

NASA ADVISORY COUNCIL
TASK FORCE ON THE SHUTTLE-MIR RENDEZVOUS AND DOCKING MISSIONS
July 13, 1994
Lyndon B. Johnson Space Center
Houston, Texas

SUMMARY

The NASA Advisory Council Task Force on the Shuttle-Mir Rendezvous and Docking Missions met on July 13 from 1:00 p.m. to 4:00 p.m. in Room 966 of Building 1 at the Johnson Space Center (JSC). Attachment A contains the agenda. Attachment B lists the Task Force members, NASA employees, and members of the public in attendance. Attachment C lists the presentation material on file.

MINUTES

Introductory Remarks

Gen. Stafford opened the session by thanking each of the Task Force members for returning to JSC for the second meeting of the Task Force. He also thanked them for their efforts in the individual working groups. He reviewed agenda and closed by reminding the team leads that each should do his best to keep within the schedule.

Crew Systems, Training, and Operations Working Group

Gen. Engle reviewed the specific actions which had been assigned to the working group and the working group's findings and recommendations associated with each. The first dealt with the evaluation of the rendezvous and docking training tools including the Shuttle Engineering Simulator, the docking tunnel mock-up, and the Payload and General Support Computer (PGSC) laptop displays. The group found the SES to be an excellent training tool and simulator, but did note that the Orbiter/Mir plume model used in the SES is only as good as the estimates used in creating the model. The docking tunnel is adequate for initial concept and transfer evaluations; however, it will require additional fidelity for crew training. The PGSC displays require a minimum of two crew, possibly 3 if sensor input has to be entered manually. The working group's recommendation, which was accepted by the Task Force, was as follows: The verified Shuttle Plume Impingement Flight Experiment (SPIFEX) data from STS-64 must be made available per the existing schedule (2/15/95) and the SES updated as soon as the verified data is available.

The second action involved evaluation of the plan for transitioning the Tools for Rendezvous and Docking (TRAD) system from Development Test Objective (DTO) to operational status. The working group found the transition plan to be well conceived and laid out. The working group's recommendations, which were accepted by the Task Force were as follows:

1. During STS-63, perform HHL tests against the Mir complex and determine range-rate accuracy and stability.
2. During STS-63, perform a range and range rate checkout of the TCS against the Mir complex.

The third action involved the specific objectives for STS-63 Mir proximity operations in preparation for STS-71, the first Shuttle-Mir docking mission. Gen. Engle reviewed the importance of this mission as the only opportunity to perform a rendezvous and proximity operations with the Mir complex prior to STS-71. He outlined the proposal for a "Near-Mir Fly-By" within 30 feet of the Mir complex. He also discussed the concept of placing the Color Television Camera (CTVC), which will be the primary docking tool on the Shuttle-Mir docking missions, in the Spacehab module on STS-63. This would allow a full checkout of the camera using the Mir docking target. The working groups recommendations, which were accepted by the Task Force, are as follows:

1. Because STS-63 represents the only opportunity to test the hardware, techniques, and operational procedures to be used in Mir rendezvous and prox ops, the Mir-related objectives must be given top priority on the mission.
2. An approach to within 30 feet of Mir should be made on STS-63 to accomplish the "Near Mir Fly-By Objectives".
3. The CTVC camera should be manifested on STS-63 and mounted in the Spacehab module in order to perform a CTVC visibility checkout to include recording of camera output for post-mission evaluation; evaluate lighting and shadow effects on the target image; and conduct attitude fly-out tests in Low-Z.

The fourth action involved the working group's review of the Mir Approach Development Test Objective (DTO), a mission experiment to be conducted on three flights (STS-66, STS-63, and STS-69). The five objectives of the DTO are to conduct a Radial Vector (R-bar) approach; an approach corridor demonstration; stationkeeping at a distance of 250 feet while on an R-bar approach; proximity operations approach timing coordination; and an angular misalignment flyout demonstration. The recommendation of the working group, which was accepted by the Task Force, was as follows: Ensure that the Mir Approach DTO is fully implemented.

