

ASTP (USSR) MISSION SR61/2  
Time: 07:12 CDT, 47:52 GET  
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of the following experiments. New data on the origin of these particles in the upper atmospheric layers were obtained. Now this program is being expanded for the purpose of finding out how this stratification of particles depends upon the layers. Therefore this photography will cover horizons for a total of many thousands of kilometers. Of course, now according to the flight program, the flight engineer, Valeriy Kubasov, is scheduled to photograph the daylight horizon. This is Moscow Mission Control.)

KIO This is the Soviet Mission Control Center, Moscow time is 15:43 GET is 48:23. The Soyuz spacecraft has left the shadow and is now over the southern part of South America. At 15:30 Moscow time the Soyuz and Apollo spacecraft were about 590 kilometers apart. According to trajectory measurement data the projected parameters for 34th orbit are as follows: Crossing the equator time - 15:57:39; maximum altitude - 223.6 kilometers; minimum altitude - 221 kilometers; orbital period - 88.89 minutes; orbit inclination - 51.78 degrees. In accordance with the flight schedule the crew will monitor the orbit attitude using the SOAS. Mission Control Center, Moscow.

KIO (Moscow time 15 hours 55 minutes. The 33rd orbit of Soyuz 19 is being completed. At the beginning of this orbit, the crew did a manual orientation towards the Earth with 180 degree orientation, 0.0 degrees. Then the spacecraft was changed to automatic attitude hold, using the infrared vertical and the rate gyro. At the present time the spacecraft is oriented towards the Earth and is in an orbital hold mode. The spacecraft is now over the illuminated part of the Earth's surface and is approaching the equator over the Atlantic. At the present time, the spacecraft is within the zone of coverage of Ascension Island U.S. ground station. According to the onboard program, the flight engineer is now engaged in the experiment of photographing the daylight horizon. The purpose of this experiment is to - the obtaining of photometric characteristics of the visible horizon under various lighting - lighting conditions, the study of high air level atmospheric levels. And this experiment is being done by photographing through the forward porthole of the orbital module. By watching the daylight horizon, Bor - the flight engineer Kubasov is registering the upper illuminated layer of the night side of the Earth. The ionospheric clouds on the background of the horizon. The results of this experiment are being entered into the onboard log. Before the next comm session with the Moscow Control Center which will be pl - take place on the 34th orbit over the Eupatoria ground station there are about 11 minutes left. The spacecraft has just - - )

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KIO (... Eupatoria ground station. We have about 11 minutes left. The spacecraft has just finished the 33rd orbit and is just now beginning the 34th orbit around the Earth. On this orbit, in order to communicate with Mission Control Center, the crew will be in touch with the following stations: Eupatoria, Tbilisi, Djusaly, Kolpashevo, Ulan-Ude, and Ussurisk. The flight program on - for the 34th orbit: At the present time the cosmonauts have to be getting ready for communication with the Mission Control Center. After completing the comm session, the crew of the spacecraft will begin checking out the communications over VHF/AM and VHF/FM. Then they will do their concluding operations on the photographing experiment of the daylight horizon and will be getting prepared for movie photography. After this there will be a test switching on and off of the beacons. At the end of the 34th orbit the crew of the spacecraft will es - will set up the TV camera number one in the orbital module. After this they have personal time. The next comm session in Moscow will be in 9-1/2 minutes. This is Moscow Mission Control.)

KIO This is the Soviet Mission Control Center. Moscow time is 16 hours 2 minutes. This is the 34th orbit of the Soyuz spacecraft around the Earth. According to the calculated figures at 16 o'clock, Moscow time, the distance separating Soyuz and Apollo was 435 kilometers. We just received a report, that the American astronauts made the first sighting of the Soyuz spacecraft. There are 6 minutes until the next scheduled communication session. Mission Control Center, Moscow.

USA Soyuz, this is Apollo. How do you read me? Over. Hello, Valeriy. How are things? (English)

USA Good morning - good day, Valeriy. (English)

USA Excellent. (English)

SCDR We are very glad. Good morning. (English)

USA Alexey, I hear you very well. How do you read me? (English)

SCDR Very good. (English)

USA Soyuz, this is Apollo. Ready for comm check on VHF/AM. (English)

USA Soyuz, this is Apollo on VHF/AM. How do you read? (English)

USSR Say again please. I did not hear you. (English)

USA All right. (English)

KIO This is the Soviet Mission Control Center. In a minute the Soyuz 19 spacecraft will enter the coverage zone of the tracking station Eupatoria.

SPEAKER The communication is intermittent. (English)

MCC-M Soyuz, this is Moscow. How do you read me?

MCC-M Soyuz, this is Moscow. How do you read me?

USSR I hear you excellently. Somehow, though, we didn't receive your communication signal. But we had it turned on onboard.

MCC-M We gave you the communication signal.

USSR Well, we were tuned in. The situation is like this. We just had communication with Apollo, but the check did not follow. That is, they established it with us, and in the upcoming hour we're going to start checking on it.

MCC-M Roger. Right now we're getting a beautiful picture and we see you very well. Give us a report on your orientation.

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USSR Our exact orientation was at an angle of 180 after emerging from shadow, orientation changed to a small inclination of 1 or 2 degrees. Right now we are flying over the Black Sea. We are approaching the Crimean Peninsula - here is the Crimean Peninsula. Yes, everything is nominal, orientation light is lit - it went on while we were in shadow and it is still on.

MCC-M Roger.

USSR At the same time we checked the orientation; orientation looks good.

MCC-M For your information, the Apollo NC2 was nominally executed in the estimated time.

USSR Roger. Transmission (garble).

MCC-M We will have commentary with MCC.

USSR That's clear. Tell us when to start.

USSR (Garble) going to check over Soyuz? (English)

KIO This is the Soviet Mission Control Center. Right now Soyuz 19 is in the coverage zones of ground tracking stations. Television is being transmitted from the spacecraft. Cosmonauts Alexey Leonov and Valeriy Kubasov are in the descent vehicle and are talking with the Mission Control Center. The interior volume of the descent vehicle is conditionally divided into two functional areas: the working area and the equipment bay. In the working area is the transfer tunnel hatch, through which the cosmonauts transfer into the descent vehicle, the pilots couch, the systems control panel, the stowage containers for the scientific apparatus, and other equipment. In the equipment bay is the system for gas mixture supply; elements of a thermoregulation system for providing gas composition, the automation of systems controls, the descent vehicle orbits and other equipment. The systems for interior lighting of the descent vehicle enable the cosmonauts to do normal operations with the panels and equipment, transmit television, and take still and movie photography.

USSR Apollo, Soyuz. How do you read me? (English)

USA (Garble) I hear you well.

MCC-M ... we hear you well; they can hear you poorly.

USSR How do you receive, (garble). (English)

USSR VHF/AM ... VHF/FM. How do you read me, VHF/FM?

KIO This is the Soviet Mission Control Center. The TV transmission from the Soyuz 19 is still in progress. The cosmonauts are trying to establish communications with the Apollo crew. The TV transmission from the Soyuz continues. Cosmonauts Alexey Leonov and Valeriy Kubasov are trying to establish a communication check, VHF/AM and VHF/FM, with the Apollo crew. Right now we see how Alexey Leonov is conducting experiments in zero g.

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KIO A TV transmission from Soyuz spacecraft is being continued.  
At the beginning of this comm session SCDR Alexey Leonov was looking through the observation window and said he could see the Crimea very well, the Kerch Gulf. The cosmonauts are trying to establish communication with the Apollo crew.

USSR (Garble) Apollo. Is it okay that the windows are open?  
MCC-M It's better to close them.  
MCC-M They saw you three minutes ahead of the schedule.  
USSR Roger.  
MCC-M They saw you at a distance of approximately 430 kilometers.  
USSR Roger.  
USSR We heard him say.  
MCC-M Do you have good communication with them?  
USSR On AM it is okay. As to FM, they have said they will check it in 5 or 10 minutes. Probably something is wrong onboard there.  
MCC-M Then we'll be silent and let them check it.  
USSR Roger.  
USSR Go ahead, Deke. (English)  
USSR FM (garble). Apollo, Soyuz. I read you 3 by 3 on VHF/FM.  
(English)  
USSR Could you read me on VHF/FM? (English)  
USSR I read you 3 by 3, no more. I read you loud and clear. We have VHF/AM and VHF/FM. (English)  
MCC-M Soyuz, this is Moscow.  
USSR Stand by.  
MCC-M I would like to remind you not to use the outer TV camera, and it is better to cross its operation out from the documentation.  
USSR Roger.  
MCC-M The same is about the filters.  
USSR Do you mean filters on TK-1 and TK-3?  
MCC-M No. Outer TV camera filters.  
USSR Roger. Thank you that you reminded of it.  
MCC-M Do not forget to turn on the beacons when entering the shadow.  
USSR Apollo, Soyuz. Soyuz beacon on. (English)  
MCC-M Valeriy, you have the beacons on, haven't you?  
SFE Yes.  
MCC-M Check it on the solar cells panel. Does it indicate the beacons are on?  
SFE I did not get you.  
MCC-M (Garble)  
SFE Yes, it indicates.  
MCC-M Okay. Thank you.  
USSR (Garble)  
MCC-M Repeat, please. I do not read you.  
USSR (Garble)

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MCC-M Roger. This is Moscow. One minute is left.  
USSR One minute.  
SFE Moscow, this is Soyuz. I install the TK-1 in its place.  
MCC-M Roger.  
USSR I'll be back in one hour through Moscow. (English)  
MCC-M Happy flight to you! Till the next orbit.  
KIO This is the Soviet Mission Control Center. Moscow time is

16:34. A few minutes ago a scheduled communication session of the spacecraft crew with MCC was completed. During this session a TV transmission from the spacecraft was conducted. According to USSR Commander Alexey Leonov's report they have established two-way radio communication. When entering the shadow, Soyuz 19 SFE, Valeriy Kubasov, turned on the flash beacons and reported to the MCC that the beacons operated excellently. Now the telemetry information is being processed. At 16:30 the Soyuz and Apollo spacecraft were 310 kilometers apart. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. Moscow time is 16:40. The Soyuz 19 spacecraft is in its 34th orbit around the Earth. During the last communication session, telemetry information from the spacecraft was received. According to this information data, the spacecraft onboard systems status is normal; there are no comments on the crew members health status. Commander Alexey Leonov's heart beat is 54 per minute; respiration frequency is 14. SFE Valeriy Kubasov's heart beat is 70; respiration frequency is 20. According to telemetry data DV air pressure is 514.6 mmHg, in OM it is 521 mmHg; DV air temperature is 18.7 degrees C; in OM, 20.2 degrees. The Apollo crew and Soyuz crew have turned on the radio systems to measure the distance between the spacecraft. At 16:30 the calculated distance between the spacecraft was 310 kilometers. So the main part of the Soyuz Apollo test flight is coming - docking and joint crew activity. In the 34th orbit the Soyuz 19 crew will perform the following operations: They will install TV camera 1 in the OM, will conduct the final operations of the experiment Photography of Daytime Horizon, and at the end of the 34th orbit the crew will have personal time. On one of the Mission Control Room screens we can see that the session program for this orbit is completed. Onboard systems status is normal. The orientation mode is being continued. A two-way communication has been established with Apollo spacecraft. The program for the 35th orbit operation is nominal. Mission Control Center, Moscow.

END OF TAPE

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KIO This is the Soviet Mission Control Center. Moscow time is 17:02. The spacecraft Soyuz has been in flight for 49 hours and 42 minutes. At present time, it is flying over the Pacific Ocean and is leaving the shadow. According to the flight program, the crew has finished the communication check with Apollo crew on VHF band - 296.8 MHz amplitude mode and amplitude modulation. The check of onboard communication is as follows: In the Soviet coverage zones, the Soyuz crew has received instructions from the Mission Control Center regarding the switch of VHF/AM equipment - air/air. Radio communication of both sides is carried out simultaneously on operational frequencies of American and Soviet transmitters. After establishing the communication between crews of the spacecraft Soyuz and Apollo, a consecutive check of air-to-air communication, first on 296.8 MHz frequency, then on 121.75 MHz frequency, is being carried out. Air-to-air conversations on the 121.75 MHz are controlled by USSR tracking stations and are being transmitted to the Mission Control Center in Moscow and Houston. Upon completion of comm check, a continuous exchange of radio communications was established between cosmonauts and astronauts. A communication between crews was established at a distance of approximately 430 kilometers. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. Moscow time is 17:15. The spacecraft Soyuz has been in flight 49 hours 55 minutes. At the present time it is located over South America. According to the flight program, the crew has finished the photography of a daylight horizon. At the present time, the crew is mounting TV camera in the OM for the performance of the next TV report. A personal time is planned according to the crew's day schedule. At this time the American spacecraft Apollo is about 150 kilometers behind and about 10 kilometers below the Soyuz. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. Moscow time is 17:26. GET is 50 hours and 7 minutes. The spacecraft Soyuz has begun its 35th orbit. The predicted orbital parameters of the 35th orbit are as follows:

Maximum altitude - 223.5 km;  
Minimum altitude - 221 km;  
Orbit period - 88.88 minutes;  
Inclination of the orbit toward the equator - 51.78 degrees  
Centigrade.

