Apollo 11

Spacecraft Commentary

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

APOLLO 11 MISSION COMMENTARY

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CDT 07:02 GET T -1:30:55 TAPE 001/1

PAO

This is Apollo/Saturn Launch Control T minus 1 hour 30 minutes 55 seconds and counting. All elements are GO with the countdown at this time, the countdown aimed at landing 2 astronauts on the Moon. At this time the spacecraft Test Conductor Skip Chauvin going through some checks with astronaut Mike Collins aboard the spacecraft. We're winding up this important emergency detection system test that Neil Armstrong has been participating in. Meanwhile, at the 320 foot level the closeout crew now placing the boost protective cover over the hatch now that we have completed the cabin purge and have the proper cabin environment inside the cabin. We have also performed leak checks to assure ourselves that the cabin atmosphere is valid. This boost protective cover is used during the early phases of a powered flight and it is jettisoned with the escape tower shortly after second stage ignition. Here in the firing room the launch vehicle test team's still keeping a close eye on the status of the propellants aboard the Saturn V launch vehicle. We're back to 100 percent supply with the liquid hydrogen fuel in the third stage. This problem with the leaking valve is no problem at this time. We've actually bypassed the valve that we are maintaining our hydrogen supply aboard the vehicle. All aspects GO, the weather is very satisfactory this morning, a thin cloud cover about 15,000 feet, temperature at launch time exected to be about 85 degrees. At T minus I hour, 29 minutes, 30 seconds and counting, this is Kennedy Launch Control.

END OF TAPE

CDT 07:11 GET T -1:20:55 TAPE 002/1

PAO

This is Apollo/Saturn Launch Control T minus 1 hour, 20 minutes, 55 seconds and counting. All is still GO with the countdown for Apollo 11 at this time. At this point in the countdown Spacecraft Commander Neil Armstrong once again appears to be the busiest worker in the spacecraft as he is performing a series of alignment checks associated with the guidance system in the spacecraft. He is working these checks with the spacecraft test conductor as the test conductor reads out the various procedures and Armstrong responds to them. The astronauts aboard the spacecraft also were informed by the spacecraft conductor a short while ago that the launch vehicle is GO at this time. The hydrogen problem that we did encounter earlier has been solved. That is real good news said Armstrong and then he went back to work shortly thereafter. We are now coming up on the 1 hour, 20 minute mark in the countdown. This is Kennedy Launch Control.

END OF TAPE

CDT 07:21 GET T -1:11:55 TAPE 003/1

PAO

This is Apollo Saturn Launch Control. T minus one hour, 11 minutes, 55 seconds and counting. The countdown for Apollo 11 still going very satisfactorily at this time. In most cases we're a matter of 5 or 10 minutes ahead of the countdown procedures. The crew in the white room at the 10 and 20 foot level who have been aiding the astronauts up to this time are just in the process of finishing up their work. They've been advised by the spacecraft test conductor that they'll probably be able to move out in about 3 minutes or so. Once this is accomplished, once the close-out crew does depart, we'll be ready to move that swing-arm back - swing-arm 9. It will be moved 12 degrees away from the spacecraft hatch which is about 5 feet away from the hatch. Once this is accomplished, we will arm the pyrotechnic systems in the spacecraft so in the event of a possible catastrophic condition below them, the launch vehicle, while still on the pad, the astronauts could fire that escape rocket and separate from the rocket in difficulty. The close-out crew are about to depart at this time. That swing-arm remains about 12 degrees away from the spacecraft hatch as mentioned - 5 feet or so until the 5-minute mark in the count when it's fully retracted to it's fall-back position. The obvious reason here is in the event we do have to get the astronauts out in a hurry, the swing-arm is in a stand-by position and could be moved rapidly back to the hatch - to the hatch level so the astronauts could depart in the event of an emergency. We're coming up on T minus 1 hour, 10 minutes, and 20 seconds. This is Kennedy Launch Control.

END OF TAPE

CDT 07:25 GET T -1:07:25 TAPE 004/1

PAO

This is Apollo/Saturn Launch Control at 1 hours 7 minutes 25 seconds and counting, countdown still proceeding satisfactorily. For those people who would like to synchronize their watches in relation to the count, we'll synchronize on 26 minutes past the hour, which is now about 65 seconds away. We'll count down the last 5 seconds to 26 minutes past the hour. We're now 1 minute away from 26 minutes past the hour. In the meantime, we do have information from the Civil Defense Agency in the area. The estimate is more than a million persons are in the immediate area in Brevard County to watch the launch. Now 40 seconds away from 26 minutes past the hour. Civil Defense Agency reports further that there is extensive heavy traffic, a number of traffic jams, particularly in the area of Titusville and the U.S. 1 and Route 50. Countdown still progressing satisfactorily. 15 seconds away from 26 minutes. 5, 4, 3, 2, 1, Mark. 8:26 am Eastern Daylight Time. We're now 1 hour 5 minutes 55 seconds and counting as it was announced at that point. This is Kennedy Launch Control.

END OF TAPE

CDT 07:31 GET T -1:01:00 TAPE 005/1

PAO

This is Apollo-Saturn launch control. T-61 minutes and counting - T-61 minutes on the Apollo 11 countdown, and all elements are GO at this time. Astronaut Neil Armstrong has just completed a series of checks on that big service propulsion system engine that sits below him in the stack. We want to assure ourselves before liftoff that that engine can respond to commands from inside the spacecraft. As Neil Armstrong moved his rotational hand controller we assured ourselves that the engine did respond by swiveling or gimballing. This is - course is important for maneuvers in space. The countdown is still proceeding very satisfactorily other than two minor problems essentially picked up the count at 11 pm eastern daylight time last night, all has gone well. As we approach the one hour mark now, in the count of series of radio frequency and telemetry checks will be in progress with the launch vehicle. We'll also check out the tracking beacons in the instrument unit that travels as a guidance system for the Saturn 5 during the powered phase of flight. Now 59 minutes, 48 seconds and counting, this is Kennedy launch control.

END OF TAPE

CDT 07:36 GET T -0:56:00 TAPE 006/1

PAO

This is Apollo/Saturn Launch Control. We have just passed the 56-minute mark in our countdown. We are still proceeding in an excellent manner at this time. All elements reporting in that all systems continuing to look good at this point. We are still aiming toward our planned liftoff at the start of the lunar window 9:32 AM eastern daylight. A short while ago, in fact the spacecraft test conductor - we are doing quite well, in fact some 15 minutes ahead on some aspects of the preparation spacecraftwise. Armstrong replied that was fine so long as we don't launch 15 minutes early. I guess they are referring to the start of the window. The countdown is still going well, T minus 55 minutes, 10 seconds in counting, this is Kennedy Launch Control.

END OF TAPE

CDT 07:41 GET T -0:50:51 TAPE 007/1

PAO

This is Apollo/Saturn Launch Control. We have passed the 51 minute mark in our countdown. We're now T minus 50 minutes 51 seconds and counting. Apollo 11 countdown is still GO at this time, all elements reporting ready at this point in the countdown. The spacecraft - correction - the Test Supervisor Bill Schick has advised all hands here in the control center and spacecraft checkout people that in about 30 seconds that big swing arm that has been attached to the spacecraft up to now will be moved back to a parked position some 5 feet away from the spacecraft. We alert the astronauts because there is a little jolt when this arm is moved away. It will remain in that position some 5 feet away from the spacecraft until the 5 minute mark in the count when it's completely pulled away to its retracted position. It's coming up now in 5 seconds, the swing arm will come back. Mark. The swing arm now coming back from the spacecraft. Countdown proceeding satisfactortly, we've completed our telemetry checks with the launch vehicle and at this point with the swing arm back we arm the pyrotechnics so that escape tower atop the astronauts, atop their spacecraft, could be used if a catastrophic condition was going to occur under them with the launch vehicle from this point on down in the countdown. We have the high speed elevator located at the 320 foot level in the event the astronauts have to get out in a hurry. This is a special precaution. One of the members of the support team for Apollo 11, Astronaut Bill Pogue, is here in the firing room. He acts as Capsule Communication during the countdown. His call sign is Stoney. He controls that elevator. He now has it locked at the 320 foot level. These are special precautions for safety purposes during the final phase of the count. Now coming up on the 49 minute in the countdown, this is Kennedy Launch Control.

END OF TAPE

CDT 07:46 GET T -0:45:42 TAPE 008/1

PAO

This is Apollo Saturn Launch Control. We've passed the 46-minute mark in our countdown. T minus 45 minutes, 52 seconds and counting. All elements still GO

in the countdown at this time. The hard work on the spacecraft at this point in the countdown - Astronaut Buzz Aldrin in the middle seat. He's been working with the spacecraft test conductor on setting up proper switch settings in preparation for pressurizing the reaction control system. These are these big thrusters on the side of the service module. There's actually 16 of them in 4 quadrants around the service module. They are used for maneuvers in space. We pressurized that system before liftoff. That particular operation will be coming up in some 5 minutes or so. In preparation for it, Buzz Aldrin who has most of the switches in front of him has been preparing for that particular event. The launch vehicle people keeping an eye on the status of the various propellants aboard the Saturn V launch vehicle. Just at liftoff, we will have the vehicle weighing close to 6 and a half million pounds on the launch pad. There's more that a million gallons of propellants aboard the 3 stages of Saturn V. The report here in the control center are the propellants are stable. They did look a little while ago at the RP 1, the high-grade kerosend fuel that's used in the first stage of the Saturn V to make sure it was at it's top level. We keep an eye on these various aspects throug-

hout the count, and use the aid of computers to keep an overall look on general status. So now at T minus 44 minutes, 21 seconds and counting, this is Kennedy Launch Control.

END OF TAPE

CDT 07:51 GET T -0:40:53 TAPE 009/1

PAO
This is Apollo-Saturn launch control. We've passed the 41 minute mark in our count. T-40 minutes, 53 seconds and counting. We are continuing, and we're continuing very excellently at this time. There are no problems that have been reported in as the countdown continues to click down. We're still aiming for the start of our window on this, the first flight to land man on the moon. Our - we're aiming toward our planned liftoff time of 9:32 am eastern daylight time. Coming up shortly will be a key test here in the firing room. As far as the launch vehicle people are concerned, it's a - some final checks of the destruct system aboard the three stages of the Saturn-5 launch vehicle. In the event during powered flight that the vehicle strayed rather violently off course, the main safety officer could take action to destroy the vehicle which obviously would occur after the astronauts were separated by their escape tower from the faulty vehicle. We'll make a check of the destruct system to assure that if the signal is required to get through that, in fact, it will. This is what is coming up here in the control center at this time. All aspects of the mission still GO at T-39 minutes, 47 seconds and counting. This is Kennedy launch control.

END OF TAPE

CDT 07:56 GET T -0:35:48 TAPE 010/1

PAO
This is Apollo/Saturn Launch Control. We have passed the 36-minute mark in our countdown. T minus 35 minutes, 48 seconds and counting. We've completed those range safety command checks. All still going well with the countdown. A short while ago Spacecraft Test Conductor, Skip Chauvin, asked Neil Armstrong if the crew was comfortable up there and Neil reported back. He said it is very comfortable - it's very nice this morning. For a status report, we will now switch to Mission Control, Houston.

PAO
This is Apollo Mission Control. Flight Director, Cliff Charlesworth's team is on station here in the Mission Operations Control Room, ready to assume the control of this flight at tower clearance. There is a possibility that Apollo 11 will check out the command module color TV camera during the first earth revolution while in contact with the Goldstone station. If this checkout does occur, we acquire Goldstone at 1 hour, 29 minutes elapsed time. We have loss of signal at 1 hour, 33 minutes, 50 seconds elapsed time. This TV camera checkout is a possibility. This is Mission Control, Houston.

