

ASTP (USA) MC338/2  
Time: 06:12 CDT, 94:52 GET  
Date: 7/19/75

Soyuz cross the Siberian coast and the Japanese Island chain. Sixteen minutes until next acquisition at tracking ship Vanguard. And we're about 35 minutes away from undocking. Undocking will take place at 95:42 - first undocking. Just about 3 minutes before ATS-6 acquisition again. The go for undocking will be given at the upcoming Vanguard pass - coordination between the two spacecraft and between the two control centers and their respective spacecraft for the go no go for the undocking. The second docking, redocking will take place prior to loss of signal on this upcoming ATS-6 pass. Undocking will take place over Chile at a latitude of about 51 degrees - 51 degrees, 10 minutes south at a longitude of 87 degrees, 33 minutes west. We'll return in 15 minutes for the pass across tracking ship Vanguard, final morning pass over that ship. This is Apollo Control at 95:08.

PAO This is Apollo Control at 95:23, ground elapsed time. Acquisition at tracking ship Vanguard in about 45 seconds. During the pass over Vanguard, both spacecraft will be given go/no go for undocking at 95:42. Undocking is at that time. The Soyuz crew will start their countdown clock at undocking minus 20 minutes. And there's considerable spacecraft to spacecraft coordination involved where the Apollo crew will inform Soyuz on such events as opening the active hooks, opening the structural latches and the final countdown to the actual undocking.

CC-H - - for 7 minutes.

CMP I read 5 by, Bo.

ACDR And Bo, we have synced our clocks with the Soyuz.

Ready to copy the P52 Bo?

CC-H Ready for the P52 and understand your sync.

ACDR Roger. Star 32, star 40, NOUN 05: all balls; plus 81; minus 101; minus 49; torqued, 951416. Over.

CC-H Understand 32; 40. All balls; plus 81; minus 101; minus 4951416.

END OF TAPE

ASTP (USA) MC339/1  
Time: 06:46 CDT, 95:25 GET  
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CC-H Apollo, Houston. Just a reminder to change your  
NOUN 22's and tweak up the attitude.  
USA Roger.  
CC-H Apollo, Houston. One more small item. When you  
deactivate the primary and secondary evaporators, we'd also like you to  
make sure the waste stowage vent valve is closed.  
ACDR Okay.  
CC-H And Apollo, Houston. Just one more item. We need  
to pump OFF in the secondary evaporator loop.  
ACDR You want your pump OFF in the secondary evaporator  
loop. We'll deactivate the secondary as well as the primary at the same  
time.  
CC-H Roger. Deactivate both the primary and the secondary.  
CC-H Apollo, Houston. There is about 1 minute until LOS.  
We'll see you at ATS at 95:46.  
ACDR Roger.  
CC-H Apollo, Houston. We're going to need those evapora-  
tors OFF as quickly as you can get to them.  
ACDR Okay.  
CC-H And the pump.  
ACDR Okay. The pump's OFF, everything's - the evaporators  
are OFF now, Bo.  
CC-H Roger. Thank you. And the pump's off too.  
ACDR We had evap off (garble).  
PAO This is Apollo Control. Loss of signal through  
tracking ship Vanguard. When we next hear from Apollo and Soyuz, they  
should be involved in the station keeping in preparation for the solar  
eclipse experiment. Undocking will take place at ground elapsed time of  
95:42, just prior to acquisition at ATS-6 satellite, which is some 14  
minutes from now. We'll return at that time. At 95:32, 10 minutes away  
from undocking, this is Apollo Control.  
PAO This is Apollo Control. 95:45 ground elapsed time,  
50 seconds away from acquisition of ATS-6 satellite; the southern most  
tip of South America. At acquisition here we should have confirmation  
of undocking, and hopefully before too long, a realtime television pic-  
ture of Soyuz from Apollo as it backs away. Preparation for the solar  
corona, or solar eclipse experiment. We'll stand by for Cap comm Karol  
Bobko's first call.  
ACDR Okay, the experiment's (garble) to COAS.  
DMP And I don't control - -  
ACDR And in 4 minutes, thrust X - plus X, 4 jets for 16 seconds;  
in 4 minutes.  
DMP Am I supposed to control ROLL or not? Does it say?  
ACDR No.  
DMP I don't?  
CMP You eventually have to.