The fifth action focused on the two alternative approaches to Mir, the Radial Vector (R-bar) approach or the Velocity Vector (V-bar) approach. Gen. Engle pointed out that the primary considerations in determining which approach to use are the Mir attitude necessary for adequate electrical power (from its solar arrays), Mir attitude/Orbiter position for communications; docking attitude and the resulting docking target visibility; Orbiter propellant usage; and Orbiter techniques and training. He noted the R-bar approach is the preferred method for minimizing Mir plume loads and contamination. The R-bar approach will require additional analysis and a decision to use R-bar on STS-71 will result in a slip in the Mir on-orbit flight readiness statement scheduled for September 1994. An important consideration is

the fact that Mir configuration, power, and communications remain open issues. The working groups recommendation, which was accepted by the Task Force, is as follows:

To avoid impacting the RSA assessment teams considering loads, power, and communications, NASA should not propose changing from the planned V-bar approach on STS-63 to an R-bar approach. However, in all subsequent, relevant discussions with the RSA, the reduced RCS braking requirements of the R-bar approach and the associated plume load and contamination reductions should be emphasized. In addition, NASA should advise that they stand ready and willing to perform either a V-bar or R-bar approach based on the results of the Mir analysis. A date for the decision on the approach should be established to provide adequate time for crew training

The sixth action involved a review of the video taken during the docking and undocking of a Soyuz spacecraft at the port on the Mir Kristall module which will be used by the Shuttle. As the video was displayed for the Task Force, Gen. Engle pointed out the fact that the docking target is clearly visible with the sun behind the active docking vehicle and that visibility will be sensitive to sun angles and basic sun up/sun down orientation. The recommendation for the working group in this area, to test docking target visibility using the CTVC on STS-63, was covered in the discussion of STS-63 mission objectives earlier in the presentation.

The seventh action was an assessment of the options for attenuating range safety constraints to improve the Shuttle launch margin. Gen. Engle reviewed the improvements and modifications currently in work which include the range safety display systems, Command Message Encoder Verifier, cloud ceiling limits, External Tank (ET) disposal options, ship and aircraft clearance of the ET/Solid Rocket Booster disposal region, expanded crosswind limits, and Return to Launch Site (RTL) rain shower acceptance flight rule. In addition, the working group has proposed another candidate for this activity -- an increase in the number of RTL landing site options. The working group will pursue this option and report back to the Task Force at the next meeting.

The eight action dealt with the suggestion, made by one of the Task Force members, to consider establishment of a launch on-time policy to ensure maximum performance on Shuttle-Mir launches. Gen. Engle pointed out that the 5-minute launch window is currently under review. Performance requirements may result in an even shorter window being established. As to a launch on-time policy, a review of the data provided to the working group indicated that:

- Of 113 Shuttle launch attempts, 62 resulted in launch and 51 were scrubbed.
- 24 of the launches went on time.

- 38 of the 62 launches were delayed; of those 38 delays:
 - 3 went within 1 minute
 - 4 went within 2 minutes
 - 6 went within 3 minutes
 - 10 went within 4 minutes
 - 11 went within 5 minutes
- Of the 38 delayed launches, it is estimated that an additional 8 could have launched within a 5-minute window if it had been a requirement rather than the longer window applicable to each mission.

Based on this data, the working made the following recommendation, which was accepted by the Task Force: A launch on-time policy should not be instituted as it could result in missions being scrubbed which might otherwise be launched within a 5-minute or even shorter window.

The ninth action dealt with a suggestion, also made by one of the Task Force members, that the policy of wearing pressure suits for entry and landing be reviewed. Gen. Engle stated that the Astronaut Office had expressed strong support for the continued use of the suits for reasons which include protection against cabin pressure leaks, the fact that the suits employ a harness which is integrated in the suit, and protection against hazardous propellant. The working group's recommendation, which was accepted by the Task Force, is as follows: Continue to use pressure suits for entry and landing.