The following operations are planned for this orbit: personal time, communication sessions with the Soviet tracking stations Eupatoria, Tbilisi, Djusaly, Kolpashevo, Ulan-Ude starting 17:42 until 17:58. After this the cosmonauts should perform the condensate dump, then the immediate operations connected with the performance of the coming docking. The cosmonauts will begin donning of spacesuits and preparing of the spacecraft for the docking. Mission Control Center, Moscow.

KIO This is the Soviet Mission Central Center. In one minute the spacecraft Soyuz will enter the coverage zone of the tracking stations Eupatoria, Tbilisi, Djusaly, Kolpashevo, Ulan-Ude.

MCC-M Soyuz, this is Moscow. How do you read me?  
MCC-M Soyuz, Soyuz, this is Moscow. How do you read me?  
MCC-M Soyuz, Soyuz, this is Moscow. How do you read me? Answer  
to establish communication.

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MCC-M Soyuz, this is Moscow. How do you read me?  
MCC-M Soyuz, Soyuz, this is Moscow. How do you read? Answer  
to establish communication.  
MCC-M Soyuz, Soyuz, this is Moscow. How do you read? Answer  
to establish communication.  
MCC-M Soyuz, this is Moscow. How do you read?  
MCC-M Soyuz, this is Moscow. How do you read?  
USSR I read you well. How do you read me?  
MCC-M Excellent.  
MCC-M We are waiting for a report on the way orientation is  
progressing, Valeriy.  
USSR Roger. Our (garble) communication line has been activated.  
Visually the orientation looks good. We are flying in "NKB" mode.  
Orientation display is on. It alternately goes on and off. Dot on the  
roll is also strolling. (There is also something wrong.)  
MCC-M Will you please evaluate orientation.  
USSR Exact orientation? We - by the way - I - how many -  
perhaps 15 to 20 minutes ago corrected it.  
MCC-M Does it mean in all zeros and on all channels? Did I  
understand well?  
USSR Yes, you understood it well.  
MCC-M Thank you very much.  
USSR We inspected it by our course 20 minutes ago in the area  
of Brazil.  
MCC-M Please, write down a radiogram without form. Ready?  
USSR Without a form? Ready.  
MCC-M (Garble) 42. The time of gyro disorientation, 19:04:47.  
How did you receive?  
USSR Time of gyro disorientation, 19:04:47.  
MCC-M Confirmed.  
SFE Moscow, this is Soyuz 2.  
MCC-M I am listening to you.  
SFE Apollo informed that the distance is 48 miles.  
MCC-M Roger.  
SFE It is optimum.  
MCC-M Soyuz 2, docking is permitted at scheduled time.  
SFE Roger. Docking permitted at scheduled time.  
USSR The airport is all the time transmitting weather forecast,  
data for landing.  
MCC-M Okay. Do you need more data?  
USSR No, this is for plane landing.  
MCC-M So do not pay attention to them.  
MCC-M Soyuz 2. Write down the next communication session. You  
don't have it.  
SFE Ready.  
MCC-M From 19:08 to 19:15 through Madrid. This is a reserve one.  
From 19:49 to 19:56 through Orroral, nominal. How did you receive?  
USSR Received. I wrote down everything correctly.

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MCC-M Soyuz 2. I give you the corrections: The communications session through Madrid is nominal, not reserve.  
SFE Nominal.  
MCC-M Soyuz 2.  
SFE Standing by.  
MCC-M How is communications with Apollo?  
SFE Normal communication - fine.  
MCC-M In both channels?  
SFE Right now we are going into the measure mode, AM simplex.  
MCC-M Roger, thank you.  
SFE By the way, on Apollo they're having dinner.  
MCC-M And you are probably envious.  
SFE Yes. I'm envious. I already ate, and Leonov says that he's not going to eat until the scheduled time for dinner.  
MCC-M You have a courageous commander.  
MCC-M Soyuz 2, this is Moscow Center.  
USSR Standing by.  
MCC-M We will ask you, in the communication session over Madrid 19:08-19:15, to give us a detailed account of all the events.  
USSR Roger.  
MCC-M And second. Is the CO<sub>2</sub> absorber in the OM on?  
SFE The CO<sub>2</sub> absorber, right now ... Alexey just went there to turn it on.  
MCC-M Let's remind him.  
SFE He turned it on.  
MCC-M Okay. Thank you.  
MCC-M Soyuz 2, 1-1/2 minutes remain.  
SFE Roger.  
MCC-M Valeriy, those in the hall wish you success until the next meeting.  
SFE Thank you.  
Good luck to you. (English)  
SPEAKER In the Russian way, we wish you luck. And for the fellows in Apollo, in "American", (Russian) We'll cross our fingers. (English)  
SFE (Garble)  
MCC-M ... seconds. Have a good flight. (Russian) Good luck. (English)  
SFE Roger.  
KIO This is the Soviet Mission Control Center. Moscow time is 18 hours 06 minutes. Soyuz 19 has been in orbit 50 hours 46 minutes. A communication session with the Soviet tracking station was just finished. During the session there were radio communications between the crew and the Mission Control Center, transmission of telemetry data on the onboard system status, and bio-telemetry from the medical monitoring, a few trajectory measurements, commands given through the command radio link, and the Mission Control Center gave permission for docking at the calculated time. The communication session program was completed in full. There are no comments on the onboard system status and the crew feels fine. Mission Control Center, Moscow.



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KIO This is the Soviet Mission Control Center. Moscow time is 18 hours 15 minutes. The Soyuz 19 is continuing its 35th orbit around the Earth. Presently, the spacecraft is flying over the northern part of Australia. According to the telemetry data, received in the last communication session, onboard systems status is normal: descent vehicle air pressure - 517 mmHg; orbital module air pressure - 521 mmHg; descent vehicle air temperature - 19.3 degrees celsius; orbital module air temperature - 20. degrees. According to the radio communications data and the telemetry data, the crew status is good. The pulse rate of Commander Alexey Leonov is 60 beats a minute. Rate of breathing - 14. The pulse rate of Flight Engineer Valeriy Kubasov is 70 beats a minute. Rate of breathing - 24. According to the flight plan, presently the cosmonauts are preparing for the docking of the Soyuz spacecraft. Right now, they are donning their spacesuits, and then they will begin the necessary operations for preparation and conduction of docking. As we have already said, the Mission Control Center has given permission for a docking at the calculated time - that is, 51 hours 55 minutes GET, the beginning of the 36th orbit. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. Moscow time is 18 hours 25 minutes; 51 hours 5 minutes - GET. The Soyuz spacecraft is in the 35th orbit. The orientation system which guides the engines reliably keys the spacecraft in the orbital orientation mode. The Soyuz spacecraft is in the coverage zone of Orroral Valley, in the unlit part of the Earth's surface. And so, soon will begin the main period of the Soviet-American experiment - the docking and flight in docked configuration of the Soyuz and Apollo spacecraft. Presently, the cosmonauts and astronauts are entering the final phase of preparations for the meeting of the spacecraft. There are stable radio communications between the Soyuz and Apollo spacecraft. The Soyuz cosmonauts, dressed in spacesuits, are now turning on the orientation lights and the flash beacons. At 18 hours 20 minutes the spacecraft were separated by 28 kilometers. To achieve the designated orientation of the Soyuz spacecraft in relation to the Apollo, the crew is preparing to make the programmed maneuvers. The Apollo astronauts, with the help of VHF radio communication, conduct constant measurements on the distance to the Soyuz Spacecraft. The Apollo spacecraft carried out correction of the central part of the final phase of the maneuver to transfer into a coelliptic orbit. Right now, the Apollo spacecraft is approaching the Soyuz spacecraft at an average velocity of 30 meters a second. Houston Mission Control Center, having worked out the trajectory data for the Apollo spacecraft, communicated the orbital parameters to the crew. The American crew transmitted onboard the Soyuz the more precise data on the status of Apollo and on the parameters of the coelliptic orbits after the maneuver. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. In Moscow, it is 18:40. We're coming up on the end of the 35th orbit of Soyuz 19. The spacecraft has been in flight 51 hours 20 minutes. We are getting close to one of the fundamental steps of the joint Soviet-Apollo experimental flight. The docking will take place at the estimated time of 51:55 GET, in the 36th orbit. The projected Soyuz parameters for the 36th orbit are: maximum altitude - 223.37 kilometers; minimum

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altitude - 220.8 kilometers; orbital period - 88.88 minutes; orbital inclination to the equator 51.78 degrees. The flight program stipulates the following crew activities for the 36th orbit: At the start of the 36th orbit, the Soyuz 19 crew will close hatch number 5, the hatch that separates the descent vehicle from the orbital module. Then they will conduct still and movie photography. At 51 hours 55 minutes there will be docking between Soyuz and Apollo. After docking, the crews will have an onboard systems status check, and then, in the coverage zone of the American tracking station, will give a radio report. After the communication session with the Mission Control Center the crew will perform an integrity check between the descent vehicle and the orbital module. After that, they will open hatch number 5, the hatch which connects the descent vehicle with the orbital module. Having opened the hatch, the cosmonauts will enter the orbital module and perform pressurization and a pressure integrity check in tunnel number 2, the tunnel which connects the Apollo docking module with the Soyuz 19 orbital module. After checking the integrity in tunnel 2, Alexey Leonov and Valeriy Kubasov will doff their spacesuits. Right now the Soyuz 19 spacecraft is over the Pacific Ocean, nearing the shores of South America. The next communication session between the crew and the Mission Control Center begins in 24 minutes, through the American tracking station in Madrid. Mission Control Center, Moscow.

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KIO This is the Soviet Mission Control Center. Moscow time is 18:55. The docking of the Soyuz and Apollo will take place in 20 minutes. The Soyuz 19 is completing its 35th orbit around the Earth. The docking will occur in the 36th orbit over the area with the coordinates of about 12 degrees of Eastern longitude and 48 degrees of Northern latitude. At 18:40 Moscow time the range between the spacecraft was 2 kilometers. In accordance with the flight plan the crewmen are beginning to close hatch 5 which connects the orbital module with the descent vehicle. During the approach phase the spacecraft orientation will ensure the capture of the docking units at contact. Prior to the approach the Soyuz crew, following the Apollo commander's command, will shift from the orbital orientation mode into inertial hold; and perform the nominal 60 degree roll maneuver. The crews will be monitoring the approach using television and optical devices. The Apollo crew has completed the last orbital correction, whereas the Soyuz crew has turned on the orientation lights and informed the Apollo of the completion of this procedure. The Soyuz docking system has been shifted into the passive readiness mode. The Apollo crew will approach the Soyuz using their sighting device aimed at the Soyuz docking target. During the rendezvous and docking the onboard orientation lights and pulse beacons of both spacecraft will be on. At contact, the impact will be reduced by the shock absorbers of the Apollo docking unit. The ring of the Apollo active unit will be aligned with the ring of the Soyuz passive unit. Then the spacecraft will perform preliminary capture, alignment, retraction and rigid docking. This procedure will take about 3 minutes. The Soyuz crewmen are monitoring the retraction and interface pressure integrity. The Apollo will perform the space orientation of the docked spacecraft. The Soyuz commander will perform a rough check of the DV and OM pressure integrity. The flight engineer will turn the flash beacons off and will monitor the onboard systems. The cosmonauts will open hatch 5, connecting the DV and the OM, and will transfer to the orbital module. The Soyuz commander Alexey Leonov will perform a precise check of the Soyuz pressure integrity, which will be followed by the first transfer activities. By 18:50 Moscow time, the distance between the spacecraft had been reduced to 50 meters. At 19:08 the spacecraft will have AOS over the Madrid tracking station during which the crew will report on all docking activities and preparation. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. Moscow time is 19:03. The spacecraft docking will occur in 12 minutes. In accordance with the flight plan the Soyuz crew is informing the Apollo crew that they are ready to dock. In accordance with the flight plan, the Apollo is supposed to begin braking during which the closing rate will be reduced to 3 centimeters per second. After that the spacecraft will begin approach and docking itself. The Soyuz is located over the Atlantic Ocean and is approaching the coverage zone of the Madrid ground station. Mission Control Center, Moscow.

