

**NATIONAL AERONAUTICS AND  
SPACE ADMINISTRATION**  
Washington, D. C. 20546

**FOR RELEASE:**

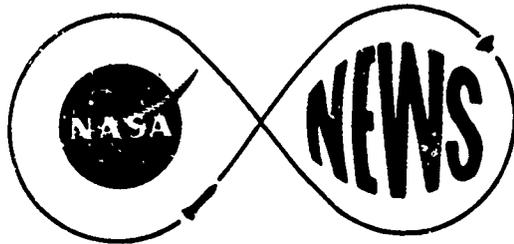
**NOTE TO EDITORS**

Attached is background material on the agreement signed May 24 in Moscow on cooperation in space between the United States and the Soviet Union.

Included are a text of the agreement, a statement by NASA Administrator James C. Fletcher, background on the spacecraft involved and a mission description. Not directly related, but also included is background on the January 1971 agreement on US/USSR cooperation in the fields of scientific research and applications in space.

You might find this information useful for reference purposes.

Richard T. Mittauer  
Director of Public Information  
Office of Public Affairs



SPECIAL

**NATIONAL AERONAUTICS AND  
SPACE ADMINISTRATION**

Washington, D. C. 20546  
Phone: (202) 755-8370  
755-8347

**FOR RELEASE:  
IMMEDIATE  
May 24, 1972**

TEXT OF US/USSR SPACE AGREEMENT

The following is the text of the agreement on cooperation in space between the United States and the Union of Soviet Socialist Republics signed in Moscow on May 24, 1972:

**AGREEMENT**

Between the United States of America and the Union of Soviet Socialist Republics concerning cooperation in the exploration and use of outer space for peaceful purposes,

The United States of America and the Union of Soviet Socialist Republics,

Considering the role which the USA and the USSR play in the exploration and use of outer space for peaceful purposes,

Striving for a further expansion of cooperation between the USA and the USSR in the exploration and use of outer space for peaceful purposes,

Noting the positive cooperation which the parties have already experienced in this area,

-more

May 24, 1972

Desiring to make the results of scientific research gained from the exploration and use of outer space for peaceful purposes available for the benefit of the peoples of the two countries and of all peoples of the world,

Taking into consideration the provisions of the treaty on principles governing the activities of states in the exploration and use of outer space, including the Moon and other celestial bodies, as well as the agreement on the rescue of astronauts, the return of astronauts, and the return of objects launched into outer space,

In accordance with the agreement between the United States of America and the Union of Soviet Socialist Republics of exchanges and cooperation in scientific, technical, educational, cultural, and other fields, signed April 11, 1972, and in order to develop further the principles of mutually beneficial cooperation between the two countries:

Have agreed as follows:

Article 1

The parties will develop cooperation in the fields of space meteorology: study of the natural environment: the exploration of near Earth space, the Moon and the planets: and space biology and medicine: and in particular, will cooperate to take all appropriate measures to encourage and achieve the fulfillment of the "summary of results of discussions on space co-

operation between the US National Aeronautics and Space Administration and the Academy of Sciences of the USSR" of January 21, 1971.

Article 2

The parties will carry out such cooperation by means of mutual exchanges of scientific information and delegations, through meetings of scientists and specialists of both countries, and also in such other ways as may be mutually agreed. Joint working groups may be created for the development and implementation of appropriate programs of cooperation.

Article 3

The parties have agreed to carry out projects for developing compatible rendezvous and docking systems of United States and Soviet manned spacecraft and stations in order to enhance the safety of manned flight in space and to provide the opportunity for conducting joint scientific experiments in the future. It is planned that the first experimental flight to test these systems be conducted during 1975, envisaging the docking of a US Apollo-type spacecraft and a Soviet Soyuz-type spacecraft with visits of astronauts in each other's spacecrafts. The implementation of these projects will be carried out on the basis of principles and procedures which will be developed in accordance with the summary of results of the meeting between representatives of the US National Aeronautics and Space Administration and the USSR Academy of Sciences on the question

of developing compatible systems for rendezvous and docking of manned spacecraft and space stations of the USA and the USSR, dated April 6, 1972.

Article 4

The parties will encourage international efforts to resolve problems of international law in the exploration and use of outer space for peaceful purposes with the aim of strengthening the legal order in space and further developing international space law and will cooperate in this field.

Article 5

The parties may by mutual agreement determine other areas of cooperation in the exploration and use of outer space for peaceful purposes.

Article 6

This agreement shall enter into force upon signature and shall remain in force for five years. It may be modified or extended by mutual agreement of the parties.

Done at Moscow on the 24th of May, 1972, in duplicate in the English and Russian languages, each equally authentic.

For the United States of America

Richard Nixon ✓

For the Union of Soviet  
Socialist Republics

Aleksei N. Kosygin ✓

STATEMENT BY DR. FLETCHER

5/24/72

We of the National Aeronautics and Space Administration are extremely pleased that President Nixon's meeting with officials of the Soviet Union in Moscow has brought to fruition the most meaningful cooperation in space yet achieved by our two nations.

We have been discussing the possibilities of such cooperation for some time now, and some important technical agreements had been reached earlier. Now, as President Nixon has announced, we have jointly agreed to firm these commitments into a definitized program and have begun to set up the timetable for various cooperative events to take place.

The most dramatic of these events will involve the rendezvous and docking of a U. S. spacecraft with a Russian Soyuz spacecraft in 1975. It will be an earth orbital mission. A U. S. command-and-service module of the type we are now using in our Apollo moon missions will link up with a Soviet Soyuz spacecraft. While two spacecraft are docked together the astronauts and cosmonauts will visit both spacecraft and perform a number of simple scientific tasks.

Let me describe briefly a few of the details of the joint mission. Our Apollo spacecraft will be fitted with a new system referred to as the docking module. It will be launched from Cape Kennedy on a Saturn IB into low earth orbit -- about 110 nautical miles. After it separates from the second Saturn stage, the command and service module will turn around, dock and extract the docking module in much the same way the lunar module is extracted from the second Saturn stage on a moon mission. The plane of the orbit will be inclined  $51.6^\circ$  to the equator, in order to pass over the USSR launch site.

Soon after the Apollo launch, the Soyuz spacecraft would be launched into an orbit of about 145 nautical miles. Once this has been attained, the Apollo would begin an active rendezvous sequence designed to bring the two craft close together. The Apollo radio and optical guidance systems would be used to rendezvous. At the time of station keeping, the Apollo spacecraft would be maneuvered to dock with the Soyuz, using a new TV docking alignment system and the compatible docking system.

Once locked together, it is expected that American astronauts would visit the Soyuz first; they would enter

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through the docking module, carrying voice communications equipment and an additional television camera. After this, an American astronaut would accompany a Soviet cosmonaut back to the Apollo.

In preparation for this event and other cooperative endeavors to follow, NASA will begin the manufacture of the docking module this summer. A task group of engineers from our two countries has already met several times to discuss the technical problems involved; another meeting will be held in the very near future.

It will take two years to build and test the docking module. We are pleased that as part of the cooperative effort there will be Soviet engineers working side-by-side with our own NASA people, probably in both countries.

The joint manned flight program will also bring many immediate and direct economic benefits to the people of the United States. First, the project will bring employment to thousands of aerospace workers to build, test or modify hardware necessary for the flight. This employment will reach a peak of about 4400 by the end of 1974.

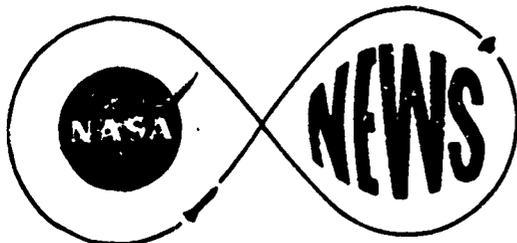
In addition, thousands of other workers employed to support test, checkout and launch activities are now assured of jobs through the launch and flight of the joint mission.

Beyond this, the agreement to carry out a joint mission assures the retention of the Apollo team, a unique technical and management resource, for work on the Space Shuttle and other important future programs.

It is our hope that this first mission is the precursor of future joint manned and unmanned efforts which will enable both nations to avoid duplication and reduce the costs of space exploration.

Such cooperative programs will enable both countries to better serve all mankind with continued vigorous efforts to expand our understanding of science and development of new technology for better life on earth.

All of us are quite optimistic that this new deeper cooperation in the exploration of space may lead to increased cooperation on still other programs. It will probably be the most visible Soviet-U.S. cooperative effort in history, since it may involve cosmonauts and astronauts working together on a very complex mission while the whole world is observing on television via satellite relay.



**NATIONAL AERONAUTICS AND  
SPACE ADMINISTRATION**  
Washington, D. C. 20546

**FOR RELEASE:  
IMMEDIATE  
May 24, 1972**

RELEASE NO: 72-109

US/USSR RENDEZVOUS AND DOCKING AGREEMENT

The National Aeronautics and Space Administration today released the text of an April 1972 agreement with the Academy of Sciences of the USSR on the organization, development, scheduling, and conduct of a test docking mission for manned spacecraft in 1975. The agreement will be the basis for implementing those sections of the space accord reached by the President this week in Moscow which relate to the test docking mission.