The tenth action was to determine if the removal of the 96 bolts connecting the Orbiter Docking System (ODS) external air lock to the ODS docking base could be done through Extravehicular Activity (EVA) as a backup approach to Shuttle-Mir demating. Gen. Engle pointed out that Rockwell Aerospace has been conducting a study of alternate separation methods. None of the available options, however, will be in place for STS-71 and may not be in place for subsequent missions. As a result, the EVA contingency is the only one available for these missions. The working group did determine that the bolts could be removed via EVA but it will require modifications to the bolts (i.e., double-height bolts and nut plates), development of a clamping device to hold the two ODS sections together during the bolt removal, and crew training. It was noted that the EVA, will entail considerable risk, as it will be used after both the mechanical undocking and pyrotechnic bolt backup have failed. As there are no sensors on the individual docking hooks, it will be difficult to determine how many hooks have disengaged and the potential impact on Shuttle-Mir stack dynamics. The working group's recommendations, which were accepted by the Task Force, are as follows:

1. The EVA approach to remove the 96 bolts which fasten the ODS docking base to the ODS external airlock should be developed and baselined as a contingency approach for APDA mechanical system and pyrotechnic failure.
2. Determine the tools, support equipment (e.g., handholds, PFR locations, etc.), training schedule, and equipment fidelity (e.g., WETF, mock-ups, etc.) needed to support the EVA demate contingency for STS-71 and, if necessary, subsequent missions.

3. Establish EVA procedures including a method to ensure positive, simultaneous, and symmetrical release.

The working group's eleventh action was to determine if redundant payload bay very high frequency (VHF) antennas are required to support Shuttle-Mir communications. Gen. Engle noted that a VHF communications capability in the Orbiter is necessary to support direct communications between the Orbiter and Mir. No PLB VHF antenna will be flown on STS-63, only an in-cabin, window-mounted, SAREX-type antenna tuned to the correct VHF frequency range). The working group found that this arrangement will be adequate for the STS-63 mission and will provide valuable data on performance of the window-mounted system.

As to the need for PLB antenna redundancy on the Shuttle-Mir missions, Gen. Engle pointed out that the PLB antenna is a completely passive device with no active electrical or moving mechanical elements; electrical or structural failure is considered noncredible. The wiring to the antenna is coax cable which is not prone to breakage or internal shorts and has proved to be very reliable and rugged on Shuttle flights. An in-cabin antenna will be carried on all Shuttle-Mir missions as backup to the PLB antenna, although this will likely provide degraded performance (i.e., shorter range) compared with the PLB antenna.

The working group's recommendations regarding the PLB VHF antennas, which were accepted by the Task Force, are as follows:

1. No redundant PLB VHF antenna is required for Shuttle-Mir missions.
2. Ensure that the test plan for STS-63 window-mounted antenna includes performance assessment with respect to Mir antenna patterns.

In addition to the recommendations made in response to the actions assigned to it by the Task Force, Gen. Engle also advanced two additional recommendations. The following recommendation was accepted by the Task Force: Investigate the value of performing attitude fly-out tests in low-Z using the CTVT mounted on the Remote Manipulator System elbow camera location. The second recommendation, to cycle the ODS docking hooks on STS-71 prior to rendezvous and docking while they were under observation, was not accepted.

Vehicle Systems Working Group

Dr. Michael Greenfield, Vehicle Systems Working Group lead, delivered the presentation for his group. The first issue that Dr. Greenfield addressed was the emergency separation of Shuttle-Mir. He identified two issues:

1. The baseline provides only one backup system, pyrotechnic bolts, to separate the Shuttle and Mir if the mechanical system fails.
2. For the backup system pyrotechnic bolts (on the Shuttle side), contractually specified data necessary for their NASA flight certification has not been received from NPO-Energia.

Dr. Greenfield then reviewed current activities related to these two issues. The findings of a study on ODS docking base separation methods conducted by Rockwell Aerospace were presented to the CCB on 5 July 1994. The study focused on three methods -- mechanical latch, expanding tube assembly, and frangible nut (wire and N2 line separation included). Over the next several weeks, Rockwell will be refining the cost estimates for these separation methods. Dr. Greenfield pointed out that none of these methods will be available for STS-71 and may not be in place for several subsequent Shuttle-Mir missions.