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KIO This is the Soviet Mission Control Center. The Soyuz spacecraft is approaching AOS of the Madrid tracking station, during which the Soyuz commander will comment on the docking activities. The 36th orbit trajectory is passing over Europe. At about 19:12:30 the spacecraft will pass over Brittany and Normandy in France. At 19:13:(garble) the spacecraft will pass over Paris - over the Paris area. At 19:14 the spacecraft will be located - will be over West Germany, and at 19:15 the nominal time of the spacecraft contact will be performed over the territory of East Germany, over the (garble) City and with the coordinates of about 12 degrees of Eastern longitude and 50 degrees 50 minutes of Northern latitude. After that, docking systems alignment, retraction, and docking completion will be performed. Mission Control Center, Moscow.

MCC-M The spacecraft has AOS over the Madrid ground station. We are activation the downlink.

MCC-M Soyuz, Moscow. How do you read?

USSR Read you well.

SFE Moscow, Soyuz 2. How do you read? Over.

MCC-M Read you well, Soyuz 2. How do you read me?

SFE I also read you well. Has the docking been completed?

Moscow, this is Soyuz 2.

MCC-M Roger. We all congratulate you on the successful docking and we are happy to have witnessed this historic event. We are expecting your report on the docking. How did you copy, Soyuz 2? Over.

SFE Copy. The docking occurred during the last orbit. When we established radio communication with the Apollo the distance was over 300 miles. After the communication had been established the ranging mode was activated. At that time the distance was about 120 miles, and the last rendezvous stage began. The Apollo performed several maneuvers, closed in, the distance was being gradually reduced from 120 to 7, 3, 1 miles to 500 meters, to 100 meters, and, at last, the Apollo began stationkeeping at 50 meters. At that time we were located over the Atlantic Ocean. We had to wait a little until we gained AOS over the tracking station in Spain. At that time we were - the Soyuz was supposed to begin the docking inertial orientation. At 19:04:47 we began the docking inertial orientation. The Soyuz acquired a fixed position and began rotations around its longitudinal axis. When these rotations had been completed we informed the Apollo that our inertial orientation has been established, the docking system was ready. And at that moment the Apollo began the docking. The range was being reduced from 50 meters to 10, to 5 meters and here we are, watching it through out sighting device, well, we were watching it at 50 meters too, as it gets closer and closer, a couple of meters, and at last, there comes a slight push, the CAPTURE light goes on fast and then, in a couple of seconds, the USA astronaut Vance Brand informed us that he had activated the retraction mode. The spacecraft retraction began which went on for several seconds. After that the docking systems interface was aligned, our INTERFACE light went on, and in just a couple of seconds the Apollo active hooks were activated and the rigid retraction of the spacecraft occurred with a force of about 20 tons. Thus, the seal was compressed, which was indicated

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by the SEAL COMPRESSED light. Now everything is fine. The spacecraft have been docked, the interfaces have been mated, and we are beginning a pressure integrity check. We'll inform you later on our further activities.

MCC-M Thank you very much for your detailed and interesting report, Valeriy. I think Fokin should fear competition now.

END OF TAPE

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CC-M Soyuz 2, inform us about rough integrity check.  
SFE Okay. We will inform you. Rough integrity check - 525 on  
both PTI.

CC-M Okay, thank you. Final data on rough integrity check will  
await through Orroral.

CC-M Soyuz, this is Moscow. We have one minute left.

SFE Roger. Everything is normal. No changes on PTI.

CC-M Roger. Accept our congratulations once again. Till we  
meet again on the next orbit. We wish you luck.

SFE Thank you. That's for the later date.

CC-M Don't mention it.

KIO This is the Soviet Mission Control Center. Moscow time is  
19:32. The Soyuz spacecraft has been in flight for 52 hours 12 minutes. The  
touching and capture of the spacecraft were performed at 19:09 Moscow time,  
or 51:49:34 GET. At this time the capture indicator on the Soyuz spacecraft  
panel is on. After this the retraction and mating of docking procedure began,  
then active operations of docking unit retraction began. The retraction force  
was about 20 tons. Onboard the Soyuz spacecraft this operation was being  
controlled by the SEAL COMPRESSED light. The operation was finished at 19:13:30  
Moscow time. At the present time, the spacecraft crews are getting prepared for  
the first transfer of the crews. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. It is 19:39  
Moscow time. The Soyuz and Apollo spacecraft have been in joint flight 30  
minutes. Right now they are flying over the equator. According to telemetric  
data and based on the information received from the spacecraft crew the onboard  
systems of the spacecraft are normal. There were no comments on the docking  
performance. Integrity and the module thermal mode are normal. There are no  
comments on the cosmonauts' health status. The next communication session of  
the spacecraft crew with the Control Center will be held in 8 minutes through  
the American tracking station Orroral in Australia. Mission Control Center,  
Moscow.

KIO This is the Soviet Mission Control Center. It is 19:43  
Moscow time. In 5 minutes the Soyuz and Apollo spacecraft will enter the  
coverage zone of the American tracking station Orroral in Australia. Let us  
remind you what will be the Soyuz 19 spacecraft crew activities for the rest of  
the 36th, the present, orbit. After the end of the communication session with  
the Mission Control Center, the cosmonauts will begin the transfer to the orbital  
module. Then they will carry out an accurate integrity check in the descent  
vehicle and the orbital module. After that, they will pressurize tunnel 2, the  
tunnel which connects the Soyuz orbital module to the Apollo docking module,  
to 200 mmHg and will begin its integrity check. After the integrity check at  
the end of the 36th orbit, the cosmonauts will take off their PGAs. Three and  
a half minutes remain until the communication session through the tracking station  
Orroral. Mission Control Center, Moscow.

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Time: 11:24 CDT, 52:04 GET  
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KIO This is the Soviet Mission Control Center. It is 19:47 Moscow time. In accordance with the flight program, the cosmonauts will now transfer to the orbital module and will carry out an accurate integrity check of the descent vehicle and the docking module. In one minute the Soyuz and Apollo spacecraft will enter the coverage zone of the American tracking station Orroal in Australia.

KIO This is the Soviet Mission Control Center. It is 20:00 in Moscow. The Soyuz and Apollo spacecraft have emerged from the Earth's shadow and are located now over the Pacific Ocean. According to telemetric data received during the communication session through the tracking stations Eupatoria, Tbilisi, Djusaly. Soyuz descent vehicle air pressure - 507 mmHg; orbital module pressure - 512 mmHg; descent vehicle air temperature - 19.8 degrees C; orbital module air temperature - 20.8 degrees C. The cosmonauts' health status is good. The spacecraft commander Alexey Leonov has a pulse rate of 64 per minute, respiration rate of 18. the pulse rate of the flight engineer Valeriy Kubasov is 70 per minute, his respiration rate is 26. Mission Control Center, Moscow.

END OF TAPE

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KIO This is the Soviet Mission Control Center. It is 20:13 Moscow time. The Soyuz spacecraft is completing its 36th orbit. The cosmonauts' first transfer has begun. During that transfer the spacecraft commander Thomas Stafford and Donald Slayton will transfer to the Soyuz spacecraft orbital module. The first transfer will last until 55:05 GET, when the astronauts will enter the Soviet spacecraft. According to flight program, the symbolic activity is scheduled for 55:50. After that, the crews will start carrying out scientific experiments, and then according to their day schedule they will have a joint dinner. Then the Apollo crew will return to Apollo spacecraft. This will be the end of the first transfer. The scheduled time for the end of the first transfer is 58:15. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. It is 20:26 Moscow time. The Soyuz spacecraft's 37th orbit around the Earth has begun. Right now the Soyuz and Apollo spacecraft are in docked configuration and are located over the South American northern seacoast. For the 37th orbit the following Soyuz and Apollo spacecraft parameters are predicted: maximum flight altitude - 223.26 kilometers; minimum flight altitude - 220.68 kilometers; orbital period - 88.88 minutes; orbital inclination to the equatorial plane - 51.78 degrees. The Soyuz 19 crew's activities during the 37th orbit: The cosmonauts are now taking off their PGAs. Then they will get prepared for the communications session with the Mission Control Center through the American tracking station on the Bermuda Islands. After the communication session they will begin PGA drying and will start preparation for the communication session with the tracking stations Eupatoria, Tbilisi, Djusaly. After the communication session, the Soyuz 19 spacecraft crew will start preparations for joint activities with the American astronauts. The American astronauts' transfer to the Soyuz spacecraft is scheduled for 55:05 Soyuz 19 GET. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. The Soyuz and Apollo spacecraft have entered the coverage zone of the American tracking station on the Bermuda Islands.

KIO This is the Soviet Mission Control Center. It is 20:44 Moscow time. The Soyuz and Apollo spacecraft joint flight is going on. According to the flight program, the Soyuz spacecraft crew has to connect the fans to their PGAs and start drying them. In 3-1/2 minutes the Soyuz and Apollo spacecraft will enter the coverage zone of the tracking station Eupatoria. During the next communication session a TV report from onboard Soyuz 19 spacecraft is going to be conducted. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. In a minute the Soyuz and Apollo spacecraft will enter the coverage zone of the Eupatoria tracking station.

MCC-M Do you read me? Over.

MCC-M Soyuz, this is Moscow. How do you read me? Over.



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MCC-M Soyuz, Soyuz, this is Moscow. How do you read me?  
Over.  
MCC-M Soyuz, this is Moscow. How do you read me?  
USSR Moscow, this is Soyuz. Read you excellently.  
MCC-M I have important news.  
USSR Moscow, Moscow, how do you read me?  
MCC-M I read you well. I have important news.  
USSR I'm listening.  
MCC-M We expect that a greeting will be transmitted to you at  
22:24. At the same time we will be watching you on the television.  
It is desirable that (right after you enter the zone at 22:22) in 1-2  
minutes Stafford's entering would be completed and that by that time we  
would be able to watch you on our screens. How did you understand me?  
USSR I understood that at 22:00 in two minutes the transfer  
would be completed and you would be able to watch us on the TV.  
MCC-M Understood correctly.  
USSR At 22:02, yes?  
MCC-M At 22:24.  
USSR At 22:24, we have got it.  
USSR We cannot find the camera 16 CM extension cord, the power  
extension cord. It is not in the bag where it should be. Ask somebody  
there.  
MCC-M Okay.  
MCC-M Soyuz, this is Moscow.  
USSR I'm standing by.  
MCC-M At what stage are you now?  
USSR We have carried out the accurate integrity check of  
tunnel 2, pressurized it. The pressure was normal during 10 minutes and  
dropped only by one millimeter. I have already reported, it is ideal.  
Right now we are preparing the equipment for movie photography.  
MCC-M (Garble)  
MCC-M Soyuz, we are ready to listen to your report, TV-9.  
MCC-M Soyuz, this is Moscow. How do you read me?  
USSR I read you, but we did not understand.  
MCC-M We are ready to listen to your TV-9, to see you on our  
screens.  
MCC-M Soyuz, this is Moscow.  
USSR I'm standing by.  
MCC-M The extension cord which you are looking for is not on-  
board the ship.  
USSR I did not understand you.  
MCC-M The extension cord which you are looking for is not on-  
board the ship.  
USSR So, what shall we do?  
MCC-M Use the one which is on the TV camera.  
MCC-M Soyuz, this is Moscow.  
USSR I am standing by, Moscow.  
MCC-M Receive a radiogram without a form.  
USSR Ready.

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MCC-M When calculating Delta-P of nitrogen, which is added from Apollo, to lower the oxygen partial pressure according the display by 20 millimeters. How did you understand? Soyuz 2, did you understand me?