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ACDR                   You - eventually you have to, you - -  
CMP                    - - because you've got to go up and dock (garble)  
USA                    Yeah.  
ACDR                   It's easier if you do.  
DMP                    But I wasn't sure of it - about this point (garble).  
CMP                    Let's see, I guess our shadow's off of us now.  
CMP                    I wonder about where it came on, where it (garble).  
ACDR                   Okay, Deke. Stand by. Plus X for 16 seconds. Mark it.  
DMP                    Okay (garble).  
ACDR                   Okay, 8 seconds gone; 10 seconds; 13, 14, 15, 16.  
That's it.    Stop.  
ACDR                   (Soyuz, this is Apollo. Apollo is station keeping.)  
USSR                   (Garble)  
DMP                    No. No, no, we're not either, Tom.  
USA                    (Garble)  
ACDR                   (50 meters.)  
USA                    Okay.  
CC-H                   Apollo, Houston through ATS. And we're hearing your  
calls.  
DMP                    Roger. We've undocked and station keeping.  
ACDR                   Everything was on time, Bo.  
CC-H                   Roger. Thank you. And if someone can get that out-  
the-window camera and check that it's in average it may help our picture.

END OF TAPE

ASTP (USA) MC340/1  
Time: 07:09 CDT, 95:49 GET  
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ACDR Everything was on time, Bo.  
CC-H Roger. Thank you. And if someone can get that  
out-the-window camera and check that it's in AVERAGE, it may help our  
picture.  
ACDR It's in AVERAGE, Bo.  
CC-H Thank you.  
SFE Soyuz orientation lights on.  
ACDR (Roger.)  
CC-H Apollo, Houston. May we ask you put that out-the-  
window camera to PEAK.  
CMP Roger.  
ACDR You got PEAK, Bo.  
CC-H Thank you.  
CC-H Apollo, Houston. On panel 230, we'd like the UP  
TELEMETRY switch to UP TELEMETRY.  
ACDR Roger.  
ACDR Bo, it's in UP TELEMETRY.  
CC-H Roger. Understand. The panel 230 UP TELEMETRY  
switch was in UP TELEMETRY.  
ACDR That's roger.  
ACDR How's your picture on the tube, Bo?  
CC-H Pretty good. We see Soyuz, there, and understand  
the picture's even going to get better as we get into the daylight.  
ACDR Oh yeah.  
USA (Garble.)  
ACDR (About 50 meters, now.)  
USSR About 30 meters?  
ACDR (50.)  
CC-H Apollo, Houston. On panel 181, we need the TV  
station select CM and CM-1 to UP TELEMETRY.  
ACDR Say again, Bo?  
CC-H On panel 181, those 2 TV station select switches  
in the upper left-hand corner - to the center UP TELEMETRY position.  
USSR What is the rate now?  
ACDR (There is station-keeping.)  
USSR What distance station-keeping?  
SCDR 50 meters.  
USA (Roger.)  
CC-H And Apollo, Houston. We need that out-the-window  
camera back to AVERAGE, because we've gone away from the Earth.  
SPEAKER (Garble.)  
ACDR Roger. You got AVERAGE.

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SFE Soyuz, ready for orientation.  
ACDR (Okay. Ready.)  
USSR (Garble) in orientation?  
ACDR (All right.)  
CC-H Apollo, Houston. The TV picture is so good we can  
see the capture latches.  
ACDR Roger, Bo. Roger.  
CC-H Apollo, Houston. Could you give us an estimate of  
your range?  
ACDR Okay. The - Deke has the same problem I have.  
the COAS is completely washed out - it's full up - it's so bright out  
here.  
CC-H Understand.  
ACDR We can look in ball park - it's about 50 meters,  
plus or minus 1 or 2.  
CC-H Roger.

END OF TAPE

ASTP (USA) MC341/1  
Time: 07:18 CDT, 95:58 GET  
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USSR Orientation(?) established.  
ACDR (All right.)  
USSR (Garble) ring extending.  
ACDR (Roger. Understand you.)  
CC-H Apollo, Houston. We would like you to go PEAK on  
the out-the-window camera.  
ACDR Roger.  
ACDR You've got PEAK, Bo.  
CC-H Thank you. The reason I called that is - whether -  
depends on whether or not we can see the Earth.  
ACDR Yeah, Bo, understand.  
SPEAKER (Say again.)  
CC-H Apollo, Houston. We'd also like you to go to  
GAMMA 1/2 on the out-the-window camera.  
ACDR Stand by. We're real busy.  
CC-H Okay.  
ACDR You've got 1/2 GAMMA, Bo.  
CC-H Thank you.  
USA And, Bo - we think maybe his docking attitude isn't  
exactly what we've got on the pad.  
USA We know it's not, Bo.  
CC-H Roger. We'll check that.  
SPKR (Garble)  
USA Roll looks good. Pitch and yaw are a little off.  
CC-H Understand.  
CC-H Could you give us your attitude? We don't have  
any data here, because we're watching TV.  
USSR APDS mode accomplished.  
ACDR (Say again, please.)  
USSR APDS mode accomplished.  
ACDR (Roger. Roger. Understand you.)  
DMP I'll give you our docking attitude as soon as we  
have it refined, here.  
CC-H Roger.  
USSR (Garble) is ready.  
DMP Okay, Bo. We're pretty close to the docking attitude  
at 195.7, 208.1, and 21 degrees point 3.  
CC-H Roger.  
ACDR (Soyuz, this is Apollo. Orientation established.  
Ready for docking.)  
USSR (Roger. Understand. You are ready.)  
ACDR Alexey. (Garble) Understand.)  
CC-H Apollo, Houston. On the out-the-window camera,  
we would like you to go AVERAGE again, please.  
ACDR (Soyuz. Am now approaching Soyuz. We are  
ready.)  
USSR (Garble.)