END OF TAPE

CDT 08:01 GET T -0:30:52 TAPE 011/1

PAO
This is Apollo/Saturn Launch Control. We've just passed the 31 minute mark in our count. At T minus 30 minutes 52 seconds and counting, aiming toward our planned liftoff time of 32 minutes past the hour, the start of launch window on this the mission to land men on the Moon. The countdown still proceeding very satisfactorily at this time. We've got by an important test with the launch vehicle checking out the various batteries in the 3 stages and instrument unit of the Saturn V. We remain on external power through most of the count to preserve those batteries which must be used during the powered flight. We've just taken a look at them by going internal and then switching back to external again. The batteries all look good. The next time we go internal will be at the 50 second mark with those batteries and they will remain, of course, on internal power during the flight. The lunar module, which has been rather inactive during these latter phases of the count also is going on internal power at this time on the 2 batteries on the ascent stage and the 4 batteries on the descent stage. For the next 20 minutes we will take a look at some systems in the lunar module and then power down at about the 10 minute mark in the count, power down the telemetry to preserve the power of the LM. The lunar module on Apollo 11, of course, when it separates from the command module in lunar orbit, will have the call sign Eagle. The command module call sign, once the 2 vehicles separate, will be Columbia. Both Columbia and Eagle are GO at this time at 29 minutes 24 seconds and counting. This is Kennedy Launch Control.

PAO
This is Apollo/Saturn Launch Control. We've just passed the 26 minute mark in the count, T minus 25 minutes 53 seconds and counting, still proceeding very satisfactorily. At this time Spacecraft Test Conductor Skip Chauvin working with Astronaut Buzz Aldrin in the middle seat covering the final pressurization of the reaction control system for the spacecraft. Those are the big thrusters on the side of the service module that are used for maneuvers in space. Each one of these thrusters is capable of 100 pounds of thrust, there are 16 of them located in 4 quadrants around the service module. We pressurize the system with helium prior to launch to make sure that all will be in readiness for use in space. The countdown still proceeding satisfactorily. We picked up at the T minus 9 hour mark at 11:00 p.m. Eastern Daylight Time last evening. We've just had 2 comparatively minor problems since that time. The major portion of the countdown during the early morning hour some 5 hours of work was taken to load the

various propellants aboard the stages of the Saturn V launch vehicle. As we came into the count this morning we did already have the fuel aboard the first stage, but it was necessary to bring the liquid oxygen aboard all 3 stages and the liquid hydrogen fuel aboard the second and third stages.

CDT 08:01 GET T -0:30:52 TAPE 011/2

PAO

Close to 3/4 of a million gallons of propellants were loaded during these 5 hours. Following that the astronauts, the prime crew, were awakened at 4:15 a.m. Eastern Daylight as planned in their countdown, and proceeded to have their physical examination in which they were declared flight ready. They sat down for the normal astronaut meal on launch day as far as breakfast is concerned, orange Juice, steaks, scrambled eggs, toast and coffee. The 3 pilots were joined by 2 of their coleagues at breakfast, Director of Flight Crew Operations Deke Slayton and the backup command module pilot Bill Anders who has been named the Executive Secretary of the National Aeronautics and Space Council. The astronauts departed from their crew quarters. After checking out their suits they departed from the crew quarters at 6:27 a.m. and some 27 minutes later and 8 miles away from the crew quarters at the Kennedy Space Center a top the launch pad at complex 39, 6:54 a.m. the commander, astronaut Neil Armstrong, was the first aboard the spacecraft. He was followed about 5 minutes later by Mike Collins and finally Buzz Aldrin, the man who is sitting in the middle seat during liftoff, was the third astronaut to come aboard. Two minor problems have been encountered during the count. Early in the count a malfunction light came on here in the control center indicating that we might have a communication problem at the launch pad. Nothing to do with the spacecraft, but it indicated we possibly might not be able to talk to some key technicians we had at the pad. The problem turned out to be very minor, a simple adjustment of some equipment beneath the pad remedied the problem. There was no, in fact, no equipment problem involved. The second problem, we did encounter a leaky valve in part of the equipment that is used to replenish the hydrogen fuel supply on the third stage of the Saturn V launch vehicle. A team of technicians were sent up to the launch pad at about the time the astronauts were traveling to the pad. They tightened some bolts and we were able to bypass this valve and to proceed with our countdown. The weather is certainly GO. It's a beautiful morning for a launch to the Moon. We expect a temperature of about 85 degrees in the Kennedy Space Center area. The wind is about 10 knots from the southeast, and the weather condition in the round-the-world track, according to reports to the Manned Space Flight Meterology group indicate all weather conditions are acceptable for launch. That's our general status. We've Just passed the 22 minute mark in the count. 21 minutes 55 seconds and counting, this is Kennedy Launch Control.

END OF TAPE

CDT 08:16 GET T -0:16:00 TAPE 012/1

PAO

This is Apollo/Saturn Launch Control. We are now less than 16 minutes away from the planned liftoff for the Apollo 11 space vehicle. All still going well with the countdown at this time. The astronauts aboard the spacecraft have had a little chance to rest over the last few minutes or so. At least they have not been busy with procedures with the spacecraft test conductor. In the meantime we have been performing final checks on the tracking beacons and the instrument unit which is used as a guidiance system during the powered phase of flight. Once we get down to the 3-minute and 10-second mark in the countdown, we'll go on an automatic sequence. As far as the launch vehicle is concerned all aspects from there on down will be automatic, run by the ground master computer here in the firing room. This will lead up to the 8.9-minute mark in the countdown when the ignition sequence will begin in those five engines of the first stage, the S-IC stage of Saturn V. At the 2-second mark we'll get information and a signal that all engines are running and at the zero mark in the countdown once we get the commit signal, the signal that says that the thrust is proper and acceptable, we then will get a commit and liftoff as the hold-on arms release the vehicle. We have some 7.6 million pounds of thrust pushing the vehicle upwards, a vehicle that weighs close to 6 and one-half million pounds. We are now 14 minutes and 30 seconds and counting and this is Kennedy Launch Control.

END OF TAPE

CDT 08:21 GET T -0:10:54 TAPE 013/1

PAO

This is Apollo Saturn Launch Control. We've passed the 11-minute mark. Now T minus 10 minutes 54 seconds on our countdown for Apollo 11. All still GO at this time. The astronauts in the spacecraft busy again. The commander Neil Armstrong has performed some final switch settings for the stabilization and control system of the spacecraft. The spacecraft also now is on full internal power. This came shortly after the 15-minute mark. Spacecraft now on the full power of it's fuel cells. Up to this time, it had been sharing the load with an external power source. Both Armstrong and Buzz Aldrin have armed their rotational hand controllers - the controllers they use in flight and we have now gone to automatic system with the emergency detection system. That system - it would que the astronauts if there's trouble down below with the Saturn V rocket during the powered flight, we're now coming up on the 10-minute mark. 10 minutes away from our planned liftoff. Mark T minus 10 minutes and counting, T minus 10. We're aiming for our planned liftoff at 32 minutes past the hour. This is Kennedy Launch Control.

END OF TAPE

CDT 08:26 GET T -0:5:52 TAPE 014/1

PAO

This is Apollo-Saturn launch control. We've passed the 6 minute mark in our countdown for Apollo 11. Now 5 minutes, 52 seconds and counting. We're on time at the present time for our planned lift off of 32 minutes past the hour. Spacecraft test conductor, Skip Chauvin now has completed the status check of his personnel in the control room. All report they are GO for the mission, and this has been reported to the test supervisor, Bill Schick. The test supervisor now going through some status checks. Launch operations manager, Paul Donnelly, reports GO for launch. Launch director Rocco Petrone, gives a GO. We're 5 minutes, 20 seconds and counting. Coming up shortly that swing arm up at the spacecraft level will come back to its fully retrakked position. It should occur at the 5 minute mark in the count. In the meantime the lunar module telemetry has been powered down. We took a good look at Eagle, and it looks good. The spacecraft test conductor for the lunar module reported that Eagle was GO. The swing arm now coming back to its fully retracted position as our countdown continues. T-4 minutes, 50 seconds and counting. Skip Chauvin informing the astronauts that the swing arm now coming back. The astronauts will have a few more reports coming up in the countdown. The last business report will be from Neil Armstrong at the 45 seconds mark in the count when he gives the status on the final alignment of the stabilization and control system. We're now passing the 4 minute, 30 second mark in the countdown - still GO at this time. Four minutes, 15 seconds - the test supervisor now has informed launch vehicle test conductor, Norm Carlson, you are GO for launch. From this time down, Carlson handles the countdown as the launch vehicle begins to build up. We're now hitting the 4 minute mark. Four minutes and counting. We are GO for Apollo 11. We'll go on an automatic sequence as standing at 3 minutes and 7 seconds. Three minutes, 45 seconds and counting. In the final abort checks between several key members of the crew here in the control center and the astronauts' launch operations manager, Paul Donnelly wished the crew on and the launch teams we have good luck and God speed. Three minutes, 25 seconds and counting. We're still GO at this time. We'll be coming up on the automatic sequence in about 10 or 15 seconds from this time. All still GO at this time. Neil Armstrong reported back when he received the good wishes, thank you very much. We know it will be a good flight. Firing command coming in now. We are on the automatic sequence. We're apprpaching the 3 minute mark in the count. T-3 minutes and counting. T-3 - we are GO with all elements of the mission at this time. We're on an automatic sequence system as the computer supervises hundreds of events occurring over these last few minutes. T-2 minutes, 45 seconds and counting.

CDT 08:26 GET T -0:5:52 TAPE 014/2

PAO

The members of the launch team here in the control center monitoring a number of what we call red-line values. These are tolerances we don't want to go above and below in temperatures and pressures. They're standing by to call out any deviations from our plans. Two minutes, 32 seconds and counting. We're still GO on Apollo 11 at this time. The vehicle starting to pressurize as far as the propellant tanks are concerned, and all is still GO as we monitor our status for it. Two minutes, 10 seconds and counting. The target for the Apollo 11 astronauts, the moon. At liftoff we'll be at a distance of 218,096 miles away. Just passed the 2 minute mark in the countdown. T-1 minute, 54 seconds and counting. Our status board indicates that the oxidizer tanks in the second and third stages now have pressurized. We continue to build up pressure in all three stages here at the last minute to prepare it for liftoff. T-1 minute, 35 seconds on the Apollo mission, the flight that will land the first man on the moon. All indications are coming in to the control center at this time indicate we are GO. One minute, 25 seconds and counting. Our status board indicates the third stage completely pressurized. Eighty second mark has now been passed. We'll go on full internal power at the 50 second mark in the countdown. Guidance system goes on internal at 17 seconds leading up to the ignition sequence at 8.9 seconds. We're approaching the 60 second mark on the Apollo - -

END OF TAPE

CDT 08:31 GET T -0:01:00 TAPE 015/1

PAO

leading up to the ignition sequence 8.9 seconds. We are approaching the 60-second mark on the Apollo 11 Mission. T-60 seconds and counting. We have passed T-60. 55 seconds and counting. Neil Armstrong just reported back. It's been a real smooth countdown. We have passed the 50-second mark. Our transfer is complete on an internal power with the launch vehicle at this time. 40 seconds away from the Apollo 11 liftoff. All the second stage tanks now pressurized. 35 seconds and counting. We are still go with Apollo 11. 30 seconds and counting. Astronauts reported, feels good. T-25 seconds. 20 seconds and counting. T-15 seconds, guidiance is internal, 12, 11, 10, 9, ignition sequence starts, 6, 5, 4, 3, 2, 1, zero, all engines running, LIFTOFF. We have a liftoff, 32 minutes past the hour. Liftoff on Apollo 11.
Tower cleared.

PAO

Neil Armstrong reporting their roll and pitch program which puts Apollo 11 on a proper heading. Plus 30 seconds.

SC

Rolls complete and a pitch is program. One BRAVO.

PAO
One BRAVO is an abort control mode. Altitude is 2 miles.

CAPCOM
All is well at Houston. You are good at 1 minute.

PAO
Down range 1 mile, altitude 3 - 4 miles now, velocity is 2,195 feet per second. We are through the region of maximum dynamic pressure now. 8 miles down range, 12 miles high, velocity 4,000 feet per second.

CAPCOM
Stand by for Mode 1 Charlie MARK Mode 1 Charlie.

