the shuttle orbiter, to be launched by a version of the Titan III L or perhaps the pressure-fed recoverable booster (with a new second stage).

This vehicle would have a 10 ft. by 20 ft. cargo bay (vice the 15 ft. by 60 ft. of the shuttle orbiter) and a 10,000# payload capacity for eastward launches (vice the 73,000# capacity of the Mk II orbiter). Independent preliminary studies suggest that such a vehicle would have a gross weight of 50,000#-60,000#. However, NASA and contractor estimates would place the gross weight of such a vehicle at 90,000 to 100,000 pounds, which seems anomalous in view of the 120,000# to 140,000# estimates for the Mk II orbiter. However, this question could be easily resolved by more detailed study.

RDT&E costs for this vehicle and the Titan III L launch vehicle would be about $2.5 billion. The refurbishment costs for the spacecraft after every flight should be less than those of the Mk II orbiter, say $2-$3 million, in contrast to the $25 to $50 million of the Big Gemini or Apollo capsule. Thus, if the manned program activity rose to as many as ten flights per year, the cost offset would be between $200 and $500 million--impressive but hardly enough to provide a 10 percent return on investment. Other savings in recovery costs have not been estimated.

The winged orbital vehicle could provide a more convenient and lower cost means of recovering men from space missions; it would insure greater safety in unscheduled aborts from orbit; it would entail making progress in reentry vehicle technology on a lower scale of risk than the shuttle orbiter; it would allow the acquisition of experience in payload recovery for smaller payloads or high-value parts of payloads, on-orbit adjustment, maintenance, refurbishment and replenishment; and finally, it would lead to the accumulation of a body of data on the techniques and operational characteristics and costs of reusable orbital recovery vehicles. Because of the relatively high cost of launch with expendable launch vehicles, the winged orbital vehicle would not, except in exceptional cases, offer the reductions in payload costs associated with the shuttle concept. It might lead to some benefits of this kind if the parachute-recovered, pressure-fed booster proved to be feasible.

D. Other Alternatives

Other alternatives were briefly considered. Sparse data were available on these other alternatives but, at least on the basis of these sparse data, most Panel members were not favorably impressed with them. They were:

1) Recoverable Booster -- The recoverable booster is an element of the shuttle. If developed alone and if a sufficiently cheap high-performance second stage were available ($5 to $10 million), launch costs for large payloads would be much lower than current costs and the system would be competitive with Titan III for other payloads. The recoverable booster could be used to launch the ballistic recovery vehicle or the winged orbital vehicle, reducing its per flight costs. However, it was generally agreed that development of such a booster would be attractive only as a step toward a complete shuttle system in a program which deferred orbiter development for several years. In such a phased development, the recoverable booster first would minimize launch costs for all large payloads and manned flights before the time when the orbiter became available. However, the RDT&E costs for a full-scale recoverable booster would be $3-$4 billion.

2) Mk II Orbiter Glider -- This alternative would comprise the Mk II orbiter without engines launched by an expendable launch vehicle. Unless the parachute-recoverable pressure-fed booster became available, costs per launch would be so high as to preclude the cost benefits sought in the shuttle program. RDT&E for this vehicle is estimated to be $2.5-$3.5 billion. It appeared that development of this vehicle would be justifiable only as a step in the phased implementation of a full shuttle program.

3) Airbreathing Recoverable Booster -- It was suggested that if the shuttle were delayed several years (Panel opinions varied as to the number of years), it would be feasible to replace the rocket engines of the shuttle booster by air-breathing engines (turbo-ramjets). This would reduce the size and weight of the booster, since oxidizers would not have to be carried, although the cost would not decrease as much as this would imply because of the cost of developing

and integrating the airbreathing engines. While this would constitute a significant technological achievement, it appeared that this approach would not significantly affect the economics of the shuttle nor would it enhance the prospects for its utilization.

4) Smaller Recoverable Booster and Winged Orbital Vehicle -- This option consists of developing a smaller recoverable booster similar to the shuttle booster to the winged orbital vehicle program of alternative (10,000# payload) 2) in combination with a low cost $H_2/0_2$ second stage. The second stage would make use of the low-cost drop tank proposed for the shuttle orbiter. The booster plus second stage would be used to launch both unmanned payloads and the winged orbital vehicle. RDT&E cost for this alternative was preliminarily estimated to be $4.5 to $5.0 billion. If second stage cost production could be held to $6 to $8 million, this system would provide substantial launch cost reductions for heavy payloads including the winged orbital vehicle. However, the orbital vehicle would not be capable of recovering many large payloads or the space tug because of cargo volume limitations. It might recover the engines, guidance and electronics modules of a suitably designed space tug if the tug, fuel and oxidizer tanks were abandoned on each flight. Because this system required a very large investment and appeared to offer less potential for off-setting cost reduction through payload reuse and recovery, it did not appear to be as attractive as the shuttle.

5) Stage-and-One-Half Shuttle and Variants -- The basic concept of this alternative is to have only a single spacecraft in the system, the orbiter. Fuel for the low altitude part of the launch is carried in large expendable drop tanks. The orbiter contains all the engines and fuel from both the drop tanks and the on-board tanks is fed through a common system into the orbiter engines.

Since only the orbiter vehicle (plus tanks) needs to be developed, procured and operated rather than two (booster plus orbiter) as in the case of the "conventional" shuttle, lower costs in RDT&E and Investment would be

expected, but because of the large drop tanks which must be expended on every flight (120,000# to 130,000#), operational costs would increase. Also, at least in the version which has been studied in greatest detail, fuel and oxidizer tanks for the "upper stage" portion of the launch have been retained in the orbiter. This factor, plus the necessity to carry more engines in the orbiter, results in a vehicle at least twice as heavy (dry weight) as the Mk I/Mk II orbiter. Since the development problems of the orbiter are inherently considerably more difficult than those of the booster in terms of sensitivity to weight increases and the requirements for thermal protection, it is not clear at this time whether the increased risk is worth the reduction in non-recurring cost which this alternative offers. However, it appears that this configuration is worthy of further study, if a decision to proceed on the shuttle is deferred.

There are obviously many variants of the stage-and-one-half concept possible by varying the amount of fuel carried internally in the orbiter and in expendable tanks which may themselves be staged to drop off at various points in the launch trajectory. A further variant is in the form of so-called rocket assisted takeoff in which an orbiter with drop tanks has an expendable first stage comprising large solid rocket motors. Obviously, varying non-recurring and operational costs can be generated depending on the amount of hardware expended per flight. At the present time, although there is insufficient data to render a final judgment, there appears to be no obvious advantage to these variants in terms of overall shuttle program objectives and economics.


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CRITERIA

In summary, the U.S. should continue as a peaceful spacefaring nation and structure its programs to enhance our position and image of world leadership.

a. Conduct a balanced program of exploration, science, and application, which also contributes to the advancement of technology.

b. Conduct a visible and reasonably continuous program of manned space flight, which develops, tests, and utilizes applications of man's capabilities.

c. As a minimum, our program should be planned to maintain our favorable image vis-a-vis the USSR.

d. Options for innovative international cooperation should be evaluated by the Administration as the opportunities arise.

More specifically:

1. The space program should be made up of projects each of which:

   a. lends itself to evolutionary development, allowing proof of principal, reduction of technical risk, and demonstration of payoff along the way by producing useful results at several intervals in a multi-step development;

b. is not so large as to force future imbalance in a fixed-budget space program, nor because of its size, should it become the major driver of the space program as a whole.

c. In the case of the shuttle, an acceptable example would be to develop a reusable orbiter in this decade, and then followed by a reusable booster if found to be desirable in the 80's.

2. The space program should stimulate and enhance the practical benefits from space operations.

a. Continue the rapid development of new uses and innovations in space.

b. Projects and technological areas should be pursued that have potential commercial or operational application, but which are not at the stage of being cost-effective. When commercial or operational viability is demonstrated, as determined outside NASA, the program should be transferred to the user or to the commercial sector of the economy.

3. Our efforts should keep options open for international cooperation.

a. International cooperation projects must be individually judged on the bases of answers to the following questions: (1) is the projected benefit clearly and demonstrably worth the cost, recognizing that the value of space cooperation depends strongly on the matter of visibility; (2) are we

committing ourselves inadvertently to more than the particular project; and (3) is an appropriate balance being maintained between our national and our international space activities?

b. The concept of international cooperation should be based on the assumption that arrangements will be reciprocal and mutually beneficial, bearing in mind that world leadership will require that we compete with as well as cooperate with other nations.

c. Only those projects should be undertaken which are sufficiently straightforward in both a technical and management sense that we are reasonably certain they will increase rather than injure our mutual friendship. Generally speaking, visible undertakings such as joint payload or exploration missions, including manned missions would appear more advantageous than joint engineering projects which increase the likelihood of management problems and technology transfer.

d. We should put ourselves into a position that would permit the US-USSR cooperation, while recognizing the necessities of having political and mission flexibility and reciprocity of prestige.

e. There should be sufficient mission flexibility so that important elements of our program do not become dependent on cooperative arrangements.

OTHER LESS IMMEDIATE CONSIDERATIONS

1. Management factors to be considered.

   a. Shape institutional base to programs, not vice versa.

   b. Work towards efficient consolidation of management and base.

   c. The present NASA structure was appropriate to Apollo, but might be more responsive to future directions if realigned along other lines, e.g., (1) exploration; (2) development of new, non-commercial space applications; (3) research in new space-oriented and aeronautical technology; (4) space science, and (5) launch operations and booster development, which might work toward being a self-supporting service. Manned space flight should be an integral and appropriate part of the exploration, applications, and science programs.

2. A productive exploration and science program should be continued from space for its benefit to the advancement of human knowledge and for the prestige that accrues to the U.S.:

   a. Exploration missions relate to national image and should be funded by NASA.

   b. Space science might be selected and judged in relation to the U. S. science program as a whole, and the experiment and recurring costs might be funded through NSF.

   c. To reduce the cost of space science, NASA might develop an unmanned spacecraft which accommodates and supports a broad range of experiments.