SFE When calculating Delta-P of nitrogen for adding partial of nitrogen, nitrogen pressure to lower by 20 millimeters.

MCC-M Oxygen partial pressure.

USSR Oxygen, yes, oxygen, to lower by 20 millimeters.

MCC-M You understood correctly.

MCC-M Radiogram without form, number 43. Ready?

USSR Ready.

MCC-M In the 38th orbit before TV-9-1 to check whether the OMP working light is off. To install PLU on PLU-53, to install all of them on the object-glass.

USSR And where PLU?

MCC-M I did not understand, repeat the question.

USSR Where to put PLU?

MCC-M On PLU-53.

USSR Roger.

MCC-M You installed it yesterday on the same place.

USSR No, yesterday we installed it, yesterday, perhaps on (garble). Further, what about (garble)?

MCC-M To install the filter on the object - glass ...

END OF TAPE

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USSR           What comes next?  
MCC-M          Install the filter on the lens. (Garble) 2 on OMP. Please, confirm the 43rd.  
USSR           On the 8th orbit, prior to TV.9.1, check the activation of OMP work lights, PLU into T3, install the filter, (garble) light 2.  
MCC-M          I confirm the 43rd. Just a moment. If you need the remote control cable, it's in container 4. How did you copy?  
USSR           We've found the remote control cable. And how about the power supply cable, the adapter?  
MCC-M          Don't look for it any more. It's not there.  
MCC-M          Soyuz 2, Soyuz 2.  
SFE            On the line.  
MCC-M          Prepare headset 3 so that Tom Stafford can monitor the greetings.  
SFE            We're getting everything ready. (Garble).  
MCC-M          That's a boy.  
SFE            Got no time left.  
MCC-M          That's a boy. 25 seconds until LOS. Good luck and see you on the next orbit.  
USSR           So, the greetings are going to be on the next orbit, aren't they?  
MCC-M          That's affirmative. During the Moscow AOS.

#### PRESS CONFERENCE

BLAGOV       (Fifty hours of flight time passed while the two craft reduced the distance between them from 6-1/2 thousand kilometers to about 50 meters, and the approach speed, well, in automobile terms, is about 130 kilometers a minute - 130 kilometers an hour.) (The flight docking operation can be subdivided into 2 parts. First, the distance approach which began from a distance of 6-1/2 thousand kilometers (garble) 50 meters. At 18:50, at a distance of 50 meters, Apollo began its stationkeeping. The Soyuz and Apollo crews must be given full credit; they must be given full credit for very precise work which made possible complete docking 3-1/2 minutes earlier than planned. Geographically, this took place over Spain, over the Bay of Biscay. Both crews say that impact was very soft. (Garble) of initial contact is the crucial moment of the entire docking operation. We were somewhat excited even when calculating this moment in the docking operation, knowing that Thomas Stafford is a man of high spirits. During one of the visits to Houston, Texas, by our team, Stafford showed them a film of his maneuvering next to an Agena rocket stage. We were astonished at the abruptness of the position-changing in the vicinity of the Agena rocket stage. I attribute this to the usual American characteristic of enterprise. Our docking operations are carried out somewhat more smoothly, and I am very happy to say that during the final stage of today's docking Tom Stafford was converted to the Russian faith. Three days

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before the actual docking this stage of initial contact was discussed in detail by the Soviet Flight Director Alexey Yeliseyev and his American counterpart Mr. Frank. And so contact took place and was followed by the process of retraction which was consummated by an air-tight seal between the two docking assemblies. The process proceeded very rapidly and lasted for something like 3-1/2 minutes. Well, this was the way we liked it - after a smooth contact, a rapid coupling and capture process. At 19 hours 12 minutes and 30 seconds, a rigid coupling was effected and an international space system consisting of the Soviet and American craft was thereby established. Following this, both crews will check their craft for leakages, these will be pressure checks, pressure integrity checks and hatch checks will be followed by the pressurization of the transfer tunnel to equalize the pressure there with the pressure inside Soyuz. This will make possible the first international crew transfer, the first visit in space. This will be at about 22:25 this evening. The visitors will be spacecraft commander Tom Stafford and Deke Slayton. Deke Slayton will not remain aboard Soyuz for long because he will have to return to Apollo to carry out the first of the joint scientific experiments which is known as the Multi-Purpose Furnace. Stafford will remain aboard Soyuz longer. The joint operations will take a total of about 3 hours, and at about 30 minutes past midnight the crew transfer will be complete. And the crews will retire for their first night aboard the space system. And I hope they will have a good night's rest after the important and difficult day that they had. In conclusion I would like to say that the specialists of the space industry who are deeply devoted to their work which they consider no less difficult than other professions, including your own profession, have seen for themselves today that the idea of technical cooperation in space has materialized, and we are heartily in favor of such cooperation. I don't know if you're aware of the first crew exchanges during the docking. This was at 16:05 over the Mediterranean Sea. Deke Slayton said, well, this is a retranslation from the Russian, "Soyuz, this is Apollo. How do you hear me?" Deke Slayton said these words in Russian. "Soyuz, this is Apollo. How do you hear me? Kubasov answered, "I read you well, hello everybody.") Are there any questions? Go ahead, France Press. Now wait, the microphone isn't working. I request that all the questions be asked through a microphone. Otherwise it would be impossible to keep track of them for history, including the French history.

QUERY (These are two questions from the France Press correspondent. He wishes to know first why rigid coupling in fact docking, occurred 3 minutes earlier than planned, and secondly, over what point in Europe, exactly, did rigid coupling take place?)

SPEAKER (The answer to the first question is because the crews worked splendidly. It is difficult, and, in fact impossible to calculate the exact moment of docking, and this is well - technically not required. We calculate that docking took place over the Atlantic Coast of Spain, from that to the border of the Soviet Union. It is in that territory that the docking process took place I haven't had time yet to calculate the exact point where rigid coupling took place but I can let you have the formula necessary to carry out the calculations to get that point. The initial point is 40 degrees

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Northern latitude and 20 degrees Western longitude. And the calculation was, well, not a computer calculation, but a manual one. No doubt - Mission Control Center now has a more accurate set of coordinates for you. You then have to take a map showing the route of the docked craft and you then have to take the - you have to multiply the speed of 8 kilometers a second by 150 seconds. Any further questions?

QUERY (American correspondent for the Los Angeles Times.) Have you yet calculated the precise landing spot of the Soyuz? Will the landing be televised? (English)

BLAGOV (The answer is "Yes" to both questions. I have't got the exact coordinates with me, but I can phone you here and let you know. This will take place in Kazakhstan, not far from the town of Arkalyk. For the present I suppose that is accurate enough. And that will occur at 13:50 Moscow time on July the 21st. And that, by the way, as you probably remember, is the day Neil Armstrong set foot on the Moon.)

QUERY (Mr. Levi of the Canadian Montreal Star wishes to know whether it is true that the Soviet side designed the docking module, and if so, considering the success of this module, is it proud of it?)

BLAGOV Are you from the Canadian press, not television, Mr. Levi? I asked this because we were somewhat mistreated today by Canadian television. But considering that you represent the Canadian press, I am happy to answer your question. The fact is the science ship Cosmonaut Yuri Gagarin - Cosmonaut Yuri Gagarin is keeping station in neutral waters off the coast of Canada and has been of great help to us in today's activities. And during the shift that I worked, that is last night, during our communication session there was marked interference by Canadian television. But I can say to the Canadian television representatives, if there are any present today, that happily this did not affect our work. Now, in answer to your question, I would not say outright that the docking module is a product of Soviet engineering. As you have probably already been told, the Soviet and American docking assemblies differ somewhat, one from the other. For one thing, the activation principle is different, ...)

END OF TAPE

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BLAGOV (Now in answer to your question, I would not say outright that the docking module is a product of Soviet engineering. As you have probably already been told, the Soviet and American docking assemblies differ somewhat, one from the other. For one thing, the activation principle is different, the docking assemblies - (garble) of different types. The idea of such a docking assembly came from the Soviet engineer, Vladimir Syromyatnikov, a very experienced engineer in docking mechanisms. ... developed practically all the docking mechanisms that have been used in Soviet docking operations. And he will be here at the press center tomorrow to answer your questions. But although the idea did come from one side, the docking assemblies were nevertheless developed thanks to the efforts of large teams of Soviet and American engineers, and no one person can really advance technology alone today. We are naturally proud and our American counterparts are no doubt equally proud that both docking assemblies functioned excellently today and ensured the establishment of the first international - well - space system. Next question?)

QUERY (Garble Los Angeles Times) I would like to know that - the geographical location of the Cosmodrome from where a ship is launched, does it give any advantages or disadvantages for the maneuverability for docking for the spaceships? The inertial propulsion given by the latitude on which the Cosmodrome is situated, does it have some advantages? (English)

BLAGOV - - What I said about Canadian television was said in good spirits, although we did record the actual interference on tape, and it did somewhat interfere with the transmission of parameters which we were receiving. So we do not for a moment entertain the thought that this was deliberate interference, the more so since this was, well, almost a peak viewing time and it was natural for Canadian television to be working. This was 16 hours local time. And now I turn to the second question before any new questions are asked. The Baikonur Cosmodrome is situated in the heart of the Soviet Union in the Kazakhstan Republic in an area with, as you know, a low population density. This, as you know, is very important because during the launching of a rocket and the initial period of its flight, several rocket stages - two rocket stages - are jettisoned, and it is important that the jettisoned stages should not endanger any populated centers. The Americans, as you know, jettison their rocket stages into the Atlantic Ocean, which as you know, is likewise sparsely populated like Kazakhstan. And that is an example of how one and the same problem can be solved in two different ways.)

INTERPRETER A question from the Polish correspondent, who wants to know whether there was any communication today between Soyuz 19 and Salyut 4. (English)

BLAGOV (There was, in fact, such a communication session during the 21st orbit of Soyuz 19. Klimuk and Sevastynov had a very hearty, cordial talk with their friends aboard Soyuz 19. It was (garble) discussion about everyday matters and did not touch upon any technical problems.)

QUERY What kind of program did you receive from Canadian television?

(Laughter)

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BLAGOV I'll take back my remarks regarding Canadian television, agreed?

INTERPRETER The correspondent of the Montreal Star wanted to clarify the point about the Canadian Television transmission that caused the interference and the speaker has very kindly retracted his whole statement about Canadian Television and let's not go into it any further. (English)

BLAGOV (It will give us food for thought as to how to protect our transmissions from television broadcasts because we cannot and must not, naturally, forbid Canadian TV companies to go on with their broadcasting.)

QUERY (The Correspondent of the Yugoslav newspaper Politica asks why we received the same TV picture of the Apollo approach from Houston and from the Mission Control Center near Moscow, and which TV cameras were working during the Apollo approach.)

BLAGOV (I have little experience of speaking to correspondents. This is the second occasion on which I am doing so. And I'm definitely forming the impression that correspondents have a particularly keen interest) in all kinds of television problems. (During the previous news conference at which I spoke, I really had to make a thorough study of the TV systems aboard the spacecraft after six questions on the subject from a French correspondent. These events, we must remember, are truly history-making, ladies and gentlemen, and shouldn't we really turn our minds away, considering that this is so, from minor television matters? I will answer the question, nevertheless, on the assumption that this will be the last question on the TV problem.)

QUARY It will be the last. (English)

MONITOR We have time for two last questions.

BLAGOV (I have provided the press center with a schedule of when which of us will be speaking here and you can see from that) you can familiarize yourselves with it (but I do remember that I will be here in the morning - tomorrow morning.)

QUARY (Garble)

BLAGOV (Yes.)

BLAGOV (The program you saw the - was conducted by the Apollo exterior camera, and you could conclude that yourselves because what you saw was a picture of Soyuz.)

MONITOR (One more question. We have time for one more question.)

QUERY Alfred Friendly, Newsweek. I'm sorry to violate the agreement so quickly, but is there an exterior camera on Soyuz and was it foreseen that there never - there should be any photography of the Apollo approaching - -)

BLAGOV (Let's keep to our gentlemen's agreement.)

(Applause - one person)

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MONITOR (I want to thank Mr. Blagov for his answers, including his television answers. The next briefing at 10 o'clock tomorrow morning here.)

BLAGOV (And there will be many events tomorrow. And there will be very important events today, so stay tuned to radio and television.)