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ACDR (Am approaching Soyuz.)  
USSR And, keep coming, Tom.  
CC-H Apollo, Houston. On the out-the-window camera,  
we'd like you to go to LINEAR again, please.  
ACDR (Garble)  
CC-H That did it. That's a good picture.

END OF TAPE

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Time: 07:28 CDT, 96:07 GET

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USA That did it. That's a good picture.  
ACDR Okay, Houston, Deke's having the same problem with  
COAS washout that I had.  
CC-H Roger. Understand.  
DMP There's absolutely zero COAS.  
(Garble)  
USA (Distance 30 meters.)  
USSR (Garble) please wait.  
USA (Very slow, very slow.)  
USA Bo, hold on a second.  
USSR You read us?  
CC-H Apollo, Houston. We're getting a good picture but  
the camera is moved a little. Can we ask you to move it a - to the  
right and up - up a little bit. Thank you.  
USA (Contact.)  
USSR Apollo, Soyuz initiation retraction.  
USA (Okay)  
CC-H Apollo, Houston now. It was a beautiful docking.  
We had a good picture. We can see Italy coming up in the Mediterranean  
right now.  
USA (Russian)  
USSR (We have capture. Now in the process of closing  
the latches. We did the solar eclipse experiment. Everything following  
the program. )

END OF TAPE



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Time: 07:37 CDT, 96:17 GET

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USSR (We did the exp - the solar eclipse experiment,  
everything following the program.)

CC-H Apollo, Houston. It looks like we lost communications  
with you for a while, but we're back again.

CMP Okay. We were getting into gimbal out there, Bo, for  
some reason. So we got to manually crank out of there; that's - probably  
we're in some a weird attitude right now.

CC-H Understand.

END OF TAPE

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Time: 07:38 CDT, 96:18 GET  
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USSR (This is Soyuz 2, interface seal compressed.  
Over. Soyuz.)  
USSR Interface seal compressed.  
ACDR (Okay, Roger. Understand you.)  
USSR APD mode - APDS mode accomplished.  
USA (All right.)  
SPKR (Garble.)  
CC-H Apollo, Houston. Over.  
ACDR Go ahead, Bo.  
CC-H We see you have the secondary of - loop and pump on.  
And - we think that you probably don't need it on. Could you comment  
on that?  
ACDR Yeah, we're burning up in here, Bo.  
CC-H Understand.  
ACDR A little hot with all the cameras on.  
ACDR Houston, Apollo.  
CC-H Go ahead.  
DMP Yeah, we're in some random attitude here, due  
to getting into that gimbal light situation. And - we're debating  
whether to maneuver back to the docked attitude or leave things go; what's  
your recommendation?  
CC-H Let me check on that for you, Deke.  
DMP Okay.  
CC-H Apollo, Houston. We suggest you maneuver back to  
the docking attitude at this time, and that's 197, 205, 014.  
DMP Okay. Roger. That's our opinion, too. Just  
(garble).  
SPKR (Garble)  
USSR (I hear you excellently. How do you read me?  
Everything is normal. We're doing the rough pressure integrity check. 1  
minute, time. The contact was proper, everything is normal. This is  
the third day that we've been bothered by - tormented by some other  
station. So every time we pass over this area, 194 degrees, then we get  
interference from a very loud station, some sort of airport weather  
station and it just completely interferes and blocks all the comm.)  
USSR (The moment we get into the docking or undocking  
area -)  
CC-H Apollo, we remind you just to tell Soyuz you're gonna  
maneuver and we'd like the 3 camera switches on 181, OFF, and we're  
going to be doing a VTR dump here, so there will be no down voice for  
approximately 5 minutes.  
USA Okay.