The April agreement builds on three previous agreements of October 1970, June 1971, and November-December 1971, on the design and flight testing of compatible rendezvous and docking systems. The April meeting was requested by NASA to satisfy management and operational considerations attaching to a joint mission prior to possible commitment at a government-to-government level.

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May 24, 1972

Dr. George M. Low, Deputy Administrator, headed the NASA delegation which included Arnold W. Frutkin, Assistant Administrator for International Affairs, and Dr. Glynn Lunney, Special Assistant to the Apollo Program Manager. The Soviet delegation was headed by Vice President of the Soviet Academy of Sciences, V. A. Kotelnikov, and included Academician B. N. Petrov, Drs. I. P. Rummyantsev, K. D. Bushuyev and others. Drs. Lunney and Bushuyev have been designated the Project Managers for the test mission.

During the April meeting, agreement was reached on such matters as regular and direct contact through frequent telephone and telex communications, as well as visits; the requirement for and control of detailed formal documentation; joint reviews of designs and hardware at various stages of development; the requirement for joint tests of interconnecting systems; early participation in the joint preparations by flight operations specialists; the development of crew training and orientation plans; and the training in each country of the other country's flight crew and operations personnel.

Agreement was reached also on the requirement for and level of detail of project schedules, including early specification of development milestones and countdown and launch dates.

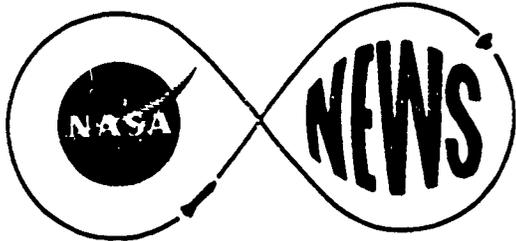
Agreement was reached as well on the principles of communications, command and control of the flight; the requirements for

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flight plans and mission rules for normal and contingency situations; the immediate transmission of flight television received in one country to the other's control center; the level of reciprocal language familiarity; and the need to develop public information plans taking into account the obligations and practices of both sides.

Beyond the test mission which is planned for 1975, the accord announced in Moscow provides that future generations of manned spacecraft of both the United States and the Soviet Union will be capable of docking with each other. That capability will facilitate emergency assistance to astronauts in difficulty and will make possible the conduct of cooperative projects, with attendant economies.

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Phone: 202/755-8370

**FOR RELEASE:**

BACKGROUND ON RENDEZVOUS AND DOCKING AGREEMENTS

Objectives:

1. To design compatible rendezvous and docking systems for future spacecraft of the US and USSR.
  
2. To test the technical requirements and solutions for compatible systems for docking of future manned spacecraft and stations using existing spacecraft. The testing will include the rendezvous and docking of Apollo/Soyuz with the active use of all the new equipment required for compatibility available for the mission. The test mission will include:
  - (a) Testing of a compatible rendezvous system in orbit.
  - (b) Testing of androgynous docking assemblies.
  - (c) Verifying techniques for transfer of astronauts and cosmonauts.
  - (d) Activities by US and Soviet crews in docked flight.
  - (e) Development of experience for the conduct of joint flights by US and Soviet spacecraft, including aid in emergency situations.

Apollo Spacecraft:

In order to perform the experimental test mission, the US will use an Apollo-type spacecraft and a new system referred to as the docking module. The Apollo spacecraft will be a modified version of the command and service module flown during the first several lunar landing missions. This basic spacecraft has been manufactured and checked out and is presently in storage. Some modifications will be required as a result of unique mission requirements. The major modifications will include additional propellants for the reaction control system; testers for thermal control, and the controls and displays required for the proper operation of the docking module.

The docking module is a cylindrical shaped structure, approximately 5 feet in diameter and 10 feet in length. It will serve as both an airlock for the internal transfer of crewmen between the different atmospheres of the two spacecraft and much of the new compatible equipment will be located in this structure. On the forward end of this module, the new peripheral docking system will be located. Radio communications, TV docking displays and antennas will also be mounted on the module.

The docking module will be equipped with the necessary stored gases, a thermal control loop, and the displays and controls necessary for safe operation of the two different pressure levels. For this operation, hatches with manual controls will be installed on either end of the module, which is scaled to handle two suited crewmen.

The Soyuz Spacecraft:

The Soyuz-type spacecraft has been selected as the Soviet vehicle for the experimental rendezvous and docking test mission. This type of spacecraft has been the primary manned vehicle for the Soviet space program since it was introduced in 1967. Various versions of the basic design have been used over a range of Earth orbital mission applications such as solo flight, manned and unmanned rendezvous flights, long-duration manned flight (18 days) and as a transport to the orbital scientific station, "Salyut."

This type of spacecraft consists of three basic modules:

- 1) Descent Module
- 2) Orbital Module
- 3) Instrument Module

The descent module is a pressurized compartment of segmented conical shape located between the orbital and instrument modules. The crew couches and main control panels are located in this module, and the crew occupies this compartment during launch into orbit, descent and landing, and during certain maneuvers and exercises performed in Earth orbit. This descent module is connected by a hatch to the orbital module, located above or in front of the descent module. This orbital module is used as a crew rest and work area during the Earth orbit phase of its missions. The orbital module is approximately spherical and can also be operated as an airlock to perform extravehicular activity. The instrument module is an unpressurized compartment at the bottom or rear of the spacecraft and contains the various sub-systems required for power, communications, propulsion and other functions.

The exact configuration of the vehicle used in the test mission will be a modification to the basic Soyuz design including the compatible rendezvous and docking equipment and possibly other requirements unique to the test mission. The compatible rendezvous and docking systems include:

- Radio communications on the US and USSR frequencies.
- Radio guidance equipment.
- Optical tracking beacon.
- Peripheral-type docking system.
- Docking aids and targets.
- Equipment for crew transfer.

- 4 -

Most of the new compatible systems will be located on the orbital module; for example, the new docking system will be installed on the existing structural docking ring on the front end of the spacecraft.

Some basic characteristics of the Soyuz vehicle planned for the test mission are:

Number of crewmen - 2

Weight - 15,000 pounds

Overall length - 24 feet

Diameter of the habitable modules - 7.5 feet

Cabin atmosphere - 14.7 psi (Nitrogen and oxygen mixture)

Partial pressure of oxygen - 3.5 psi

Consumable loading for a nominal flight of 5 days.

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Mission Description:

A possible mission profile would include the launching of an Apollo-type spacecraft on a Saturn IB from Cape Kennedy, Fla. The vehicle would be inserted into a low Earth orbit, on the order of 110 nautical miles. After separation from the second Saturn stage (S-IVB), the command and service module would turn around, dock and extract from the S-IVB, the docking module internally mounted in the adapter area, in essentially the same fashion as the lunar module is extracted on current lunar missions. The plane of the orbit will be inclined 51.6° to the equator, in order to pass over the USSR launch site. The Apollo altitude will be selected and adjusted periodically, if necessary, in order to provide daily launch opportunities for the Soyuz spacecraft. As soon as practical after the Apollo launch, the Soyuz spacecraft would be launched and maneuvered into a target orbit on the order of 145 nautical miles. Once the Soyuz spacecraft is in orbit, the Apollo would begin an active rendezvous sequence to arrive in the vicinity of the Soyuz within one, or perhaps two days, after the Soyuz launch. The Apollo radio and optical guidance systems would be used in this sequence. At the time of station keeping, the Apollo spacecraft would be maneuvered to dock with the Soyuz, using a new TV docking alignment system and the new peripheral-type compatible docking system.

Once the two vehicles are docked, a period of up to two days is planned for joint activities. The exact duration of the docked phase would depend upon further definition of specific crew activities, including the possibility of joint operation of scientific experiments. It is expected that American astronauts would enter the Soyuz internally through the docking module, carrying voice communications equipment and an additional television camera. After an initial visit, an American astronaut would accompany a Soviet cosmonaut back to the Apollo. This return visit would require an intermediate stop of approximately two hours in the docking module while both crewmen perform the necessary oxygen prebreathing to safely go to the lower operating pressure of Apollo. The length of this visit and the precise sequence of subsequent crew transfers would be defined as more complete understanding of the operational, equipment and experimental factors indicate. For this purpose, the docking module will be provisioned to permit two additional round trip transfers by two crewmen.

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Once the docked phase is completed, the two vehicles will separate and possibly perform further tests of the docking system and the optical and radio aids and equipments. The vehicles will then be maneuvered to separate orbits for return to Earth.

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Organization:

The organizational arrangement between the US and the Soviet sides at present consists of three joint working groups on (1) overall methods and means, (2) guidance systems and communications, and (3) docking assembly. The three JWG's are under the direction of Joint Project Managers, Dr. Glynn S. Lunney for NASA and Prof. K. D. Bushuyev for the Academy of Sciences of the USSR. Additional working groups and operational arrangements will be introduced as required on the basis of mutual agreement.