SC
1 Charlie.

PAO
Cliff Charlesworth taking a staging status.

CAPCOM
This is Houston, you are GO for staging.

SC
Inboard cutoff.

PAO
Inboard engines out.

CAPCOM
Inboard cutoff.

PAO
Down range 35 miles, 30 miles high. Standing by for the outboard engine cutdown now.

SC
Staging and ignition.

CAPCOM
11, Houston, thrust is GO all engines, you are looking good.

SC
Roger. Hear you loud and clear, Houston.

CDT 08:31 GET T -0:01:00 TAPE 015/2

PAO
At 3 minutes, downrange 70 miles, 43 miles high, velocity 9300 feet per second.

SC
We've got skirts up.

CAPCOM
Roger, we confirm. Skirts up.

SC
Tower is gone.

CAPCOM
Roger. Tower.

PAO
Neil Armstrong confirming both the engine skirt separation and the launch escape tower separation.

SC
Houston be advised the visual is GO today.

CAPCOM
This is Houston. Roger, out.

SC
Yes, they finally gave me a window to look out.
CAPCOM
11, Houston, your guidiance is converged, you are looking good.

PAO
Downrange 140 miles, altitude is 62 miles, velocity 10,300 feet per second.

CAPCOM
11, Houston, you are GO at 4 minutes.

SC
Roger.

PAO
Apollo 11 right on the ground track.

PAO
190 miles downrange now, 72 miles high, velocity 11,000 feet per second.

PAO
Booster says it is looking good at 5 minutes.

CAPCOM
This is Houston, you are GO at 5 minutes.

SC
Roger, Apollo 11, GO.

PAO
Downrange 270 miles, altitude is 82 miles, velocity is 12 472 feet per second.

CAPCOM
S-IVB to COI capability.

SC
Okay.

CAPCOM
MARK S-IVB to COI capability.

SC
Roger.

PAO
Apollo 11 could now get into orbit using the S-IVB if necessary.

SC
- sitting in your living room.

CAPCOM
Oh, thank you. You are coming through beautifully, too.

PAO
Everyone is reporting GO here in the Control Center.

SC
- 6 minutes, starting the gimbal motors .

CAPCOM
Roger 11, you are GO from the ground at 6 minutes.

CDT 08:31 GET T -0:01:00 TAPE 015/3

CAPCOM
Apollo 11, this is Houston. Level sense arm at 8 plus 17, outboard cutoff at 9 plus 11.

PAO
Level sense arm is the sequence that arranges the staging between the second stage and the third stage. The fuel - uncovers the sensor starting that sequence. Predicting that will be uncovered at 8 minutes 17 seconds with outboard engine cutoff at 9 minutes 11 seconds on the second stage.

SC
Apollo 11 is good at 7 minutes.

CAPCOM
Roger, 11, this is Houston. You are GO from the ground at 7 minutes. Level sense arm at 8 plus 17 outboard cutoff at at 9 plus 11.

SC
Roger.

PAO
Downrange 530 miles, altitude 95 miles, velocity 17,358 feet per second.

PAO
Apollo 11 is still right down the ground track and still GO, at 7 minutes, 41 seconds.

CAPCOM
Roger, we confirm.

PAO
Inboard engines are out on the second stage as planned.

PAO
Apollo 11 GO on all sources.

CAPCOM
11, Houston, you are GO at 8 minutes.

SC
We just got the mixture ratioshift.

CAPCOM
Roger, we've got PU shift down here, too.

SC
It's a nice day for it. These thunderstorms downrange is about all.

CAPCOM
11, this is Houston. You are GO for staging. Over.

SC
S-band, GO for staging.

CAPCOM
Stand by for Mode IV Capability.

SC
Mode IV.

CAPCOM
MARK, Mode IV capability.

PAO
Mode IV on Apollo 11 could get into orbit using the service propulsion system now. Altitude is 100 miles, downrange is 883 miles, outboard engine cutoff.

SC
- and ignition.

CAPCOM
Engine confirmed, thrust is GO, 11.

PAO
And we have a good third stage now .

PAO
Velocity is 23,128 feet per second. Downrange 1000 miles, altitude 101 miles.

CAPCOM
Apollo 11, this is Houston, at 10 minutes you are GO.

CDT 08:31 GET T -0:01:00 TAPE 015/4

SC
Roger, 11, GO.

PAO
Capcom Bruce McCandless giving the reports here in the Control Center.

CAPCOM
Apollo 11, this is Houston, predicted cutoff at 11 plus 42. Over.

SC
11 42. Roger.

PAO
Downrange 1,175 miles, velocity 24,190 feet per second and altitude 102 nautical miles.

PAO
Apollo 11 still GO on all sources.

CAPCOM
Apollo 11, this is Houston. You are GO at 11.

SC
Roger.

PAO
We are predicting third stage shutdown at 11 minutes, 42 seconds. Velocity
25,254 feet er second. Downrange 1,400 miles now. Altitude 102.8 nautical miles.

SC
Shutdown.

PAO
Shutdown right on time.

SC
101.4 by 103.6

CAPCOM
Roger. Shutdown. We copy 101.4 by 103.6.

END OF TAPE

CDT 08:44 GET 000:12:04 TAPE 016/1

CAPCOM
Apollo 11, this is Houston. You are confirmed GO.

SC
Roger.

CAPCOM
This is Houston. The booster is safe.

SC
Roger.

PAO
We show velocity and insertion 25,568
feet per second.

CAPCOM
Apollo 11, this is Houston. The booster has been configured for orbital coast. Both spacecraft are looking good. Over.

SC
Roger.

CAPCOM
Apollo 11, this is Houston. Vanguard LOS at 1535. AOS Canary at 1630. Over.

SC
Okay, thank you.

PAO
This is Apollo Control. Based on a vector from the instrument unit of the third stage of the Saturn V, here on the ground we're showing an orbit of 102.5 by 99.7 nautical miles. The flight dynamics officer, Dave Reed, wants to get some radar tracking to refine this orbit and he will report a refined orbit after more radar tracking.

PAO
This is Apollo Control at Canary Island Station. Has acquisition of Apollo 11 now. We'll continue to stand by live for any air to ground communication. We're showing an orbital weight of the combined vehicles of 297,914 pounds.

COMM TECH
Go ahead Houston Comm Tech, Canary Comm Tech.

CAPCOM
Apollo 11, this is Houston through Canary. Over.

SC
Roger, reading you loud and clear. Our insertion checklist is complete, and we have no abnormalities.

CAPCOM
Roger, and I'd like to pass up your DELTA azimuth correction at this time. Are you ready to copy?

SC
Stand by.

SC
Roger, go ahead. Ready to copy.

CAPCOM
Okay, DELTA azimuth correction is plus 0.22, that is plus .22 and we do recommend the P-52 alignment. Over.

SC
Okay, we'll go ahead with the P-52, and detecting angleplus 0.22.

CAPCOM
Roger, and your LOS time at Canary is 2337. Over.

SC
2337.

CAPCOM
Houston, Roger. Out.

PAO
This is Apollo Control. Based on that initial orbital figures, the orbital period is 1 hour, 28 minutes, 16 seconds. This number will be refined also as we get better information on the orbit through radar tracking. at

CDT 08:44 GET 000:12:04 TAPE 016/2

PAO
the present time, we're showing an orbital period of 1 hour, 28 minutes 17 seconds. We'll continue to stand by live through the Canary Station.

CAPCOM
Apollo 11, this is Houston. One minute to LOS Canary. AOS at Tananarive, 3704 in VHF simplex ALPHA. Over.

END OF TAPE

CDT 08:55 GET 000:23 TAPE 017/1

CAPCOM
Apollo 11, this is Houston, coming up on LOS Canary, AOS Tananarive at 3704, simplex ALFA. Houston out.

SC
Roger.

PAO
This is Apollo Control at 23 minutes 52 seconds. Canary Island station has loss of signal from Apollo 11. We have a tape of the air-ground during the launch phase . We'll play that for you now.

REPLAY OF LAUNCH TAPE

PAO
This is Apollo Control at 36 minutes. That's the end of the tape. We have a report on the launch heart rates now from the flight surgeon. Commander Neil Armstrong's heart rate 110, Command Module pilot Mike Collins 99, Lunar Module pilot 88. These compare with their first Gemini flights, their first liftoff back in the Gemini program. Armstrong's heart rate was 146 at that time, Collins was 125, Aldrin was 110. We have acquisition at Tananarive now. We'll stand by live now through that station.

END OF TAPE

CDT 09:10 GET 000:38 TAPE 018/1

PAO
This is Apollo - -

CAPCOM
Apollo 11, this is Houston through Tananarive. Over. Apollo 11, Apollo 11, this is Houston through Tananarive. Over.

SC
Houston, Apollo 11. Read you on VHF radio system. How do you read? Over.

CAPCOM
Roger, 11. This is Houston. We're reading you loud and fairly clearly. For your information, Canary radar shows you in a 103.0 by 103.0 orbit. Over.

SC
Clear. Over.

CAPCOM
Roger. We can clear.

SC
Gene, we're just coming in to the terminator here.

PAO
This is Apollo Control. The orbital period at that 103 nautical mile circular orbit is 1 hour, 28 minutes, 24 seconds.

CAPCOM
Apollo 11, this is Houston. One minute to LOS Tananarive. AOS Carnarvon is at 52:15. Over.

SC
All down, roger.

PAO
This is Apollo Control at 42 minutes, 53 seconds. Tananarive has loss of signal. We'll come back up at 52 minutes into the mission when the Carnarvon- Australian station acquires Apollo 11. This is Mission Control, Houston.

END OF TAPE

CDT 09:24 GET 000:52 TAPE 019/1

PAO
This is Apollo Control at 52 minutes and the station at Carnarvon, Australia is about to acquire Apollo 11. We'll stand by live for this pass.

CAPCOM
Apollo 11, this is Houston through Carnarvon. Over.

SC
Houston, Apollo 11. Loud and clear. Over.

CAPCOM
Roger 11, we're reading you the same. Both the booster and the spacecraft are looking good to us. Over.

SC
Houston, Apollo 11. Would you like to copy the alinement results?

CAPCOM
That's affirmative.

SC
Okay, NOUN 71 we used 30 and 37, 4 balls 1, NOUN 93 plus 00016 plus 00033 plus 00152. GET 00:48:15. Check star 34. Over.

CAPCOM
Roger, say again check star.

SC
Check star 34.

CAPCOM
Roger, we copy, and the angles look good.

SC
Tell Glenn Parker down at the Cape that he lucked out.

CAPCOM
Understand tell Glenn Parker he lucked out.

SC
Yes, he lucked out. He doesn't owe me a cup of coffee.

CAPCOM
This is Houston. Roger. We'll pass it on.

PAO
That was Buzz Aldrin giving the report and Mike Collins chiming in that at the last with the no cup of coffee report.

CAPCOM
Apollo 11, this is Houston. 1 minute LOS Carnarvon, AOS at Honeysuckle 59:33. Over.

SC
Apollo 11, roger.

CAPCOM
Roger, request you turn up S-band volume for the Honeysuckle pass.

PAO
This is Apollo Control. We've had loss of signal at Carnarvon. However, the station at Honeysuckle in Australia will acquire Apollo 11 in approximately a minute. We'll continue to stand by through the Honeysuckle pass.

CAPCOM
Apollo 11, Apollo 11, this is Houston on S-band. Radio check, over.

SC
Roger, Houston, Apollo 11 reads you loud and clear.

CAPCOM
This is Houston. Roger, reading you the same. Out.
PAO
That was Neil Armstrong in the radio check.

CAPCOM
Apollo 11, this is Houston, a little over 1 minute to LOS at Honeysuckle. You'll be AOS at Goldstone at 1:29:02, LOS at Goldstone 1:33:55. Over.

SC
Roger, Bruce, thank you. We expect TV

CDT 09:24 GET 000:52 TAPE 019/2

SC
We've got it all hooked up. We have not yet turned it on. We're ready to do that now.