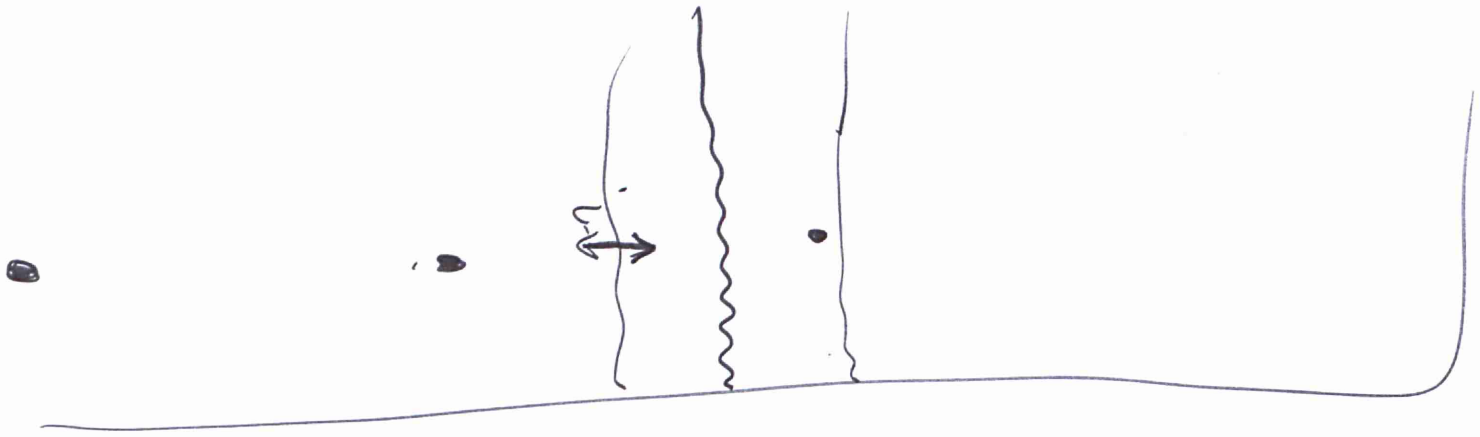
MANNED SPACE FLIGHT

CALENDAR YEAR	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
APOLLO															
SKYLAB															
CSM REVISITS															
POST SKYLAB MISSIONS															
REUSABLE ORBITER (e.g., TAHO)					(1)		(2)								
SORTIE CAN															
RAM															
REUSABLE BOOSTER												(2)			
STATION															

(1) First test flight
(2) First manned orbital flight

EXAMPLES OF POST-SKYLAB MISSIONS

Apollo 18/Orbital	Lunar orbit: mapping, remote geology, mass distribution, galactic radio emission.
CSM Earth Orbital Missions:	Earth observation from high inclination orbits, with emphasis on dynamic phenomenon and earth resources survey. Possibly international crews.
Skylab A Revisit:	Reactivate Skylab and possibly gain operational experience with replenishment and refurbishment.
Skylab B with Extended Revisits:	If Skylab B could support revisits for 2 to 3 years, exploiting the remaining Apollo hardware in this manner would allow an extensive and comprehensive experimental program. Possibly international crews.
CSM-Salyut Docking:	Could be part of a broader CSM earth orbital mission.
Soyuz-Skylab Docking:	Could be part of a Skylab B mission.



Notes on OMB Paper

1. Proposed cancellation of Apollo 16 and 17 clearly must be a Presidential decision and not a budget directive. The national and political implications would have to be assessed and not simply dismissed as in the OMB document. Recognizing the great national, if not international, focus on the success of Apollo 15, it is likely that there would considerable public dismay over an abrupt cancellation based on parsimony. Moreover, many in the scientific community have already raised anticipatory objections to cancellation; a storm of protest could be expected to the actual fact. The vast investment and the last two lunar landing opportunities probably in this century must not be abandoned except for the most profound reasons, none of which appear in the OMB paper.

Any half decision (cancel one, or cancel one and defer one, etc.) does not save enough money to be considered and has several operational drawbacks.

2. The shuttle position is reasonable in opting for an evolutionary approach, not requiring a present commitment to a fully reusable system. OMB also has the right idea in wanting to rely on NASA to develop the alternatives rather than presuming to propose a budget bureau design (even with OST assistance). However, the proffered OMB budget figure

seems to be plucked out of thin air, and they would be hard pressed to defend it as well founded. The cost must come from an acceptable design and not vice versa. It seems to me that the most useful analysis in helping the decision process would be to get from NASA a matrix showing system capability versus cost. NASA has been developing these recently but probably will not push them until they are convinced that MkI/MkII won't fly. I believe that this data will indicate there is a best choice, lying between a fully reusuable system and a glider. The so called TAHO (Thrust Augment Hydrogen Oxygen) design, involving a reusable orbiter and expendable (or "dumb" recoverable) booster, is representative of such a "best choice." We cannot, in any case, string out industry much longer -- a decision must be made and it should be one the industry and NASA can find acceptable.

3. OMB's acceptance of the necessity of a continuing, visible manned space flight program is grudging at best. This is reflected in the fact that even though a program of earth observation and docking missions is tentatively proposed, the rationale offered really seems to argue against the concept. It is apparent to me that political realities dictate the necessity of a continuous manned space flight program. Moreover, most of the people involved in the space program foresee a vital and valuable role for man in our new earth orbital endeavors. In any case, money should be appropriated to preserve the surplus Apollo hardware in order to keep our options open.

4. The paper is sometimes inconsistent, and findings often are stated without adequate supportive reasoning or, on occasions, with almost contrary rationale. This document would seem to be the work of a committee holding uncoordinated views.

Whitehead

THE SOVIET SPACE EFFORT
— — AN ANALYSIS

By Foy D. Kohler and Dodd L. Harvey

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Contrary to popular assumptions, the Soviets are not favoring unmanned space operations over manned. Indeed, the evidence suggests that their main effort in the 1970s will be to deploy a multimanned space-station system. Their overall space program is purposeful and well funded and they have not failed to notice the reductions in the American effort . . .

The Soviet Space Effort — An Analysis

By Foy D. Kohler and Dodd L. Harvey

AUTHORITATIVE Soviet comment on space since the first US lunar landing has been relatively sparse. Yet what has been said lately tells much more about concrete Soviet purposes, plans, and expectations than the enormous outpourings of earlier years. While we can only conjecture what the Soviets may be doing in space for direct military purposes, their recent declarations reveal in some detail the future directions of their general space effort. Their statements over the past couple of years suggest that:

- The Russians will not join Americans on the moon before the late 1970s, if then. Moscow still intends to put men on the moon, but only after they have developed a new line of capabilities.
- The main effort in the 1970s will be to create a multimanned, orbiting space-station system. Their space-station activity is now well under way.
- They will continue their automated explorations of the moon and will press on with automated planetary and interplanetary probes, with prime emphasis on Venus. But their deep-space operations will be strictly secondary to near-earth efforts, with no spectacular new departures in deep space. There are no indications of plans for a planetary "grand tour" during the favorable 1976–79 period.

These policies are being developed against the background of new emphasis on practical benefits from space. The 1971–75 Five-Year Plan, issued in February 1971, focused main attention on spaceborne communications, meteorology, earth-resources survey, geographical research, and "the solution of other economic tasks." M. V. Keldysh, President of the USSR Academy of Sciences, told the April 1 session of the Twenty-fourth Soviet Party Congress that "we must to a larger extent apply [space activities] to the solution of practical problems." Until recently the Soviets had spoken mostly of furthering "scientific knowledge" as the basic aim of their space program. The new emphasis is tied closely to plans and expectations for the space-station system.

Also, the Soviets appear to be generating renewed and growing confidence that, despite the Apollo successes, they can regain space leadership over the United States. This confidence evidently derives not only from recent Soviet successes but also from the reduced scale of US efforts.

Moscow's answer to US lunar accomplishments is that the USSR is going its own way in accord with its own concepts, based upon its own experiences as the "pioneering space power." It professes a high degree of assurance that, through a succession of precisely worked-out stages, the USSR will yet achieve long-term dominance in space.

But contrary to assumptions in the West, Moscow's "own way" does *not* favor automated activity over manned. While it is true that since the US moon landing, Soviet spokesmen have focused heavily on Soviet unmanned space exploits, particularly Luna-16 and Lunokhod 17, and have pictured these feats as more productive and less costly and risky than US manned efforts, they have carefully avoided any suggestion of a lack of interest or purpose in manned capabilities. Rather, their statements talk about a balanced program involving both manned and unmanned activities, with *greater* rather than lesser emphasis on the manned. The difference between the US program and the USSR program, as the Soviets describe it,

not that one is man-oriented while the other is machine-oriented but that each is proceeding according to its own plan.

Not Just Propaganda

Although the Soviets obviously have tried to explain away their lack of a manned lunar landing, the way they have talked lately suggests that they are not just propagandizing. It is reasonably certain that the Soviets gave up, sometime around 1966, any plans they may have had to compete with the US for the laurels of a first manned moon landing, in favor of primary attention to the near-earth environment. Although they were unquestionably taken aback by the Apollo achievements, the Soviet authorities appear to retain real faith in the soundness of their own course.

A reasoned exposition of how the Soviets are proceeding, and to what ends, was provided in a 1969 year-end roundup of the Soviet situation in space, prepared by Academician Boris Petrov, one of the principal official spokesmen on Soviet space affairs. Writing in *Pravda* on December 30, 1969, Petrov noted that, initially, both the USSR and US "directed their efforts toward resolving the same sorts of tasks." However,

> Having accumulated the necessary experience in resolving the phases of cosmonautics and having created powerful equipment, the leading space powers are going their own ways. This process is entirely natural and understandable. The range of space objectives accessible to research has widened appreciably. Both countries are faced with the problems of selecting their primary research aims. We know that scientists usually pose many more problems than it is possible or expedient to research at one time, and space research is not cheap. It is important, therefore, to define the strategic aim as well as the possible, and to choose what is to be concentrated on at a given stage and what must be given preference.

Petrov talked about current Soviet activities in space and future plans in terms that made it clear that manned efforts would continue unabated, but at this stage would be concentrated on circumterrestrial projects—in other words, orbiting-space-station projects. Lunar and circumlunar explorations would be left for the present to "automatic apparatuses." But these apparatuses, Petrov said, are not simply to serve ends in themselves—"they prepare the way for people." The Soviet program, Petrov emphasized, "by no means excludes manned flights to the moon." It is only that "in the present phase, primary significance is attached to investigating the moon with automatic stations."

While highly valuing automatic machines, one

—Novosti Press Agency Photo

This was the scene on the launch pad prior to launch of the Soviet Soyuz-10 manned spacecraft in April 1971.

SOVIET STATION—ALMOST

In mid-April, the Soviet Union put into orbit an unmanned spacecraft—Salute—that many observers viewed as the immediate prelude to a linkup with one or more manned vehicles expected to follow Salute into space—to form the world's first working space station. Such a success would have beat the US Skylab manned station by two years. Skylab is now scheduled for 1973 deployment.