Within NASA, the project team will be located in the Manned Spacecraft Center in Houston. It will be under the direction of the NASA Headquarters Office of Manned Space Flight.

Costs:

It is estimated that the cost of the project will be \$250 million, for development of the docking module, the new docking system, other necessary modifications, the launching and the conduct of the operation. The Apollo CSM and Saturn IB which will be used for the test mission are left over from the Apollo program.

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Summary of Agreements Reached:

October 28, 1970

- Agreed to design compatible rendezvous and docking systems for future manned spacecraft.
- Agreed to a procedure by which the two sides could, through a combination of independent action and coordination, arrive at compatible systems.
- Established three joint working groups.

June 21-25, 1971

- Agreed to study the technical and economic implications of early test missions using existing vehicles.
- Agreed on coordinate systems to be used for rendezvous purposes.
- Agreed on single documentation of requirements for atmospheres, hatches, and crew transfer techniques.
- Agreed on air lock volume.
- Agreed on placement of structural elements and equipment.
- Agreed on optical and radio beacon characteristics.
- Agreed on requirements for communications between spacecraft and between spacecraft and ground stations.
- Agreed on characteristics of control systems.
- Agreed on docking system basic functions and design features, and spacecraft mass properties.

November 29 - December 6, 1971

- Agreed on technical feasibility of a test mission using existing spacecraft.
- Agreed on objectives and preliminary documentation requirements for a possible test mission.
- Substantially completed documentation on life support systems, coordinate systems and constraints on spacecraft configuration.

- Identified guidance and control systems and on-board equipment of US and USSR spacecraft which would need to be compatible.
- Substantially completed documentation on lights, docking targets and contact conditions, control systems and radio tracking.
- Agreed to basic values for a compatible docking system including tunnel diameter for astronaut passage.
- Reached preliminary agreement on the basis for design of an androgynous docking device.

April 4-6, 1972

- Confirmed the desirability of conducting a test mission using existing spacecraft in 1975.
- Accepted, as the basis for joint specification of management and operational guidelines for joint mission, documents of "Proposed Organization Plan for the Apollo/Soyuz Test Mission," "Apollo/Soyuz Test Mission Considerations," "A Project Technical Proposal Document," and "A Project Schedule Document."
- Agreed on specific principles illustrative of those which will apply in the preparatory and operational periods:
  - Frequent direct contact between project personnel on both sides.
  - Detailed commitments to schedules.
  - A comprehensive test, qualification, training and simulation program.
  - Involvement of mission flight and ground crew personnel in joint working groups two years before the mission.
  - Engineering agreement in July 1972.
  - Control of own spacecraft and spacecraft situations, with certain pre-planned guidelines to be worked out.
  - Consultation on control actions affecting joint elements of the mission.
  - Pre-planned in-flight information exchanges, including TV.
  - Reciprocal language familiarity among flight crews.
  - A public information program respecting the policies and practices of both sides.

Key Personnel

Soviet:

- ✓ M. V. Keldysh, President, Academy of Sciences of the USSR
- ✓ V. A. Kotelnikov, Vice-President, Academy of Sciences
- B. N. Petrov, Academician and President of Intercosmos
- K. D. Bushuyev, Apollo-Soyuz Test Project Director,  
Chairman of Joint Working Group One
- ✓ V. P. Legostayev, Chairman, Working Group Two
- ✓ V. S. Syromyatnikov, Chairman, Working Group Three
- I. P. Rumyantsev, Intercosmos

United States:

- G. M. Low, Deputy Administrator, NASA
- ✓ D. D. Myers, Associate Administrator for Manned Space  
Flight, NASA
- A. W. Frutkin, Assistant Administrator for International  
Affairs
- R. R. Gilruth, Former Director, Manned Spacecraft Center,  
Houston, Texas
- ✓ C. C. Kraft, Director, Manned Spacecraft Center
- ✓ G. S. Lunney, Apollo-Soyuz Test Project Director,  
Chairman, Working Group One
- ✓ D. C. Cheatham, Chairman, Working Group Two
- ✓ D. C. Wade, Chairman, Working Group Three

Chronology of Events  
US-USSR Negotiations on Compatible Rendezvous  
and Docking Systems

- April 24, 1970 - In an informal meeting in New York, Dr. Paine, then Administrator of NASA, suggested to Soviet Academician Blagonravov cooperation in the area of astronaut safety, including compatible docking fixtures for space stations and shuttles.
- May 1970 - Dr. Paine indicated the NASA interest in common docking to President Handler of the US National Academy of Sciences, who relayed the suggestion to President Keldysh of the Academy of Sciences of the USSR.
- July 31, 1970 - Dr. Paine suggested to Academician Keldysh that this possibility be considered in a projected meeting.
- September 11, 1970 - Academician Keldysh and NASA's Acting  
October 10, 1970 Administrator, Dr. Low, agreed on an October 26-28 meeting in Moscow.
- October 26-28, 1970 - Discussions of possible docking arrangements were held in Moscow, resulting in agreement that the two sides would attempt to design compatible docking systems for future manned spacecraft. Agreement reached on procedures and on a schedule for joint efforts to design compatible rendezvous and docking arrangements. Three Joint Working Groups were established.
- January 1971 - Dr. Low suggested to President Keldysh  
June 21-25, 1971 that Apollo and Soyuz spacecraft be considered for a rendezvous and docking mission.
- June 21-25, 1971 - The three Joint Working Groups, meeting in Houston, considered the technical requirements for compatible systems including the general methods and means for rendezvous and docking, radio and optical reference systems, communications systems, life support and crew transfer systems, and docking assemblies. They

agreed in principle or in detail on a number of technical solutions and requirements and identified a number of other problems which required additional development and discussion. They agreed that studies should be made of the technical and economic implications of flight experiments to test the technical solutions for compatible systems.

- November 29 -  
December 6, 1971 - The three Joint Working Groups met again in Moscow and made progress in planning a possible joint test mission as well as advancing the definition of technical requirements for compatible systems in future spacecraft. They agreed on the technical feasibility of such a test mission.
- March 27 -  
April 3, 1972 - Working Group Number 3, responsible for assuring compatibility of docking systems and tunnels, met in Houston. Results to be confirmed in 60 days.
- April 4-6, 1972 - NASA delegation headed by Dr. Low met with Soviet delegation in Moscow, confirmed the desirability of a test mission and established understanding on the management and operation of a joint test mission. Agreed to use specified documents as basis for development of joint documentation. Agreed on illustrative principles for preparatory and operational phases.
- May 10-17, 1972 - Working Group Number 2 responsible for compatibility of radio guidance systems, optics and other guidance and communications systems, met in Moscow. Results to be confirmed in 60 days.

## SUMMARY OF RESULTS

of a Meeting Between Representatives of the US National Aeronautics and Space Administration (NASA) and the USSR Academy of Sciences (the Academy) on the Question of Developing Compatible Systems for the Rendezvous and Docking of Manned Spacecraft and Space Stations of the USA and the USSR.

During April 4 - 6, 1972, in Moscow, the Deputy Administrator of NASA, Dr. George M. Low, and the Acting President of the Academy, Academician V. A. Ketsinikov, met to continue discussions of questions relating to the development of compatible rendezvous and docking systems for manned spacecraft and space stations. Official representatives of both sides participated.

Both sides confirmed the desirability of (a) continuing further work to develop such systems and (b) conducting a test mission of such systems during 1975.

NASA and the Academy agreed that the first joint experimental testing of compatible rendezvous and docking systems should be conducted with the use of Apollo-type and Soyuz-type spacecraft employing systems developed by both sides in accordance with the Summaries of Results and related documentation resulting from previous meetings.

During the meeting, the Soviet side presented technical materials on the Soyuz-type spacecraft. Technical materials relating to the proposed joint flight of Apollo and Soyuz type spacecraft shall be forwarded to the American side in May 1972.

NASA and the Academy agree that a common understanding of basic principles for organizing, developing, scheduling, and conducting such a test mission is required as a necessary prerequisite to the possible approval by their governments of such a test mission.

To provide a basis for understanding and developing such principles, the US side has prepared a number of draft documents including, particularly, the following ones:

- A. Proposed Organisation Plan for the Apollo/Soyuz Test Mission.
- B. Apollo/Soyuz Test Mission Considerations (brief summary of document A).
- C. A Project Technical Proposal Document.
- D. A Project Schedule Document.

These documents are accepted as the basis for the development of jointly prepared documents.

Both sides agree that the specific content of these documents will be jointly developed and agreed upon at the next meeting of working groups in July 1972, to provide the necessary basis for successful implementation of a joint mission, should such a mission be approved by the two governments.

The following points, to which both sides agree, while not comprehensive, illustrate in summary fashion some of the major requirements which are contained in document B:

- A. For the preparatory (pre-launch) period--
  - 1. Regular and direct contact will be provided through communication links and visits as required.
  - 2. A complete project schedule will be developed and commitments will be made on both sides to meet this schedule in order to avoid costly delays to either party.
  - 3. Arrangements will be made for necessary contact and understanding between specialists engaged in developing and conducting the project.
  - 4. A comprehensive test, qualification, and simulation program will be developed.