CAPCOM
Roger, we copy. We'll be configured and waiting for what ever you want to send out.

PAO
This is Apollo Control at 1 hour 6 minutes into the mission of Apollo 11. Honeysuckle has lost signal. Mike Collins reported just prior to LOS here that the crew would check out the TV camera at the Goldstone station. Goldstone will acquire Apollo 11 at 1 hours 29 minutes 2 seconds and will lose the spacecraft at 1 hour 33 minutes 55 seconds. We'll come back up shortly prior to acquisition at Goldstone. This is Mission Control Houston.

END OF TAPE

PAO
This is Apollo Control at 1 hour and 28 minutes into the mission. We are about 10 or 12 seconds away from acquisition at Goldstone at which time we expect a checkout of the color TV camera. We will then continue live through the United States pass.

CAPCOM
(Garble)

SC
Roger, Houston, read you loud and clear.

CAPCOM
Roger. Reading you same, coming up on Goldstone.

SC
Roger.

SC
Cecil B. to Aldrin is standing by for instructions.

CAPCOM
Houston, Roger.

PAO
We have no downlink yet at Goldstone. We're standing by.

CAPCOM
Apollo I1, this is Houston. We are not receiving your FM downlink yet. We are standing by.

CAPCOM
Apollo 11, this is Houston. We are receiving your FM downlink now. We are standing by for TV modulations on the signal.

CAPCOM
Apollo 11, Apollo 11, this is Houston on radio check. Over.

SC
Roger. Loud and clear. We think we are transmitting to you.

CAPCOM
Okay, we are not receiving it yet, 11, although we have confirmed presence of your FM downlink carrier.

SC
Which switches do you want us to confirm?

CAPCOM
Stand by.

CAPCOM
Apollo 11, this is Houston. You were just on the fringes of coverage from Goldstone. We have just had LOS at Goldstone and we'd like to push on and get the pad messages read up to you here shortly.

SC
Roger. We are ready to copy.

CAPCOM
Apollo 11, this is Houston. I am ready with your TLI plus 90 minute abort test.

CAPCOM
Apollo 11, this is Houston. I am ready with your TLI-plus 90 minute abort test.

SC
Apollo 11 is ready to copy TLI plus 90.

CAPCOM
Roger. TLI plus 90, SPS G&N,

CDT 10:00 GET 001:28 TAPE 020/2

CAPCOM
63481 minus 153 plus 132, CETI 004102538, NOUN 81 minus 04761 plus 00001 plus 53361, ROLL 180 193 000. HA is NA plus 002035357363353349, Sextant Star 3352578122, the aboard sight star is not available. Latitude minus 02052 minus 02580 11887 34345 0160350. GDC aline Vega and Deneb. ROLL 071291341 no ullage undocks. I have your P37 for TLI plus 5 hours. Over.

SC
Go ahead TLI plus 5.

CAPCOM
Roger P37 format, TLI plus 5, 00744 6485 minus 165 02506. Readback over.

SC
TLI plus 90 SPS G&N 63481 minus 153 plus 132 004 102538 minus 04761 plus 00001 plus 53361 180 193 000. Not applicable, plus 00203 53573633 53349331578122 not available, minus 0252, minus 0258 1188734345 0160350. Vega and Deneb 071291 341. No ullage, undocked. P37 TLI plus 5.

END OF TAPE

CDT 10:10 GET 001:38 TAPE 021/1

SC
291341. No ullage undocked. P37 TLI plus 5. 00744 6485 minus 165 02506. Over.

CAPCOM
Apollo 11, this is Houston. Readback correct. For your information Goldstone reports receiving approximately 1 minute of FM down link carrier. We were getting ready to request you confirm the S-band OCS switches, the S-band OCS tape switch to OFF and the S-band OCS TV switch to TV. Over.

SC
I confirm that that is the configuration we're in.

CAPCOM
Roger. Let us do a little more detective work here and see if we can come up with something.

SC
Okay.

SC
Houston, Apollo 11 is ready to go ahead with the - extend the docking probe, and ready to go with the RCS hot fire when you're ready to monitor. Over.

CAPCOM
Roger, go ahead with the probe count.

SC
Roger.

SC
Okay, we're ready with the hot fire check when you're ready.

CAPCOM
Roger, we're ready 11. Go ahead.

SC
Roger, here's the pitch.

CAPCOM
Apollo 11, this is Houston. We are seeing the pitch hot firing and it looks good.

SC
Roger. Be advised that we are unable to hear them.

CAPCOM
Roger, we copy.

SC
Have you seen all 3 axis fire?

CAPCOM
We've seen pitch and yaw, we've not seen roll today.

SC
Okay, I'll put in a couple more rolls.

CAPCOM
Okay, we've got the roll in focus and you're looking good here.

SC
Roger. Houston, Apollo 11. We're standing by for a GO for sequence logic on.

CAPCOM
Apollo 11, this is Houston. Go ahead and we'll watch on TM.
SC
Okay. Sequence logic, 2 of them. Sequence logic 1 and 2 coming up and on them.

CAPCOM
Apollo 11, this is Houston, you are GO for pyro arm.

SC
Roger, thank you.

CAPCOM
Apollo 11, this is Houston. If you will give us POO in accept we have a state vector update for you.

SC
Roger. You have PO0 in accept.

CAPCOM
Roger. It will probably be another 10 or 15 seconds. We're going to go up through the Vanguard. When you are ready to copy I have your TLI pad.

SC
Roger, ready to copy TLI pad.

CDT 10:10 GET 001:38 TAPE 021/2

CAPCOM
Roger, TLI 235 14 179 071 001. Burn time 547 104356 35575 Roll for sep 357107041 301 287 319. TLI 10 minute abort pitch 223. Readback. Over.

SC
Roger. TLI PAD. 23514 179071001 547 10 4356 35575 357107041 301 287 319. TLI 10 minute abort pitch 223. Over.

CAPCOM
Apollo 11, Houston. Roger. Would you read back DELTA-VC prime again? You were cut out by noise.

SC
Okay. Roger, I'm picking up the squeal here, also. DELTA-VC 104356. Over.

CAPCOM
Apollo 11, this is Houston. Readback correct. Out.

CAPCOM
Apollo 11, this is Houston. We've completed the uplink, the computer is yours, you can go back to BLOCK. Would you verify that you have extended the probe? Over.

SC
Roger, that's verified. The probe is extended.

CAPCOM
Roger. About 2 minutes to LOS on this state side pass. AOS Canaries at 1:50:13. Over.

SC
Roger, 1:50.

END OF TAPE

CDT 10:20 GET 001:48 TAPE 022/1

PAO
This is Apollo Control. The tracking ship, Vanguard, has had loss of signal, however, the Canary Island station will acquire Apollo 11 in less than a minute. We'll continue to stay up live through the Canary station. The ignition time for the translunar injection burn - an elapsed time of 2 hours, 44 minutes, 14 seconds. Duration of the burn expected to be 5 minutes, 47 seconds. We're acquiring at Canaries now. We'll stand by.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Roger, Houston, Apollo 11. Loud and clear.

CAPCOM
Okay, on your service module RCS quad BRAVO package temperature, we're showing it running a little low. Looks like about 20 degrees low - lower than the rest of the quad. Would you confirm that your RCS heater switch for quad BRAVO is in primary? Over.

SC
You're correct. It was not in primary. It was off. It's on now. Thank you.

CAPCOM
Roger, thank you.

PAO
And the temperature on that reaction control system quad is coming up to normal now that the heater's on.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Houston, Apollo 11. Go ahead.

CAPCOM
Roger. We've checked over the spacecraft and the launch vehicle guidance. They're both looking to be in good shape. We estimate you have better than a 99 percent probability of a guidance cutoff on the launch vehicle, so things are apparently holding in very well. For your information, Mila received approximately 1 minute of a usable TV picture, so apparently the system is working, and you're a little over a minute from LOS at Canary. AOS Tananarive is 2 hours, 9 minutes, and 18 seconds. Over.

SC
Roger. We like those 99 numbers. Thank you.

CAPCOM
Roger, out.

PAO
This is Apollo Control at 1 hour, 55 minutes into the mission. Canary has had loss of signal. We were unable to use the 1 minute of TV time from the mylar station. There is no longer a converter at Mila. The one formerly there has been sent to the Australian station. Tananarive will acquire Apollo 11 on its second orbit of the earth at 2 hours, 9 minutes, 18 seconds. We expect the translunar injection burn at 2 hours, 44 minutes, 14 seconds. Duration of 5 minutes, 47 seconds and the DELTA-V or the velocity that we will add to the spacecraft of 10,435.6 feet per second. We'll come back up at Tananarive acquisition. This is Mission Control, Houston.

END OF TAPE

CDT 10:40 GET 002:08 TAPE 023/1

PAO
This Apollo Control at 2 hours, 8 minutes into the mission. Apollo 11 about to be acquired at the Tananarive station. As expected this orbit is changing slightly as the S-IVB third stage vents. We are showing an orbit now of 107 by 105.7 nautical miles in an orbital period of 1 hour, 28 minutes, 30 seconds. We have acquired Tananarive now. We'll stand by live through that station.

CAPCOM
Apollo 11, this is Houston, through Tananarive. How do you read?

CAPCOM
ApolLo 11, this is Houston standing by through Tananarive.

COMM TECH
Tananarive, Houston COMM TECH. Net 1.

COMM TECH
Tananarive, Houston, COMM TECH. Net 1.

COMM TECH
Goddard voice, Houston COMM TECH Net 1.

GODDARD
Goddard voice, read you loud and clear.

COMM TECH
Roger, we can not raise Tananarive.

TAN
Houston, COMM TECH, Tananarive.

COMM TECH
Roger, Tananarive. Are you receiving CAPCOM's voice and are you uplinking it?

TAN
Negative.

COMM TECH
Roger. Monitor again I'll tell CAPCOM to make one more transmission.

TAN
Roger.

CAPCOM
Apollo 11, Apollo 11, this is Houston standing by through Tananarive. Over.

SC
Houston, Apollo 11.

CAPCOM
Roger. Reading you loud and clear.

SC
Houston, Apollo. The power is on.

CAPCOM
This is Houston. Roger. Out.

CAPCOM
Apollo 11, this is Houston. 1 minute to LOS Tananarive, AOS at Carnarvon, 22530.

SC
Roger.

PAO
This is Apollo Control at 2 hours, 16 minutes. Tananarive has loss of signal. The Carnarvon station will acquire at 2 hours, 25 and one-half minutes and during the Carnarvon pass the GO/NO GO decision will be made for the translunar injection maneuver. That maneuver to occur at about 27 minutes from now near the - spacecraft is near the Gilbert Islands, about halfway between Australia and Hawaii. We will come back up just prior to Carnarvon acquisition. This is Mission Control, Houston.

END OF TAPE

CDT 10:57 GET 002:25 TAPE 024/1

PAO
This is Apollo Control at 2 hours 5 minutes and Carnarvon has acquired Apollo 11. At LOS here at Carnarvon we will have several ARIA's, Apollo Range Instrumented Aircraft, in the area between LOS Carnarvon and acquisition at the tracking ship Redstone, so we may have the capability of continuous communications between now and the TLI burn. We'll stand by through Carnarvon.

CAPCOM
Apollo 11, this is Houston through Carnarvon. Radio check, over.

SC
Roger, Houston through Carnarvon, Apollo 11, loud and clear.

CAPCOM
Roger, you're coming in very loud and very clear here. Out.

CAPCOM
Apollo 11, this is Houston, you are GO for TLI. Over.

SC
Apollo 11, thank you.

CAPCOM
Roger, out.

CAPCOM
Apollo 11, this is Houston, over.

SC
Houston, 11.

CAPCOM
Roger. We'll be coming within range of the ARIA aircraft coverage here in about 1 minute. They're going to try uplinking both on S-band and on VHF this time, so if you'll make sure your S-band volume is turned up we'll appreciate it and we believe that we'll have continuous coverage from now on through this TLI burn. Over.

SC
Very good.