MCC-M We transmitted this press conference from the Moscow press center.

END OF PRESS CONFERENCE

KIO This is the Soviet Mission Control Center. Moscow time is 21:46. The Soyuz has been in flight for 54 hours 26 minutes. At present they are located over the Pacific Ocean. In accordance with flight plan the following operations will be performed onboard the spacecraft: onboard the Apollo, the docking module will be pressurized to a pressure compatible with that of the Soyuz orbital module. At this time - -

END OF TAPE



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KIO In accordance with the flight plan the following operations will be performed onboard the spacecraft: on the Apollo the docking module will be pressurized to a pressure compatible with the Soyuz orbital module. At this time, Stafford and Slayton will be located in the DM. The Soyuz crew are preparing for joint separations. After this there will be a check of the integrity of the hatch connecting the Apollo command module and service module, an assembly which is separate. After the integrity check, pressure will be equalized in the docking module and the Soyuz orbital module. At approximately 55:05 GET, the hatch connecting the living modules of the Apollo and Soyuz is programmed to be opened. After this, two members of the American crew will transfer to the Soyuz. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. Moscow time is 21:50. The Soyuz is completing its 37th orbit. The projected orbital parameters are as follows: maximum altitude, 223.15 kilometers; minimum altitude, 220.57 kilometers; orbital period is 88.88 minutes. Orbital inclination to the equator is 51.78 degrees. In 3 minutes the Soyuz will enter the coverage zone of tracking ship Academician Sergei Korolev. Mission Control Center, Moscow.

MCC-M Soyuz, this is Moscow. How do you read? Soyuz, this is Moscow. How do you read? Soyuz, this is Moscow. How do you read? Soyuz, this is Moscow. How do you read? Soyuz, this is Moscow. How do you read?

USSR Moscow, Soyuz. How do you read?

MCC-M I hear you well. How me?

USSR I read you excellently. Let's turn it off.

MCC-M Roger.

SCDR All is nominal. We just received your keying signal.

MCC-M This is Moscow. What stage are you in?

SCDR We are at panel number 18. Panel 18, final pressurization of the tunnel. Valeriy is carrying it out. (Garble) We are preparing to receive our guests but last time (garble) it is necessary either to work or to complain about what you can't do.

MCC-M We prefer the first alternative. Work better.

SCDR Moscow, how do you read?

MCC-M I read you well.

SCDR You got what I said, didn't you?

MCC-M I understood, I understood.

SCDR We've done everything we could with the camera. We've found everything. Everything will be working.

MCC-M Roger. You must precisely carry out preparations before the very beginning of TV-9-1. How did you read?

USSR We didn't understand, Georgi.

MCC-M Carry out precisely the beginning of TV-9-1, but I gave you those recommendations during the last pass.

USSR (Garble) We will do as we have heard.

MCC-M Roger.

USSR Apollo, Soyuz. How do you read me? Pressure in tunnel 2 is 495. Roger. Initiating step number 19. (English)

MCC-M Twenty seconds until our meeting over Moscow.

SFE (Garble) panel number 19.

MCC-M Roger, Soyuz 2.  
(Noise and garble)

END OF TAPE

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Time: 14:07 CDT, 54:47 GET  
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(Garble and noise)  
USSR ... equalize pressure tunnel 2. Soyuz. (English)  
(Garble)  
KIO This is the Soviet Mission Control Center. Moscow time is 22:13. The Soyuz has been in flight for 54 hours 54 minutes. The Soyuz and Apollo crews are now completing the pre-transfer activities. They are equalizing the living modules pressure. In 10 minutes the spacecraft crews will begin to open hatch 3 connecting the docking module with the Soyuz orbital module. Mission Control Center, Moscow.  
KIO This is the Soviet Mission Control Center. The hatch connecting the Apollo service module and the Soyuz orbital module is open now. In 2 minutes the Soyuz will have AOS over the ground stations Eupatoria and Tbilisi. Mission Control Center, Moscow.  
KIO Mission Control Center, Moscow. The spacecraft commanders have met and have shaken each other's hands. The Soyuz will have AOS over the Eupatoria ground station in 15 seconds. At this time, Stafford will be transferring to the Soyuz orbital module.  
SFE Moscow, Soyuz 2. Read you well.  
CC-M Soyuz 2, read you very well.  
SFE The hatches are open. Tom is in the orbital module. Deke is in Tunnel 2. His feet are in the docking module and his head is in the orbital module.  
CC-M We see that.  
SFE TK-1 is ready.  
CC-M Roger.  
SFE I didn't get that.  
CC-M Roger, roger.  
SFE Tell me when the TV camera is ready.  
CC-M In a minute.  
SFE (Garble) forms have been exchanged. You can see it on the TV.  
CC-M Soyuz, how do read me?  
USSR Moscow, Soyuz. Read you very well.  
USSR How do you read me? (English)  
SFE On VHF?  
CC-M Invite him over and give him headset 3. The 3d one. And get Tom out of the camera's way. And now comes the greeting.  
MCC-M Comrade Leonid Ilich Brezhnev's greeting to the crews of the Soyuz-19 and Apollo spacecraft.  
MCC-M To the cosmonauts Alexey Leonov, Valeriy Kubasov, Thomas Stafford, Vance Brand, Donald Slayton. Speaking on behalf of the Soviet people, and for myself, I congratulate you on this memorable event - the first docking of the Soviet spacecraft Soyuz 19 and the American spacecraft Apollo. The whole world is watching with rapt attention and admiration your joint activities in fulfillment of the complicated program of scientific experiments. The successful docking has confirmed the correctness of the technical decisions developed and realized by means of cooperative friendship between the Soviet and American scientists, designers and cosmonauts. One can say that the

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Time: 14:07 CDT, 54:47 GET  
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Soyuz Apollo is a forerunner of future international orbital stations. Since the time the first artificial Earth satellite was launched and since the first manned space flight, space has become an arena for international cooperation. The detente and positive changes in the Soviet-American relations have made possible the first international space flight. New possibilities for large-scale fruitful development of scientific relations between countries and peoples are arising in the interest of peace and progress of the whole mankind. You, the courageous conquerors of space, had the great honor of opening a new page in the history of space exploration. I wish you successful completion of the scheduled program and safe return to Earth. Leonid Brezhnev. (Applause)

USSR Moscow, Moscow, this is Soyuz. How do you read me?  
CC-M Soyuz, Moscow. I read you well.  
SCDR We are very grateful for those exceptionally warm words. We are very excited. We shall be working even better now.  
SFE Thanks very much.  
CC-M We also listened to the greeting and we are happy for you. Let's go on with our work.  
SCDR Roger.  
CC-M There is a minute and a half left.  
SCDR Roger, Georgiy. Have you turned the TV camera off?  
CC-M Yes, we have.  
USSR We are going on with the photography. Convey our thanks for those exceptionally warm words. You can understand that - We have only a minute and a half and there's so much to say in response, and there is so little time.  
CC-M Well put, Alexey. See you at 23:37 over KYG.  
Happy flight, friends.

END OF TAPE

ASTP (USSR) MISSION SR73/1  
Time: 14:29 CDT, 55:08 GET  
7/17/75

KIO This is the Soviet Mission Control Center. The spacecraft crewmen in the orbital module are now listening to President Ford's address. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. The cosmonauts are now performing symbolic activities. They are exchanging their national flags. There are 10 national flags aboard each spacecraft. The size of 5 of them is 8 to 12 inches which makes about 200 to 400 millimeters. They will pass 5 of those flags on to the other side. Besides that, the UN flag has been put on aboard the Soyuz. In addition to those flags, each spacecraft has a big national flag with a size of about 900 to 1800 millimeters. The cosmonauts are shaking each other's hands and are thanking each other. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. Moscow time is 22:59. The spacecraft is now located over the Australia area, and is leaving darkness. In accordance with the flight plan and their schedule, the cosmonauts are getting ready for the first joint banquet - dinner in space. The cosmonauts' day schedule includes 4 meals a day. They are distributed in the following way: calorie count of the first breakfast is 25%; second breakfast - 20%; lunch - 35%; dinner - 20%. The space ration includes over 40 kinds of food stuffs and dishes. The average calorie count over a day is 2900. The ration has a higher vitamin content. The meat products - shoulder roast, smoked pork, veal, ham, chicken, pate - have been canned. The first dish - - borscht, cabbage soup, vegetable soup, lamb soup and some of meats - lamb, fowl pate - and also juices - black current, apple, cherry - - have been packed in aluminum tubes. The Soviet cosmonauts will treat their American colleagues to the guest ration which has been ordered in advance according to the astronauts' preferences. They will be offered borscht, jellied turkey, Yantar cheese, apple-cranberry sauce, candy and apple juice. Venya Brand (sic) has ordered vegetable soup, shoulder roast. The Soviet cosmonauts will have lamb soup as their first dish, chicken as their second. For dessert they'll have prunes with nuts and apple juice. Let's wish them bon appetit. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. Moscow time is 23:13. The Soyuz has been in flight for 55 hours 53 minutes. The docked spacecraft are located over the Pacific Ocean, within the coverage zone of the Vanguard tracking station. The Soyuz is completing its 38th orbit. On the next orbit, in 23 minutes, the spacecraft will have AOS over the Yuri Gagarin tracking ship. During the AOS a scheduled comm session with the Soyuz crew will be held. Further, on the 39th revolution, the spacecraft will continue joint activities, during which the Multi-Purpose Furnace experiment is planned to be conducted. After that, the cosmonauts will begin getting ready for the Apollo astronauts' re-transfer back to their spacecraft. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. It is 23:26 in Moscow. The Soyuz Apollo joint flight in docked configuration has been going on for more than 4 hours. The spacecraft are now located over the Pacific Ocean. The Soyuz 19's 39th orbit around the Earth has begun. The joint dinner of the cosmonauts and astronauts in the Soyuz 19 OM is continuing. On the current, 39th revolution,

ASTP (USSR) MISSION SR73/2  
Time: 14:29 CDT, 55:08 GET  
7/17/75

the Soyuz crew will perform the following activities: The joint activities of the cosmonauts and the astronauts after dinner. They will engage in different types of photography and will perform activities related to the joint Soviet-American Multi-Purpose Furnace experiment. After the experiment, the photography and joint activities will continue. At about 57:10 Soyuz-19 GET; the final first transfer activities will begin. The Soyuz-19 crew will close hatch 4 connecting tunnel 2 with the orbital module. In their turn, the U.S. astronauts will close hatch 3, connecting the transfer tunnel with the docking module. Then the tunnel 2 pressure relief will begin. This will be accomplished early in the 40th orbit. The next MCC-Soyuz comm session will be held during AOS over the Yuri Gagarin tracking ship at 23:37 Moscow time. The AOS will be gained in 8.5 minutes. Mission Control Center, Moscow.

END OF TAPE

ASTP (USSR) MISSION SR74/1  
Time: 15:36 CDT, 56:16 GET  
7/17/75

KIO This is the Soviet Mission Control Center. In a minute the Soyuz and Apollo spacecraft will enter the coverage zone of tracking ship Cosmonaut Yuri Gagarin.

SCDR I hear you perfectly. Everything is quiet.  
MCC-M What step are you on, Alexey?  
SCDR Repeat it.  
MCC-M What step are you completing?  
SCDR Right now we are beginning to sign joint documents.  
MCC-M Roger. To your list of honorary titles today you may add one more. All five of you are honorary citizens of the city of Samarkand.  
USSR Samarkand?  
MCC-M Exactly. All five of you. You can tell this to Tom, Vance, and Deke.

USSR Thank you, Georgiy, for the good news.  
MCC-M The telegram is long so I won't read it. It will be safely put away for you and I will give it to you personally.  
USSR (I said we all are honorary citizens of Samarkand City.)  
MCC-M We have 1 minute left. Good luck until we meet on the next orbit.