5. A sufficient level of familiarization and training, where applicable, with the other country's vehicle and/or normal training equipment must be defined and provided for safety-of-flight assurance. The necessary training exercises will be conducted in each country for the other country's flight crew and ground operations personnel.

6. The parties recognize in particular that they must jointly make a concerted effort to arrive at a full agreement on the engineering aspects of the mission during the meeting of working groups in July 1972.

7. Two years prior to the flight, responsible persons who will directly participate in the flight operations should be included in the working groups in order to assure a proper level of mutual understanding and a continuity of personnel into the real-time operation.

B. For the mission operation--

1. Control of the flight of the Apollo-type spacecraft will be accomplished by the American Control Center and that of the Soyuz by the Soviet Control Center, with sufficient communication channels between centers for proper coordination.

2. In the course of control, decisions concerning questions affecting joint elements of the flight program, including countdown coordination, will be made after consultation with the control center of the other country.

3. Joint elements of the flight will be conducted according to coordinated and approved mission documentation, including contingency plans.

4. In the conduct of the flight, pre-planned exchanges of technical information and status will be performed on a scheduled basis.

5. The host country control center or host country spacecraft commander will have primary responsibility for deciding the appropriate

pre-planned contingency course of action for a given situation in the host vehicle. Each country will prepare detailed rules for various equipment failures requiring any of the pre-planned contingency courses of action.

6. In situations requiring immediate response, or when out of contact with ground personnel, decision will be taken by the commander of the host ship according to the pre-planned, contingency courses of action.

7. Any television downlink will be immediately transmitted to the other country's control center. The capability to listen to the voice communications between the vehicles and the ground will be available to the other country's control center on a pre-planned basis and, upon joint consent, as further required or deemed desirable.

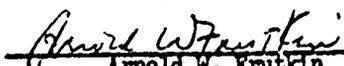
8. Both sides will continue to consider techniques for providing additional information and background to the other country's control center personnel to assist in mutual understanding (including the placement of representatives in each others control centers).

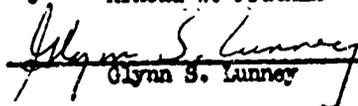
9. As a minimum, flight crews should be trained in the other country's language well enough to understand it and act in response as appropriate to established voice communications regarding normal and contingency courses of action.

10. A public information plan will be developed which takes into account the obligations and practices of both sides.

Done in Moscow, April 6, 1972, in English and Russian, both languages having equal force.

  
George M. Low

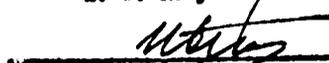
  
Arnold W. Frutkin

  
Glynis S. Lunney

  
V. A. Kotelnikov

  
B. M. Petrov

  
I. P. Rumyantsev

  
K. D. Bushuyev

## MILESTONES IN US/USSR SPACE COOPERATION

Efforts to develop US-USSR cooperation in space research go back to the first planning of space projects in 1955 for the International Geophysical Year. In a series of international meetings, U. S. scientists and those of other nations sought to develop conventions for wide exchange of space data.

More specific efforts were made at various times but were not generally fruitful until after the successful manned orbital flight of U. S. astronaut John Glenn in February 1962. The US then made specific proposals which resulted in talks between Dr. Hugh L. Dryden late Deputy Administrator of NASA and Academician Anatoly A. Biagonravov. The result was the three-part bilateral space agreement of June 1962. It provided:

1. Coordinated launchings by the two countries of experimental meteorological satellites and for the exchange of data over a Washington-Moscow channel.
2. Launchings by each country of satellites equipped with absolute magnetometers and the subsequent exchange of data in order to arrive at a map of the Earth's magnetic field in space.

3. Joint communications experiments by means of the U. S. passive satellite Echo II.

The Dryden-Blagonravov talks also led to a second agreement in November 1965 for the preparation and publication of a joint US/USSR review of space biology and medicine. These agreements were not fully realized.

A new phase of the US/USSR space relationship began in 1969 when NASA Administrator Dr. Thomas O. Paine, in letters to President Keldysh and Academician Blagonravov, invited new initiatives in space cooperation, in general scientific fields as well as in rendezvous and docking of manned spacecraft. President Keldysh agreed to pursue these suggestions.

The first rendezvous and docking talks took place in Moscow in October 1970 and the more general discussions were held in Moscow in January 1971. The October 1970 talks related to the possibility that U. S. and U.S.S.R. manned spacecraft might be designed so as to be able to rendezvous and dock with each other in space.

The NASA group at these discussions was headed by Dr. Robert Gilruth, Director of the NASA Manned Spacecraft Center, and the Soviet side was headed by Academician Boris Petrov, Chairman of Intercosmos, an Academy office concerned with international cooperation in space. The new talks were direct, substantive and businesslike throughout.

The resulting agreement provided for procedures by which the two countries can, through a combination of independent action and coordination, arrive at compatible systems. Joint working groups were established which, in a series of meetings, developed the technical understandings required for design of compatible rendezvous and docking systems. In April 1972, the necessary management and operational understandings were established to warrant a government-level commitment to a joint test docking mission in 1975 and to the use of compatible docking systems in future generations of spacecraft.

The broader talks on cooperation in space science and applications took place in January 1971 in Moscow. Dr. George Low headed the US group. An agreement was reached on the following main points:

1. An exchange of lunar samples obtained in the Apollo and Luna programs.
2. Direct efforts by the National Oceanographic and Atmospheric Agency (U.S.) and the Soviet Hydrometeorological Service to improve the exchange of weather/satellite data, which dated from 1964, so as to achieve operational utility.
3. Coordination of networks of meteorological rocket soundings along selected meridional lines.

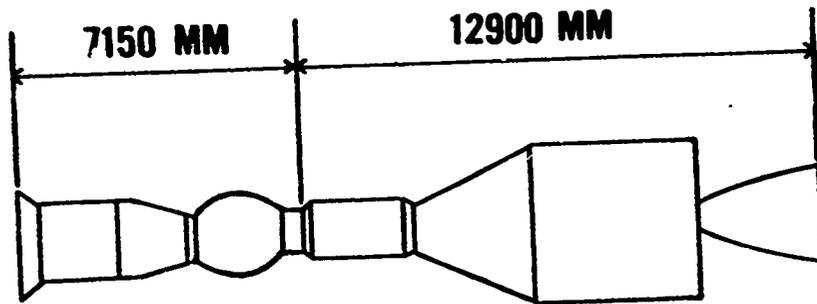
4. Development of a program for coordinated surface, air and space research over specified international water areas and exchange of results of coordinated measurements made by each country over similar land sites in their respective territories. The objective is to utilize space and conventional earth resources survey techniques to investigate the natural environment in areas of common interest, beginning with the oceans and vegetation.

5. Joint consideration of the most important scientific objectives for the rapid exchange of results from the scientific investigation of near-Earth space, the Moon and the planets. This will allow each country to take the objectives and work of the other into account in planning its own program.

6. Exchange of detailed medical information of man's reaction to the space environment.

Joint working groups were established to recommend and work out the necessary steps. These groups have been meeting on a business-like basis. Early results of this January 1971 agreement include the repeated exchange of lunar samples retrieved by both countries and the exchange of information from Mars probes of both countries while in operation about the planet.