CAPCOM
Apollo 11, Apollo 11, this is Houston through ARIA 4. Radio check, over.

SC
Houston, we read you strength 4 and a little scratchy.

CAPCOM
Roger, we're reading you strength 5, readability 3, should be quite adequate.

CAPCOM
Apollo 11, Apollo 11, this is Houston. We're reading you readability about 3, strength 5, sounds pretty good. Over.

SC
Roger. We've got a little static in the background now.

PAO
This is Apollo Control. We are 10 minutes away from ignition on translunar injection. We want to add 10,435 feet per second to the spacecraft's velocity, looking for a total velocity at the end of this burn of about 35,575 feet per second.

END OF TAPE

CDT 11:07 GET 002:35 TAPE 025/1

CAPCOM
Apollo 11, this is Houston through Aria 3, radio check, over.

SC
Roger, Houston, Apollo 11, you are much clearer and adquately read. Over.

CAPCOM
Roger, 11, you are coming in 5 by 5 here. Beautiful signal.

SC
This is lot better than the static we had previously.

CAPCOM
Ok ay.

SC
And we got the time base fix indications on time.

CAPCOM
This is Houston. Roger. Out.

CAPCOM
Apollo 11, this is Houston. We just got telemetry back down on your booster and it is looking good.

SC
Roger. It looks good here.

CAPCOM
Houston, Roger, out.

PAO
This is Apollo Control. We are 2 minutes from ignition now. We are showing present altitude of about 108 nautical miles. We expect to be in an altitude of 177 nautical miles at cutoff. The present velocity is 25,560 feet per second. We are one minute from ignition.

CAPCOM
Apollo 11, this is Houston, slightly less than 1 minute to ignition and everything is GO.

END OF TAPE

CDT 11:15 GET 002:43 TAPE 026/1

PAO
and we're one minute from ignition.

CAPCOM
Apollo 11, this is Houston. we are slightly less than one minute to ignition and everything is GO.

SC
Roger.

SC
Ignition.

CAPCOM
We confirm ignition and thrust is GO.

PAO
Guidance looking good. velocity 26,000 feet per second

CAPCOM
Apollo 11, this is Houston at 1 minute. Trajectory and guidance look good and the stage is good. Over.

SC
Apollo 11. Roger.

PAO
Coming up on 27,000 feet per second.

PAO
Telemetry and radar tracking both solid. Velocity 27,800 feet per second.

CAPCOM
Apollo 11, this is Houston. Thrust is good. Everything's still looking good.

SC
Roger.

PAO
We're 2 and a half minutes into this burn. Still have another 3 minutes to go.

PAO
And velocity exceeds 29,000 feet per second building up toward 30,000 feet per second.

PAO
Present altitude 115 nautical miles.

CAPCOM
Apollo 11, this is Houston. Around 3 and a half minutes. You're still looking good. Your predicted cutoff is right on the nominal.

SC
Roger. Apollo ll's GO.

PAO
31,200 feet per second now. Altitude 125 nautical miles.

PAO
Velocity 32,000 feet per second. Altitude 130 miles.

PAO
One minute left to burn. Velocity is 33,000 feet per second. Altitude 142 and a half nautical miles

CAPCOM
Apollo 11, this is Houston. You are GO at 5 minutes.

SC
Roger, we're GO.
PAO
34,000 feet per second now. Altitude 152.

PA0
35,000 feet per second.

PAO
Cut out. We're showing velocity 35, 570 feet per second. Altitude 177 nautical miles.

CAPCOM
Apollo 11, this is Houston. we show

CDT 11:15 GET 002:43 TAPE 26/2

CAPCOM
cutoff and we copy the numbers in noun 62.

CAPCOM
Apollo 11, Houston, do you read?

CAPCOM
Apollo 11, this is Houston. Do you read? Over.

SC
Roger, Houston. Apollo 11. We're reading the VIL 35579 and the EMS was plus 3.3. Over.

CAPCOM
Roger. Plus 3.3 on the EMS. And we copy the VI.

SC
Hey Houston, Apollo 11. This Saturn gave us a magnificent ride.

END OF TAPE

CDT 11:25 GET 002:53 TAPE 027/1

SC
Houston, Apollo 11. The Saturn gave us a magnificent ride.
CAPCOM
Roger, 11, we'll pass that on, and it looks like you are well on your way now.

PAO
That was Neil Armstrong praising the launch vehicle.

SC
We have no complaints with any of the 3 stages on that ride. It was beautiful.

CAPCOM
Roger, no transients at staging of any significance, over.

SC
That's right, it was nominal. All a good ride.

CAPCOM
Houston, roger, out.

CAPCOM
Apollo 11, this is Houston. For your information we expect the maneuver to separation attitude to begin at 3 plus 05 plus 03, and to be completed plus 09 plus 20. Separation at 3 plus 15 plus 00.

SC
Roger, time to begin maneuver is 30503, complete 30920. Separation 3 plus 1500.

CAPCOM
Roger, that separation should be 3 plus 15 03, my error in reading up.

SC
Roger.

PAO
This is Apollo Control, velocity falling off now. Immediately after shutdown we're showing 34,000 feet per second now. The altitude building 512 nautical
miles.

CAPCOM
Apollo 11, this is Houston. All the booster functions are proceeding normally. The sequencing is in good shape, and it doesn't look like you are having any problems at all. Over.

SC
Roger.

PAO
This is Apollo Control and we're showing orbital weight 138,892.9 pounds.

PAO
This is Apollo Control at 3 hours into the mission. Velocity now 31,214 feet per second. Apollo ll's distance from Earth 1245 nautical miles.

END OF TAPE

CDT 11:35 GET 003:03 TAPE 028/1

CAPCOM
Apollo 11, this is Houston. Preliminary data indicates a good cutoff on the S IVB. We'll have some more trajectory data for you in about half an hour. Over.

PAO
This is Apollo Control. The S IVB has started its maneuvering to the separation attitude.

PAO
At 3 hours 7 minutes the velocity is 27,945 feet per second. Distance from Earth 2384 nautical miles.

CAPCOM
Apollo 11, Apollo 11, this is Houston, over.

CAPCOM
Apollo 11, Apollo 11, this is Houston, over.

SC
Hello Houston. Hello Houston. This is Apollo 11. I'm reading you loud and clear. Go ahead, over.

CAPCOM
Roger, 11, this is Houston. We had to shift stations. We weren't reading you through Goldstone. We show pyro bus A armed and pyro bus B not armed at the present time. Over.

SC
That's affirmative, Houston, that's affirmative.

CAPCOM
Roger.

PAO
The S IVB has completed its maneuver to separation attitude.

PAO
4 minutes away from separation, 4 minutes.

PAO
At 3 hours II minutes into the mission velocity 26 314 feet per second. Distance from Earth 3140 nautical miles.

PAO
The S-IVB is reported in a stable attitude for the separation.

PAO
Rates are less than 1/10th of a foot per second in all axis.

END OF TAPE

CDT 11:45 GET 003:13 TAPE 029/1

PAO
One minute to separation.

CAPCOM
Apollo 11, this is Houston. You're GO for separation. Our systems recommendation is arm both pyro busses. Over.
SC
Okay. Pyro B coming armed. My intent is to use bottle primary 1, as per the check list therefore I just turned A on.

CAPCOM
Roger, we confer with the logic.

PAO
We' re waiting confirmation of separation.

SC
Houston, we're about to SEP.

CAPCOM
This is Houston. We copy.

SC
Separation complete.

CAPCOM
Roger.

PAO
We confirm the separation here on the ground.

SC
And (garbled) secondary propellant B went (garbled).

CAPCOM
That was secondary propellant on quad BRAVO?

SC
Quad BRAVO, yes. Both the primary and secondary (garbled).

SC
Houston, stand by.

CAPCOM
Apollo 11, this is Houston. Radio checkover.

PAO
The Goldstone station reports a very weak signal. We believe that (garble) is now maneuvering the spacecraft in the transposition and docking maneuver, and the antenna patterns aren't too good at the moment, so we have a weak signal strength.

END OF TAPE

CDT 11:55 GET 003:23 TAPE 030/1

CAPCOM
Apollo 11, Apollo 11, this is Houston broadcasting in the blind. Request OMNI BRAVO is you read us. request OMNI BRAVO. out.

CAPCOM
Apollo 11, this is Houston. How do you read?

PAO
Goldstone still showing weak signal strength.

CAPCOM
Apollo 11, this is Houston. How do you read? Over.

CAPCOM
Apollo 11, Apollo 11, this is Houston. Do you read? Over.

CAPCOM
Apollo 11, this is Houston. Radio check. Over.

CAPCOM
Apollo 11, this is Houston. Radio check. Over.

CAPCOM
Roger, we've copying you about 5 by 2, very weak. Can you give us a status report, please?

SC
Roger, we are docked and we do want acquisition with the high gain at this time I think.

CAPCOM
Understand you are using the high gain, over.

SC
That's affirmative.

CAPCOM
Roger, I read you very loud and clear, Buzz. Mike is pretty weak.

SC
Roger, we've got the high gain locked on now I believe, auto tracking now.

CAPCOM
Okay, you're coming in loud and clear but Mike is just barely readable.

SC
That was Neil. How are you reading Mike.

CAPCOM
Loud and clear, Mike, and we understand that you are docked.

SC
That's affirmative.

SC
Houston, CDR. How do you read (garbled).

CAPCOM
1l, CDR loud and clear, Neil.

SC
Okay.

PAO
This is Apollo Control. Apollo ll's velocity now 21,096 feet per second, distance from Earth 6649 nautical miles.

CAPCOM
11, this is Houston. Over.

SC
Houston, Apollo 11. Go ahead.

CAPCOM
Roger, when you commented on that BRAVO problem at separation you were a lttie weak. Could you go through what you did after you noticed the talkback problem again, please?

END OF TAPE

CDT 12:05 GET 003:33 TAPE 031/1

CAPCOM
We copied the - the primary and secondary propellant talk back on SM RCS quad BRAVO 1 to barberpole at separation.

SC
Roger. Roger, that's affirmative, and we moved that switch to the open position and they went back to gray. Over.

CAPCOM
Roger.

PAO
This is Apollo Control. We're 34 minutes away from extraction of the Lunar Module from its adapter in the third stage of the saturn. The crew has started pressurizing the LM.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Roger, Houston. Apollo 11, go ahead.

CAPCOM
Roger. Could you give us comments on how the transposition and docking was? Over.

SC
I thought it went pretty well, Houston. Although I expect I used more gas than I've been using in the simulator. The turn around maneuver, I went pitch accel command and started to pitch up, and then when I started to pitch up, and then when I put manual attitude pitch back to rate command for some reason it - it stopped its pitch rate, and I had to go back to accel command and hit what I thought was an extra proceed on the DSKY. And during the course of that we drifted slightly further away from the S-IV B than I expected. I expected to be out about 66 feet. My guess would be I was around 100 or so, and therefore I expect I used a bit more coming back in. Except for using a little more gas, and I've used a few numbers on that everything went nominally.

CAPCOM
This is Houston. We copy.

PAO
That was Mike Collins giving the description on the transposition and docking.

END OF TAPE

CDT 12:15 GET 003:43 TAPE 032/1

SC
Apollo 11. Over.

CAPCOM
Go ahead 11.

SC
Bruce, we're working on the pressurisation of the LM now and working off the decal with the SM LM pressure equalization. And we're down to step 13 where we're waiting for the cabin pressure to be 5 or should be roughly 5 before we turn the repress package O2 valve to FILL. Instead Of 5, we're running about 4.4. Over.

CAPCOM
Roger. Stand by a second.

SC
Houston, Apollo 11. We just put the repress package O2 valve to .FILL. Momentarily there at step 13 and we have filled the bottles back up partially. What's the pressure reading on them?

SC
We have about 450 PSI in the 3 1-pound bottle.

CAPCOM
Roger. Stand by a second please.

SC
Roger, standing by. The repress valve is now in the OFF position. What's the cabin pressure now Buzz? Cabin pressure is now 4.5.