KIO This is the Soviet Mission Control Center. Moscow time is 23:50. The joint flight of Soyuz and Apollo is still in progress. Right now the spacecraft are approaching Europe. In the Soyuz 19 orbital module, joint activities of the American astronauts and Soviet cosmonauts continue. In accordance with the flight plan, at present they are involved in still and movie photography and are signing joint documents, Fédération d'Avion Internationale certificates. In all, on board the Soyuz 19, there were four Fédération d'Avion Internationale certificates in metal boxes. The certificates were signed by all the members of the Soyuz and Apollo crews. Having been signed, the certificates will be returned to Earth, two certificates in the Soyuz and two certificates in the Apollo. The next communication session with the Mission Control Center will be in 50 minutes through the American tracking ship, Vanguard. Right now the Soyuz and Apollo spacecraft are entering the Earth's shadow. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. It is midnight in Moscow. It is the 18th of July, 1975. The Soyuz and Apollo have been in a docked configuration for 5 hours. At present, the spacecraft are located over Africa and are approaching the equator. In the Soyuz orbital module, joint activities of the American astronauts and Soviet cosmonauts continue. At present they are signing certificates of the Fédération d'Avion Internationale. As we have already stated, after the completion of this mission, these certificates will be returned by the Apollo and Soyuz, then one of each of the certificates will remain in the possession of each country and the remaining certificates will be presented to the FAI. At the return of the astronauts into the Apollo, the joint experiment Multi-Purpose Furnace will commence. A few words about this experiment - it is well known that the use of natural space factors including the weightless condition, offer interesting results of

ASTP (USSR) MISSION SR74/2  
Time: 15:36 CDT, 56:16 GET  
7/17/75

new materials with new physical properties. The creation of metals and semi-conducting materials from elements which are composed of different specific gravities in the crystallization process and the liquid phase is very tempting. It is either impossible or very difficult to make compounds under earth conditions because of so-called "weight" element segregation which caused heavy elements to separate out. It is anticipated that in the future the large semiconductor crystals formed under weightless conditions, including those formed of elements with significant differences in their specific weights, will possess semiconductor properties which are not possible under Earth conditions. Such crystals will enable us to design new semiconductor devices for electronic computers, engineering instruments, space radio systems. Weightlessness will allow the manufacture of what are called the compound materials which have a fusible base and a heavy, high melting material of the second phase. Calculations show that such compounds will possess unique mechanical, electric, and other properties. The weightless condition permits the use of the process of sphere formation to fabricate, from melted metal, the perfect sphere for bearings of different uses, to get a semiconductor in the form of a sphere, and so on. We may expect the sphere-formation of various powder systems when melting occurs under weightless conditions. That is, this process is important for this kind of technological space operations, such as welding, and treatment of chemically and biological active raw material, and so on. The Soviet samples for the experiment are prepared and they consist of 3 types. The 1st type: Aluminum, 30% by weight; Tungsten in the form of spheres ranging in size from 1000 angstroms to 300 microns - 70% by weight. 2nd type: Aluminum powder. 3rd type: Solid solution, 99.5% by weight germanium; plus 0.5% by weight of silicon. The samples of the materials are housed in 3 cartridges. Each cartridge contains 3 quartz ampoules. The maximum temperature is 1050°C and takes 1 hour to reach. The scientific program of this research was the work of the Institute of Metalurgy of the Academy of Sciences in the Soviet Union. The flight equipment for the experiment consists of a set of three cartridges with 3 ampoules in each, the container to store cartridges, and the welding furnace system. Mission Control Center, Moscow.

KIO                      This is the Soviet Mission Control Center. In Moscow it is 12:25 AM. The joint flight of Soyuz and Apollo continues and so does the 1st meeting between Soviet cosmonauts and American astronauts in the Soyuz 19 orbital module. Presently, the cosmonauts and astronauts are dining. The spacecraft are located presently over the Indian Ocean and soon will come out

ASTP (USSR) MISSION SR74/3  
Time: 15:36 CDT, 56:16 GET  
7/17/75

of the Earth's shadow. The Soyuz 19 is in its 39th orbit around the Earth and has been in flight 57 hours 6 minutes. Soon the present, 39th, orbit will end. The projected orbital parameters for Soyuz and Apollo for the next, the 40th, orbit: Time for crossing the equator - 0:51:10; maximum altitude - 226.25 km; minimum altitude - 221.69 km; orbital period - 88.91 minutes; orbital inclination to the equatorial plane - 51.78°. At the beginning of the joint activities, the cosmonauts and astronauts exchanged the rhythm 1 device for conducting the joint Soviet/U.S. experiment, Zone Forming Fungi. Having exchanged the containers for the microbial exchange experiment,

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KIO                   The next communication session between the Soyuz 19 crew and the Mission Control Center is scheduled to take place through the American tracking ship, Vanguard. There remain 13-1/2 minutes until the session. Mission Control Center, Moscow.

END OF TAPE



ASTP (USSR) MISSION SR75/1  
Time: 16:40 CDT, 57:20 GET  
7/17/75

KIO This is the Soviet Mission Control Center. It is 00:50 Moscow time. The Soyuz 19 spacecraft's 39th orbit is being completed. The Soyuz and Apollo have been in joint flight about 3 hours. The joint activities of Thomas Stafford, Deke Slayton, Alexey Leonov and Valeriy Kubasov are continuing in the Soyuz orbital module. The Soyuz and Apollo spacecraft are now located in the area of the equator over the Pacific Ocean. According to telemetric data, received through the tracking ship Cosmonaut Yuri Gagarin, the Soyuz 19 descent vehicle air pressure is 499 mmHg; the orbital module air pressure - 503.1 mmHg; the descent vehicle air temperature - 19.7 degrees Celsius; orbital module air temperature - 22.5 degrees Celsius. The next communication session of the spacecraft crew with the Mission Control Center will be held in 20 minutes through the tracking ship Cosmonaut Yuri Gagarin. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. It is 01:03 in Moscow. The Soyuz and Apollo spacecraft joint flight in docked configuration is continuing. The Mission Control Centers in Moscow and in Houston decided that the Soyuz and Apollo crews would fulfill the program of this working day completely. That is the reason that the crews' sleep will begin a little later, approximately an hour later. In 7 minutes Soyuz and Apollo spacecraft will enter the coverage zone of the tracking ship Yuri Gagarin. The spacecraft crew will conduct the regular communication session with the Mission Control Center. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. In a minute the Soyuz and Apollo spacecraft will enter the coverage zone of the tracking ship Cosmonaut Yuri Gagarin.

CC-M Soyuz, Soyuz, this is Moscow. How do you read me?

CC-M Soyuz, this is Moscow. How do you read me? Answer. I am standing by.

CC-M Soyuz, Soyuz, this is Moscow. How do you read me?

CC-M Soyuz, Soyuz, this is Moscow. How do you read me?

CC-M Soyuz, Soyuz, this is Moscow. How do you read me?

CC-M Soyuz, Soyuz, this is Moscow. How do you read me?

CC-M Soyuz, Soyuz, this is Moscow. How do you read me?

CC-M Soyuz, Soyuz, this is Moscow. How do you read me?

CC-M Soyuz, Soyuz, this is Moscow. How do you read me?

CC-M Soyuz, Soyuz, this is Moscow. How do you read me?

CC-M Soyuz, Soyuz, this is Moscow. How do you read me?

USSR Moscow, this is Soyuz. How do you read me?

CC-M I read you well. And how me?

USSR Read you excellently. (Garble)

CC-M What (garble) do you carry out (garble)

USSR Stage 40.

CC-M 41st.

USSR How did you get me, Georgiy?

CC-M I got you. The 41st (garble)

USSR (Garble)

CC-M According to my data, you are behind.

ASTP (USSR) MISSION SR75/2  
Time: 16:40 CDT, 57:20 GET  
7/17/75

USSR We are behind.  
CC-M Try to keep the schedule - to go back to the schedule. I have  
a couple of radiograms. Tell me when you are ready.  
CC-M Form 3, form 2 and without form. Are you ready?  
CC-M Soyuz, I have only a minute and half left, hurry up.  
CC-M How do you read me?  
CC-M Soyuz, how do you read me?  
CC-M Soyuz, how do you read me?  
USSR Moscow, this is Soyuz. I read you.  
CC-M Write down the radiograms. I have one minute. Form 2.  
USSR Without form?  
CC-M Form 2.  
USSR Shall I write down?  
CC-M Yes, yes.  
USSR Ready.  
CC-M The 45th. Longitude - 6; period - 88.91; orbit - 039.4; ignition  
time - 01:29:16.  
USSR Longitude - 6; period - 88.91; orbit - 039.4; ignition time  
01:29:16.  
CC-M Confirmed. Without form. 10 seconds. Before sleep to close all  
the valves (garble) and to install the PEV and IPV protective caps. How did you  
get?  
USSR I know about it. Before sleep to close all the PEV and IPV valves  
and to install the protective caps.  
MCC-M Get for you information. (English)  
USSR Thank you. (English)

END OF TAPE

ASTP (USSR) MISSION SR76/1  
Time: 17:27 CDT, 58:07 GET  
7/17/75

KIO This is the Soviet Mission Control Center. Moscow time is 1:27. 10 minutes ago the scheduled radio communication session between the crew and the Mission Control Center was completed. During the communication session radiograms were transmitted onboard the spacecraft. Radiograms without form, and radiograms on audio-correction form 2. The joint activities of Tom Stafford, Donald Slayton, Alexey Leonov and Valeriy Kubasov in orbit continues. A few minutes ago, the crews exchanged the U.N. flag. The flag of the United Nations was put into orbit in the Soyuz 19 spacecraft, and will be carried back to Earth onboard Apollo. Right now, the Soyuz and Apollo spacecraft are continuing their flight in the docked configuration, and are in the 40th Soyuz 19 orbit. The spacecraft are over Africa. The next scheduled communications session from the Soyuz crew to Mission Control will be transmitted through the American tracking station Orroral in Australia. The session will be in 34 minutes. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. In 57 seconds the Soyuz and Apollo spacecraft will enter the coverage zone of the tracking station Orroral.

CC-M Soyuz, this is Moscow. How do you read me?  
Answer the communication signal. Over.

CC-M Soyuz, this is Moscow. How do you read me?  
Answer the communication signal. Over.

CC-M Soyuz, this is Moscow. How do you read me?  
Answer the communication signal. Over.

CC-M Soyuz, this is Moscow. How do you read me?  
Answer the communication signal. Over.

CC-M Soyuz, this is Moscow. How do you read me?  
Answer the communication signal. Over.

KIO This is the Soviet Mission Control Center. Moscow time is 2 hours 17 minutes. The Soyuz spacecraft has been in flight 58 hours 57 minutes. It is completing its 40th orbit of flight. Summing up the results of the last communication session, the atmospheric parameters of the Soyuz spacecraft on the 40th orbit are as follows: Pressure in descent vehicle - 522.5 mmHg; temperature in descent vehicle - 19.3 degrees C; pressure in orbital module - 532.2 mmHg; temperature in orbital module - 23.5 degrees C; pressure in instrument module - 859.5 mmHg; temperature in instrument module - 12.1 degrees C. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. In 57 seconds the spacecraft Soyuz and Apollo will enter the coverage zone of tracking station Hawaii.

CC-M Soyuz, how do you read me? Soyuz, this is Moscow.  
Answer please. Over.

CC-M Soyuz, Soyuz, this is Moscow. How do you read me? Over.

ASTP (USSR) MISSION SR76/2  
Time: 17:27 CDT, 58:07 GET  
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CC-M Soyuz, Soyuz, this is Moscow. How do you read me? Over.  
CC-M Soyuz, Soyuz, this is Moscow. How do you read me? Over.  
CC-M Soyuz, Soyuz, this is Moscow. How do you read me? Over.  
CC-M Soyuz, this is Moscow. I read you well. Over.  
USSR I read you well. How do you read me? Over.  
CC-M Please inform integrity hatch 3. This is Moscow. Over.  
USSR - - pressure up to 260. Well, now we load the pro-  
pellant - - (garble)  
CC-M 6 mm for how long? Over.  
USSR For 10 minutes.  
CC-M Roger.  
USSR - - batteries, is the same.  
CC-M Roger.  
CC-M Soyuz, this is Moscow. What is the PICS status?  
USSR PICS (garble) are opened. Others are captured  
(garble).  
CC-M Roger. Soyuz, this is Moscow.  
USSR (Garble)  
CC-M On leaving the coverage zone disconnect simplex AM.  
USSR Roger. On leaving the coverage zone disconnect  
simplex AM.  
CC-M You see - - (garble).  
USSR (Garble)  
CC-M Soyuz, this is Moscow. Did you perform - - (garble)  
KIO This is the Soviet Mission Control Center. In one  
minute Soyuz and Apollo spacecraft will enter radio coverage tracking  
station cosmonaut Yuri Gagarin.  
SFE Moscow, this is Soyuz 2. Read you well. How do  
you read me?  
CC-M Read you excellently. Valeriy, repeat your report  
on hatch 3 and 4 integrity.  
SFE The first time we closed the hatch the leakage was 6 mm  
within 6 minutes. Opened the hatches again, checked the sealing and closed  
hatches 3 and 4 once again. Then we again dropped the pressure to 260 and  
checked the integrity. Within 10 minutes the pressure dropped 10 mm; within  
the next 8 minutes the pressure dropped 2 mm and now... Just a moment, I'll  
tell you within what period of time. Within another 5 minutes the pressure  
dropped half a millimeter.  
CC-M Do you mean the pressure has dropped or went up?  
USSR Up, up! It did not drop, it went up. All that  
I've told you. There is pressurization from OM into tunnel 2.  
CC-M Roger.  
USSR There is pressurization. The hooks seem to be loose.  
The cable is in a closed position, handle, and the cable is very loose.  
And some of the hooks are rattling.