# APOLLO/SOYUZ CONFIGURATION



# DOCKING SYSTEM

СТЫКОВОЧНОЕ УСТРОЙСТВО

PASSIVE  
DOCKING SYSTEM

ПАСИВНЫЙ  
СТЫКОВОЧНЫЙ АГРЕГАТ

BODY-MOUNTED  
LATCHES

ЗАЩЕЛКИ  
НА КОРПУСЕ

ATTENUATORS  
АМОРТИЗАТОРЫ

ACTIVE  
DOCKING SYSTEM

АКТИВНЫЙ  
СТЫКОВОЧНЫЙ АГРЕГАТ

GUIDE  
НАПРАВЛЯЮЩИЙ  
ВЫСТУП

STRUCTURAL RING  
СТЫКОВОЧНЫЙ ШЛАНГОУТ

STRUCTURAL RING  
INTERFACE SURFACE  
ПЛОСКОСТЬ  
СТЫКА

STRUCTURAL RING  
LATCHES  
ЗАМКИ СТЫКОВОЧНОГО  
ШЛАНГОУТА

CAPTURE LATCHES  
ЗАЩЕЛКИ  
КОЛЬЦА

BASE AND TUNNEL  
ASSEMBLY

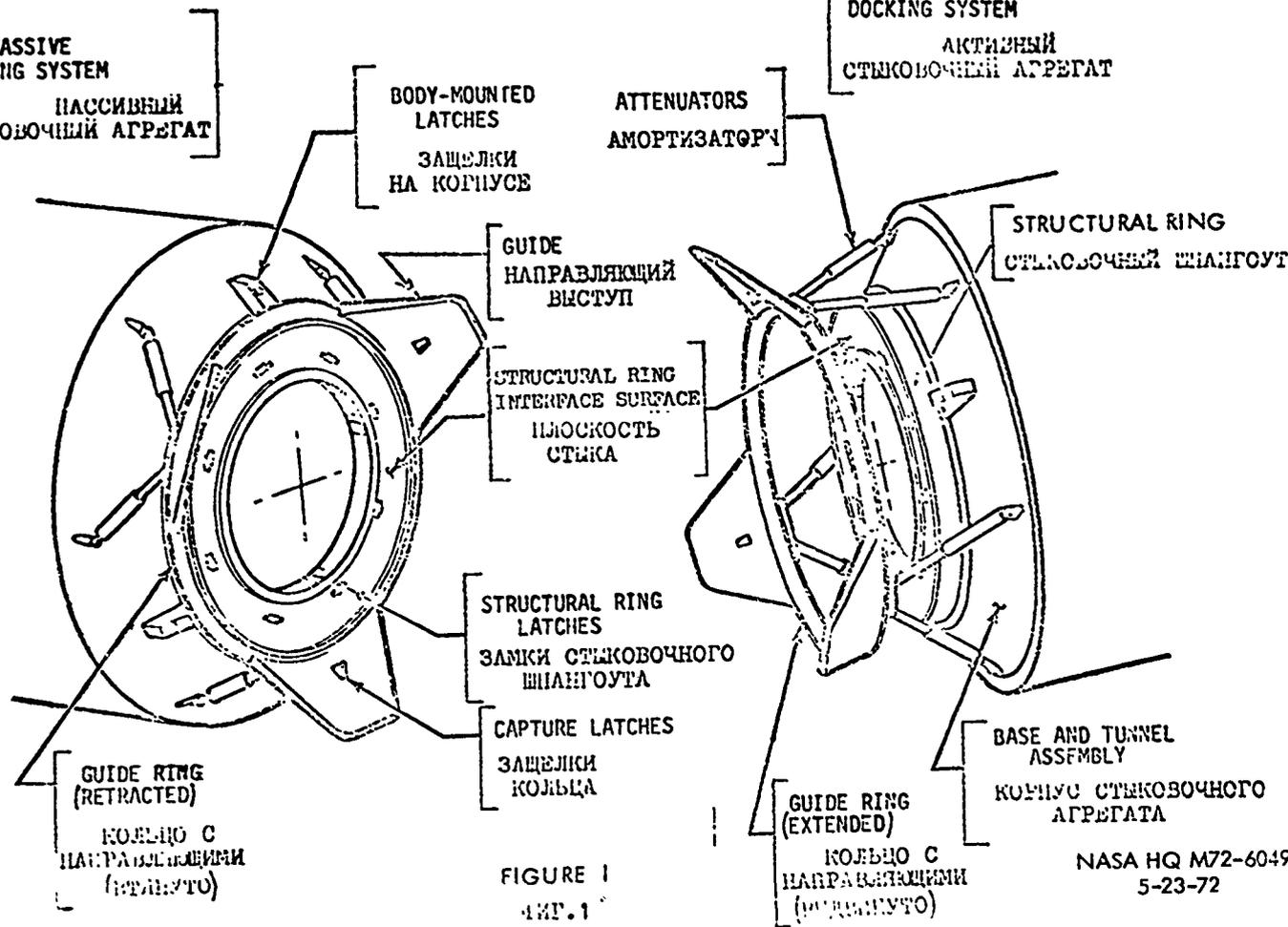
КОРПУС СТЫКОВОЧНОГО  
АГРЕГАТА

GUIDE RING  
(RETRACTED)  
КОЛЬЦО С  
НАПРАВЛЯЮЩИМИ  
(ВСТЯНУТО)

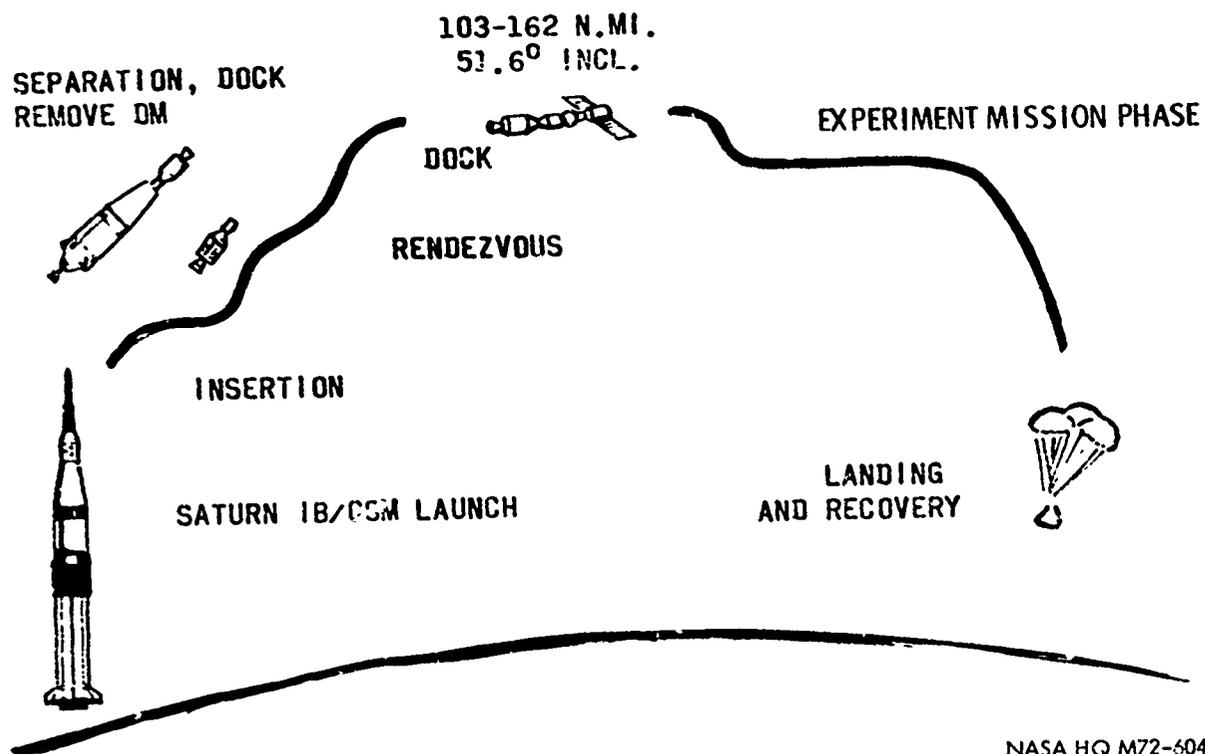
GUIDE RING  
(EXTENDED)  
КОЛЬЦО С  
НАПРАВЛЯЮЩИМИ  
(ПОДВИНУТО)