PAO
At 3 hours, 46 minutes, velocity is 18,917 feet per second. Distance from Earth 9002 nautical miles .

SC
Houston, Apollo 11. We think these readings are in normal tolerance and we just wanted to get your concurrence before we press down any further with these decals.

CAPCOM
Okay, captain.

SC
Houston, Apollo 11. How do you read?

CAPCOM
Apollo 11, this is Houston. Go ahead.

SC
Roger. LM looks to be in pretty fine shape from about all we can see from here.

CAPCOM
Okay, and in reference to your question on this step 13 on the decal, I understand that you have used up the contents of the repress O2 package and at that time, instead of being up to 5 PSI, you were reading 4.4. Is that correct?

SC
I said 4.4, yes sir.

CAPCOM
Okay, and you want to know if you can go ahead and use additional oxygen to bring the command module up to 5.0 and continue the equalization? Over.

SC
Yes. We think it's within normal balances Bruce. We just wanted to get your concurrence before we press nominal procedure.

CAPCOM
Roger, Apollo 11. Go ahead.

SC
Okay, we pressed nominal procedure.

CAPCOM
And 11, Houston. We have a request for you on the service module secondary propellant fuel pressurization valve. As a precautionary measure, we'd like you to momentarily cycle the 4 switches to the close position and then release. As you know we have no TM or talkback on these

CDT 12:15 GET 003:43 TAPE 032/2

CAPCOM
Valve positions and it's conceivable that one of them might also have been moved into a different position by the shock of separation. Over.

SC
Okay, good idea. That's being done.

CAPCOM
Houston, roger. Out.

CAPCOM
Apollo 11, Houston. We're doing a non-propulsive vat on the booster at the present time. You may see some sort of a cloud coming out of it. When you're ready I have your evasive maneuver pad.

SC
Roger. It's coming out.

CAPCOM
Roger, out.

SC
It's a haze. It's going by toward our minus X direction and several small particles are moving along with it. A natural velocity is fairly high - at least it appears to be high. And we've got a 02 high - right now.

CAP COM
Houston, roger. Out.

END OF TAPE

CDT 12:25 GET 003:53 TAPE 033/1

SC
And, Houston, you might be interested that at my firsthand window right now, I can observe the entire continent of North America, Alaska, over the Pole, down to the Yucatan Peninsula, Cuba, northern part of South America and then I run out of window.

CAPCOM
Roger. We copy.

PAO
That was Neil Armstrong with that report.

SC
Houston, Apollo 11. All 12 latches are locked.

CAPCOM
Roger, 11, this is Houston. Understand. 12 latches locked.

PAO
That was Buzz Aldrin reporting that all 12 of the latches in the docking mechanism had locked.

CAPCOM
11, Houston. Whenever you possess a free moment there, we've got this Evasive Maneuver Pass.

SC
Roger.

SC
Go ahead, Houston, Apollo 11 ready to copy.

CAPCOM
Apollo 11, this is Houston. Evasive Maneuver SPS G&N 63481 plus 095 minus 020. GETI 004 40 01 00 plus 000 51 plus all balls, plus 00190, ROLL is your option, PITCH 213 357 NOUN 44 is NA, DELTA VT is 00 197 003 00152. The rest of the pad is NA. No ullage, LM weight 33 290. Readback. Over.

CAPCOM
Apollo 11, this is Houston. Standing by for your readback. Over.

CAPCOM
11, Houston, do you read? Over.

CAPCOM
Apollo 11, this is Houston. Do you read? Over.

SC
All of a sudden there, we had a little click and the signal strength began to start dropping off. Your transmissions were cut off very abruptly. How do you read now?

CAPCOM
Roger. Loud and clear. We had a handover to Madrid about the time I was halfway through the pad. If you could give me the last value you read, I'll pick up there. Over.

SC
Okay, back with DELTA VZ. Over.

CAPCOM
Roger. DELTA VZ is plus 00190, ROLL, your option, PITCH 213 357 and NOUN 44 is NA.

END OF TAPE

CDT 12:35 GET 004:03 TAPE 034/1

CAPCOM
Roll, your option. Pitch 213357 NOUN 44 is NA. DELTA-VT 00197 00300152. The rest of the pad is NA, and no ullage. LM weight 33 290. Read back. Over.

SC
Roger, Houston. Evasive maneuver SPS G&N. 63481 plus 095 minus 020 00440 0100 plus 00051 plus all zeros plus 00190. Roll crew option, 213357 NA 00197 003 00152 No ullage. LM weight 33290. Over.

CAPCOM
11, this is Houston. Readback correct, Out.

PAO
This is Apollo Control at 4 hours 4 minutes Apollo ll's velocity now is 17,014 feet per second. Its distance from Earth 11,753 nautical miles. We're about 5 minutes away from ejection of the lunar module and about 35 minutes away from this evasive

maneuver. Ignition time on the evasive maneuver ground elapsed time of 4 hours 40 minutes 1 second. It will be a service propulsion system burn of 3 seconds duration DELTA-V 19.7 feet per second.

END OF TAPE

CDT 12:45 GET 004:13 TAPE 035/1

SC
Houston, Apollo 11.

CAPCOM
Go ahead, 11.

SC
We'd like to arm our logic switches.
CAPCOM
Go ahead with the logic.

SC
Okay, mark logic 1 and 2 armed.

CAPCOM
Roger, we show the logic armed, and you're GO for pyro arm.

SC
Houston, we're ready for LM ejection.

CAPCOM
Roger, you're GO for LM ejection.

SC
Thank you.

SC
Houston, we have sep. We have a cryo press, light.

CAPCOM
Roger, copy. Cryo press, light.

CAPCOM
Roger, 11. We recommend you turn the O2 fans on manually and insure that the O2 heaters are in the automatic position.

SC
Roger. O2 heaters are on, and we're going to cycle the O2 fans now.

CAPCOM
Roger, O2 heaters to AUTO, or you can watch them in the ON position and O2 fans manual ON.

END OF TAPE

CDT 12:55 GET 004:23 TAPE 036/1

CAPCOM
Apollo 11, this is Houston. Over.
SC
Here it is now, Apollo 11.

CAPcoM
Roger. In answer to your question on RCS usage, it looks like you are 18 or maybe 20 pounds below nominal at the present time. No problem at all. Over.

SC
Great .

SC
Wanted to be 18 or 20 pounds above nominal.

CAPCOM
Sorry about that.

END OF TAPE

CDT 13:05 GET 004:33 TAPE 037/1

PAO
This is Apollo Control at 4 hours, 34 minutes. Apollo ll's velocity is 14,972 feet per second. Its distance from earth is 15,895 nautical miles. The spacecraft weight 96,760.9 pounds. We're about 5 minutes away from a evasive maneuver - that one I'm sure there will be no problems of recontact between the spacecraft and the SIVB stage of the launch vehicle.

CAPCOM
11, Houston. Your systems are looking good. We're standing by for the burn.

PAO
The duration of this burn will be 3 seconds. DELTA-V 19.7 feet per second. Ignition, shutdown.

SC
Houston, Apollo 11. Could you confirm that pitch gimbal motor number 1 turned off? We just shut all four off, and we got a questionable indication on the ECS on pitch 1.
CAPCOM
Roger. Stand by a second. Apollo 11, this is Houston. Stand by, please.

SC
Go ahead, Houston. Did you copy our residuals?

CAPCOM
Roger. We got O0 and .2 it looks like.

SC
We had .1 while ago. It's Just like the .2.

CAPCOM
Okay.

SC
That EMS DELTA-V counter is minus 4.0.

CAP COM
Minus 4.0. Roger.

SC
And how about pitch gimbal 17 Can you confirm that off?

CAPCOM
Can you stand by just a second on that? At the present time we cannot confirm it off. We saw a current drop indicating that several motors had gone off. We'll be back with you in just a second on it. Over.

SC
Okay. If necessary we can recycle it.

CAPCOM
Apollo 11, this is Houston. If you'll go ahead and cycle pitch gimbal motor number 1 on and then off and give us a mark, and we'll tell you what we
see. Over.

SC
Okay, fine. It's coming back on. Ready, MARK. And it's going back off. Ready, MARK. And that time we had an onboard indication, Houston. Thank you alot.

CAPCOM
Roger. We confirm that it is off.

SC
We do likewise.

PAO
This is Apollo Control at 4 hours, 44 minutes. A news conference at Kennedy Space Center is

CDT 13:05 GET 004:33 TAPE 037/2

PAO
about to begin. We will take down the live circuits and tape air to ground during this news conference and play it back after the conference. This is Mission Control, Houston.

END OF TAPE

CDT 13:43 GET 005:11 TAPE 038/1

PAO
This is Apollo Control at 5 hours, 11 minutes into the mission. The S4B slingshot maneuver was completed about 5 minutes ago. Designed to put the third stage of the launch vehicle into a trajectory that will take it behind the trailing edge of the moon and then into a solar orbit. The crew did not witness this maneuver. The command was not in the proper attitude where they could see the S-IVB at the time. We've advised the crew that we do not believe that we'll do the first midcourse correction. That we'll wait for midcourse correction 2 tomorrow and expect a DELTA V to be performed in that maneuver of about 21.3 feet per second. We've also had some other brief transmissions including a - comments from Neil Armstrong on the view out the window, and a weather report on the part of the world he can see. We have the tape of these transmissions that have occured during the news conference at the Cape. We'll play that for you now and catch up live.

SC
Houston, Apollo 11. We're starting our maneuver to observe the S-IVB slingshot.
CAPCOM
Roger, 11. We've got an updated attitude for you on the slingshot observation.

SC
Okay, say the angles please.

CAPCOM
Roger. ROLL 002.5, PITCH 289.3, YAW 357.5 and there's also an update - minor correction to your attitude for the P-52. Over.

SC
Roger. I'have ROLL 2.5, PITCH 289.3,
and YAW 357.5. Over.

CAPCOM
Roger. And for your P-52 and optics calibration it'll be ROLL 346.5, PITCH 345.0, and YAW 007.8. Over.

SC
Roger. 346.5, 345.0, and 7.8 Thank you.

CAPCOM
Houston, roger. Out.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Roger, go ahead Houston. Apollo 11.

CAPCOM
Roger. We're going to go ahead and able the S-IVB for the slingshot maneuver. the LOX dump will start about 12 minutes from now. Over.

SC
Okay, LOX dump about - I guess that'll make it about O1.

CAPCOM
Right. I'll,try to give you a little closer update as we approach it.

SC
Alright.

CAPCOM
11, for your information, the magnetude of midcourse correction number 1, if we've burned it, looks like about 17 feet per second. We're presently considering not burning it. This could make midcourse correction 2 tomorrow about 21.3. Over.

SC
That sounds good to us.

CDT 13:43 GET 005:11 TAPE 038/2

CAPCOM
Roger, you're looking good down here.

SC
Well, we didn't have much time, Houston, to talk to you about our view out the window, so when we were prepared for lunar injection, but up to that time, we had the entire northern part of the lighted hemisphere visible including North America, North Atlantic, and Europe and Northern Africa. We could see that the weather was good just about everywhere. There was one cyclonic depression in Northern Canada, in the Athabaska - probably east of Athabaska area. Greenland was clear and it appeared to be we were seeing just the icecap in Greenland. All North Atlantic was pretty good, and Europe and Northern Africa seemed to be clear. Most of the United States was clear. There was a low - looked like a front stretching from the center of the country up cross north of the Great Lakes and into Newfoundland.

CAPCOM
Roger, we copy.

SC
I didn't know what I was looking at, but I sure did like it.

CAPCOM
Okay. I guess the view must be pretty good from up there. We show you just roughly somewhere around 19 000 miles out now.

SC
I didn't have much outside my window.

CAPCOM
We'll get you into the PTC one of these days, and you can take turns looking.

SC
Houston, Apollo 11. We've completed our maneuvers to observe the slingshot attitude, but we don't see anything - no Earth and no S4B.