As to the certification of the pyrotechnic bolts, Dr. Greenfield stated that the data on the composition of the explosive used in the bolts has been provided. A series of eight tests required to certify the "reliability for firing" of the bolts has been started by NPO-Energia while several of the tests are still under negotiation. In this process, Rockwell is treating NPO-Energia as they would any subcontractor. Rockwell representatives have stated that they will not request waivers on any of the required tests. Completion of the tests is expected by the first quarter of calendar year 1995.

Dr. Greenfield discussed the existing options for ameliorating the risk of a single-fault tolerant Orbiter-Mir release mechanism. The first option involves the removal of the 96 bolts connecting the ODS docking base to the ODS external airlock. This will require crew training as well as the development of associated hardware. The second option involves the use of the active docking hooks on the Mir APDA instead of the ODS active docking hooks for mating. This would require, however, increased Russian ground control interaction during docking, greater complexity for the Mission Control Center - Moscow, and a loss of Orbiter-Mir docking autonomy. In addition, it would require a clear understanding of the pyrotechnic capabilities of the Mir active docking hooks and the control of that mechanism. There remains some question as to whether the pyrotechnic bolts on the Mir active docking hooks are fully functional. The third option would involve a contract with Tsniimash of Russia to perform independent reliability and risk analysis of the APDA emergency release mechanism and a comparison of Russian aerospace flight certification procedures to those of NASA. This would provide added confidence regarding APDA separation robustness.

During this discussion the following recommendation was made and accepted by the Task Force: Ensure that the ODS active hooks will be cycled as part of the ODS testing to be conducted at KSC prior to STS-71.

Dr. Greenfield then moved on to a discussion of the delivery schedule for the second APDA unit being supplied by NPO-Energia, this one under the terms of the NASA contract with the Russian Space Agency (RSA) rather than the Rockwell Aerospace contract. This second unit is not scheduled for delivery until June 1995. As a result, the second unit will not be available in the event that there is a non-generic problem with the APDA being installed in *Atlantis* in preparation for STS-71. If such a problem is encountered, the APDA unit will need to be shipped back to NPO-Energia for repair delaying the STS-71 mission significantly. The working group's recommendation, which was accepted by the Task Force, is as follows:

Investigate the feasibility of accelerating the schedule for the second APDA in time to serve as a backup for STS-71 and the impacts involved in doing so.

Dr. Greenfield then discussed the Orbiter-Mir Docking Module. The Docking Module (DM) is a 14 foot extension which will be installed on the Mir Kristall module's APDA-equipped port. The installation will be accomplished on the second Shuttle-Mir mission, STS-74, which is currently scheduled for October 1995. Mir will be in different configuration than during the STS-71 mission for STS-74 and all subsequent Shuttle-Mir missions. The DM is required in this revised configuration in order for the docked Orbiter to clear the Mir solar arrays. Once installed during STS-74, the DM will be left in place.

The DM is equipped with APDAs at both ends. One APDA will be mated to the ODS APDA prior to the Mir rendezvous and docking operation. The Orbiter cannot be launched with the DM mated to the ODS due to the height of the DM. The mating will occur on orbit.

NPO-Energia, which is building the DM under the NASA contract with RSA, will perform fit checks on the three STS-74 APDAs (two for the DM and one for the ODS) using the master tooling jig at their facility in Russia. No functional tests will be performed. Both the mechanical and electrical interfaces between the STS-74 ODS APDA and its corresponding DM APDA will be verified at NPO-Energia also.

During processing at KSC, there will be an electrical functional check between the ODS APDA and DM APDA via jumper cables. There is a reluctance to perform a mechanical fit check due to the extensive ground support and handling equipment which would need to be brought from Russia in order to do this.

The recommendations of the working group, which were accepted by the Task Force, are as follows:

1. Verify that the shipping environment did not adversely impact the three APDAs following their shipment from NPO-Energia where the final fit check will be performed.
2. Revisit the risk decision and assess the risk involved in handling the Docking Module as well as the ground support equipment needed to perform an ODS/DM fit check.