FIGURE 1  
ЧЕРТ. 1

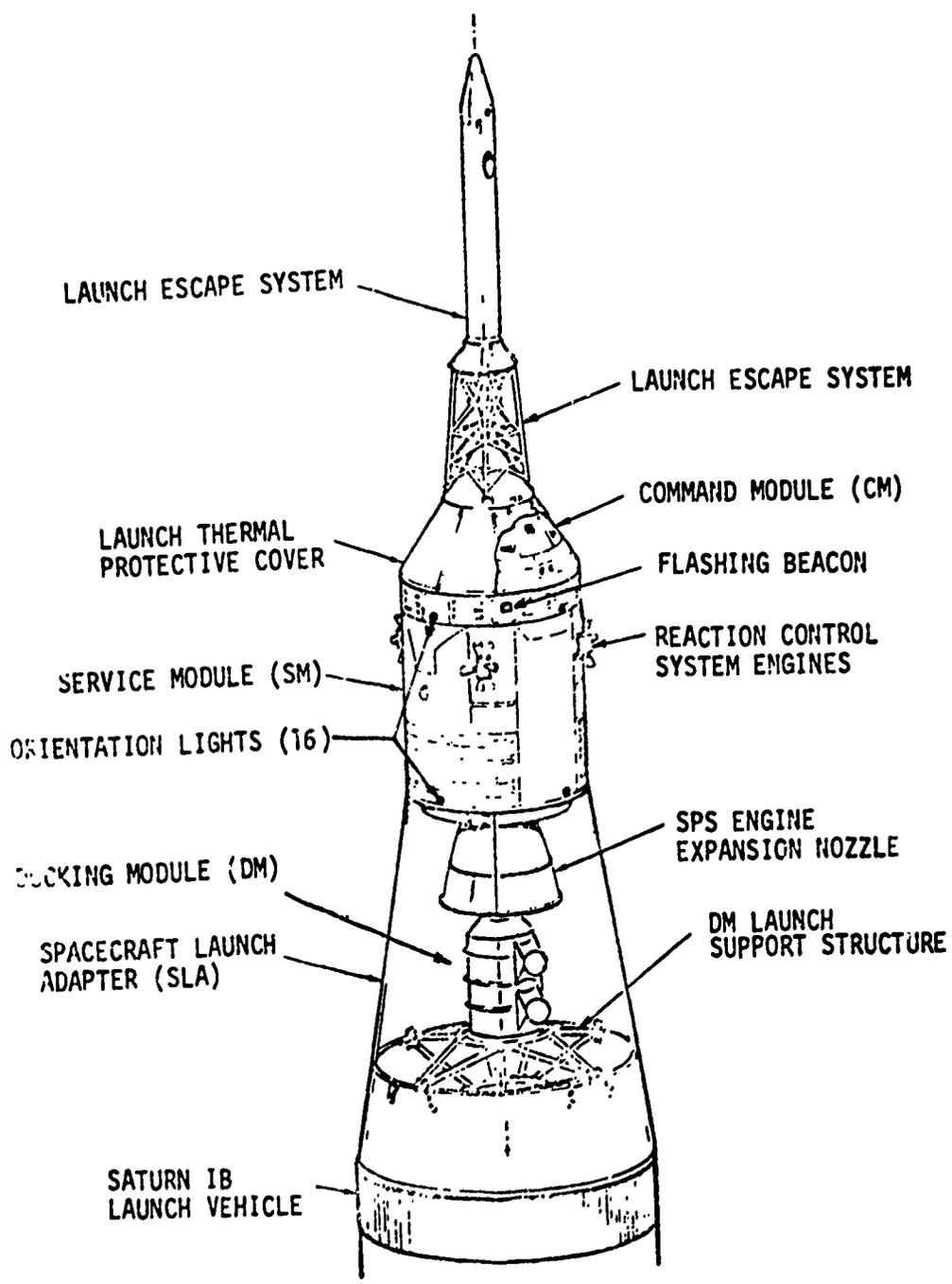
NASA HQ M72-6049  
5-23-72

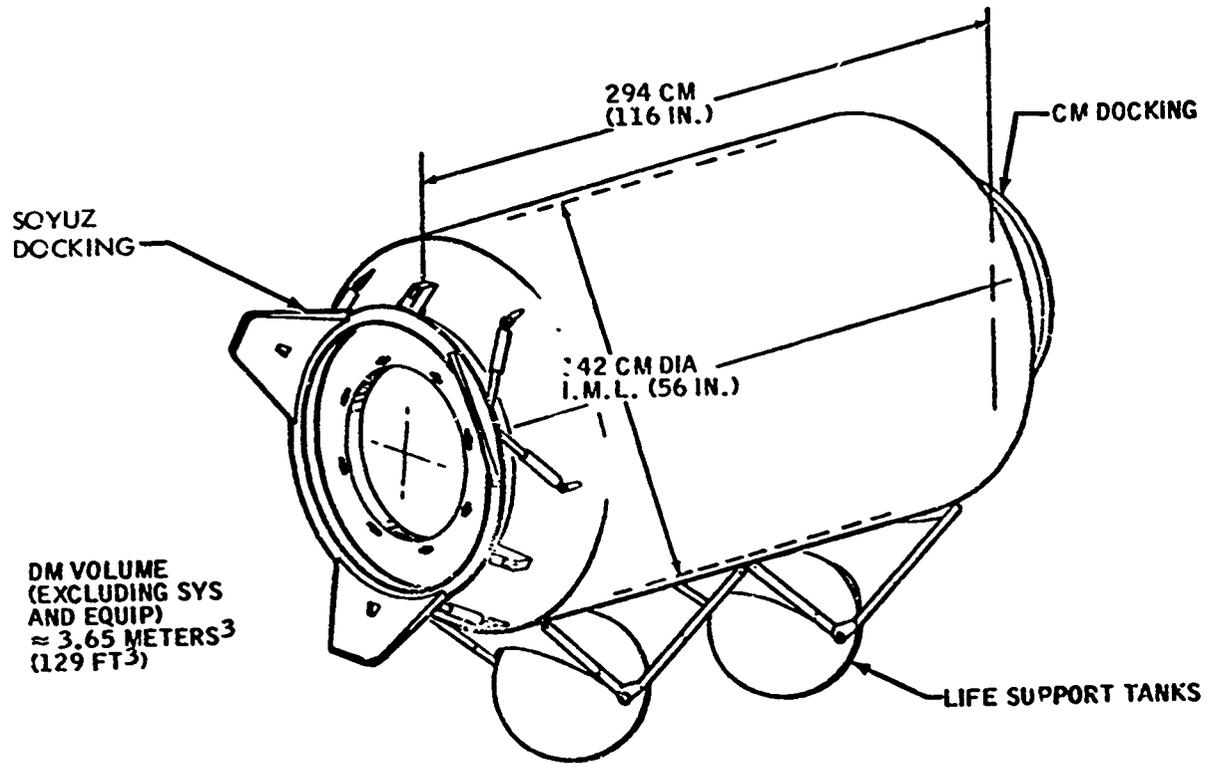


# GENERAL MISSION DESCRIPTION



NASA HQ M72-6044  
5-23-72





DOCKING MODULE OVERALL DIMENSIONS

NASA HQ M72-6051  
5-23-72

## BACKGROUND ON JANUARY 1971 AGREEMENT

### Title:

"Summary of Results of Discussions on Space Cooperation between the Academy of Sciences of the USSR and the US National Aeronautics and Space Administration, Moscow, January 18-21, 1971"

### Summary:

This broad agreement covers cooperation in the fields of scientific research and applications in space. It calls for improvements in the existing exchange of weather satellite data, cooperation to advance weather research from space, the development of a global meteorological sounding rocket network with the collaboration of other countries, efforts to advance the techniques of surveying the natural environment from space, exchanges on data and future scientific objectives for near-earth, lunar and planetary exploration, and exchanges on space biology and medicine.

Chronology of Events  
Relating to January 1971 Agreement  
between NASA and the Academy of Sciences of the USSR  
on Cooperation in Space Science & Applications

- October 10, 1969 - ~~Dr. Thomas Paine~~, Administrator of NASA, wrote Academician Keldysh, President of the Academy of Sciences of the USSR, suggesting discussions looking toward substantial advances in space cooperation.
- December 12, 1969 - Academician Keldysh accepted Dr. Paine's suggestion but asked to defer discussion of the time and place.
- October 19, 1970 - Following other correspondence relating to compatible systems for rendezvous and docking, Academician Keldysh suggested that the discussions on cooperation in space science and applications take place in Moscow sometime after November 1970.
- November 24, 1970 - ~~Dr. Low~~ accepted Keldysh's proposal and suggested a meeting before the end of January 1971.
- January 18-21, 1970 - The US delegation, headed by Dr. Low, met in Moscow with the Soviet delegation, headed by Academician Keldysh, to discuss possible directions for increased US/USSR cooperation in space. These talks resulted in agreement on the exchange of lunar surface samples and on procedures to produce recommendations for joint consideration of the objectives and results of space research, the improvement of existing weather data exchanges, research with meteorological rockets, techniques for studying the natural environment, and the expanded exchange of data on space biology and medicine. To implement this agreement, five Joint Working Groups (JWG) were established:

- JWG on Meteorological Satellites;
- JWG on Meteorological Rocket Soundings;
- JWG on the Natural Environment;
- JWG on the Exploration of Near-Earth Space, the Moon and the Planets;
- JWG on Space Biology and Medicine.

March 26, 1971

- January 21, 1971 agreement confirmed by principals.

August 2-6, 1971

- Four of the five JWGs met in Moscow and developed recommendations for joint projects and exchanges:

a) JWG on Near-Earth Space, the Moon and the Planets recommended continued exchange of lunar samples, rapid exchange of significant findings by the two countries' respective probes then en route to Mars, and joint working seminars to consider scientific results, objectives, strategy, and cross calibration of instruments;

b) JWG on the Natural Environment recommended a number of analogous and complementary land sites in each country for the conduct of multi-purpose aerospace and field experiments on the environment and recommended the exchange of satellite and surface data accumulated in the eastern tropical Atlantic to compare satellite infrared temperature measurements with surface temperatures;

c) JWG on Meteorological Satellites recommended an experiment in atmospheric temperature sounding by satellites of both countries;

d) JWG on Meteorological Rockets recommended coordinated meteorological rocket soundings along selected meridional zones in the Eastern and Western Hemispheres.

- October 6, 1971 - Recommendations of the Joint Working Groups which met in Moscow, August 2-6, 1971, were confirmed by the principals.
- October 9-13, 1971 - The Joint Working Group on Space Biology and Medicine met in Moscow and began an exchange of data and results from Soyuz and Apollo programs and developed recommendations and procedures for expanded exchange of information in space biology and medicine.
- December 10, 1971 - Recommendations of the Joint Working Group on Space Biology and Medicine were confirmed by the principals.
- May 8-12, 1972 - JWG on the Natural Environment: special Joint Coordination Group developed more detailed definitions of possible joint projects.
- May 8-12, 1972 - JWG on Near-Earth, the Moon and the Planets: special Meeting of Experts on Lunar Cartography recommended joint lunar cartographic activities including development of a common coordinate system.
- May 12-18, 1972 - The Joint Working Group on Space Biology and Medicine held its second meeting at the Manned Spacecraft Center in Houston, continued the exchange of data and results from the Apollo and Soyuz/Salyut programs and developed recommendations and procedures for expanded exchange of information in space biology and medicine. The Working Group also discussed pre- and post-flight medical examination procedures, prediction of the inflight status of crewmen, the problem of biological exploration in space, and the need for exchange of medical terminology.