CAPCOM
Roger, stand by. In GET I have a LOX dump start time for you. It's supposed to start at 5 plus 03 plus 07 and stop at 5 plus 04 plus 55. LH burn starts at 5 plus 37 plus 47. Stop at 5 plus 42 plus 27. Over.

SC
Roger, thank you.

CAPCOM
11, Houston.

SC
Go ahead Houston.

CAPCOM
Roger. We now recommend the following attitudes: ROLL 307.0, PITCH 354.0, YAW 019.5, and the LOX dump has already been enabled so we can't hold it off any longer.

SC
That's okay, go ahead. We'll maneuver around to 307, 354, and 19 and a half.

CAPCOM
Roger.

CAPCOM
11, Houston. It doesn't look to us like you'll be able to make it around to this observation attitude in 2 minutes. We recommend that you save the fuel. Over.

SC
Okay, Houston. You got to us just a little late. Our maneuver's already begun, so it's going

CDT 13:43 GET 005:11 TAPE 038/3

SC
to cost us about the same amount of fuel to stop it no matter where we stop it and we may as well keep going.

CAPCOM
Roger, go ahead.

CAPCOM
11, Houston. LOX dump initiated.

CAPCOM
11, Houston. LOX dump has been terminated. Over.

SC
Roger. We still don't have the -

CAPCOM
Roger, out.

CAPCOM
Apollo I1, this is Houston. Over.

SC
Go ahead.

CAPCOM
Roger, if you'll give us ACCEPT and stay in POO, we'll set your trunnion bias to 0 and I have a plan for balancing your oxygen cryo's. Over.

SC
You got it.

CAPCOM
Roger.

SC
Houston, Apollo 11. We've got the - what appears to be the S4B in sight - oh it has to be a couple of miles away. It's at our number 5 window and the dump appears to be coming out of 2 radially opposite directions from the S4B.

CAPCOM
Roger. they're continuing with the non-propulsive vent from a liquid oxygen tank. It would he radially opposite then. And boo-

sters tell me it's the continuous vent system they're also dumping a small amount of fuel at this time. We've got about 23 and a half minutes or so until the APS burn. Over.

SC
Roger.

CAPCOM
11, Houston. We have our recommended configuration for your cryo switches to even up the load between oxygen tanks 1 and 2. Over.

SC
(inaudible)

CAPCOM
Okay, you're coming in very weakly there. We're recommending O2 tank 1 heater off, O2 tank 2 heater to AUTO, O2 tanks 1 and 2 fans both OFF, H2 tank 1 heaters to AUTO, and H2 tank 2 heaters to OFF. Over.

SC
Roger, we have that except the last one was H2 fans to OFF. Is that affirmed?

SC
The configuration we have now is hydrogen heaters, we got 1 AUTO, 2 OFF, oxygen heaters 1 OFF, 2 AUTO, and we 'have all the fans OFF.

CAPCOM
This is Houston. Roger, we concur. Out.

CAPCOM
11, this is Houston. We've completed the trunnion zero bias setting. We can retrieve the computer and go to BLOCK.

SC
Roger, and I thank you.

CAPCOM
11, this is Houston. With this maneuvering to observe the slingshot, I guess we missed copying your LM CM DELTA P reading. Over.

CDT 13:43 GET 005:11 TAPE 038/4

SC
Stand by, we'll give you a reading.

CAPCOM
Okay, roger.

SC
Right now reading 0.2 Bruce.

CAPCOM
Roger, 0.2. Okay, Mike, and could you verify that your waste compartment valve is in VENT then?

SC
Roger, waste compartment valve has been in VENT for oh I guess 45 minutes or so.

CAPCOM
Roger, we copy.

SC
If we're late in answering you, it's because we' re munching sandwiches.

CAPCOM
Roger. I wish I could do the same here.

SC
don't leave the console.

CAPCOM
Don't worry. I won't.

SC
Frank doesn't like it.

SC
How is Frank today?

CAPCOM
Oh he's doing quite well.

PAO
This is Apollo control at 5 hours 22 minutes. We're back live now. The Delta-P you heard discussed is the difference in pressure, between the LM and the command module, the cabin pressure. Apollo I1, coming up on 22 thousand miles distance from the earth now. Velocity, 12 thousand 9 hundred 14 feet per second.

END OF TAPE

CDT 13:55 GET 005:23 TAPE 039/1

SC
Houston, 11.

CAPCOM
Go ahead, 11.

SC
Down in the control center you might want to join us in wishing Dr. George Mueller a happy birthday.

CAPCOM
Roger. We are standing by for your birthday greetings.

SC
I think today is also the birthday of California and I believe they are 200 years old and we send them a happy birthday. It's Dr. Mueller 's birthday also but I don't think he is that old.

CAPCOM
Roger. We copy and looking back in the viewing room right now. I don't see him.

SC
He may not be back from the Cape yet.

CAPCOM
Roger. I believe Dr. Mueller is on his way back from the Cape. We will relay his greetings for you.

SC
Roger.

CAPCOM
11, this is Houston. Over.

SC
Go ahead, Houston.

CAPCOM
Roger. At your convenience, we would like to get a waste water dump to 5 percent remaining. After completion of this one the next waste water dump will be at about GET equal to 25 hours. Over.

SC
Coming on right now.

CAPCOM
Roger.

PAO
This is Apollo Control at 5 hours, 31 minutes into the mission. Apollo ll's velocity now is 12,637 feet per second. Distance from earth 22,971 miles. Spacecraft weight is 96,573 pounds.

END OF TAPE

CDT 14:05 GET 005:33 TAPE 040/1

SC
Houston, Apollo 11. Do you copy our torquing angles?

CAPCOM
Would you leave them on there for another second, please?

SC
Will do.

CAPCOM
11, this is Houston. We copy the angles, but stand by before you go ahead and use them. Over.

SC
Standing by.

CAPCOM
Wait a minute, Houston. We request that you redo P52 and if the angles come out the same magnitude go ahead and incorporate them. Over.

SC
Okay, will do.

CAPCOM
They look a little large right now .

SC
Yes, roll- roll looks a little large especially there.

CAPCOM
Roger.

CAPCOM
We showing a waste water quantity of about 13 percent on TM now, 11. Over.

SC
Roger. It's off now.
CAPCOM
Roger. We copy.

SC
Houston, Apollo 11. Torquing angles essentially the same, and we're going to go ahead and torque them now.

CAPCOM
Roger. We concur.

SC
Okay.

CAPCOM
Apollo 11, this is Houston. Could you give us a - an auto optics check to a third star or a different star from the one you've been using?

SC
Sure, be glad to. I can go back and do the whole thing and pick different stars.

CAPCOM
I don't think there - there's any need to do that. We'd just like to confirm it with a different star. That roll angle was a little larger than we expected.

SC
Okay.

CAPCOM
Apollo I1, Houston. I have a TLI plus 11 hour pad when you're ready to copy.

SC
Wait one.

END OF TAPE

CDT 14:15 GET 005:43 TAPE 041/1

SC
Old Star No. 30 looks like it is right dab smack in the middle of the Sextant.

CAPCOM
Houston, Roger. Out.

SC
11, ready to copy.

CAPCOM
Roger, 11. This is the TLI plus 11 hours, P-37 format. 013444793 minus 165 049 23. Readback. Over.

SC
Roger. 1344 4793 minus 165 04923. Over.

CAPCOM
This is Houston. Readback correct. Over.

PAO
This is Apollo Control at 5 hours, 55 minutes. Apollo ll's velocity is 11,970 feet per second. Distance from earth is 25,671 nautical miles.

SC
Houston, Apollo 11.

CAPCOM
Go ahead, 11.

SC
Did you have any update for the ROLL, PITCH and YAW angles on the top of Page 37 in the flight plan, or are they still good?

CAPCOM
That's for the optics calibration?

SC
Yes, Sir.

END OF TAPE

CDT 14:30 GET 005:58 TAPE 042/1

SC
Houston, Apollo 11.

CAPCOM
Go ahead, 11.

SC
Roger, do you have any update for the roll, pitch, and yaw angles on the top of page 3, 7 on the flight plan, or are they still good?

CAPCOM
That's for the optics calibration.

SC
Yes, sir.

CAPCOM
Yes, indeed. I'll give them to you in Just a second here. Roger, 11, for the optics calibration I've got 346.5 for roll, 345.0 for pitch, and 007.8 for yaw. The pen and ink attitude corrections in your book are good, over.

SC
Okay.

CAPCOM
And we're going to hand over to Hawaii in about 5 or 6 seconds. Here we'll have a momentary comm dropout.

SC Roger.

CAPCOM
Hello, Apollo 11, Houston. Be advised your friendly white team is - come on for it's first shift, and if we can be of service, don't hesitate to call.

SC
Thank you very much. Yeah, we're about to take our marks, Charlie, and it's B23 optics cal. I've got it in the sextant now, and I'm about to split the image and mark.

CAPCOM
Roger, Mike, we'll watch it.

PAO
The Cap Com is now Charlie Duke, and Gene Kranz and his white team of flight controllers is preparing to take over the responsibility here in the Control Center from Clif Charlesworth's team.

END OF TAPE

CDT 14:42 GET 006:10 TAPE 043/1

PAO
This is Apollo Control at 6 hours, 16 minutes into the mission. Velocity now 11,479 feet per second. Apollo ll's distance from earth, 27,938 nautical miles. We're estimating the change of shift news conference for 3:30 p.m. central daylight time.

CAPCOM
Hello, Apollo 11, Houston. We have scrubbed the midcourse 1. Over.

SC
Roger. Understand you've scrubbed midcourse 1.

CAPCOM
Roger.

CAPCOM
Hello, Apollo 11, Houston. We see your middle gimbal angle getting pretty big. Over.

SC
Well, it was, Charlie, but in going from one auto maneuver to another we took over control and have gone around gimbal lock, and we're about to give control back the DAP.

CAPCOM
Roger, Mike. We see it increasing now.

SC
Hey, Charlie. Houston, Apollo i1.

CAPCOM
Go ahead, 11. Over.

SC
Hey, maybe you better call Lou and tell him we might be a little bit late for dinner.

CAPCOM
Okay, sure will. We'd like for you to turn on the fan on in O2 tank number 2, Buzz.

END OF TAPE

CDT 14:57 GET 006:25 TAPE 044/1

SC
Houston, Apollo 11.

CAPCOM
Go ahead, 11.

SC
Maybe you ought to call Lou and tell him we might be a little bit late for dinner.

CAPCOM
Okay. Sure will. We'd like you to turn the fan on in O2 Tank No. 2, Buzz. And, 11, did you, on your optics calibrations, did you proceed or recall the program? Over.

SC
We recalled the program.

CAPCOM
Roger.

SC
And O2 Fan No. 2 is on.

CAPCOM
Roger.

SC
Houston, Apollo. I've got a CRYO pressure light, and a master alarm. It's reset.

CAPCOM
Roger. We suspected that. That's why we had you turn the fan on. We were getting pretty close to the caution warning limits. We were trying to prevent that.

SC
Okay.

PAO
This is Apollo Control at 6 hours, 31 minutes. At the present time the spacecraft is 29,363 nautical miles from earth and the velocity continuing to drop off gradually, reading now 11,192 feet per second. Flight Director, Gene Kranz, has taken over as Flight Director now from Clifford Charlesworth. Kranz has been reviewing the status of the spacecraft's systems with his team of flight controllers; everything looks very good at this point. The crew has been advised that the mid-course correction 1, the first opportunity for mid-course correction, of which has been scheduled into the flight plan at about 13 hours, 30 minutes will not be performed. A correction of mid-course had been scheduled at 11 hours, 45 minutes into the flight plan and that will not be performed according to the tracking data we have at this time. The crew, up until their sleep period which will begin in about 13 hours, 30 minutes or about 7 hours from now will be involved generally in a routine of housekeeping type activities aboard the spacecraft. At the present time they should be involved in some mid-course navigations. At 6 hours, 32 minutes this is Apollo Control of Houston.

SC
Houston, Apollo 11.

CAPCOM
Go ahead 11. Over.

SC
Roger. You looking at our Delta -R- our Delta-V? Looks like Delta R's a pretty large area. We want to talk about it before we incorporate it.