But the Soviet operation did not turn out as anticipated. While a Soviet manned craft —Soyuz-10—did go into orbit shortly after Salute and did dock successfully with Salute for five and a half hours, the crew of Soyuz-10 unaccountably shortly afterward brought the craft back to earth. The possibility is that the cosmonauts may have had trouble with their operation, and that another try to link up one or more manned craft with an orbiting lab will be made in future months.

must not, however, absolutize their importance and possibilities. Our loyal automatic aids are far from capable of doing everything, and they cannot replace man in everything.

While Petrov sought to demonstrate that the Soviet course is scientifically and technologically sound, his overall pitch was low key when it came to comparisons with the US program.

By the end of 1970, however, the Soviets were striking a quite different note. A year-end review on space, published in *Pravda* on December 29, 1970, and signed by Professor A. Dmitriyev, suggested that the Soviet leadership is swinging full circle, back to the belief that the Soviet approach is not only sound in itself but distinctly superior to that of the US. He also pointedly noted the evident downgrading of space efforts in the United States.

Dmitriyev avoided any suggestion that the Soviets are centering their efforts mainly on automated explorations. While he asserted that automatic vehicles are much cheaper than manned craft, his overall picture was of a comprehensive Soviet effort encompassing across-the-board capabilities—manned as well as unmanned. He saw three main directions in the Soviet Union's conquest of space: The first and chief one is systematic research in near-earth space, using automatic vehicles and manned craft; the second is the moon and circumlunar space as a "testing ground" for Soviet cosmonautics; and the third is research of distant planets, primarily Venus, with the aid of automatic devices.

Recent Soviet accomplishments, Dmitriyev argued, have prepared the way for significant breakthroughs in all of these main directions.

Space Stations

But the main focus of the Soviet space program remains on the establishment of a multimanned orbiting-space-station system. As a Soviet radio commentator put it in a broadcast on May 3, 1970: "The total of Soviet space programs is keyed to achieving an orbiting station."

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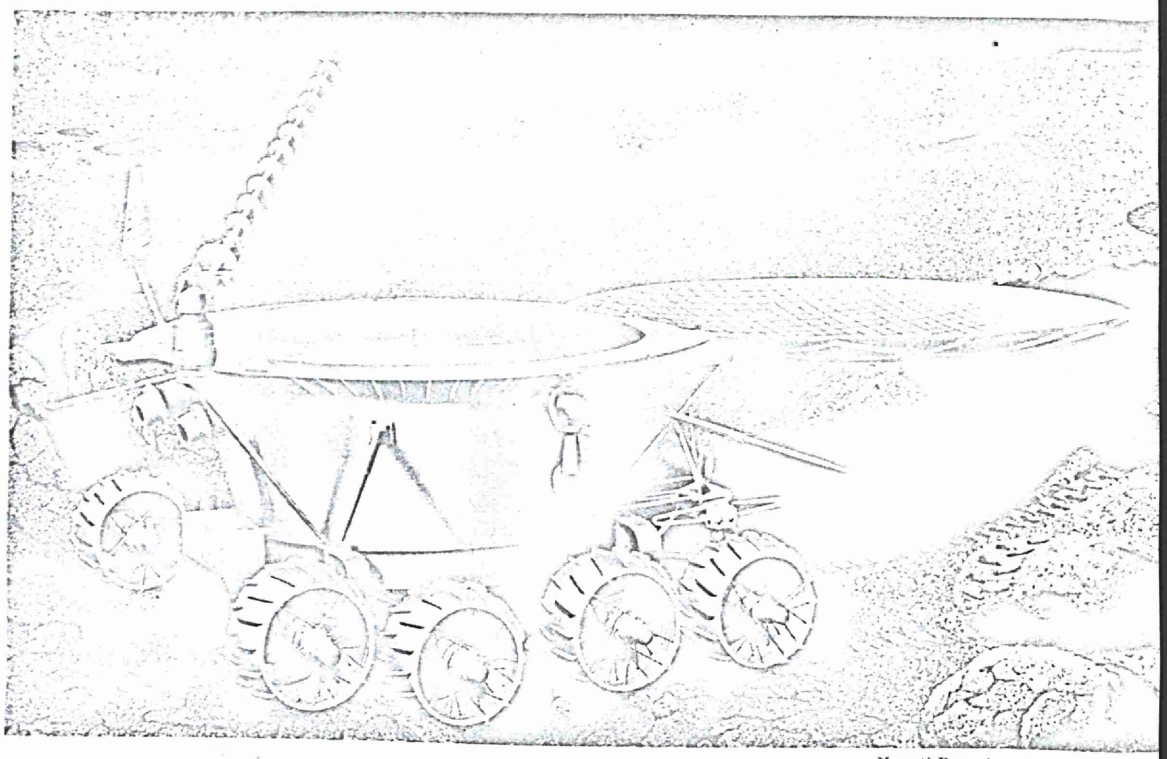
The Soviets appear confident that the long-term effort toward a space-station system is at the payoff stage. Dmitriyev was categoric on this point: "In the near future, here, in near-earth space, long-term manned orbital stations will be assembled and will operate." Brezhnev has also spoken in terms of imminent success, and nearly all commentaries on space appearing in scientific and technical journals over the past eighteen months, as well as popular treatments, have placed major stress on the imminence of the space station.

But it is important to note that in speaking of space stations in "near-future" terms, the Soviets are evidently looking, at the moment, toward a first-generation effort that would be primarily experimental and of limited purpose and duration. For the longer term, the Soviets are clearly aiming and working toward a far more elaborate undertaking, something on the order of a multipurpose, long-lasting "base-station," or "cosmodrome in space," as Brezhnev has called it. But they expect to achieve that only after a succession of "stages" extending over the decade of the 1970s.

How these stages are expected to develop, including what is in the more immediate offing, was described by Boris Petrov in an article in the October 1970 issue of *Vestnik Akademii Nauk SSSR*. He predicted:

> First of all, small stations for a relatively narrow purpose, with a crew of three to twelve men, with a period of existence of from one month to a year or slightly longer will be put in circumterrestrial orbit. . . . Well elaborated and tested compartments of space vehicles and individual stages of carrier rockets will be used as the main units of those stations. This, of course, does not exclude . . . designs intended especially for orbital stations. Such stations can be put into orbit in an assembled state by means of powerful carrier rockets or in parts, with one or two dockings. The station crew can be delivered by a transport space vehicle, with which the crews also will be exchanged. The station and the vehicle must be equipped with docking units and systems. One of the main tasks of such stations will be medical and biological experiments, on the basis of which the requirements must be worked out for the design and the most important characteristics of long-term orbital stations. . . . [Next] . . . the creation of orbital stations of block design, assembled in a circumterrestrial orbit in parts, with a long life (up to ten years) and a crew of 12–20. And, finally, [we] can speak of the advisability of . . . plans of very large multipurpose orbital base stations designed for a crew of 50–70, with further increase to 100–120.

In discussing technical problems, Petrov and other Soviet space specialists talk in generic rather than specific terms. And they draw heavily on US sources. For example, Petrov took US proposals and projects as the point of



While they're pleased with results from their unmanned craft, the Soviets continue to work toward manned feats. This is an artist's sketch of the Lunokhod moon-rover.

—Novosti Press Agency Drawing

departure for his comments. This should not be taken to mean, however, that the USSR is behind the US or is necessarily paralleling US approaches. Rather, it reflects the secretiveness with which the USSR still surrounds all technical aspects of its space plans and activities.

Who's Ahead?

Although Soviet authorities have avoided direct comparisons between Soviet and US approaches to orbiting stations, they assert that the USSR is far out front. They convey the conviction that the USSR is about to achieve a quantum jump in overall capabilities, allowing it to reassume unquestioned world space leadership.

M. V. Keldysh, President of the USSR Academy of Sciences, sees the orbiting stations as providing means to solve "cardinal issues of physics, geophysics, and astrophysics and promote the most rational use of the wealth of the earth and advance geology, meteorology, agriculture, forestry, fishing, and oceanology to new heights. . . ."

Boris Petrov goes into some detail in his article in *Vestnik Akademii Nauk SSSR*. He argues that "no other line in cosmonautics is capable of securing such an effect [in the way of advancing man's mastery of space] and such economic benefits."

> Habitable orbital stations of long duration, in combination with automatic space laboratories and observatories, will permit raising space investigations to a new level and will assure the continuous and regular procurement of scientific information and practical data and the setting up of very complex scientific-technical and medical-biological experiments, and also will facilitate the equipping of expeditions for distant space travels.

The orbiting station "can be used as an enormous physics laboratory in cosmic space"; it can be "of exceptional importance" for studies of the earth's atmosphere and of "cosmic meteorology"; cosmic meteorology in its turn "will make it possible to substantially refine the forecasting of weather" and "will undoubtedly play a decisive role in the solution of a very difficult problem of the future—control of the weather." And with regard to earth resources, "completely new prospects are being opened up . . . in the study of our native planet."

Major advances will ensue in the field of communications, Petrov says:

> Thanks to the system of television broadcasting by satellites and, in the near future, direct television transmission . . . to domestic television antennae, possibilities will emerge for spreading scientific, medical, and sanitary and agricultural knowledge on a wider scale. Space television will become accessible to the population in even the most remote corners of our planet and will play an important role in the development of education, improvement of qualifications, and advancement of the culture of peoples in developing countries. . . .

Finally, Petrov makes clear that the USSR has in view and is working toward not simply a space station, but a *system* of space stations.

> Long-term orbital space stations undoubtedly will be multipurpose cosmic apparatuses, but that does not exclude their certain specializa-

tion. Stations intended for study of the earth's resources and investigations of the atmosphere must be put in relatively narrow orbits in which the greatest effectiveness of the work being done will be assured. Stations for astronomical and radio-astronomical purposes, on the other hand, should be built in orbits whose heights are measured in tens and even hundreds of thousands of kilometers. Also of great interest are lunar-orbital stations, revolving in a selenocentric orbit. With them it will be possible to conduct investigations of the moon and of circumlunar space and astrophysical observations, and also to make periodic landings on the lunar surface of expeditions in special expeditionary space vehicles attached to an orbital station.

Neither Petrov nor other Soviets mention the usefulness of space stations and space-station applications to the Soviet military establishment or to Soviet political strategy in "the competition between systems in the world arena." But that these aspects of the matter are central to Soviet thinking is implicit in nearly all commentaries.

The Moon

Although the Soviets are concentrating most of their resources on the space-station effort and related activities aimed at mastering the near-earth environment, the Soviets are by no means leaving the moon and its environs to the US, even for an interim period. They are currently devoting major attention to automatic explorations of the lunar surface and evidently plan to step up activities in this respect, systematically and rapidly. Also, the number, variety, technical sophistication, and performance potential of "automatic apparatuses" to be employed in the near-term moon effort seem almost certain to increase.