ASTP (USSR) MISSION SR76/3  
Time: 17:27 CDT, 58:07 GET  
7/17/75

CC-M Roger.  
USSR The cable is very loose.  
CC-M Georgiy.  
SPEAKER [Standing by?] or [and while you receive?]  
SCDR When the indicator is in the position CLOSED, all  
eight hooks are rattling. Now the support is only from the inner pressure.  
And in position 3 mm from CLOSED in the direction to OPEN two hooks are  
tight, the rest rattle.  
CC-M Roger, Alexey. We'll analyze your report.

END OF TAPE

ASTP (USSR) MISSION SR77/1  
Time: 18:47 CDT, 59:27 GET  
7/17/75

MCC-M           What pressure is in tunnel now?  
USSR            The pressure in tunnel is 275 mmHg.  
MCC-M           Roger.  
MCC-M           Soyuz. This is Moscow. Would you manage to look  
under the housing and verify if the cable is over all drums, or it may  
happen that it slipped off from any of them.  
MCC-M           Did you understand me?  
USSR            Roger.  
USSR            On all drums.  
MCC-M           Roger.  
MCC-M           Alexey, take a note the communication session through  
Orroral 03:35 - 03:42. It will be simplex AM. How did you receive it?  
SFE             He didn't take a note, I took a note.  
MCC-M           Wonderful, Valeriy. Well, we will enter the light, re-  
serve this station now and then we will give instructions.  
SFE             03:35.  
MCC-M           03:35 to 03:42. Up to present we are flying according  
to nominal program.  
SFE             We should go on according to nominal program, isn't it?  
MCC-M           Yes, yes. Roger, Valeriy.  
MCC-M           Close PCV and monitor non-integrity check.  
SFE             Roger.  
MCC-M           Open PEV and monitor the pressure for 10 minutes.  
KIO             This is the Soviet Mission Control Center. Moscow time

3:14. The spacecraft Soyuz is in flight for 59 hours 54 minutes. It completes  
41st orbit of the flight. At present time the spacecraft Soyuz and Apollo  
continue flight in docked configuration. After completion of the first trans-  
fer the astronauts returned to Apollo spacecraft. The Soyuz crew continues  
monitoring integrity of the tunnel 2. Mission Control Center, Moscow.

KIO             This is the Soviet Mission Control Center. Moscow time  
3:32. The spacecraft Soyuz has been in flight for 60 hours 12 minutes. The  
flight of the spacecraft continues in docked configuration with spacecraft  
Apollo. It completes the 41st orbit of flight. The following orbital para-  
meters are predicted for the 42nd orbit: Time of crossing over equator -  
3 hours 49 minutes; maximum altitude - 226 kilometers; minimum altitude -  
221.5 kilometers; orbital period - 88.91 minutes; inclination - 51.78°. The  
spacecraft will enter shadow at 4:19 and leave the shadow at 4:56. In  
2 minutes 31 seconds, the spacecraft will enter the coverage zone of tracking  
station Orroral. The spacecraft Soyuz will carry out the communication session  
with the Mission Control Center. Mission Control Center, Moscow.

KIO             This is the Soviet mission Control Center. Moscow time  
3:46. The spacecraft Soyuz is in flight 60 hours 26 minutes. It is com-  
pleting the 41st orbit of flight. The spacecraft Soyuz and Apollo are  
flying in docked configuration. According to the telemetry data, which  
was received on the 41st orbit during the communication session, the pres-  
sure in the DV of the spacecraft Soyuz is 515.9 millimeters of Mercury,  
temperature in the DV 19 degrees Celsius. The pressure in OM is 526 mmHg,  
temperature in OM 23.7° Celsius. The pressure in the IM is 863.5 mmHg,  
temperature in the IM is 12.2° Celsius. During the last communication session,  
conducted through the tracking station Orroral, the crew has reported about

ASTP (USSR) MISSION SR78/1  
Time: 22:44 CDT, 63:24 GET  
7/17/75

KIO This is the Soviet Mission Control Center. It is 06:44 Moscow time. The Soyuz spacecraft has been in flight 63 hours 24 minutes and is performing its 43rd orbit. The Soviet cosmonauts are now in their sleep period. Later, after the sleep is over, the cosmonauts will carry out the onboard system check and will perform their personal hygiene. During their breakfast, which will last about forty minutes, each cosmonaut, in accordance with the flight program, will conduct a TV report from onboard the Soyuz spacecraft. During the next 24 hours the cosmonauts will have to perform a series of stages stipulated by the flight plan. During the 47th orbit, the Soyuz commander comrade Leonov will start preparations for TV reports and movie photography. The flight engineer Valeriy Kubasov will be occupied with the Microbial Growth experiment. During the 48th orbit after completion of the second transfer, joint activities of the Soyuz flight engineer and the Apollo command module pilot will begin. Their joint activities will go on during the 48th, 49th, 50th, and 51st orbit. At the same time radio communication and TV reports on their joint activities will be conducted. The cosmonauts' dinner is planned for the 50th and 51st orbit. After the dinner, the transfer will begin. The flight program devotes the 52nd, the 53rd, and the beginning of the 54th orbit to the Soyuz and Apollo commanders' joint activity. Besides the activities connected with the transfer from onboard the spacecraft a TV report will be held in the coverage zone of the Soviet tracking stations. The scientific program for the end of the 53rd and beginning of the 54th orbit contains the Microbial Growth experiment and the joint Microbial Exchange experiment. Before the end of the joint activity in the 54th orbit a TV report will be held from onboard the spacecraft. In the end of the 54th and beginning of the 55th orbit the cosmonauts will be busy with the transfer, during which movie photography will take place three times and the joint Microbial Exchange experiment will be carried out. In the end of the 55th and the beginning of the 56th orbit, Soyuz crew will hold a communication session with the Soviet Mission Control Center through the tracking station onboard the ship Vanguard. They will also carry out the Zone-Forming Fungi experiment. During the 56th orbit the cosmonauts will hold a communication session, will have their supper, will check the onboard system status and will get prepared for sleep. In accordance with the flight program, the cosmonauts will sleep 8 hours starting from the 57th orbit. Mission Control Center, Moscow.

KIO This is the Soviet Mission Control Center. It is 07:55 Moscow time. The Soyuz spacecraft has been in flight 64 hours 35 minutes and is performing its 44th orbit. At the present time, the Soyuz and Apollo spacecraft continue their flight in docked configuration. The cosmonauts and astronauts are sleeping. The following orbit parameters are predicted for the 45th orbit: the time of crossing the equator - 08:45 Moscow time; maximum flight altitude - 225.8 km, minimum flight altitude - 221.24 km; orbital period - 88.9°; orbital inclination to the equatorial plane - 51.79°. The spacecraft will enter shadow at 08:46 Moscow time and will emerge from shadow at 09:22 Moscow time. Mission Control Center, Moscow.

MCC-H	Moscow voice, Houston voice on GY-8. (English)
MCC-H	Moscow voice, Houston voice. GY-8. (English)
MCC-H	Moscow voice, Houston voice on GY-8. (English)
MCC-H	Moscow voice, Houston voice on GY-8. (English)

ASTP (USSR) MISSION SR78/2  
Time: 22:44 CDT, 63:24 GET  
7/17/75

MCC-M Go ahead. (English)  
MCC-H How do you read me? (English)  
MCC-M I read you clear and loud. How do you? (English)  
MCC-H I can understand you too. You coming - - (English)  
MCC-M Do you read me well?  
MCC-H Yes, I read you well. (English)  
MCC-M Thank you. (English)  
MCC-M GY-8.  
MCC-H Okay, let me check then. (English)  
MCC-H Moscow voice, Houston voice. GY-8. (English)  
MCC-M Houston voice, Moscow voice on GY-8. (English)  
MCC-M Houston voice, Moscow voice on GY-8. (English)  
MCC-M Can you read us? (English)  
MCC-H Standing by. (English)  
MCC-H Moscow voice, Houston voice on GY-8. Moscow voice, Hous-  
ton voice on GY-8. (English)  
MCC-M Houston voice, Moscow voice on GY-8. (English)  
MCC-H I read you loud and clear, how me? (English)  
MCC-M I read you clear and loud. (English)  
MCC-H Okay, so 8 and 9 are back here. (English)  
MCC-M Let us check again GY-9.  
MCC-H Okay.  
MCC-M (Garble) GY-9. (English)  
MCC-H Roger. (English)

END OF TAPE



ASTP (USSR) MISSION SR79/1  
Time: 01:56 CDT, 66:36 GET  
7/18/75

KIO This the Soviet Mission Control Center. In 56 seconds the Soyuz spacecraft will enter the coverage zone of the Soviet tracking stations.

USSR (garble) FM is on.

CC-M Everything is normal, Soyuz, everything is normal. It is normal. Soyuz, this is Moscow.

USSR Standing by.

CC-M Get ready to receive form 14.

USSR (garble) What other forms are you going to give us?

CC-M I did not get you.

USSR Give us the enumeration of the rest. We should perform clock and gyro correction.

CC-M Okay. The gyro correction will be in the next orbit.

USSR Can't you give the time now?

CC-M Yes, we'll give you the time right away. So, 10 seconds before 10:00; 10:00. In a minute I'll give you more precisely. Get ready. The GET will be 66:41. Moscow time will be 10:01.

USSR Roger.

CC-M In 40 seconds.

USSR Go ahead. We are ready.

CC-M And meanwhile form 14. Find it.

USSR We have it.

CC-M Okay. 20 seconds - 10 - It is 10:01:00. GET - 66:41:00.

USSR Got it.

CC-M Form 14

USSR Ready

CC-M Number 48 - pulse and time for engine operation is the same, 46th orbit - 11:10:40, 102; 48th - 12:43:16, 102; 48th - 14:04:43, 101; 49th - 15:36:55, 102; 51st - 17:09:27, 102; 51st - 18:36:50, 102; 53rd - 20:08:59, 102; 54th - 21:36:50, 102; 54th - 22:52:59, 099; 55th - 00:25:22, 100; 56th - 01:57:24, 101; 57th - 03:29:49, 102; 59th - 05:03:16, 101; 60th - 06:38:13, 100; 60th - 07:47:08, 099; 61th - 09:20:54, 101; 62nd - 10:53:20, 101; 64th - 12:25:58, 101; 64th - 13:47:22, 101; 65th - 15:19:30, 101; 67th - 16:52:02, 101; 67th - 18:19:19, 101; 68th - 19:46:01, 101; 70th - 21:19:02, 101; 70th - 22:35:35, 099.

USSR Repeat. 22?

CC-M 22:35:35, 099; 71st - 00:07:45, 100; 72nd - 01:39:47, 101; 73rd - 03:12:11, 101; 75th - 04:45:41, 101; 76th - 06:20:43, 100; 76th - 07:29:21, 099; 77th - 09:03:08, 100; 78th - 10:35:32, 101. In the acknowledgement message give us only the time of ignition. No orbits, no range is necessary. Only in a column from the top, the ignition time.

USSR Roger. Repeat, please, the last one again. 78th - 10:35:32, 101; the last is 070 and 1; and 156?

MCC-M Yes, Yes. 070 and 1; 156 for all orbits the same.