Dr. Greenfield next reviewed the status of the Docking Module safety reviews, none of which have been scheduled. To support the combined Phase I/II review, it is expected that NPO-Energia will supply the necessary data package in the November 1994 time frame. The data requirements, however, are still in negotiation in the Joint Safety Assurance Working Group (JSAWG) which includes U.S. and Russian representatives.

Delivery of the DM to KSC is currently scheduled for June 1995. The Phase III review may not precede delivery. If the review results in additional data requirements, they could result in "make-work" modifications at KSC or require acceptance of safety waivers.

The working group's recommendation, which was accepted by the Task Force, is as follows: Evaluate DM safety review schedule acceleration vs. risk acceptance.

Next Dr. Greenfield focused on the fact that the value of the STS-71 loads analysis DTO depends upon the validity of the Russian dynamics model. In addition, no corresponding DTO for STS-74 has been planned.

The proposed Loads Analysis DTO on the STS-71 mission provides for the firing of Shuttle thrusters to excite and allow subsequent observation of three or four critical mated vehicle structural modes. These identified modes would be used to update digital autopilot (DAP) attitude control software and verify the sequence of Primary Reaction Control System (PRCS) pulse timing interval selection.

The DTO details were briefed to NPO Energia at the loads lead engineer level during the week of June 13, 1994. The following agreements were reached:

- DTO, Part 1 - this consists of five PRCS pulses of 80 milliseconds duration to excite the mated structure, determine critical modes, and verify stability margins.
- DTO, Part 2 - five sets of 80 millisecond PRCS pulse followed after a 11 second delay by a second pulse. This would verify that the 11 second delay will not excite the stack resonant modes and overstress the structure.

Dr. Greenfield pointed out that understanding the mated Shuttle-Mir stack dynamic response requires the use of the Russian Mir model and hence an understanding of its robustness. The DTO offers significant benefits for STS-71. The low frequency Shuttle-Mir stack structural modes will be identified, enabling notch filters to be properly centered to prevent instabilities. With this understanding, overstressing of the core stack elements will be precluded. Higher modes, associated with other "light" weight appendages will not be identified by the DTO.

While some data from the STS-71 DTO may be of use in determining the stack lateral modes, it will not be sufficient. The DTO offers little support for STS-74 as it will excite and measure modes of the Shuttle-Mir stack while the Shuttle is mated to the Mir longitudinal axis.

The working group's recommendations, which were accepted by the Task Force, are as follows:

1. The robustness of the Russian Mir model must be fully analyzed and understood in order to assess stack dynamic response.
2. A Loads Analysis DTO corresponding to the STS-71 DTO should be conducted on STS-74. The data this DTO will produce is critical to the safety of the Phase 1 program.

Dr. Greenfield next addressed the fact that the requirements for Shuttle-Mir stack rotation requires a detailed understanding of stack dynamics and will rely on the robustness of the

Russian Mir model. Three Shuttle-Mir operational modes have been defined which will require rotation of the Shuttle-Mir stack:

- The docking attitudes selected to put the docking port along the V-bar or R-bar axis are not gravity stable for the combined stack after docking.
- The Shuttle IMU alignment requires updating every 24 hours. The planned stack attitude is inadequate to site the Star Tracker.
- Thermal limitations at high beta angles limit Shuttle attitude to 16 hours.

Stack rotations will use existing digital autopilot (DAP) software codes. JSC Engineering is analyzing maneuver structural loads that result from DAP rotation commands and is also assessing control margins.

The working group's recommendation, which was accepted by the Task Force, is as follows: The Russian Mir structural dynamics model must be fully analyzed and the resulting DAP controllability and structural integrity determined.

Phase 1 Working Group

Dr. Arnauld Nicogossian, the Phase 1 Working Group lead, delivered the presentation for his group. He first discussed the current schedule for the Office of Life and Microgravity Science and Applications orbital research program. He then identified the following objectives of the Phase 1 science and technology program:

- Obtain engineering and operational experience of conducting research on an orbital station.
- Characterize the environment relative to microgravity and life sciences research on Mir.
- Conduct demonstrations and specific peer-reviewed U.S. investigations in medical support, life sciences, microgravity sciences, Earth observations, and life support.
- Identify and implement experiments demonstrating technologies and equipment selected to validate ISSA designs and operations.
- Provide EVA demonstrations for Space Station hardware and tasks.