Both Petrov and Dmitriyev in their respective year-end roundups for 1969 and 1970 singled out automated exploration and study of the moon as one of the main directions in which the Soviet space program is moving.

Significant details as to the nature, scope, and technical purposes of Soviet automated moon explorations have been provided by the extensive comment following the successful flights of Luna-16 in September 1970 and Lunokhod-1 in November 1970.

Outstanding is an article that appeared in the October 1970 *Vestnik Akademii Nauk SSSR*. Almost uniquely for the Soviets in such matters, the article provides comprehensive and fairly precise technical data as to the hardware flight program, and performance of the Luna-16 mission. Further, it gives clear indication that the mission represented the opening phase of a new, broad-gauged Soviet effort to master the moon environment pursuant to a settled "program of cosmic investigations," which is "characterized by its purposefulness and by a planned systematic approach to the solution of new scientific and technical problems." Claiming that "a stage new in principle" had been opened with Luna-16, the article asserted:

> Soviet scientists, designers, engineers, and workers have been posed the task of further improvement of cosmic automata and the development of new and very complex elements and units of automatic systems. The achievements of our science in the area of automatic control and experimental cadres in industry have permitted coping brilliantly with that task. Proof of that is the remarkable success of the Luna-16 station. . . . In the course of the flight, valuable data were obtained on the working capacity of the new design and its high reliability, which will help to create new types of cosmic apparatus of the near future.

The first of the forecasted "new types" of

Rubles for Space

Viewed in overall terms, authoritative Soviet comment on space matters since the Apollo-11 lunar landing bears out Brezhnev's assertion that the USSR "has a space program drawn up for many years ahead." The evidence is that the Soviet leadership has long since finally decided that the conquest of space in the fullest meaning of the term is sufficiently important to the interests of the USSR to justify a continuing large-scale effort, and that it stands ready now and in the future to provide the resources necessary to sustain such an effort.

The Soviets evidently believe that space and space applications will yield great and increasingly direct benefits to the economic development and economic well-being of the USSR, as well as to Soviet prowess in a continuing struggle with the US. They also evidently believe that advancements in space will continue indefinitely as both spearhead and lever for the general advancement of Soviet capabilities in science and technology.

The "Draft Directives" for the 1971–75 Five-Year Plan, along with establishing new and broadly ranging goals in space as one of the main tasks for the nation during the plan period, singled out "outstanding new successes of Soviet cosmonautics" as "convincing proof of the high level of the development of science and technology in our country."

Also, in its budgetary allocations for 1971, the first year of the new plan, the regime has provided for the support of science, which includes most importantly support of science related to space, at a level eighteen percent above that planned for 1970 and 8.3 percent above the substantially larger level actually provided. The level for 1971 is more than three times that provided in 1960 and almost twice that provided in 1965.

apparatus turned out to be, of course, Lunokhod-1, which landed and began its plodding on the moon surface within six weeks of Luna-16. While comment on Lunokhod-1 has been in a more general vein than comment on Luna-16, some details have been given as to the design and potential of the vehicle and as to where the Soviets expect to go in its utilization. In an interview broadcast by Radio Moscow on November 19, 1970, Petrov described the Lunokhod as "a multipurpose mobile scientific laboratory." He stressed that the research program of the lunar vehicle is "evidence of the great possibilities of studying areas of space far distant from our planet by means of automatic devices."

Academician A. A. Blagonravov, in a broadcast of January 16, 1971, emphasized the importance of automatic vehicles and claimed that the Lunokhod's "safety margin and perfect design" have "surpassed all expectations." He stressed that at this stage of development of space technology a man could not have stayed on the moon for such a long period of time. He further argued that in the future it will be possible to assign to automatic devices such tasks as studying meteorites, exploring volcanoes, and studying radiation in near-moon space.

"What is most important," he stated, "is that we now have an almost ideal means of conveyance on the moon, a means independent of super-rigorous conditions of vacuum and sharp changes of temperature. We can load such a selenomobile with different scientific apparatus."

Engineer T. Borisov wrote in *Trud,* on January 22, 1971, that the present stage in the development of automatic craft opens up prospects for the "interaction of different types of automata." What is also important, he noted, is the length of the lunar vehicle's active life. "Two months of faultless performance by Lunokhod-1 is the highest appraisal of the machinery developed by Soviet designers. This experiment shows that it is possible in principle to develop moon vehicles that would be able to operate anywhere in space."

Surpassing the US

While avoiding saying so in so many words, Soviet spokesmen consistently imply that through the systematic development and use of increasingly varied and increasingly complex and sophisticated automatic devices for moon exploration, the USSR is putting itself in a position to surpass the US both in the buildup of scientific knowledge about the moon and, ultimately, in manned activity on the moon and elsewhere in space. In this connection, they are drawing assurance from the decline in the scope of US space efforts, including particularly those related to the moon. They seem to be paying close attention and attaching important weight to comparative evaluation of trends in the US and Soviet programs appearing abroad, as for example in *The Economist* of November 21, 1970:

> If the Russians are going to land robots at the rate of one every month while the Americans are going to put a man on the moon perhaps only once a year, the difference will soon cease to look so impressive merely because in a very short space of time the Russians will know more about the moon and have explored more places on its surface than the Americans will have done. The tortoise will have won another race. . . . If they are not very careful, the Americans will find that within a few years the place that people know about the moon will not be Houston but Moscow.

In contrast to their moon-exploration efforts, Soviet plans for planetary and interplanetary explorations at this stage appear modest. The avowed intent is to lay scientific and technological foundations for a large-scale, new-dimensional, and continuing effort once the orbital-space-station system is operational. Primary emphasis is being placed on Venus, since "the launching of devices toward this planet provides extremely important information for understanding the origin of the planets of the solar system and our own earth."

According to Petrov, in *Sovietskiy Voin* of March 1970: "There will be further study of the Venusian atmosphere by automatic probes and the determination of the internal structure, nature, and relief of the surface of that mysterious planet." With respect to other planets and interplanetary space, Petrov suggests only remote plans.

Clearly, the Soviets intend, beginning with Venus, to use automatic devices and vehicles being developed and utilized for moon explorations. Dmitriyev asserts that one of the objectives of the moon explorations is the accumulation of the "necessary experience for creating new automatic vehicles intended for the future study of Venus and Mars, Saturn and Jupiter, and the other heavenly bodies. . . ." And in more specific terms he argued that "Luna-16 opens up the prospect of automatic vehicles making trips to other planets and subsequently delivering research results to earth."

All of this, however, is in the more distant future. The vision of a reach into all parts of the solar system is strongly held, but fulfillment is to come at a much later stage. Thus, it appears unlikely that within this decade the USSR will substantially increase the level of activities it has maintained in the past for translunar space. Planetary explorations are low on the scale of current Soviet priorities, falling well behind automated lunar efforts and *far* behind the orbiting-stations project. ■

OFFICE OF TELECOMMUNICATIONS POLICY
WASHINGTON

OMB

1. no lock II in to shuttle
2. problems w/ tech dev't. we know where we're going
3. launch assurances related NASA planning, budgeting, & needs OMB input.

Policy

US involvement or detached?
Why Intelsat veto?
Sep launches from genl space to benefit US
(1) commit but unenforced
(2) backlash US dominance min
(3) Any phases except meddling?

Post Apollo

OFFICE OF TELECOMMUNICATIONS POLICY
WASHINGTON

"Space cooper"

A. tech & trade
1. net gain vs. net loss in tensions
2. world/domestic opinion (Europe vs. LDC)
— launch ops vs. science or manned research
3. cost sharing
C. ~~C~~. US budgeting flexibility
B. ~~B~~. US autonomy

What would it cost?
What do we want?

	launch	sci	manned
1	--	+	+
2	+	+	++
3	0	+	++
A	-	+	0
B	-	0	0
C	--	0	-

US does cooperate in launches now; what credit?
ways establishing or bilateral working together?
Interest < jeopardizing existing coop ventures for practical benefit
yielding to Europeans at all costs; what have they done?

State is really flailing on this: HAJ BR IAW HP

CRITERIA

In summary, the U.S. should continue as a peaceful spacefaring nation and structure its programs to enhance our position and image of world leadership.

a. Conduct a balanced program of exploration, science, and application, which also contributes to the advancement of technology.

b. Conduct a visible and reasonably continuous program of manned space flight, which develops, tests, and utilizes applications of man's capabilities.

c. As a minimum, our program should be planned to maintain our favorable image vis-a-vis the USSR.

d. Options for innovative international cooperation should be evaluated by the Administration as the opportunities arise.

More specifically:

1. The space program should be made up of projects each of which:

   a. lends itself to evolutionary development, allowing proof of principal, reduction of technical risk, and demonstration of payoff along the way by producing useful results at several intervals in a multi-step development;

b. is not so large as to force future imbalance in a fixed-budget space program, nor because of its size, should it become the major driver of the space program as a whole.

2. The space program should stimulate and enhance the practical benefits from space operations.

a. Continue the rapid development of new uses and innovations in space.

b. Projects and technological areas should be pursued that have potential commercial or operational application, but which are not at the stage of being cost-effective. When commercial or operational viability is demonstrated, as determined outside NASA, the program should be transferred to the user or to the commercial sector of the economy.

3. Our efforts should keep options open for international cooperation.

a. International cooperation projects must be individually judged on the bases of answers to the following questions: (1) is the projected benefit clearly and demonstrably worth the cost, recognizing that the value of space cooperation depends strongly on the matter of visibility; (2) are we

committing ourselves inadvertently to more than the particular project; and (3) is an appropriate balance being maintained between our national and our international space activities?

b. The concept of international cooperation should be based on the assumption that arrangements will be reciprocal and mutually beneficial, bearing in mind that world leadership will require that we compete with as well as cooperate with other nations.

c. Only those projects should be undertaken which are sufficiently straightforward in both a technical and management sense that we are reasonably certain they will increase rather than injure our mutual friendship. Generally speaking, visible undertakings such as joint payload or exploration missions, including manned missions would appear more advantageous than joint engineering projects which increase the likelihood of management problems and technology transfer.

d. We should put ourselves into a position that would permit the US-USSR cooperation, while recognizing the necessities of having political and mission flexibility and reciprocity of prestige.

e. There should be sufficient mission flexibility so that important elements of our program do not become dependent on cooperative arrangements.

OTHER LESS IMMEDIATE CONSIDERATIONS

1. Management factors to be considered.

   a. Shape institutional base to programs, not vice versa.

   b. Work towards efficient consolidation of management and base.

   c. The present NASA structure was appropriate to Apollo, but might be more responsive to future directions if realigned along other lines, e.g., (1) exploration; (2) development of new, non-commercial space applications; (3) research in new space-oriented and aeronautical technology; (4) space science, and (5) launch operations and booster development, which might work toward being a self-supporting service. Manned space flight should be an integral and appropriate part of the exploration, applications, and science programs.