END OF TAPE

ASTP (USA) MC345/1  
Time: 07:48 CDT, 96:28 GET  
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USSR (Pressure 800 in the orbital module, 810 in the descent vehicle.)  
CC-H Apollo, Houston. There are 2 minutes until ATS  
LOS. We'll see you at Guam, at 96:39.  
CMP Okay, Bo. And we've got the hatch out and the  
UVA cable connected to the pressings(?)  
CC-H Roger. I understood that you have the hatch out.  
USSR (Garble)  
CMP That's affirmative. And the UVA prep check complete.  
CC-H Roger. And we have an addition. At 96:40 GET,  
we'd like you to do a helium injection. DM checklist D7-5F. And  
you've already gotten the hatch out.  
CMP That's affirm, and we got that helium injection  
D7 dash 5.

END OF TAPE

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Time: 07:58 CDT, 96:38 GET  
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USSR Tom, just now we are in the orbital module.  
ACDR (Roger. You are in the orbital module.)  
CC-H Apollo, Houston through Guam for 4 minutes.  
DMP Okay, Bo.  
CC-H I have got the second undocking pad on page 7-7, if  
somebody can copy.  
DMP Stand by.  
USA Just a second.  
CC-H Apollo, Houston. Over.  
DMP Roger, Bo. Ready to copy the second undocking.  
CC-H Roger. That's on page 7-7. Undocking time is as  
scheduled. 02600, 30700, 32200, high-gain: plus 003, plus 230. Over.  
DMP Roger. I missed the first thing. It was the nominal  
time for undocking; but give me a roll angle.  
CC-H The roll was 02600.  
ACDR Okay. Nominal time, which should be 09907 and four  
balls; time - roll, 02600, 30700, 32200; plus 003 for pitch; plus 230  
for yaw. Over.  
CC-H Roger. That was a good readback. And just some  
information about your fuel: in the simulator you used about 120; this  
undocking and redocking you used about 200; you're about 200 above the  
experiments redline.  
USA Roger.  
USA Okay, Bo. Thank you.  
CC-H Roger.  
CC-H Apollo, Houston. There is less than a minute until  
LOS; Santiago at 97:16.  
ACDR Roger. And, Bo. Again, you wanted the helium in-  
ject at this time, right, at 96:40?  
CC-H That's affirmative.  
ACDR Okay. That's page 7-3 in the DM checklist.  
CC-H That was page 7-5.  
ACDR Roger. 7-5.  
PAO This is Apollo Control; 96:46 ground elapsed time.  
Loss of signal through tracking station Guam. 30 minutes to acquisition  
at Santiago, Chile. Apollo crew at this time preparing for the ultra-  
violet absorption experiment which will be done after the second undocking  
which will be on the nominal flight plan time at 99:07 ground elapsed  
time. Apollo will do flyaround of Soyuz at different distances: 150  
meters, 500 meters and 1 kilometer, or a thousand meters. We'll return  
in a half hour with Santiago, Chile at ATS-6 satellite coverage. This  
is Apollo Control at 96:47 ground elapsed time.

END OF TAPE

ASTP (USA) MC347/1  
Time: 97:15 CDT, 08:35 GET  
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PAO This is Apollo Control at 97:15 ground elapsed time. Acquisition within about 50 seconds through tracking station at Santiago, Chile. Another of the new stations for whom it's the first time to support a manned flight. The time on the first redocking was 96:13 on the capture latches and perhaps a couple minutes later than that for the hard docking as the hooks were engaged. It was calculated that some 200 pounds over the predicted budget of RCS, Reaction Control System propellant were used during the fly around and the solar eclipse experiment while Apollo and Soyuz were undocked. Upcoming at 96:07, less than an hour from now - 99:07, I beg your pardon. More than two hours from now it'll be the second and final undocking which will take place over the Atlantic Ocean at 19:05 north. That's 19 degrees 5 minutes north, longitude of 46 degrees 58 minutes west. We should have data and voice now through Santiago.