Dr. Nicogossian then discussed research aboard Mir. This will involve early Progress flights which will deliver microgravity life support and radiation equipment to measure the Mir environment. The Spektr module will primarily provide accommodations for life sciences equipment while the Priroda module will focus on microgravity equipment accommodations. Earth sciences, technology demonstrations, and medical support will be conducted on Mir and the Shuttle as appropriate.

On the subject of Mir lifetime extension, Dr. Nicogossian pointed out that RSA is will identify, procure, transport, install, and test all equipment required to extend the useful lifetime of Mir from the beginning of 1996 to the end of 1997. In doing so, they will ensure the safety and habitability of Mir for U.S. astronauts during their missions to Mir, support the objectives of the planned flights of the U.S. Shuttle to Mir, and enable the performance of the research program, technology demonstrations, and system validation tasks. NASA will fund

procurement of this equipment per the terms of the contract with RSA and will consider transporting this equipment on the Shuttle on a case-by-case basis.

Dr. Nicogossian next discussed the Phase 1 capabilities on Mir and Shuttle missions. They are as follows:

- Microgravity deliverables
 - Protein crystal growth
 - Solidification research
 - Biotechnology systems
 - Glovebox experiments
 - Combustion and fluid research
- Life sciences deliverables
 - Human physiology experiments
 - Human experiments and equipment
 - Environmental monitoring
 - Orbiter refrigerator/freezers
 - Urine monitoring system
 - Life support
 - Lower body negative pressure device
 - Torque velocity dynamometer
 - Countermeasure exercise device
 - Biorack
- Technology and engineering
 - Solar dynamics
 - EVA commonality and tools
 - Orbital debris
 - Medical support and countermeasures
 - Vibration isolation
 - Life support commonality

Investigation support will involve U.S. astronauts and Russian cosmonauts as operators and subjects. The cosmonauts will participate in and conduct experiments when astronauts are not on board. The U.S. experiments on Mir will be agreed upon through the Mission Science Working Group. RSA will provide:

- access to trainers and mockups;
- data to NASA to be used in constructing mockups of Spektr, Priroda, and the Mir core; and
- environmental and crew health data necessary for interpretation of research results.

Dr. Nicogossian went on to discuss the resources to be provided by RSA; crew exchange; extravehicular activity (EVA); medical operations; the RSA scientific process; the proposed Russian scientific community participation; and the proposed Russian scientific investigation.

Next he addressed the specific requirements for the Phase 1 research program. These involve the following:

- Microgravity research
 - Gallar performance documentation and sample cartridges to be provided by RSA
 - Technical information on Biocryst to be provided by RSA
- Biomedical research
 - Baseline facilities already defined by the Mission Science Working Group will be used for Shuttle-Mir
 - All crew members will participate in preflight, in-flight, and postflight life science research
- Fundamental biology
 - NASA to provide new hardware
 - NASA/Mir will continue research of Shuttle-Mir program
- Remote sensing
 - Use of Russian instruments will be evaluated

Dr. Nicogossian then discussed the Phase 1 Mission Science Working Group. He pointed out that the MSWG was founded for a particular purpose -- to negotiate and implement a science and technology program for the Shuttle-Mir and NASA-Mir missions. The MSWG receives oversight by the Management Working Group; it operates independently and on a schedule compatible with its specific scientific research objectives, and it is one of five working groups which reports to the Management Working Group. It was established in 1992 to negotiate implementation of the Phase 1 program with RSA.