2. A productive exploration and science program should be continued from space for its benefit to the advancement of human knowledge and for the prestige that accrues to the U.S.:

   a. Exploration missions relate to national image and should be funded by NASA.

   b. Space science might be selected and judged in relation to the U. S. science program as a whole, and the experiment and recurring costs might be funded through NSF.

   c. To reduce the cost of space science, NASA might develop an unmanned spacecraft which accommodates and supports a broad range of experiments.

Criteria for the Development of a Space Program for the 1970's

GENERAL CRITERIA

In summary, the U.S. should continue as a peaceful spacefaring nation and structure its programs to enhance our position and image of world leadership.

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b. Conduct a visible and reasonably continuous program of manned space flight.

c. As a minimum, our program should be planned to maintain our favorable image vis-a-vis the USSR.

d. Options for innovative international cooperation should be evaluated by the Administration as the opportunities arise.

More specifically:

1. The space program should be made up of projects each of which:

   a. lends itself to evolutionary development, allowing proof of principal, reduction of technical risk and reduced cost of space operations, and demonstration of payoff along the way by producing useful results at several intervals in a multi-step development;

b. is not so large as to force future imbalance in a fixed-budget space program, nor because of its size, should it become the major driver of the space program as a whole.

2. Management factors to be considered.

a. Shape institutional base to programs, not vice versa.

b. Work towards efficient consolidation of management and base.

c. The present NASA structure was appropriate to Apollo, but could be more responsive to future directions if realigned along the lines: (1) exploration; (2) development of new, non-commercial space applications; (3) research in new space-oriented and aeronautical technology; (4) space science, and (5) launch operations and booster development, which would work toward being a self-supporting service. Manned space flight would be an integral part of the exploration, applications, and science programs.

3. The space program should stimulate and enhance the practical benefits from space operations.

a. Continue the rapid development of new uses and innovations in space.

b. Projects and technological areas should be pursued that have potential commercial or operational application, but which

are not at the stage of being cost-effective. When commercial or operational viability is demonstrated, as determined outside NASA, the program should be transferred to the user or to the commercial sector of the economy.

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c. Only those projects should be undertaken which are sufficiently straightforward in both a technical and management sense that we are reasonably certain they will increase rather than injure our mutual friendship. Generally speaking, visible undertakings such as joint payload or exploration missions, including manned missions, are much preferred to joint engineering projects which involve management problems and technology transfer.

d. We should put ourselves into a position that would permit the US-USSR cooperation, while recognizing the necessities of having political flexibility and reciprocity of prestige.

e. There should be sufficient mission flexibility so that important elements of our program do not become dependent on cooperative arrangements.

POSSIBLE EXAMPLES OF SPECIFIC CRITERIA

1. NASA should base its planning for the next 5 years on the basis of an average budget of $3 to 3.5 billion, adjusted for inflation.

2. Manned space flights should occur at least as frequently as one every 12 to 18 months through 1980.

3. No manned lunar or planetary surface exploration following Apollo before 1980.

4. Phase out Marshall and possibly Wallops or Ames in FY 1974 to 1975; reduce NASA to X number of people by June 30, 1975.

5. Use modular rather than all-up system approach for space programs. Each component (i.e., booster, engine, guidance, spacecraft) should have multiple uses and be compatible with other DOD and NASA components with minimum changes. No component should require more than four years to develop for operational use.

   Specifically with regard to the shuttle, first develop and test operationally a reusable spacecraft which also meets DOD and commercial requirements. The booster should be the least expensive vehicle meeting reliability and payload requirements. After spacecraft capabilities are satisfactorily demonstrated, consider development of reusable orbiter and then booster systems, if such are then economically attractive.

6. Decrease funding and personnel for manned space flight and space science; increase those for space applications and aeronautics.

7. International cooperation: maintain present launch assurances; undertake no large, joint engineering projects; continue to explore joint docking, foreign astronaut participation, and science and applications program.

Example of a Space Program that Meets the Criteria

EXPLANATION OF THE KEY FACTORS IN THE EXAMPLE SPACE PROGRAM

1. The structure of any space program is determined primarily by the choice of the manned space flight activities. This, however, does not mean that the manned part of the program should be conducted as a separate entity, but rather it should be integrated into the missions of exploration, application, and possibly science.

2. The character and schedule of manned space flight may be divided into three time periods: 1973 (following the completion of Skylab) to 1978 when a new spacecraft could be flown; 1978 to that time when a shuttle or something of similar concept might enter service (perhaps 1983); and then the shuttle era.

1973-1978. Because of hardware availability, budget realities, and lead times, our manned program during this time would be restricted to a choice among the following: (a) four CSM earth resources missions, lasting a few weeks each, plus possible dockings with the Soviet Salyut space stations, (b) a second Skylab mission, or (c) a lunar orbiting mission plus three CSM earth resources missions and possible Salyut dockings. From the point of view of cost and benefit, we would set the priorities as (c), (a), and (b), and our program reflects this choice. It is possible to have fewer flights, but

this would not be consistent with the criteria of a reasonably continuous manned space flight program. The cost of any of the options would be less than $1B.

1978-1983. By 1978, the spectrum of possible space vehicles, and the types of missions they would support, spans the limits of the smallest program (attempts to reuse our present CSM system for continuing earth resources surveying) to the most ambitious (a fully reusable shuttle supporting the fairly extensive mission models currently proposed by NASA and DOD). After examining these and the intermediate alternatives, the program we selected for this time period would focus on a reusable, landable, orbital spacecraft. This system would represent a new capability, and would accommodate some new missions, and would have important elements of new technology. Moreover, it would be a significant step in an evolutionary development and obtaining of operational experience for a shuttle. The spacecraft would work in conjunction with a Sortie Can (NASA's first generation experiment module). In 1981, the Research and Applications Module (RAM) would replace the Sortie Can to accommodate larger and more comprehensive instruments; this module would then continue to be used for missions with the shuttle after 1983. The experiments

and some members of the spacecraft crew could be provided by other nations if we decide to internationalize our manned space flight activities. The development cost of the new spacecraft would be less than $3B.

After 1983. A reusable booster, orbiter, and tug system would open the capabilities that NASA has identified; easy and inexpensive access to space and a substantially increased size and flexibility to accomplish ~~the~~ our space activities of the last part of this century. It seems reasonable and likely that the U.S. will want to have this capability, but by making the undertaking evolutionary, the annual cost would be more acceptable and the value of the system can be demonstrated prior to the completion of the full system. The development cost would lie between $5 and $10B, with annual funding well below $1B. If the development were to be carried out by a separate, self-sufficient launch and booster development organization within NASA, then the cost would be recovered through user charges thereby reducing the burden on NASA of justifying and gaining the budgetary support for the project. By 1986, a space station may be brought into service to function in conjuction with the shuttle, however, the value of this step can be better judged after our experience with Skylab-Sortie Can-RAM missions.

3. NASA will close Marshall, and possibly Wallops or Ames, by 1974 in order to reduce its institutional base to be commensurate with projected funding levels and program needs. Essential capabilities would be transferred to other centers. KSC and the tracking network will be reduced in size to be compatible with the lower level and different character of future manned space flights.

4. The NASA budget, not including space science, will remain in the neighborhood of $3B in 1971 dollars for the decade of the 1970's.

5. An operational nuclear rocket would be developed in the 1980's if proved to be feasible and useful, based on a small flight prototype program to be completed in the 1970's. The prototype would cost in the neighborhood of $150M.

6. In associating a budget with our example program, we have relied wherever possible on NASA's figures, using the FY 1973 recommended alternate budget estimate and the FY 1977 projection, modified by the addition of the new orbital spacecraft and the extended shuttle development.

The institutional costs (people and facilities) and the tracking net costs are broken out separately (as is NASA practice) but alternatively are shown distributed among the mission organizations within NASA, who are the users.

MANNED SPACE FLIGHT

CALENDAR YEAR	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
APOLLO															
SKYLAB															
CSM REVISITS															
LUNAR ORBIT															
CSM EARTH OBS															
Possible USSR Docking															
High Inclination															
NEW ORBITAL S/C					(1)		(2)								
SORTIE CAN															
RAM															
SHUTTLE												(2)			
STATION															
CLOSE			MSFC												

(1) First test flight
(2) First manned orbital flight

Schedule of Manned Space Flight

NASA Launch Service Organization

Breakout of a user-supported NASA organization to handle launch vehicles, launch and launch-site services, tracking, and new booster R&D. Below is an example of the charges it would make for FY 1973.

		($ in millions)
Vehicle procurement flight, and recovery	Apollo	$ 58
	Skylab	204
	Additional launch-site services	100 (est.)
	Science and applications	188
	Outside NASA users	60
Tracking and data acquisition		260
Booster R&D charged as overhead to all users (shuttle, nuclear propulsion)		210
	Total	$1080

FY 1977 Strawman

	($ in millions)
Manned exploration	$100
Additional launch-site services	25
Unmanned exploration	100
Applications	25
Science and other outside NASA users	100
Tracking and data acquisition	150
Booster R&D	400
Total	$900

Budget of the New NASA Launch Service Organization

The FY1973 NASA budget estimate if NASA were restructured into the four categories: Exploration, Applications, Space and Aeronautical Technology, and Science. (Based on NASA's "Recommended Alternate Budget")

($ in millions)

Exploration	Manned	Apollo	$ 75
		Skylab	325
		Apollo & Skylab operating base support	298
		CSM missions	60
		(1)	262
		(2)	140
		(3)	455
		Total	$1615
	Unmanned	Planetary missions R&D	354
		(1)	100
		(2)	60
		(3)	200
		Total	$ 714
Applications		R&D	220
		(1)	60
		(2)	40
		(3)	115
		Total	$ 435
Space and Aeronautical Technology (4)		OART	248
		OMSF	56
		Technology Utilization	5
			309
		(3)	135
		Total	$ 444
Science		R&D	168
		(1)	20
		(2)	25
		(3)	100
		Total	$ 313
		Grand Total	$3.5 billion

Footnotes:
(1) Rough breakdown of the launch vehicle and launch services costs for this category.
(2) Pro rata share (based on the size of the R&D) of the $260M cost of tracking and data acquisition (i.e., support of the tracking network).
(3) Pro rata share of: (a) Research and Program Management (i.e., NASA salaries), (b) Construction of Facilities, and (c) new booster development (shuttle, nuclear propulsion, and OSSA's SR/T for vehicles).
(4) This category is defined as the OART work less NERVA, plus OMSF's Orbital Systems and Experiments and Advanced Missions. The latter two could be carried under Exploration R&D just as well.