CC-H Apollo, Houston through Santiago and then ATS.  
ACDR Roger, Bo. Read you loud and clear. How me?  
CC-H Loud and clear.  
ACDR Okay. The helium rejection was done. And also we'll read the data from - copy to data from P-52.  
CC-H Roger. We're ready for the P-52 data.  
ACDR Star 33, star 42, NOUN 05, all zeros, plus 13 minus 18 and plus 4, platform torqued 96:43:15.  
CC-H Understand, 33, 42, all balls, plus 13, minus 18 plus 04, 96:43:15.  
ACDR Roger.  
CC-H And do you have the option 1 time?  
ACDR Stand by.  
CC-H Apollo, Houston. You can do that option 1 either in daylight or darkness, as you wish.  
ACDR Yes, but we're going to do it - -  
CC-H Apollo, Houston now through ATS.  
ACDR Roger, through ATS. Okay we're pitching down with respect to the ground now. Stand by.  
ACDR Hello, Houston, Apollo.  
CC-H Apollo, Houston. Go ahead.  
CMP A - Bo, you want us to - try this option one now and not worry about tweaking it up on the stars after the platform does a coarse align, or would you prefer we wait until the next night pass - -  
CC-H Roger. We understand you'd like to do the option 1 now and not worry about tweaking it up until the next night pass and that's fine with us.  
ACDR Okay. It's either that or getting it on the next night pass and as you prefer I'll do it now.  
CC-H Roger. We prefer you do it now and if somebody's down there we'd like on panel 230 the UP TELEMETRY switch to RELAY.  
USA (Garble)

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ACDR                    You got relay.  
CC-H                    Thank you.  
CC-H                    And Apollo, Houston. We need the UP TELEMETRY  
switch now back to UP TELEMETRY.  
CC-H                    Apollo, Houston. I think we've got a good ATS  
lockup now.

END OF TAPE

ASTP (USA) MC348/1  
Time: 08:45 CDT, 97:25 GET  
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CC-H Apollo, Houston. How do you read?  
CC-H Apollo, Houston. If you read - we think you can  
go narrow and reacq on the antenna now.  
SPEAKER (Russian)  
CC-H Apollo, Houston. If you read - we think you can  
go narrow and reacq on the ATS antenna now.  
CC-H Apollo, Houston. If you read - narrow and reacq  
on the ATS antenna.  
ACDR Houston, Apollo.  
CC-H Roger. We read you, Tom.  
ACDR Hello. Houston, Apollo.  
CC-H We read you. How do you read us?  
ACDR Houston, Apollo. How do you read?  
CC-H Apollo, Houston. We read you loud and clear.  
CC-H Apollo, Houston. Please go narrow and reacq on the  
ATS antenna.  
ACDR Hello. Houston, Apollo.  
CC-H Apollo, Houston. We read you loud and clear.  
CC-H Apollo, Houston. How do you read?  
CC-H Apollo, Houston. How do you read?  
CC-H Apollo, Houston. How do you read?

END OF TAPE

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Time: 08:55 CDT, 97:35 GET  
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ACDR Hello, Houston. Apollo.  
CC-H Apollo, Houston. Go ahead. We read you loud and clear.  
CC-H Apollo, Houston. How do you read?  
ACDR Houston, Apollo. How do you read through Madrid?  
CC-H Apollo, Houston. We read you. Go ahead.  
ACDR Hello. Houston, Apollo. How do you read through Madrid?  
CC-H Apollo, Houston. We read you well through Madrid. Go ahead.  
CC-H Apollo, Houston through Madrid. How do you read?  
ACDR Houston, Apollo. Do you read through Madrid?  
CC-H Apollo, Houston, through Madrid. How do you read us?  
CC-H Apollo, Houston. How do you read?  
CC-H Apollo, Houston. How do you read?  
CC-H Apollo, Houston. How do you read?  
ACDR Okay. Read you loud and clear. But the needle keeps wavering on your station through Madrid. I wonder what happened to the S-band? Over.  
CC-H We're trying to figure that out. The angles that we have for your ATS are a minus 19 and 252.  
ACDR Okay. I've got a minus 19 and 252 in the react. Is that any good through ATS?  
CC-H Roger. We seem to be reading you quite well now. How are you reading us?  
ACDR Loud and clear through ATS.  
CC-H Roger. That's good. Do you have any messages?  
ACDR No. You've got an echo.  
CC-H Roger. That's probably the VHF at Madrid.  
CC-H And Apollo, Houston. We would like you to go  
ACCEPT.  
ACDR Roger. ACCEPT. Got it.