USSR 46th - 11:10:40  
12:43:16  
14:04:43  
15:36:55  
17:09:27  
18:36:50  
20:08:59  
21:36:50

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22:52:59  
00:25:22  
01:57:24  
03:29:49  
05:03:16  
06:38:13  
07:47:08  
09:20:54  
10:53:20  
12:25:58  
13:47:22

END OF TAPE

ASTP (USSR) PRESS CONFERENCE SR80/1  
Time: 02:07 CDT, 66:47 GET  
7/18/75

USSR 10:53:20  
12:25:58  
13:47:22  
16:19:30  
16:52:02  
18:19:19  
19:46:01  
21:19:02  
22:35:35  
00:07:45  
01:39:47  
03:12:11  
04:45:41  
06:20:43  
07:29:21  
09:03:08  
10:35:32

MCC-M Everything is absolutely correct.  
CC-M Soyuz, this is Moscow. The next scheduled session is at  
11:23-11:42.  
CC-M Soyuz, this is Moscow. Form 23. All the data are delayed  
by one minute, to the right.  
USSR (Garble)  
MCC-M Roger. All the rest practically remains unchanged.  
USSR For all communication points?  
MCC-M Yes, right. Delayed by one minute.  
KIO This is the Soviet Mission Control Center. We give Moscow  
Press Center.

MCC-M ... spacecraft, general secretary of the USSR Communist party central committee comrade Brezhnev and USA President Ford warmly greeted Soviet cosmonauts and American astronauts congratulated them on the successful completion of the docking and first transfer. Soviet cosmonauts and American astronauts signed a joint flight document and exchanged souvenirs. From 23:05, July 18th, on board the Soyuz 19 they had dinner together. After the dinner the crews exchanged devices for Microbial Exchange and Zone Forming Fungi scientific experiments. After that Donald Slayton and Valeriy Kubasov transferred to the DM, where Kubasov put cartridges with different sample materials into the electric melting furnace thus preparing for the beginning of the Multi-Purpose Furnace experiment. The electric furnace was turned on. Then Kubasov returned to the OM, and Apollo Commander Stafford returned to the DM. The two hatches of the tunnel between the docked ships were closed and thus the first mutual transfer of the two spacecraft members ended. After the transfer was over Valeriy Kubasov went on with the Zone-Forming Fungi and Micro-Organism Growth biological experiments while Alexey Leonov had a comm session with the Soviet MCC. After an onboard systems check and personal hygiene session, at 3:46 the cosmonauts were told they could rest until 9:50.

ASTP (USSR) PRESS CONFERENCE SR80/2

Time: 02:07 CDT, 66:47 GET

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MCC-M (We have with us today) Can you hear me? (We have with us today Georgiy Shonin who is the chief operator on communications with the crew, Vadim Kravets who heads the second flight shift, and also Vladimir Seromyatnikov who heads the third group and who designed the docking system. It was his idea.

MCC-M (First you will hear Vadim Kravets.)

KRAVETS (You heard in detail yesterday about the entire process of the convergence of the two ships, so today I'll talk - in detail about docking itself. The docking took place slightly earlier than calculated. Just about three minutes earlier. After the docking took place there was careful checkup of the pressurized internal situation, and also the various planes of the docking apparatus. This took approximately three hours. At first the crews of both ships were slightly behind the schedule, and at one time we were concerned that they would not catch up with the schedule. But they caught up with the schedule and right on schedule we were able to see the hatches opened in both crafts. This was an exciting moment for us. We at the Control Center had carried out this operation many times before, nevertheless you can never get used to the very fact. And we were all very relieved and very happy that everything ended successfully and very well. At 22:17:30 the hatches were open and I wrote down the time precisely: at exactly at 22:19:27 Leonov and Stafford shook hands. And then approximately two minutes later we saw them all in the Soviet ship. First we saw them through the Soviet cameras and then the portable American camera. We saw Slayton, Stafford, Leonov and Kubasov. Then the two crews continued with the work according to the program) scheduled for the first transfer. (They exchanged letters, souvenirs, signed a joint flight document, had dinner together, or supper, and carried out several) scientific (experiments. And again it turned out that the foreseen schedule was very rigid.) Approximately in the middle of the first transfer ...

END OF TAPE

ASTP (USSR) PRESS CONFERENCE SR81/1

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MCC-M (- - and again, it turned out that the foreseen schedule was very rigid. Approximately in the middle of the first crew transfer, the crews were behind schedule approximately 1 hour. By the end of the crew transfer, the lag in the schedule was an hour and a half. One of the reasons for this big lag was, when the Americans were leaving for their Apollo, it took a little bit longer to check the pressure between the docking and command modules. And instead of retiring at 2:20 early this morning, they retired at 4:10. You can see for yourself how tense the atmosphere was - and their work was - because they worked from 10 in the morning on the 17th until 4 in the morning on the 18th. But we are very satisfied with their work; everything was successful. That's what I wanted to tell you, in brief, about yesterday. A few words about today's activities: There will be three crew transfers today. The crews have already risen. Today at 12 o'clock Moscow time, the second transfer will take place. This will be the longest transfer; this entire process will last through 6 hours - the transfer and the visit. The third transfer will take about 4 hours - and the last transfer will be approximately an hour in length. All work will be completed today, that is, early tomorrow morning at 1 o'clock in the morning. That's all I wanted to inform you of today.)

QUERY (The (Garble) correspondent says he's very happy to see Syromyatnikov here and he would like to repeat a question which was posed in Houston yesterday. I repeat the American question: Why is it that your docking apparatus works better - Two questions from the Warsaw correspondent, number 1: Why does the Soviet docking apparatus work better than it did on the Apollo, previously? This is a question which was asked also in Houston. And the second question: Why is it that there always seems to be some trouble or there is a defect in the sound transfer? When we were listening to President Ford, we could not - we heard him poorly, but we could not hear the answers at all. In other words, What is the difference in the two systems? the Warsaw correspondent asked. What is the difference between the two designs, the old design and the new one which was designed together with the Americans?)

MCC-M (Yesterday, in speaking to correspondents, I spoke of this very fact and we were able to convince ourselves of the advantages of the new system when the American crew was bringing the docking module up front. We made the new docking module peripheral and androgynous. This means that every ship can carry out the docking operations independently. If this was - For instance, if the Apollo could not do this, then this could have been done by the Soyuz. And the new peripheral design makes impossible the trouble that the Americans had previously. You - I think you all saw the new docking apparatus; you saw that its tunnel is absolutely unhampered. And you see that because there are no obstacles, there is no necessity for removing the docking mechanisms as the Americans had to do at the beginning of their flight. Yesterday, through the American consultative group at the control center, I conveyed my congratulations to my American colleague Bob White, in which I mentioned the obvious advantages of the new system over the old. I also mentioned that the American docking apparatus worked exactly as it did here in Moscow at the Institute of Cosmic

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Research. And I think that my colleagues share this opinion. I hope I answered your question.)

QUERY (Garble)

MCC-M (You're true - you're correct; when we were listening to President Ford yesterday, the Soviet answers were not heard very well. The point is that communications went through a long link from the Soyuz to the Apollo, from the Apollo the AST-6 [sic] Sputnik, from the Sputnik down to Madrid, from Madrid to Houston, from Houston to Moscow, and it's almost impossible for me right now to say at which link the trouble rested.)

END OF TAPE

ASTP (USSR) PRESS CONFERENCE SR82/1  
Time: 02:30 CDT, 67:10 GET  
7/18/75

QUERY (The correspondent from Federal Republic of Germany: Yesterday, regretfully, we saw the image from Houston but we had no sound, and we also did not hear the cosmonauts talking among themselves. Will that be the same today?)

MCC-M (I think that today the situation will be much better. You will hear most of the conversations during the transfer except for a few moments, or a few minutes, at which time it is very difficult to maintain communications.)

QUERY (The New Times correspondent: Regretfully we did not hear any of the conversation yesterday during the crew transfer. Could you recall what was said exactly when they met?)

MCC-M (The docking itself - the transfer and docking is a very important part of the mission; therefore, during all this work, we were very tense and we were carrying out our instructions and did not want to interfere with their work. Besides that, during the docking itself, there are many operations which the crew must be very careful to carry out. And for - and there is very little time for all these operations; therefore, the situation is very tense and everything must be done very rapidly. Therefore, there is very little time or desire to carry out any extra or excess conversation. So everything that we had - everything that we wanted to tell them at the docking maneuver we told them at the previous communication time.)

QUERY (Nevertheless, during the docking and when the crews met, you were in communications with them all the time. Do you remember any words that they said, and exclamations?)

MCC-M (Leonov - you saw on your television screens that the Soviet hatch was open slightly before the American hatch and Leonov was so impatient - he wanted to see Stafford so much that in purely Russian style he started telling him to hurry up. Stafford apparently didn't quite understand the gist of the Leonov's words. Leonov said, "Come on Tom; come on in.")

QUERY President Ford (English) - -

MCC-M Would you identify yourself, please. (English)

QUERY Yes, John Dancy, NBC News. President Ford read his remarks and his greetings to the astronauts personally. Could you tell us why Chairman Breshnev did not read his remarks personally to the cosmonauts? (English)

MCC-M (Academician Boris Petrov.)

MCC-M (As you heard yesterday, Leonid Breshnev's message was read in a strong, resonant voice which was meant to cover all communications - possible communications defects, and this was done in order that there be no misunderstanding by the cosmonauts of the text of the message. And we are certain that the message would have gotten through even if there were, for instance, some - if there was some interference. And the message was referred personally to every member of the Soviet and American crew. And I know that not only in the con - control center but also in many peoples' houses and apartments, the voice sounded very resonant, loud and clear. I am certain that even if Leonid Breshnev spoke himself, the message would have been just as clear and resonant. I can only ask, for instance, what's the difference? May I ask the correspondent the opposite question. Leonid Breshnev had his message read out and general - President Ford read his message himself; why was that - why wasn't it the other way around?)

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QUERY (I have two questions. First: Where exactly - over which part of Europe did the docking take place, and two: Did the crew on the Salyut themselves hear the message of - sent by Breshnev?)

MCC-M (The difference between the two ships was approximately 6000 kilometers; therefore, there was no direct contact between the two ships. Yesterday there was communication - -)

END OF TAPE



ASTP (USSR) PRESS CONFERENCE SR83/1

Time: 02:41 CDT, 67:21 GET

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KRAVETZ (- - Yesterday there was communication between the Salyut and the docked ship, but this was at a different time when the distance between them decreased greatly. During the flight there will be one more such moment. And if the crews of both ships at that moment will have some free time, then we can once again carry out such communication between them.

QUERY (Hungarian Radio. Will there be joint research on X-rays of which Dr. Fioktistov spoke and second when will the Soyuz land? I am sorry - when will the Salyut land - the experimental station?)

KRAVETZ At present, on the two ships there are autonomous programs - very tense autonomous programs and that work is not planned at this time.)

QUERY Next one please, what is your second question?

MCC-M (The answer was in the third part of July.) The answer is confirmed to be right.

QUERY (The Polish Press Agency: Tell me please how was the successful docking marked by the crew? I mean in the Control Center. How was this event marked at the Control Center.)

MCC-M Well, we waited for this event for over two years, we and our American colleagues. It was very tense; we expected it, nevertheless when it did happen we all arose, we applauded we were all very happy. Regretfully, we could not join you here at the press center because we had to work until 4 in the morning. But I think when the ships land then we will have more opportunity. Nevertheless the press center continued functioning even after 4 and marking this event - - under the leadership of the press center.

QUERY George Krinsky the Associated Press (English) (Could you tell us anything about the situation with the TV cameras, today?)

KRAVETZ You know that the repair work carried by the Soyuz crew made it possible to receive color images from two color cameras. The work carried out down on the ground showed us that we could also do repair work on the remaining 2 black and white cameras. However this requires a great deal of time. Our schedule is very tightly packed today, tomorrow, and for the rest of the trip also. Everything is scheduled according to minutes. And now this concerns joint operations. And we have not found a window where we could carry out this repair work.)

QUERY (Mlada Fronta the Czechoslovakia. Yesterday, we were told that the docking took place over the Bay of Biscay. Would you tell us where it ended?)

MCC-H (The ships touched over the ocean. And the words "docking ended" from both ships was either over the Bay of Biscayne or the entrance to Northern France, somewhere on the coast.)

QUERY (And where did the handshake take place?)