Comments concerning the transition to a later time, say FY 1977 as an example

Manned exploration will continue, however, limited in the 1970's to orbital operations. If the current shuttle concept goes forward, the manned program would center on it. In any case, a new reusable orbital spacecraft should be developed which could also be a step in the evolutionary development of a fully reusable space transportation system. If man plays a role in earth resources survey, then part of the manned activities would be subsumed in the Applications category.

Unmanned exploration will focus on planetary probes and possibly automated lunar missions. At some point, however, repeated lunar or planetary missions will transfer to the Science category and be subject to its funding procedure.

Advanced space technology and innovations will continue to be tested. Operational earth resources surveying will be handed over to the established user community.

Aeronautical R&D will continue in coordination with DOT and DOD, and will be cognizant of the needs of the commercial sector. Space-oriented R&D will support the Exploration, Applications, and new booster programs.

Science projects will be selected and funded through NSF. Additional directed funds will have to be provided to NSF at least during a transition period since the current space science expenditures would be more than 50% of the present NSF budget. Science projects will concentrate on astronomy and space physics but will pick up some of the planetary projects as they transfer from the Exploration category.

Strawman FY 1977 NASA budget, operating under the new structure (based partially on NASA's "Tentative New Starts 1974-1977")

($ in millions)

Exploration	Manned	CSM mission	$ 40
		Sortie Can	30
		Operating base support	150
		(1)	100
		(2)	35
		(3)	105
		Total	$ 460
	Unmanned	Planetary missions R&D	170
		(1)	100
		(2)	30
		(3)	80
		Total	$ 380
Applications		R&D	350
		(1)	25
		(2)	55
		(3)	170
		Total	$ 600
Space and Aeronautical Technology		Space R&D	150
		Aeronautics R&D	200
	Elements of manned orbital program started in FY 1973-74(4)	(Completion and testing of new orbital spacecraft (RAM	500 / 200
		(3)	500
		Total	$1550
Science	Not in NASA budget	(R&D	200
		((1)	30
		((2)	30
		((3)	95
		Total	$ 355
	(not including Science)	Grand Total	$3.0 billion

Footnotes:
(1) Same.
(2) Same, except it is assumed that the cost of tracking and data acquisition will be reduced to $150M with reduced manned flight activity.
(3) Same, except R&PM is assumed to be reduced to $500M with two center closings, and the new booster development will have grown to $400M.
(4) As this program demonstrates operational utility in the areas of Exploration, Applications, and Science, the funding would be subsumed within these categories.

Budget of Other 4 Elements in New NASA Structure: Exploration-Applications-Space & Aeronautical Technology-Science

Post Apollo
(Get a copy of the first paper from Era)
file - European Coop.

DEPARTMENT OF STATE

WASHINGTON, D.C. 20520

August 7, 1971

Mr. Whitehead
Room 749
1800 G St.

Revision of statement sent to you a few days ago. The key change is marked on page 3.

HP(W)
Herman Pollack

Mr. Whitehead

DRAFT August 7, 1971

Proposed Policy on Launch Assistance

The US recognizes that the interests of the US and other countries in securing the benefits of space exploration and of applications of space technology for all mankind require optimum, rational use of the resources and capabilities of space-faring nations. We further recognize the need for confidence in the availability of launch assistance. Accordingly, the US has established the following policy with respect to the provision of assistance for the launching of space satellites of other countries.

This policy applies to US assistance in the launching of those foreign satellites which are for peaceful purposes and are consistent with obligations under relevant international agreements and arrangements. This launch assistance would be available, consistent with US laws, either from US launch sites (through the acquisition of US launch services on a cooperative or reimbursable basis), or from foreign launch sites (by purchase of an appropriate US launch vehicle); it would not be conditioned on participation in the Post-Apollo program. In the case of launches from foreign launch sites, the US would require assurance

that the launch vehicles would not be made available to third parties without prior agreement of the US. Specifically --

First, the US will authorize appropriate launch assistance (1) for space and applications research satellite projects and (2) for operational applications satellites intended to provide services whose international implications are well understood or are governed by specific international agreements or arrangements, e.g.: meteorological satellites and communications satellites for specialized aeronautical and marine services.

Second, with respect to satellites intended to provide international public telecommunications services, when the definitive arrangements for INTELSAT come into force, the US will also authorize appropriate launch assistance for those satellite systems for which INTELSAT makes a favorable recommendation in accordance with Article XIV of its definitive arrangements.

If launch assistance is requested in the absence of a favorable recommendation by INTELSAT, we would consider the provision of launch assistance, taking into account our own position as to the acceptability of the proposed system, the vote within INTELSAT, the issues and considerations

raised within INTELSAT, and the possibility that the proposed system could be modified in the light of these considerations. We expect that we would provide launch assistance for those systems which we have supported within INTELSAT so long as the country requesting the assistance considers that it has met its relevant obligations under Article XIV of the definitive arrangements.

Third, recognizing the rapid development of satellite technology and its implications, the US anticipates that launch assistance may be sought in instances where the international implications of the proposed satellite services are not yet well understood or are not governed by specific international agreements or arrangements. Operational satellites for such applications as broadcasting and remote sensing of the natural environment fall in this category. The US is prepared to consider requests for launch assistance in such instances in the light of the intent of this policy.

Mr. Whitehead

DRAFT August 7, 1971

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If launch assistance is requested in the absence of a favorable recommendation by INTELSAT, we would consider the provision of launch assistance, taking into account our own position as to the acceptability of the proposed system, the vote within INTELSAT, the issues and considerations

raised within INTELSAT, and the possibility that the proposed system could be modified in the light of these considerations. We expect that we would provide launch assistance for those systems which we have supported within INTELSAT so long as the country requesting the assistance considers that it has met its relevant obligations under Article XIV of the definitive arrangements.

changed

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Post Apollo

~~CONFIDENTIAL~~

DEPARTMENT OF STATE

Washington, D.C. 20520

BUREAU OF INTERNATIONAL SCIENTIFIC
AND TECHNOLOGICAL AFFAIRS

August 5, 1971

MEMORANDUM FOR:

NASA	-	Mr. Frutkin
OSD/ISA	-	Dr. Mountain
NASC	-	Mr. Anders
OTP	-	Dr. Whitehead
NSC	-	Mr. Guhin
OST	-	Dr. Drew

We understand that the attached statement of launch assistance policy may be discussed by our respective principals as early as Monday of next week, although I am not certain of the venue of the meeting. I therefore felt it desirable to get this to you promptly so that you might have at least a little time to prepare yourselves to brief your principals in the event an early meeting is called.

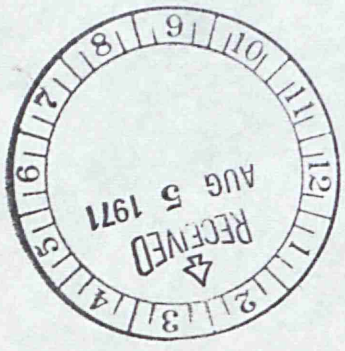
Herman Pollack

Herman Pollack
Director

Attachment:

Statement.

DECLASSIFIED
Authority DOS guidelines
By SO NARA, Date 4/15/10


RECEIVED
AUG 5 1971

~~CONFIDENTIAL~~

DRAFT August 5, 1971

Proposed Policy on Launch Assistance For Foreign Space Satellites

DECLASSIFIED
E.O. 12958, Sec. 3.4
Dept. of State Review
By S. Worrel Date 5/26/2010

The inter-agency Ad Hoc Committee on International Space Cooperation under NSSM-72 is preparing a study on international cooperation in those aspects of space activity which involve primarily technology development and flight operations. We expect that this study will be forwarded to the Under Secretaries Committee within a few weeks.

One aspect of this study concerns the extent of our willingness to offer greater assurance of the availability of US launch assistance for foreign satellite projects. This aspect is of particular importance, because our willingness to do so will bear heavily on the decisions of other countries (primarily the countries of Western Europe) as to whether they should commit substantial resources and effort to the further development of their own space launch capabilities, which would duplicate those already available in the US, or apply these resources and effort to more

advanced technological and flight programs. The establishment of a US policy in this matter is needed urgently, since the European countries will make this decision within a few months. Their decision will affect our own program, especially in instances where a substantial portion of their resources and effort may be committed to collaboration with us in projects of mutual interest, if not reserved for the further development of their own launch capability. It will also affect our opportunities to achieve foreign relations benefits and economies through expanded cooperation in space activities.

This aspect of the study should be, thus, considered as a separate matter in advance of completion of the overall study.

As a matter of stated intention and practice over the past ten years we have provided launch services at US launch sites on a case-by-case basis, and have not thus far found it necessary to deny any specific requests which we have received for launch services for foreign satellite projects because they were contrary to US interests. We have also been willing to sell appropriate launch vehicles for the launching of foreign satellite projects abroad, but have as yet not been requested to do so. We have not, however,

established a policy which would provide advance assurance of the availability of US launch assistance.

The only existing policy directed specifically to the provision of launch assistance concerns the launching of foreign satellites intended to provide international public telecommunications services. It is contained in NSAM-338 which was designed to limit the provision of assistance for foreign communications satellite projects in order to support the establishment of a single global commercial communications satellite system by INTELSAT. NSAM-338 is directed primarily to those provisions of the interim arrangements for INTELSAT which do not allow for the establishment of separate regional systems in competition with the global system.

The recently negotiated definitive arrangements for INTELSAT, however, deal specifically with the compatibility of such separate systems with the global system and would permit the establishment of such separate systems subject to consultation with INTELSAT. Thus, when the definitive arrangements come into force NSAM-338 will become obsolete. It should be replaced by a broader policy which would concern the provision of launch services generally and, with respect to communications satellites, would be consistent with our evolving obligations and interests within INTELSAT.

The Ad Hoc Committee has concluded that such a broad policy should provide general criteria, clearly understood abroad, under which other countries could have adequate advance assurance of the availability of US launch assistance. It should make clear our intention, whenever possible, to provide launch assistance (either by launching from US launch sites or by making launch vehicles available for launching abroad) for foreign satellite projects which are for peaceful purposes, are consistent with US laws and with US obligations under relevant international agreements and arrangements, and are not contrary to other overriding US interests or purposes. In order to be satisfied with respect to the above requirements this assistance would be provided in response to specific requests (which provide adequate information as to the purposes of the satellite projects as well as the parameters of the spacecraft and their orbital profile), and would be subject to appropriate licensing or intergovernmental agreements.