END OF TAPE



ASTP (USA) MC350/1  
Time: 09:05 CDT, 97:45 GET  
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CC-H - accept.  
ACDR Roger. Accept. Got it.  
DMP And the option 1 was completed.  
CC-H Thank you.  
CC-H Apollo, Houston. Do you have a time on that option  
1?  
DMP (Garble.)  
SPKR Would you care to proceed?  
CC-H Apollo, Houston. Do you have a time on that option 1?  
SPKR (Garble)  
CC-H Apollo, Houston. How do you read?  
DMP Loud and clear, Bo. How - you been reading us?  
CC-H Negative. You've been cut out by a lot of  
interference.  
DMP Okay, Tom will come up with the time in just a  
minute; he's looking it up.  
USSR (Moscow, this is Soyuz. I read you well. Over.)  
ACDR Okay, Bo. It was 97 plus 20.  
USSR (Rough integrity check results excellent. Exact  
integrity - pressure integrity check was performed for 10 minutes. The  
results are also excellent.)  
CC-H Apollo, Houston. We would like to go block if you  
read.  
ACDR (Garble.)  
CC-H Roger. Go block on the computer and we copied 97:20.  
Was that for the option 1?  
ACDR Roger. We'll (garble) them before I get - on the next  
night pass.  
ACDR Houston, how do you read now?  
CC-H We read you fairly well. Go ahead.  
ACDR Okay, just doing a ground check.  
CC-H Roger. I have two notes for the UVA, when somebody  
is ready to copy.  
ACDR Go ahead.  
CC-H The first is on the field of view. It is possible  
that the star tracker could indicate lock and be outside of the  
spectrometer field of view in yaw without an oscillation. And, therefore,  
you must fly the spacecraft with Soyuz reflector within plus or minus  
1 and 1 quarter degree of the center of the COAS calibration mark in  
yaw. Pitch is operating normally.  
ACDR Roger. Possible on the field of view for it to indicate  
locked on, but really be outside, so you must fly within plus or minus 1 and  
a quarter degrees to center of the COAS. Over.  
CC-H Roger. That's right. Within 1 and a quarter degree  
of the center of the COAS cal mark. That's only for yaw.  
USA Okay, Bo.  
USA Yeah, Bo, we had a - 3 degrees to the right and 2 and a  
half to the left, you may remember, on the cal (garble).  
USA You're telling him that we got (garble).  
CC-H Roger. That's what brought this all about. And -  
on the UVA RCS cut off, if necessary, the PSN can be used to depletion,  
which is 7 percent of the onboard meter. Then you are cleared to

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continue EVA on the quads until the lowest quad reads 80 percent.

ACDR Okay. Got that.

USA Roger.

CC-H Apollo, Houston. On panel 10 we would like you to check the VHF FM thumb wheel at no higher than 3 and could you tell us where it is.

DMP Stand by.

DMP That VHF FM thumbwheel was at 5. I'll position it to about 3 or less.

CC-H Roger. Understand it was 5 and your bringing it down to three.

END OF TAPE

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Time: 09:15 CDT, 97:55 GET  
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MS (Garble)  
CC-H Apollo, Houston on channel - on channel 230. We would like to verify that the UP TELEMETRY is in the center UP TELEMETRY position.  
ACDR Okay. It's in RELAY going to UP TELEMETRY.  
CC-H Thank you.  
SCDR Apollo, Soyuz. How do you read me?  
ACDR (I hear you excellently.)  
SCDR - - the time to initiate undocking is 99:03:00 flight time.  
ACDR Yes, 99:07:00. Over.  
SCDR Mission Control - Moscow Mission Control said -  
told us that the time is 99:03:00 - the time to initiate undocking.  
ACDR Bo, did you hear that on RELAY?  
CC-H Roger, I did. Soyuz told you Moscow told them  
99:03.  
ACDR Roger.  
SCDR How do you read me?  
ACDR Okay, it takes awhile for them to undock so I see  
what you're getting at.  
SCDR How do you read me?  
ACDR (Roger. Understood you excellently.)  
SCDR The time of undocking - 99:03.  
ACDR (Roger. Understand you. All right.)  
ACDR Yes, Bo. We're squared. We know that it takes them  
quite a while to undock. There's no problem.  
CC-H Roger. We believe so too, but we discussing it  
right now to make sure.  
DMP Okay. They're ready to go over their sequence starts  
at that time, and it doesn't complete until 99:07.  
CC-H Roger.  
ACDR Bo, do have anything eles for us on this before we go  
over the hill on ATS and before the eat we hit the eat period.  
CC-H Negative. We were going to say we do agree with  
you - that 99:03 is the time they start and then your undocking time  
is the time they sep - that you separate.  
CC-H We have one question and that is: how did the  
solar eclipse go?  
ACDR It went just fine as far as I could tell, Bo.  
We called them - said they had sunlight on their reflector. It was  
creeping in there fairly slow but as soon as I saw it touch the edge  
I gave them a call and at about 2 minutes and 53, 54 seconds.  
CC-H I understand 2 minutes, 53, 54 seconds is when  
you gave them a call saying they had some sunlight.  
ACDR That's affirm. It may have been a little earlier on it  
but I thought I'd better be conservative because I remember how sensitive  
they were to that - -  
CC-H Okay.  
USSR (Russian)  
ACDR - - Bo, just for your information, coming back in there  
we were in good shape - they had an orbit - they were above the horizon. We  
were in good shape.