Accomplishments:

- June 10, 1971 - Lunar samples returned by Luna 16 and by Apollo 11 and 12 were exchanged in Moscow.
- August 2-6, 1971 - Joint Working Group on the Natural Environment recommended a number of analogous and complementary land sites in each country for the conduct of multi-purpose aerospace and field experiments on the environment.
- November 16, 1971-  
May 5, 1972 and ff. - "Real-time" exchange of significant findings by the US Mariner 9 and Soviet Mars 2 and 3 probes.
- January 19, 1972 - Lunar samples retrieved by Apollo 14 provided to Soviet side at Manned Spacecraft Center, Houston.
- February 19, 1972 - Preliminary Apollo 15 sample sent to Soviet side.
- April 13, 1972 - Lunar sample returned by Luna 20 and remaining Apollo 15 sample were exchanged in Moscow.

Summary of Results  
of  
Discussions on Space Cooperation  
Between  
The Academy of Sciences of the USSR  
and  
The US National Aeronautics and Space Administration  
Moscow, January 18-21, 1971

1. The Academy of Sciences of the USSR (hereinafter called the Academy) and the US National Aeronautics and Space Administration (hereinafter called NASA) consider that the expansion of cooperation between the Soviet Union and the United States in space research and exploration can speed acquisition of knowledge of the earth's environment and surface features, increase opportunities to apply that knowledge for the benefit of man on earth, contribute to the efficient planning of the scientific exploration of the universe, enhance the safety of man in space and permit application of bio-medical knowledge gained from manned space flight to the well-being of man on earth.

2. Accordingly, the President of the Academy and the Acting Administrator of NASA, with leading representatives of other concerned agencies (a list of participants is attached), have

held a series of meetings during the period indicated above to exchange views on possible directions for increased cooperation between the Soviet Union and the United States in the exploration and use of outer space for peaceful purposes. During these meetings, they took note of the significance of past agreements between them and in particular the understanding of October 28, 1970 with regard to the question of providing for the compatibility of rendezvous and docking systems of manned spacecraft and space stations of both countries.

3. In the current series of meetings, the Academy and NASA have agreed to undertake certain cooperative actions and to consider jointly further possibilities for cooperation, including:

-- In the field of meteorological satellites, to work jointly to make improvements in the current exchange of data and to consider alternative possibilities for coordinating satellite systems of both countries so as to achieve the economies and other advantages of complementary systems.

-- In the field of meteorological rocket soundings, to formulate provisions for a program of soundings along selected meridional lines in cooperation with other countries.

-- In the field of the natural environment, to study the possibility of conducting coordinated surface, air and space research over specified international waters and to exchange results of measurements made by each country over similar land sites in their respective territories so as to advance the potential applications of space and conventional

3.

survey techniques for investigating the natural environment in the common interest.

-- In the fields of exploration of near-earth space, the Moon and the planets, to work jointly to define the most important scientific objectives in each area, to exchange information of the scientific objectives and results of their national programs in these fields, to consider the possibilities for coordination of certain lunar explorations, and, in particular, to initiate an exchange of lunar surface samples by performing an agreed exchange of samples already obtained in the Apollo and Luna programs.

-- In the field of space biology and medicine, to develop appropriate procedures and recommendations to assure a more detailed and regular exchange of information including biomedical data obtained in manned space flights.

4. The details of the considerations described generally in paragraph 3 are provided in Attachments I - IV to this Summary of Results. These Attachments shall be understood to constitute an integral part of this Summary of Results.

5. To provide for the specific actions with respect to agreements and further cooperative possibilities which are set forth in the Attachments noted immediately above, the Academy and NASA agree to designate representatives to Working Groups in connection with each Attachment. Such designations shall be made by the President of the Academy and the Administrator of NASA at the same time that each

acts to confirm this Summary of Results under the provisions of paragraphs 6 - 8 below. Each Joint Working Group shall commence to consider, as a Group, the tasks assigned it under the applicable Attachment within 90 days of the date that confirmation of this Summary is established. After commencing its assignment, each Joint Working Group will report its required actions and recommendations to the President of the Academy and the Administrator of NASA within a further period of six months. The Joint Working Groups shall conduct their work by correspondence and direct meetings in an expeditious manner within the schedules prescribed.

6. The President of the Academy and the Acting Administrator of NASA have indicated their preliminary agreement to this Summary of Results by initialing it below. It is agreed that they shall have a further period of 60 days from this date in which to provide for further consideration. By the end of that period, they shall communicate to each other their written and final confirmation of this Summary, or, in the alternative, their possible specific proposals for altered language to modify any of its provisions.

7. In the case that full and mutual confirmation shall be established, the procedures provided in paragraph 5 above for implementation shall automatically go into effect.

8. In the case that the President of the Academy or the Administrator of NASA is not prepared to give full confirmation of the Summary, he may confirm certain Attachments and reserve confirmation with respect to others. In that case, the Attachments which are mutually confirmed

shall go into full effect. The remaining Attachments shall be considered expeditiously by the President and the Administrator, by correspondence if possible and by meetings if necessary, in order to reach agreement on changes which will permit their early confirmation and implementation.

Initialed: MA  
Academician M. V. Keldysh  
President  
Academy of Sciences of the USSR

January 21, 1971

Initialed: GM L  
George M. Low  
Acting Administrator  
US National Aeronautics and  
Space Administration

January 21, 1971

Attachment I

SPACE METEOROLOGY

I. Meteorological Satellites

A. Agreements and Objectives

The Academy and NASA noted the usefulness of cooperation in the field of meteorology within the Bilateral Agreement between AS USSR and NASA USA of 1962 and Memoranda of Understanding of March and May 1963 and June 1964 and the value of application of artificial earth satellites for global observational information for the benefit of the meteorological services of both countries, and also for the World Weather Watch.

For the purpose of further development of the cooperation in space meteorology the Academy and NASA consider it useful to discuss and coordinate their activities in the following fields:

1. Immediate steps to expand and improve the current exchange of information from US and USSR artificial earth satellites, specifically:

- to increase the volume and quality of original TV and IR pictures of clouds and surface transmitted;
- to improve the forms of presentation of satellite information in combination with other types of meteorological data;
- to improve further the technical performance of the communication link between Moscow and Washington;
- to convert to high speed exchange of conventional data with resulting expansion of its volume;

Coordination of the activity in data exchange shall be arranged directly between the Hydrometeorological Service of the USSR and the National Oceanic and Atmospheric Administration of the USA to include the

questions of schedules, data content, data format, international communications procedures to be followed, etc.

B. Proposals for Further Discussion

1. Cooperation in scientific investigations for further development of methods of meteorological measurements from satellites, data interpretation, data processing, and application of the data.

Such problems as the following should be considered:

- development and improvement of methods for sounding of vertical temperature and humidity distribution, observation of precipitation areas and intensity etc.;
- development of optimum methods for mathematical solution of inversion problems in satellite meteorology;
- application of information from meteorological satellites to numerical forecasting techniques;
- methods of automatic data processing of meteorological satellite data.

2. Cooperation in establishment of space meteorological systems with the purpose of sharing of effort.

NASA and the Academy consider important the coordination of their efforts in the establishment of complementary space meteorological systems which take into account the requirements of the World Weather Watch. Exchange of opinions resulted in agreement to continue consideration of the problems in order to work out in the future decisions acceptable to both sides.

II. Meteorological Rockets

A. Agreements and Objectives

1. Cooperation in research on upper layers of the atmosphere

by means of meteorological rockets. In this field NASA and the Academy agreed as desirable coordination of programs to conduct meteorological rocket firings along selected meridians in the Eastern and Western Hemispheres (about  $60^{\circ}\text{E}$  and  $90^{\circ}\text{W}$ ), together with other countries concerned.

B. Proposals for Further Discussion

NASA and the Academy agree to consider and coordinate the following problems, always giving consideration to interests of other countries involved:

- definition of the scientific objectives of the two networks;
- preparation of the necessary plans and procedures required to coordinate the launchings in the two networks and provide for the analysis of the data from both networks on a synoptic basis;
- determination of the appropriate measurement instrumentation systems and techniques to be used.

The two Working Groups (one for the problems of satellite meteorology and the other for meteorological rocket soundings of the atmosphere) shall consider and coordinate the problems mentioned in this attachment above in accordance with the procedure established in the document, taking into account also the appropriate recommendations of the World Meteorological Organisation and the International Council of Scientific Unions.

STUDY OF THE NATURAL  
ENVIRONMENT

A. Agreements and Objectives

1. The survey of a wide variety of earth features and conditions from space, primarily on a spectral basis, may be scientifically useful and economically advantageous. The capability to conduct such surveys is in an early stage and requires intensive surface, air and space investigations, studies, testing, and intercomparisons on an experimental basis.