1. By "whenever possible" we mean that: a suitable US launch vehicle is available; a launching from US launch sites would be compatible with our own launch schedules; satisfactory commercial arrangements can be reached for foreign acquisition of a launch vehicle; the sale of launch

vehicles and launch services would be consistent with applicable US laws, such as those governing the export of technology; and the launch assistance would not be contrary to other overriding US interests (see subparagraphs 5 and 6 below).

2. By the reference to "obligations" we intend that the purposes of the launchings must be consistent with common obligations under relevant international agreements wherever both the US and the foreign governments adhere to these agreements, or consistent with US obligations under relevant international agreements whenever the foreign governments are not similarly obligated.

3. Relevant international "agreements" refer to the Outer Space Agreement, the definitive arrangements for INTELSAT, the Convention on Space Liability when it comes into force, the US-Japanese Space Agreement, government-to-government agreements governing NASA or DOD cooperative space projects, and other pertinent treaties and agreements such as the UN Charter.

4. Relevant international "arrangements" refer to international commitments, principles and customary

practices such as those embodied in agency-to-agency agreements concerning NASA's international cooperative projects and in UNGA Resolutions.

5 The caveat referring to "US interests and purposes", as distinct from "obligations", relates to our direct concern as to purposes of the launchings which we provide. For example, there may be some restraints on our ability to provide assurance of launch assistance: (a) in the case of requests for launch assistance for those satellite systems intended to provide international public telecommunication services within the meaning of the definitive arrangements of INTELSAT which have not received a favorable recommendation by INTELSAT; (b) in the case of future satellite applications, such as broadcasting and remote sensing of the natural environment, where the international implications of the proposed satellite services are not yet well understood or are not governed by specific international agreements or arrangements; and (c) in cases involving adverse national security considerations under our National Disclosure Policy or NSAM-294. In cases such as these the provision of launch assistance, or the assurance thereof, will have to

be subject to individual review.

6. In the light of "US interests and purposes", we can, however, provide assurance of appropriate launch assistance for space research satellite projects and for applications satellites intended to provide services whose international implications are well understood or concerning which our concern as to their purposes and use is adequately met by specific international agreements and arrangements. Meteorological satellites and communications satellites for specialized aeronautical and marine services fall in this category.

The preceding paragraph and its numbered subparagraphs specify the understanding within the US Government as to the conditions under which such a broad policy on launch assistance would be implemented. Attached is a proposed policy statement designed to be made known to other countries. It is intended to meet these conditions and to provide greater confidence abroad that US launch assistance will be available for foreign satellite projects. Its provisions concerning launch services for satellites intended to provide international public telecommunications services (fourth paragraph) should not become effective until the

definitive arrangements for INTELSAT come into force, at which time the provisions of NSAM-338 concerning such launch services should be rescinded. The other provisions of this proposed policy can become effective as soon as the policy is approved.

With respect to the fourth paragraph of the proposed policy there is a difference of view within the Ad Hoc Committee as to whether we should make a distinction between the provision of launch assistance from US launch sites or from foreign launch sites in those instance where assistance is requested for launching satellites intended to provide international telecommunications services in the absence of a favorable recommendation by INTELSAT in accordance with Article XIV of its definitive arrangements. This difference is reflected by the bracketed language in subparagraphs 1 and 2 of the attached Policy Statement.

1. All members of the Committee except the Department of State member (i.e.: the members representing NASA, DOD, the Office of Science and Technology, the Office of Telecommunications Policy, the NSC staff and the Executive Secretary of the Space Council) believe that we should make a distinction. They propose that we reserve unilateral judgement

as to the provision of such launch assistance from US launch sites (as proposed in subparagraph 2), but that we need not do so in the case of launch assistance from foreign launch sites so long as the country requesting the launch is a member of INTELSAT and has met its relevant obligations to consult with INTELSAT as specified in Article XIV (as proposed in subparagraph 1). They feel: that this distinction would meet our legal obligations under the definitive arrangements and would be consistent with the intent of those arrangements; that it would reduce the extent of unilateral US judgements and would thus appear less arbitrary; and that it would provide greater assurance of the availability of launch assistance for regional communications satellite systems for those countries which are prepared to take advantageof the more expensive option to launch from their own launch sites.

2. The Department of State member feels that it would be unwise to make this distinction since in the case of launchings abroad: it would reduce our own control over foreign actions which

might affect our interests vis-a-vis INTELSAT adversely; could associate the US with foreign communications satellite systems which might be launched contrary to the views and interests of other countries which are associated closely with us; and is not needed in order to provide adequate assurance. In the event the latter assumption proves incorrect, the majority position could then be reconsidered.

The minority view requires deletion of the bracketed language.

It is recommended (1) that the conditions described on pages 4 - 7 above, under which a broad policy on launch assistance would be implemented, be approved; (2) that the difference of view concerning the fourth paragraph of the attached proposed policy statement be resolved; and (3) that the attached proposed policy statement be approved.

Attachment: Proposed Policy on Launch Assistance

DRAFT August 5, 1971

Proposed Policy on Launch Assistance

Recognizing that the interests of the US and other countries in securing the benefits of space exploration and of applications of space technology for all mankind require optimum, rational use of the resources and capabilities of space-faring nations, the US has established the following policy with respect to the provision of assistance for the launching of space satellites of other countries.

This policy applies to US assistance in the launching of those foreign satellites which are for peaceful purposes and consistent with US laws and US obligations under relevant international agreements and arrangements. This launch assistance would be available either from US launch sites, through the acquisition of US launch services on a cooperative or reimbursable basis, or from foreign launch sites, by foreign purchase of an appropriate US launch vehicle. In the latter case the US would require assurance that the launch vehicles would not be made available to third parties without prior agreement of the US. Specifically --

First, the US will authorize appropriate launch assistance (1) for space research satellite projects and (2) for applications satellites intended to provide services

whose international implications are well understood or are governed by specific international agreements or arrangements, e.g.: meteorological satellites and communications satellites for specialized aeronautical and marine services.

Second, with respect to satellites intended to provide international public telecommunications services within the meaning of the definitive arrangements for INTELSAT, the US will also authorize appropriate launch assistance for those satellite systems for which INTELSAT makes a favorable recommendation in accordance with Article XIV of its definitive arrangements. If launch assistance is requested in the absence of a favorable recommendation by INTELSAT:

/1. We would authorize the sale of appropriate launch vehicles for launching from foreign launch sites, so long as the country requesting the launch is a member of INTELSAT and meets its relevant obligations under Article XIV of the definitive arrangements./

2. /In the case of requests for launch services from US launch sites/ we would consider the provision of launch assistance, taking into account our own position as to the acceptability of the proposed

system, the vote within INTELSAT, the issues and considerations raised within INTELSAT, and the possibility that the proposed system could be modified in the light of those considerations. We expect that we would provide launch assistance for those systems which we had supported within INTELSAT and had been found acceptable by a majority of the member countries of INTELSAT.

Third, recognizing the rapid development of satellite technology and its implications, the US anticipates that launch assistance may be sought in instances where the international implications of the proposed satellite services are not yet well understood or are not governed by specific international agreements or arrangements. Such prospective satellite applications as broadcasting and remote sensing of the natural environment fall in this category. The US is prepared to consider requests for launch assistance in such instances on a case-by-case basis in the light of the intent of this policy.

MEMORANDUM OF CALL

TO: CTW

☑ YOU WERE CALLED BY— ☐ YOU WERE VISITED BY—

Michael Guhin

OF (Organization)

☑ PLEASE CALL → PHONE NO. CODE/EXT.

☐ WILL CALL AGAIN ☐ IS WAITING TO SEE YOU

☐ RETURNED YOUR CALL ☐ WISHES AN APPOINTMENT

MESSAGE

you talked?

RECEIVED BY	DATE	TIME
	8/11	10:20

STANDARD FORM 63
REVISED AUGUST 1967
GSA FPMR (41 CFR) 101-11.6

GPO : 1969—048—16—80341-1 332-389

63-108

Wednesday 8/11/71

9:30 We have a call in to Mr. Guhin's office to see if he expects any response from Flanigan to the attached memo.

1170

30876

MEMORANDUM

"staff"

THE WHITE HOUSE

WASHINGTON

August 3, 1971

~~CONFIDENTIAL~~

MEMORANDUM FOR: PETER FLANIGAN

FROM: AL HAIG

SUBJECT: Post-Apollo Space Cooperation

Last week, Dr. David wrote you and Dr. Kissinger proposing a course of action regarding post-Apollo space cooperation with the Europeans.

In order to staff Secretary Rogers' March 23 memorandum to the President without further delay, we would appreciate your views on Dr. David's proposed course as soon as possible for incorporation in the memorandum to the President on the subject.

DECLASSIFIED
Authority NSC waiver
By SO NARA, Date 4/15/10

~~CONFIDENTIAL~~

Post Apollo

JUL 30 1971

MEMORANDUM FOR

Mr. Peter Flanigan
Dr. Edward David

I have been trying to think through where we are and where we might want to be going on the question of international cooperation in space and our own planning for the post-Apollo space program. It seems to me that most of the discussions on these subjects going on in the bureaucracy have gotten mired down in a narrow perspective and far too much detail.

I suppose my thoughts basically boil down to two propositions and a rather simple proposal:

Propositions:

1. Launch assurances are the main issue with the Europeans; if the United States is going to give away launch assurances on a significant basis, we should get far more credit for the country and President than the current scenarios would permit. This should be announced and played as the really significant U.S. initiative it is.

2. With the passing of the moon landing goal, we have not been able to find any useful rationale or planning framework to guide NASA in planning the space program. We very much need to find some such device to guide planning and establish expenditure restraints.

Proposal:

Put NASA launch operations (include launch vehicle design and procurement) on a commercial accounting basis within NASA; this presumably would involve some kind of trust fund or industrial fund that would take full account of investment, operating costs, depreciation, etc. Have the President announce that NASA launch operations

are being put on a commercial-type basis and that these services will be made available to the nations of the world and to private business on nondiscriminatory economic basis. The general pitch would be that the United States was putting space launch services on a stable, regular basis for the economic, social, and scientific benefit of mankind.

This clearly needs some more thought to fill out the scope and the posture that would maximize our various objectives, but I believe something like this has great promise. If you agree, I propose that we establish a small Executive Office working group to explore the idea a bit more before getting NASA and State all excited.

Clay T. Whitehead

cc: Mr. Whitehead (2)
Subject File
Chron File

CTWhitehead:ed/jm/ec:7/27/71

Routing Slip
Office of Telecommunications Policy

Date: 2 AUG 1971

From:
To:

	Whitehead. C. T.	
	Mansur, G. F.	
	Babcock, C.	
	Buss, L.	
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	Cooke, A.	
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	Dean, W.	
	Doyle, S.	
	Enslow, P.	
	Goldberg, H.	
	Hailey, L.	
	Hall, D.	
	Hinchman, W.	
	Jansky, D.	
	Johnston, B.	
	Joyce, C.	
	Lamb, B.	
	Lasher, S.	
	Lyons, W.	
	McCrudden, M	
	Nelson, R	
	Owen, B.	
	Raish, L.	
	Robinson, K.	
	Scalia, A.	
✓	Smith, L.	
	Thornell, J.	
	Urbany, F.	
	Ward, D.	