ASTP (USA) MC351/2

Time: 09:15 CDT, 97:55 GET

Date: 7/19/75

As soon as they got below the horizon that COAS just washed out to nothing and trying to judge, translational requirements is (garble) so I think what I'm telling you is that the safest place we can be is going to be in close enough so we can see that cross on there - that standoff cross on there, especially if we re(?) in the earth background.

CC-H Roger. We understand what you're saying.

CC-H Apollo, Houston. We think that a UVA here, - you should probably be in local horizontal most of the time so you shouldn't have the problem.

ACDR Yes, that's true. We hope so.

ACDR Houston, Apollo.

CC-H Apollo, Houston. Go ahead.

ACDR Roger. We've got a little present here we wanted -  
of music that -

(recorded music).

USA (Garble) - -

END OF TAPE

ASTP (USA) MC352/1  
Time: 09:25, 98:05 GET  
7/19/75

ACDR (Recorded music for the crew and we will do it by  
Moscow.)  
ACDR Okay, it's going to be playing now.  
(Music)  
ACDR Over.  
CC-H Apollo, Houston.  
ACDR Go ahead.  
CC-H That sounded like it was from far Western Oklahoma,  
around Kiev.  
ACDR No that was Conway Twitty in Russian for the Soyuz  
crew and the people in the control center.  
ACDR I don't know whether my old friend, Jim Hartz,  
who's working upstairs, recognized that or not, he's from Tulsa.  
CC-H Roger.  
CC-H Apollo, Houston. I have a block data here for rev  
93. If and when somebody is ready to copy it, please give me a call.  
ACDR Go ahead.  
CC-H Roger. Rev 93. Time 153:20:39. Minus 1939;  
plus all balls; plus 0203, 002, 330, 355 1770, 0008, 197, 15716, 25770,  
2603, 2720, not applicable, 051, 309, 3244, 3547, plus 1977, minus 16375.  
Over.  
ACDR Okay, you want a readback on that?  
CC-H If you wish.  
ACDR Okay. Rev 93. Time 153:20:39, minus 1939, plus all  
balls, plus 0203, 002, 330, 355, 1770, 0008, 197, 15716, 25770, 2603, 2720,  
N/A, 051, 309, 3244, 3547, plus 1977, minus 16375. Over.  
CC-H Roger. That's a good readback. Remarks: orbital  
REFSMATT CS/SM sep, yaw left to 310, NOUN 48, pitch plus .04, yaw minus  
.67; CSM weight, 26240, DM weight, 4500.  
ACDR Okay. Orbital REFSSMAT, CMSM sep, yaw left 031 degrees,  
and the NOUN 48's, pitch is plus 04, yaw minus 67; the weight is 26248[sic],  
and 4500.  
CC-H Roger. You were cut out on that yaw left -  
it was 310. Otherwise it's all a good readback.  
ACDR Okay.  
CC-H And I have one other change for you, and that is  
the PSM cut off for UVA should be 10 per cent.  
ACDR Roger. 10 per cent.  
CC-H And, we're less than a minute from LOS. The next  
pass is Orroral at 98:24.  
CC-H And as we go over the hill, we see that your in  
ATT one rate 2, instead of rate 2.

END OF TAPE

ASTP (USA) MC353/1  
Time: 09:37 CDT, 09:37 GET  
Date: 7/19/75

PAO                    This is Apollo Control. Loss of signal through  
ATS-6 satellite, there's a 7 minute gap across the Republic of Indonesia,  
Coral Sea between Australia and New Guinea until reacquisition at  
Orroral Valley, Australia. Presently the Apollo and Soyuz crew are  
getting set up in the proper attitude for the undocking which should  
be completed at 99:07 ground elapsed time. And following that, the  
fly around in plane and out of plane at varying distances for the  
ultra-violet absorption experiment. This experiment which has the -  
number MA059 is an investigation of - and measurement of atomic oxygen  
and atomic nitrogen particles in Earth's upper atmosphere. The experi-  
ment will measure atomic oxygen and nitrogen using light beams directed  
from Apollo to a retro-reflector mounted on Soyuz spacecraft. These  
beams in turn will be re - bounced back to optical absorption spectrometer  
aboard Apollo. The separation distances for the different measurements  
and wavelengths in the two - of the two elements, oxygen and nitrogen  
will range from 150 meters to 1 kilometer. There are two principal  
investigators on MA059. They are Dr. Thomas M. Donahue of the University  
of Michigan, Department of Atmospheric and Oceanic Science, and Dr.  
Robert D. Hudson of the Johnson Space Center Environmental Effects  
Project Office. Presently Apollo and Soyuz, in an almost circular  
orbit, with a perigee of 121.6 nautical miles and an apogee of about a  
mile higher, 122.9 nautical miles. Five minutes of loss of signal  
remaining here between ATS and the reacquisition through Orroral  
Valley and we're standing by.