2. In this field the Academy and NASA agree to make every effort to develop cooperation in the following principal directions:

a. Discussions, and the exchange of scientific information, on the use of space technology for investigating the natural environment;

b. Studies of different techniques of measuring parameters of the natural environment, using space and conventional means, and studies of the interpretation of results of these measurements. In this regard, use will be made of the results of research conducted within the framework of existing international space and conventional programs;

c. Study of questions involved in the use of instrumentation required for the registration of electromagnetic radiation of Earth from outer space in various spectral ranges;

d. The possibility of coordinating selected integrated experiments involving space and conventional technology in selected areas of the international ocean; and also the exchange of results of coordinated research above selected areas of the earth surface, with initial emphasis on vegetation, carried out in accordance with national programs.

B. Proposals for further discussions

In performing its assigned tasks, it is suggested that the Working Group on the Natural Environment shall:

- review and consider results already obtained,
- discuss additional data which appear to be required,
- discuss the kind of instrumentation considered necessary to achieve desired results,
  - in the case of study of vegetation, recommend the selection of similar sites in the USSR and the US, which each side on its own territory will use for ground analysis and its own air and space surveys,
  - in the case of study of the oceans, recommend specific international ocean areas of prime interest for the conduct of research,
    - recommend the parameters to be measured and the kind of data to be gathered by both sides, as well as the formats and schedules which shall be used for data exchanges,
    - recommend a mechanism for the exchange by each side with the other of the surface, air, and space data obtained by each for the agreed sea and its own land areas,
    - recommend a procedure and schedule for the joint review and consideration of such data in symposia open to other countries,
    - recommend mutually acceptable schedules for the coordinated programs.

Attachment III

EXPLORATION OF NEAR-EARTH SPACE, THE MOON AND THE PLANETS

A. Agreements and Objectives

I. The Academy and NASA agree that their respective programs of scientific investigation of the Moon can be substantially enhanced by exchanges of samples and other scientific information obtained by each side from the Moon.

II. The Academy and NASA agree to exchange small quantities of such materials to permit their comparative analysis in the laboratories of both countries, to make available to both sides materials from all sites visited on the Moon, and to facilitate analysis in unique or special facilities which may exist in either country. The Academy will provide NASA about 3 grams of regolith brought back by Luna-16 from different parts of the core. In return NASA will provide the Academy about 3 grams from the regolith in the core sample of Apollo 12 and about 3 grams from Apollo 11 samples. The samples to be selected in each case will be agreed by appropriate NASA and Academy representatives.

III. The Academy and NASA agree to support in their respective national programs the "International Magnetosphere Survey" being organized by the IUCSTP-COSPAR Special Study Group.

IV. The Academy and NASA agree to use, along with the existing international scientific channels, such as COSPAR, direct channels for the exchange of scientific information in those cases where the existing channels are inadequate or too slow for the purpose, and where it is in the mutual interest to do so.

## B. Proposals for Further Discussion

The Academy and NASA agree that the following points should be discussed by the Working Group on the Exploration of Near-Earth Space, the Moon and the Planets:

### I. In the Study of the Magnetosphere

1. Define the problems of the Magnetosphere which should be investigated in the next several years.
2. Determine the ground-based observations which each side could conduct during the period of a particular satellite investigation.
3. Investigate the possibility of standardizing the presentation of data and methods of measurement in studies of the Magnetosphere.
4. Examine the possibility of joint analysis of data from two or more simultaneously operating satellites.
5. Examine the feasibility of and steps required to jointly produce a "standard magnetosphere" for periods of minimum solar activity.
6. Arrange for periodic and timely joint reviews of the status of knowledge of X-ray radiation from the sun and the processes on the sun associated with solar activity.

### II. Exploration and Use of the Moon.

1. Define the scientific problems of the Moon which should be investigated over the next several years.

3.

2. Recommend procedures for the reciprocal exchange of future lunar samples and describe the documentation which will be required.
3. Recommend procedures for the reciprocal exchange of lunar photographs, from both orbital and landed spacecraft.
4. Conduct a joint study of the methods of analyzing lunar photographs and preparing lunar maps, and prepare an agreement on a standard lunar coordinate system.
5. Recommend procedures for a reciprocal exchange of data on lunar dynamic processes under observation.
6. Discuss the possibility of a reciprocal exchange of information on the scientific problems under investigation in the Luna and Apollo programs, so that NASA and the Academy can take advantage of their knowledge of the other's scientific objectives as they plan their specific lunar flights.
7. Initiate a joint discussion of the problems of the use of the Moon for astrophysical studies.

### III. Exploration of the Planets.

1. Discuss the principal scientific problems in the exploration of the solar system.
2. Arrange for periodic and rapid exchange of scientific information from planetary experiments, so that NASA and the Academy can take these results into account in the planning of their future experiments.
3. Examine the possibilities of one side conducting experiments

4.

in its program, which may be proposed for that purpose by the other.

4. Examine the possibility of joint complementary activity by one side during the conduct of planetary investigations by the other; such as radio occultation experiments, monitoring of solar activity, simultaneous sounding rocket or balloon observations, or ground-based astronomical observations.

SPACE BIOLOGY AND MEDICINE

A. Agreement and Objectives

1. There are increased possibilities for the extension of the exchange of space biomedical data. This exchange should be expanded and made more regular in order to make maximum contributions to the safety and efficiency of manned space flight and to general medical knowledge which may be used for the benefit of all mankind.

2 The Academy and NASA agree that a Working Group shall develop recommendations and procedures to implement the expanded exchange of information. This Working Group will consider the arrangements for regular meetings of competent representatives for the detailed and timely exchange and evaluation of data associated with manned space flight. This exchange should include sufficiently detailed pre- and post-flight data, operational information, and other considerations necessary for full understanding of the results obtained.

3. The exchange of scientific information of mutual interest shall include:

- a. biomedical data characterizing the adaptation of man to the conditions of space flight,
- b. the development of recommendations concerning the internal environment of manned spacecraft,
- c. radiation effects and considerations applicable to manned space flight,
- d. directions and methods of biological investigations.

4. The Academy and NASA further agreed that such meetings shall take place as data accumulate but should occur at least once per year in the major problem areas recommended by the Working Group. The first of such meetings

should be held as soon as possible and should be dedicated to the examination of data and results obtained from the Soyuz and Apollo programs.

5. The Academy and NASA encourage the earliest possible completion of the joint publication, Foundations of Space Biology and Medicine.

B. Proposals for Further Discussion

As new knowledge is shared through this program, and new problems associated with manned space flight develop, the Working Group should expand the scope of its recommendations for further information exchange accordingly.

COMPOSITION OF THE SOVIET DELEGATION

1. M. V. Keldysh - President, Academy of Sciences of the USSR
2. A. P. Vinogradov - Vice-President of the Academy of Sciences of the USSR
3. B. N. Petrov - Chairman of the "Intercosmos" Council of the Academy of Sciences of the USSR
4. G. I. Petrov - Director of the Institute for Space Research of the Academy of Sciences of the USSR
5. I. P. Rumyantsev - Member of the "Intercosmos" Council of the Academy
6. I. V. Mashcheryakov - Member of the "Intercosmos" Council of the Academy
7. A. I. Tsarev - Member of the "Intercosmos" Council of the Academy
8. M. Ya. Marov - Scientific Staff Member of the Institute of Applied Mathematics
9. Ye. K. Fedorov - Chief of the Main Administration of the Hydrometeorological Service of the Council of Ministers of the USSR
10. L. A. Aleksandrov - Deputy Chief of the Directorate of the Main Administration of the Hydrometeorological Service of the Council of Ministers of the USSR (for Technology)
11. N. N. Gurovskiy - Chief of the Directorate of the Ministry of Health of the USSR
12. O. G. Gizenko - Director of the Institute of Medical-Biological Problems of the Ministry of Health of the USSR
13. Yu. A. Mezshorin - Professor of the Moscow Physics-Technical Institute
14. V. P. Minashin - Chief of the Main Administration of Space Communication of the Ministry of Communications of the USSR

15. I. Ya. Petrov

- Deputy Chief of the Main Administration  
for Space Communications of the Ministry  
of Communications of the USSR

16. K. G. Fedoseyev

- Deputy Chief of the USA Section of the  
Ministry of Foreign Affairs of the USSR

COMPOSITION OF THE UNITED STATES DELEGATION

1. George M. Low - Acting Administrator, National Aeronautics and Space Administration
2. <sup>Alison</sup> William Anders - Executive Secretary, National Aeronautics and Space Council
3. John E. Naugle - Associate Administrator for Space Science and Applications, NASA
4. Arnold W. Frutkin - Assistant Administrator for International Affairs, NASA
5. Robert F. Packard - Director, Office of Space-Atmospheric and Marine Science Affairs, Department of State
6. Arthur W. Johnson - Deputy Director, National Environmental Satellite Service, NOAA
7. William Krimer - Interpreter, Department of State