Remarks:

European Corp

INTERNATIONAL TELECOMMUNICATION UNION

UNIÓN INTERNACIONAL DE TELECOMUNICACIONES

UNION INTERNATIONALE DES TÉLÉCOMMUNICATIONS

SECRÉTARIAT GÉNÉRAL

ADRESSE TÉLÉGRAPHIQUE : BURINTERNA GENÈVE
TÉLÉPHONE 34 70 00 — 34 60 00
TÉLEX 23000

GENÈVE, PLACE DES NATIONS

30 July 1971

Référence à rappeler dans la réponse :
When replying, please quote :
Indiquese en la respuesta esta referencia : } Nº 323/SG

Dr. Clay T. Whitehead,
Director,
Office of Telecommunications Policy,
Executive Office of the President,
WASHINGTON D.C. 20504.

Dear Dr. Whitehead,

I was most happy to see you again at the Space Conference last month and I hope that you gained a good impression of the progress it was making. I myself was kept so busy by the Conference that I unfortunately was not able to spend at least a short time with you; I am sure that we could have had a very useful exchange of views.

Recently I read in some newspapers an account of a noteworthy address which you pronounced on the 14th of July during the Convention of the American Bar Association in London. Your statement having been given wide coverage by the Press, I should be most grateful if you could let me have, at your earliest convenience, the complete text.

With kind regards,

Yours sincerely,

M. MILI
Secretary-General

Prière d'adresser toute correspondance officielle à
Please address all official correspondance to
Toda correspondencia oficial debe dirigirse a

Monsieur le Secrétaire général
Union internationale des télécommunications
1211 GENÈVE 20
Suisse - Switzerland - Suiza

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Dr. Mansfield
Post Apollo

JUL 30 1971

Tom - this sounds great. Maybe it should be explored rapidly so that the WH can combine both aspects in a major announcement.
Lynn

MEMORANDUM FOR

Mr. Peter Flanigan
Dr. Edward David

I have been trying to think through where we are and where we might want to be going on the question of international cooperation in space and our own planning for the post-Apollo space program. It seems to me that most of the discussions on these subjects going on in the bureaucracy have gotten mired down in a narrow perspective and far too much detail.

I suppose my thoughts basically boil down to two propositions and a rather simple proposal:

Propositions:

1. Launch assurances are the main issue with the Europeans; if the United States is going to give away launch assurances on a significant basis, we should get far more credit for the country and President than the current scenarios would permit. This should be announced and played as the really significant U.S. initiative it is.

2. With the passing of the moon landing goal, we have not been able to find any useful rationale or planning framework to guide NASA in planning the space program. We very much need to find some such device to guide planning and establish expenditure restraints.

Proposal:

Put NASA launch operations (include launch vehicle design and procurement) on a commercial accounting basis within NASA; this presumably would involve some kind of trust fund or industrial fund that would take full account of investment, operating costs, depreciation, etc. Have the President announce that NASA launch operations

In this regard I disagree with Daniels' drop from Kissenger to Rogers in that I do not think the STS is a suitable program for Euro cooperation for a multiplicity of reasons i.e. management, national security, technology currently. As you suggest, NASA should examine their objectives realistically and when properly focused should then expand the LeFebre discussions to include a broad spectrum of scientific projects, thus diversifying the STS.

(over)

are being put on a commercial-type basis and that these services will be made available to the nations of the world and to private business on nondiscriminatory economic basis. The general pitch would be that the United States was putting space launch services on a stable, regular basis for the economic, social, and scientific benefit of mankind.

This clearly needs some more thought to fill out the scope and the posture that would maximize our various objectives, but I believe something like this has great promise. If you agree, I propose that we establish a small Executive Office working group to explore the idea a bit more before getting NASA and State all excited.

Clay T. Whitehead

cc: Mr. Whitehead (2)
Subject File
Chron File

CTWhitehead:ed/jm/ec:7/27/71

Specifically when European cooperation is considered I think we must clearly distinguish between

(1) programs with near term commercial application

(2) programs which give a basic and essential capability to the U.S. and upon which national security may rest e.g. space shuttle

(3) scientific programs such as OSO, OGO etc.

In my book only (3) is suitable for cooperative activities.

GM.

nasa

June 29, 1971

To: Dick Speier

From: Tom Whitehead

These are the things you asked to borrow. Please return as soon as you have read it.

Attachments: NASA papers: (1) Introduction to NASA Presentation on Post-Apollo
(2) Technology Transfer in the Post-Apollo Program
(3) Alternatives to Post-Apollo Participation

"The Artist's Guide to His Market" by Betty Chamberlain -- books belongs to Speier.

mr. whitehead

July 23, 1971

MEMORANDUM FOR

Henry Kissinger
Peter Flanigan

Subject: Post-Apollo Space Cooperation with the Europeans

Background

It was agreed at our meeting with Jim Fletcher on April 23, 1971, that NASA should prepare an evaluation of (1) the degree of technology transfer to the Europeans, which would take place if the proposed U.S.-European cooperation on development of a space transportation system (STS) were to materialize; and (2) alternative subjects for U.S.-European cooperation. I have now reviewed NASA's informal paper (summary attached) and discussed the subject with Jim Fletcher, who concurs with the course of action recommended in this memorandum.

Pending further consideration of the details of the NASA analysis, and additional discussions at the technical level between the U.S. and European space groups, I am not prepared to have the U.S. commit itself to this cooperative program of STS development. Although the NASA study (concurred in by Jim Fletcher) suggests that the technology transfer question as well as management complications are not of significant proportions, my personal concerns on these points have not yet been answered to my full satisfaction, nor can they be answered until there is a better understanding of the potential European contribution. Furthermore, U.S. shuttle planning is not sufficiently definitive at present to permit any agreement on the shuttle with the Europeans in the near future. Nonetheless, I do believe that a resumption of technical-level discussions with the Europeans would be in order at this time for the purpose of more clearly defining, without any precommitment, the potential interests and contributions of both sides.

EED chron

It is also apparent from recent telegrams from Europe that a reply to Minister Theo LeFevre's letter to Alex Johnson of March 3, requesting a statement of the U.S. position on post-Apollo space cooperation, cannot be delayed much longer. Europe's space officials must move ahead with their own planning for the future. I believe this matter can be resolved by separating the issue into two components and addressing each separately.

The urgent question before the Europeans is whether U.S. launchers will be available at a fair price and on a non-discriminatory basis for launching European satellites. If the answer is no, the Europeans will likely proceed to develop their own EUROPA-III launch vehicle, with little or no funds left for cooperation with the U.S. in any area; if yes, they will most probably abandon their launcher development plans, freeing funds for increased cooperation with the U.S. and/or for other space developments of their own.

The first alternative would require European expenditures of almost a billion dollars to build a launch capability which has already existed in the United States for several years. In the process, it will doubtless engender some bitterness on the part of those countries who oppose this choice on practical grounds, but would feel constrained to support it on political grounds. However, this approach will by 1976-78 provide the Europeans with a capability to launch their own geosynchronous satellites independently of U.S. views or influence.

The second alternative would perpetuate European dependence on the U.S. for launch services, would generate sales for U.S. booster manufacturing firms, and would preserve the chance for a major European input to a cooperative program with the U.S. This alternative would seem more attractive than the first for longer-range U.S. interests.

Although the availability of U.S. launchers might also enable the Europeans to compete with U.S. firms for satellite construction contracts from other countries, both the U.S. aerospace industry and I believe that this would not be a significant commercial threat, in view of our vastly superiority satellite technology.

Recommendation

Accordingly, I propose that we separate the two elements of launch assurances and space cooperation and that State be advised to proceed along the lines of the attached draft letter to Bill Rogers. If you are in agreement, I believe this course of action provides a satisfactory exit from the present impasse.

Edward E. David, Jr

Edward E. David, Jr.
Science Adviser

Attachments

cc: EED file - chron
S&T file - chron
NPN chron
MR. BECKLER
DR. DREW
Michael Gukin, NSC

NPNeureiter:jmk
7/23/71

DRAFT
July 27, 1971

Dear Bill:

Uncertainties in U.S. domestic shuttle planning and a need for additional review of the problems of technology transfer and management complications in undertaking a joint program of space transportation system (STS) development with the Europeans have delayed this reply to your letter to the President of March 23.

Although that review is not yet complete, the President feels it is now possible to develop a reply to Minister LeFevre and the European Space Conference (ESC) and to resume a dialogue with the Europeans; however, in a way that does not condition U.S. launch assurances for European payloads upon substantial European participation in a joint STS program, but treats each of these two matters separately.

A first priority would be to prepare a position for discussion with the Europeans, indicating U.S. willingness to provide launch assurances for foreign satellites of a peaceful nature. Language acceptable to the Europeans, but recognizing overall U.S. obligations to Intelsat, should be sought for such assurances.

However, one possible formulation which would be acceptable to the President, if such a degree of assurance is necessary to avoid European charges that the U.S. seeks to retain a veto over their space plans, would provide for launch services by the U.S. of foreign systems approved under Article 14 of the definitive arrangements of Intelsat; and would permit sale of the necessary launch vehicle for "unapproved" systems, leaving to the launching nation the interpretation of its obligations under Article 14.

? to specify for directions to see STS?

Renewed discussions with the ESC about post-Apollo cooperation should be undertaken at the technical working level. Their purpose would be to seek to define a possible cooperative relationship between Europe and the U.S. in a program of STS development, with full understanding that no commitment on either side is expected or assured until the results of these discussions have been referred to the involved governments for review and final decision. Although no cooperative programs have been discussed in the present context with the Europeans to compare in magnitude with STS development, it will be useful in the course of these talks to keep in mind the full range of

? mind willing to agree? Too much STS emphasis

potential cooperative opportunities, in the eventuality that a satisfactory agreement is not reached on the STS program and assuming that the Europeans do respond to the offer of U.S. launch assurances by abandoning EUROPA-III.

The President hopes that this course of action will address the pressing European concern regarding launcher availability, will permit a continued dialogue with the Europeans directed toward mutually beneficial space cooperation with full protection of U.S. interests, and will avoid locking the U.S. prematurely into a commitment or schedule for the STS.

Sincerely,

Henry A. Kissinger

Honorable William P. Rogers
Secretary of State
Washington, D. C. 20520