Finally, Dr. Nicogossian provided background on the Joint Working Group (JWG) on Space Biomedicine, Life Support Systems, and Microgravity Sciences. Founded in 1971, the JWG is responsible for the development of broad scientific principles and strategies for the conduct of U.S./Russian space cooperation in the areas of life sciences, life support systems, and microgravity sciences. It has management level responsibility to ensure that all joint efforts are conducted based on the principles of mutual programmatic interest, scientific merit and integrity, equality, and reciprocity. In 1994 its role expanded significantly. As stated in the JWG Charter which was signed on 1 April 1994 in Moscow:

The primary goal of the JWG is to plan and develop strategies for cooperation, organization, coordination, and oversight of research and development under the auspices of the U.S./Russian agreement within the JWG purview including piloted and robotic space missions and ground-based investigations. The JWG will review and plan initiatives in the areas of space biomedicine, life support systems, medical applications, and microgravity research.

The working group's recommendations, which were accepted by the Task Force, are as follows:

1. The Associate Administrator for Life and Microgravity Sciences and Applications should be designated as the focal point for the international research community's requirements and priorities.
2. The OSF Chief Medical Officer will chair the Medical Policy Board for the development of medical support for ISSA risk mitigation and all NASA/RSA joint development of medical support for ISSA risk mitigation. The OSF Chief Medical Officer will coordinate those requirements with RSA through the joint NASA/RSA Medical Policy Board and the Phase 1 Project Manager.

Management Working Group

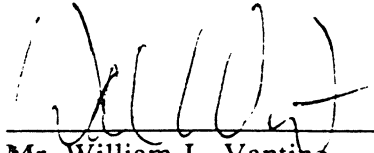
Col. James Adamson, the Management Working Group lead, made the presentation for his group. The discussion centered on the proposed organization chart (see Attachment C) which focused on the creation of a small Phase 1 Project organization headed by a Project Manager and Deputy Project Manager. The specific recommendations which emerged from that discussion are as follows:

- Establish a Phase 1 Project Manager with a small staff located at the Johnson Space Center. This job should be the sole responsibility of the individual assigned to it and he/she should not have dual responsibilities in any other organization. The Phase 1 Project Manager will have the following roles and responsibilities:
 - Accountable for implementation of Phase 1.
 - Represents and reports directly to the Associate Administrator for Space Flight.
 - Responsible for the proper coordination among the various NASA offices, NASA centers, ISSA managers, SSP managers, and persons, groups, and organizations external to NASA who have a responsibility for the safe and successful execution of the mission.
 - Ensures that management of full-time Mir operations as well as Shuttle-Mir operations and cargo integration is adequately addressed.
 - Oversees mission training and concurs in the determination of flight readiness of the flight crew, the integrated operations team, and the mission management team for each mission.
 - Establishes the goals, objectives, priorities, and policies for each mission with concurrence of the ISSA and SSP Program Managers.
 - Approves the cargo mix, including secondary payloads, Development Test Objectives (DTOs), and Development Science Objectives (DSOs).
 - Is a signatory on the Certificates of Flight Readiness that pertain to each mission.
 - Serves on the Mission Management Team with specific duties during each phase of the mission, particularly the Orbiter untended portion, to be determined.
 - Concurs in the approval or disapproval of flight specific waivers.
 - Establishes special committees and assessment teams, as required, to assess the readiness of the STS and cargo to support mission requirements.