ACDR                    Hello, Houston. Apollo through Orroral.  
CC-H                    Roger. We read you through Orroral and you are  
go for undocking.  
CC-H                    Apollo, Houston. Over. How do you read?

END OF TAPE

ASTP (USA) MC354/1  
Time: 09:47 CDT, 98:27 GET  
7/19/75

CC-H Apollo, Houston. Over. How do you read?  
PAO This is Apollo Control. Very brief exchange of conversation there, through Orroral Valley, on VHF - very high frequency radio link. The Australian tracking station was unable to lock onto Apollo on the S-band downlink, because of the low-elevation angle and, probably, because of a masking caused by mountains to the north and northwest of that tracking station. However, spacecraft communicator Bo Bobko did get in a GO for undocking to the crew. Undocking still scheduled at 99:07 ground elapsed time - about 37 minutes from now. And we should be within acquisition at ATS-6 satellite at that time. Apparently, the Santiago station will not be up for this revolution. Next station will be ATS-6 satellite, in about 30 minutes. This is Apollo Control at 98:29 ground elapsed time.

END OF TAPE

ASTP (USA) MC355/1  
Time: 10:17 CDT, 98:57 GET  
7/19/75

PAO This is Apollo Control at 98:57. We thought briefly there that we had a solid enough signal at Quito for the Cap comm to make a call to the crew to marginal pass at the southeast of the Quito station at an extremely low elevation angle. We're a little over a minute away from predicted acquisition through ATS-6 satellite; as the Apollo and Soyuz, still docked at this time, about 8 minutes away from undocking, come across the northern portion of South America. Strip recorder charts are set up in one of the back rooms for the ultra-violet absorption experiment upcoming after undocking; and a television camera looking down on that strip recorder; it's being projected on one of the eidophores here, so that the experiment officer may follow the progress of the data gathering for the UVA experiment. 35 seconds to predicted acquisition of ATS-6 - -

CC-H Apollo, Houston through ATS. Over.  
ACDR Roger, Bo. Read you loud and clear.  
CC-H Roger. You have a GO for undock. On panel 230 we would like the UP telemetry switch to RELAY.  
ACDR Roger. Relay and we have the UV absorption power ON at 98, plus 56, plus 00.  
CC-H Roger. 56 plus 00, the absorption power ON and on panel 181 we would like the three TV camera switches to the ON position - the power switches.  
CC-H And Apollo, Houston. We have our commands in, so on panel 230, the UP telemetry switch to UP telemetry when you have a chance.

ACDR You got it.  
CC-H Thank you.  
CC-H Apollo, Houston. We have a good TV picture.  
ACDR Okay.  
USSR Apollo, Soyuz.  
ACDR (Over.)  
USSR (Garble) undocking.  
ACDR (All right.)  
SCDR Undocking, now.  
ACDR (Roger.)  
ACDR Houston, do you have any recommendations for a new film magazine for the DAC.  
CC-H We hear that. We'll check on it.  
SCDR The seal compress OFF. Indicator OFF. Intersection compress OFF.

CC-H Apollo, Houston. The internal camera is getting reflections from the window. Can you move it down a little so we won't see the sun?

CC-H And Apollo, Houston. If CX03 is empty, you can use CX04.  
SCDR Interface (garble) OFF.  
ACDR Roger.  
SCDR (Garble)  
ACDR (Okay.)  
SCDR Tom, be careful.

END OF TAPE



ASTP (USA) MC356/1  
Time: 10:27 CDT, 99:07 GET  
7/19/75

USSR (Garble.)  
USSR (Russian)  
ACDR (About 20 meters.)  
USSR 15!  
ACDR (Right.)  
USSR (Garble) ready now?  
USSR Right.  
ACDR (Velocity minus.)  
USSR Please inform us about Apollo station-keeping  
ACDR (20 meters.)  
ACDR (Soyuz, this is Apollo. Now open the reflector  
covers, as programmed.)  
USSR After Apollo station-keeping?  
ACDR (Yes. We are now station-keeping. Open reflector  
covers, as programmed.)  
USSR In just a moment we are going to initiate orbital  
rate attitude: 002180.  
CC-H Apollo, Houston. Just a reminder. We need the  
primary and secondary evaporators deactivated.  
SPEAKER (Garble.)  
USSR (Russian)  
CC-H Apollo, Houston. We need the primary evaporator  
to INCREASE.  
USSR (Garble.)

END OF TAPE