- Develops a Project Plan in response to the requirements provided by the ISSA Program Manager, SSP Program Manager, and the Payload Steering Committee who will each identify their specific Phase 1 requirements and their relative priority. Overall Phase 1 requirement priorities will be based on the following objectives listed in order of importance:
 1. Reduce technical risks associated with the construction and operation of the international space station.
 2. Conduct combined international space operations and joint space technology demonstrations.
 3. Provide early opportunities for extended scientific and research activities.
 In addition to identifying Phase 1 requirements, the Project Plan should include the following:
 - Project and mission baselines.
 - Definition of key specific mission activities and metrics necessary to achieve overall project goals and objectives.
 - Project schedules and major controlled milestones.
- Serves as the change authority for the Project Plan with concurrence from ISSA and SSP Program Managers.
- Monitors Phase 1 RSA contract performance.
- Works with the ISSA Program Manager to ensure that the Phase 1 Project has adequate representation in Russia for technical acceptance of hardware produced under the RSA Phase 1 contract.
- Works with the ISSA and SSP Program Managers in the development of standardized documentation and procedures for NASA and RSA.
- Works with the ISSA Program Manager to document that provisions are in place to transition into Phase 2 and 3.
- The JSC Russian Projects Office should be matrixed to support the Phase 1 Project Manager with the Director of the JSC Russian Projects Office serving as the Phase 1 Deputy Project Manager. The Director of the JSC Russian Projects Office should continue to coordinate the administrative activities of the Joint Working Groups which are matrixed operationally to the Phase 1 Project Manager (see 2.3.3 below).
- The joint NASA/RSA working groups, with the exception of the Management Working Group (WG-0) and the Safety Assurance Working Group (WG-2), should be matrixed intact and with the necessary administrative support from the JSC to support the Phase 1 Project Manager. The Task Force believes that a number of strong working relationships with the RSA and related organizations have been established and continue to develop in a positive vein. Given this, we feel that it would be a mistake to significantly change or expand on a structure which is already functioning well. Any restructuring of project management should leave those working groups intact.

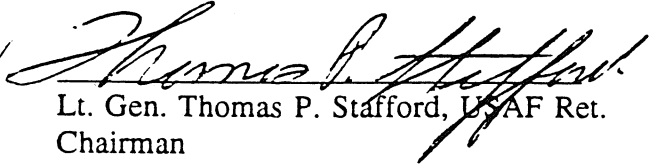
- The Phase I Project Manager should be responsible for the management direction and oversight of the integration and flight preparation process and accomplishment of the objectives for each Phase 1 mission. As such, the SSP should provide matrixed support to the Phase 1 Project Manager for all Shuttle Program activities associated with Phase 1. This relationship should be documented in a Memorandum of Agreement.
- The ISSA Russian Programs Phase 1 Office currently reporting to the ISSA Program Manager should be matrixed intact to the Phase 1 Project Manager. The ISSA Russian Programs Phase 1 Office should be operationally accountable to the Phase 1 Project Manager but draw necessary administrative support from the ISSA Program. The Russian Programs Phase 1 Office Manager should continue to coordinate the RSA contract activities. This relationship should be documented in a Memorandum of Agreement.
- A Requirements Integration Manager should be designated and report directly to the Phase 1 Project Manager. The Requirements Integration Manager should be responsible for assembling all Phase 1 requirements and assisting the Phase 1 Project Manager in developing the Phase 1 Project Plan. The Phase 1 Requirements Integration Manager, working together with the Associate Administrator for Life and Microgravity Sciences and Applications, should coordinate the development of a policy for Spacelab/Spacehab volume utilization for Phase 1 which satisfies cost, schedule, and performance requirements of the Phase 1 Project Plan.
- A Public Information Officer (PIO) should be designated as a staff assistant to the Phase 1 Project Manager in order to achieve the maximum media benefit from the Phase 1 missions.
- The Public Relations Working Group (WG-1) should be matrixed to the Phase 1 PIO intact.
- The ISSA Program Manager should be designated as the sole source for ISSA risk mitigation requirements.
- The Associate Administrator for Life and Microgravity Sciences and Applications should be designated as the focal point for the international research community's requirements and priorities.
- The OSF Chief Medical Officer will chair the Medical Policy Board for the development of medical support for ISSA risk mitigation and all NASA/RSA joint development of medical support for ISSA risk mitigation. The OSF Chief Medical Officer will coordinate those requirements with RSA through the joint NASA/RSA Medical Policy Board and the Phase 1 Project Manager.

At the conclusion of the Management Working Group presentation and discussion, Gen. Stafford thanked the members once again for their participation. He advised them that the results of the meeting would be incorporated into a draft report which would be submitted to them within two weeks for their review. He then adjourned the meeting.



Mr. William L. Vantine
Executive Secretary
Task Force on the Shuttle-Mir Rendezvous
and Docking Missions

23 May 94



Lt. Gen. Thomas P. Stafford, USAF Ret.
Chairman
Task Force on the Shuttle-Mir Rendezvous
and Docking Missions