CAPCOM
Stand by Mike. We don't have anything on our paneling here I don't think, on the DSKY. Stand by.

CDT 14:57 GET 006:25 TAPE 044/2

SC
Okay. Our NOUN 49 is reading register 1 plus 08793. Register 2, all balls.

CAPCOM
Copy.

END OF TAPE

CDT: 15:07 GET: 006:35 TAPE 045/1

CAPCOM
11, Houston. Guidance is looking at the 940, 49 stuff, so we'll be back with you momentarily, ove r.

SC
Okay, Charlie, I think we'll just hold right here in the program.

CAPCOM
Roger, we got the DOWN light now, over.

SC
Okay.

CAPCOM
Hello, Apollo 11, Houston. We'd like you to reject the 940, 49 stuff on the DSKY right now, Mike, and try it again, over.

SC
Okay, will do.

CAPCOM
Okay, Houston, Apollo 11. Here's another 49 for you. Are you getting it on the DOWNLINK.

SC
Roger, we see it, stand by.

CAPCOM
Hello, Apollo 11, Houston. We recommend you accept the NOUN 49 display on the DSKY now. Over.

SC
Okay. It looks like an awful big one. We noticed that you had moved star number 2 to the tail-end of the listing, and we should be marking first on star 40. Did that have anything to do with it?

CAPCOM
Negative. We don't believe so, Apollo 11. We think that this is possibly due to some TOI dispersions, and it's probably satisfactory so go ahead and accept this. It fits our criteria anyway that if you repeat a Mark and you get an equivalent size, and we'll have to go ahead and accept it. And this is an equivalent size 0. Over.

SC
Okay, we'll do it.

CAPCOM
And, 11, Houston. Your state vector in the LM slots is good. Over.

SC
Roger. Thank you.

SC
Houston, Apollo 11. If you like this, we'll accept it as well.

CAPCOM
Stand by.

CAPCOM
Hello, Apollo 11. Houston. We recommend you accept the NOUN 49. Over.

SC
Okay, Charlie. Thank you. We'll do that now.

SC
Now we're going to proceed on this one, too, Charlie.

CAPCOM
Roger. Copy.

END OF TAPE

CDT 15:17 GET 006:45 TAPE 046/1

SC
Houston, Apollo 11. Another noun 49 for you.

CAPCOM
Rog, we copy. Stand by.

CAPCOM
Hello, Apollo 11, Houston. We'd like you to recycle and do this one over again. Over.

SC
Okay.

PAO
This is Apollo Control at 6 hours 52 minutes. Apollo 11 now 31,565 nautical miles from earth and the velocity is 10,789 feet per second. The crew at this time is involved in midcourse navigation using their onboard optical system. We have completed the changeover in briefing of shifts here in Mission Control, and the crew activities, until the sleep period begins, will consist of housekeeping, functions aboard the spacecraft, changing out carbon dioxide filters. They will not be doing the midcourse correction scheduled for 11 hours 45 minutes into the flight as the first opportunity. The change of shift briefing is scheduled to begin shortly. Any conversations that develop with the crew during that period of time will be tape recorded and we'll play those back following the change of shift briefing. This is Apollo Control at 6 hours 53 minutes.

END OF TAPE

PAO
This is Apollo Control, 7 hours, 21 minutes into the flight of Apollo 11. During the change of shift briefing, we accumulated about 4 minutes of tape conversation with the spacecraft. That conversation generally related to the onboard batteries, which are currently being charged - a routine operation - and also the midcourse navigation exercise that the crew is currently involved in. We'll play back the tape for you now, and then stand by for any live conversation with the crew.

SC
Houston, Apollo 11.

CAPCOM
Go ahead, Apollo 11. Over.

SC
Roger. Why don't you sing out when you think we've done enough battery charging on B.

CAPCOM
Roger. Stand by, Buzz. Over.

CAPCOM
Apollo 11, Houston. We'll be charging battery B up until the sleep period. We'll discontinue charging at that time. Also, at about 12:25 in the flight plan, we have battery A charge. That has been deleted. Over.

SC
Roger. Understand. We'll charge until the sleep period on B and delete the battery A charge.

CAPCOM
Affirm.

SC
And, Houston, Apollo 11. These AUTO OPTICS MANEUVERS or P23's AUTO MANEUVERS don't seem to be going to the substellar point. Can you come up with the roll pitch, and yaw angle for the substellar point on this star. It's our second star.

CAPCOM
Roger. Stand by.

CAPCOM
Hello, Apollo 11, Houston. Your angles in the flight plan we feel are still good. 198.6, 130.7, 340.0. Just slightly off than those in the flight plan. Over.

SC
Okay, and we'll try that.

SC
Charlie, state those 3 angles one more time. I'd like to confirm them before I maneuver.

CAPCOM
Roger. Roll and pitch are slightly off than what's in the flight plan, 11. Roll is now 198.6, pitch is 130.7. Over.

SC
Roger. Roll 198.6, pitch 130.7, and yaw 4000.

CAPCOM
That's affirmative.

SC
Houston, Apollo 11. I think the problem here is that that attitude just is not too close to the substellar point. I'm having them maneuvered quite a bit, and that's in progress now, so stand by for some more.

CAPCOM
Roger. We copy all.

CAPCOM
Hello, Apollo 11, Houston. We've run the angles given in the flight plan for the P23 attitude through the machines down here and they come up with the same thing every time. We think everything's going correctly, Mike, and we're wondering if the non-symmetrical horizon might be giving

CDT 15:53 GET 007:21 TAPE 047/2

CAPCOM
a problem. Over.

SC
Yes, I'd say - it could be, Charlie. Stand by here. We'll get another Mark for you.

CAPCOM
Okay.

SC
Houston, Apollo 11. Noun 49 for you.

CAPCOM
Roger; copy. Stand by.

CAPCOM
Hello, Apollo 11; Houston. We recommend you accept the Noun 49. Continue through your sequence of sightings and then we'll analyze the data afterwards. Over.

SC
Okay. Houston, Apollo 11. Star 40 Just disappeared now in the sextant. Could the trunnion angle 47 something be a little higher?

CAPCOM
Stand by. Hello, Apollo 11; Houston. We'd like you to press on to star 44. Over.

SC
Yes, Roger. How many Marks did you record on star 40?

CAPCOM
Stand by, Mike.

SC
Okay.

CAPCOM
I1, Houston. We copied 2 good Marks. Over.

SC
Okay.

END OF TAPE

CDT 16:03 GET 007:31 TAPE 048/1

SC
Houston, Apollo 11.

CAPCOM
Go ahead. Over.

SC
Roger. 44 is Just not bright enough for this. There's a reddish glow filling the black area of the sextant and the star is lost somewhere in there and I can not see it.

CAPCOM
Roger. Stand by. We'll come up with another star. Over.

SC
Yes. I'd appreciate that.

CAPCOM
Hello Apollo 11, Houston. We'd like you to go on to star 45. Over.

SC
Okay.
CAPCOM
And, Mike, we think these large Delta-Rs, NOUN 49 you're getting, is really meaningful since it's been . . . TLI since we had a state vector update and we think it's normal. Over.

SC
Okay. Could be Charlie. Some of the area markings I might not have had precisely the sub stellar point. I think as time goes by, they've been coming more accurate but Olean up here is just flat invisible.

CAPCOM
Rog.

SC
Sam Houston, Apollo 11. Understand it's the same 3 gimbal angles you gave me should be valid for star 45 as well. Is that affirmative?

CAPCOM
I'm believe that's right. Stand by 1. Over.

SC
Okay.

CAPCOM
That is negative. Stand by 1.

SC
Okay, cause it's quite a difference between the gimbal angles you have and the gimbal angles the program was but with inaccurate state vector I'm inclined not to believe the program.

CAPCOM
Stand by.

SC
Houston, Apollo 11. LMB is back on the line.

CAPCOM
Roger. Copy.

SC
Read you bye, bye.

CAPCOM
Roger same, Buzz. And 11, the angles for you are 1978 roll, 1285 pitch, 3400 yaw.

SC
Okay. Just as a matter of comparison, P-23 for this star would like to go to 235.66, 154.31 and 31365. Over.

CAPCOM
Roger. We copy 11. We understand the program can give you almost an infinite combination of angles NP-23 and it's not too unreasonable. If you'll stand by we'll look at these - that we see on the DSKY. Over.

SC
Okay. Then in the meantime I'll just go ahead and maneuver to yours. 197.8, 128.5 and 340.0.

CDT 16:03 GET 007:31 TAPE 048/2

CAPCOM
Roger.

END OF TAPE

CDT 16:13 GET 007:41 TAPE 049/1

SC
Houston, Apollo 11.

CAPCOM
Go ahead. Over.

SC
Okay, Charlie. Is the attitude you gave me on star number 45. The radial is off, I'd say, a good 30 degrees in roll and the star is not in sight. Over.

CAPCOM
Roger. stand by.

SC
Something's wrong with those attitudes.

CAPCOM
Hello, Apollo 11, Houston. I wondered if you have auto optics selected. Over.

SC
That's affirmative.

CAPCOM
Roger. Looks like to us we need a proceed, Mike, to get the sextant pointed at the star. Over.

SC
Okay. Stand by.

CAPCOM
11, Houston. Those shaft and trunnion angles were exactly what we were computing on the ground. Over.

SC
Okay, I'm going to trim up the attitude here. I'll give it another try.

SC
Okay, I have it loud and clear, now, Charlie, so I might as well do a bunch of marks on this one to get a horizon count.

CAPCOM
Roger. Stand by.

SC
It still looks like I'm far from the substellar point, however, I'm off quite a bit in roll.

CAPCOM
Roger, we'd like you to mark right where it is now, Mike, and we'd like two sets of marks on this. Over.

SC
Okay, fine, but the radial is not parallel to the'horizon. I have to move off quite a bit in order to get it parallel to the horizon.

CAPCOM
Apollo 11, Houston. Our Procedures guys are saying that the radial does not have to be parallel. Over.

SC
Well, then we' re going to have to substellar point it for now.

CAPCOM
Rog.

END OF TAPE

CDT 16:23 GET 007:51 TAPE 050/1

SC
Houston, you copy that noun 49?

CAPCOM
Roger, we see it 11. Stand by.

CAPCOM
Apollo 11, Houston. We would like you to accept this one and every mark thereafter, over.

SC
Okay.

SC
Do you need me to wait in the noun 49 display, for any length of time?

CAPCOM
Negative.

SC
Okay.

SC
Okay, Chariie. I'll be glad to give you as many of these as you like.

CAPCOM
Roger, we'd like six marks on star 45, Mike and then we'll probably go back to star 2, again. Stand by, we'll have further word on that.

SC
Okay.

SC
They seem to be getting smaller Charlie. Are you sure you wouldn't like some more?

CAPCOM
Stand by Mike.

SC
It's no trouble.

CAPCOM
Right, stand by.

CAPCOM
Apollo 11, Houston. We'd like you to do 2 more on Star 45, over.

SC
Okay.

SC
Okay, Charlie, there's your two more marks. Where do you want to go from here?

CAPCOM
Stand by.

CAPCOM
Hello Apollo 11, Houston We'd like you to go back to star number 2 with an attitude as follows, roll 1952 pitch 1239 yaw 3400. Mike that'll give you a trunion angle of about 31.4 over.

SC
Okay I understand star number 2 and roll 195.2, pitch 123.9, and yaw 340.0, over.

CAPCOM
That's affirmative.

END OF TAPE

CDT 16:33 GET 008:01 TAPE 051/1

SC
Okay Charlie. On there, I've got a trunnion angle of 30.5 degrees. Again, miss a line considerably in a row and I do believe that's important to getting good marks.

CAPCOM
Stand by.

SC
See if my radicals not down, then I'm not marking normal to the right and I'm not marking at the substellar point. I'm marking off somewhere else.

CAPCOM
Stand by 11. Over.

SC
Okay.

CAPCOM
Apollo 11, Houston. The ground computed values for your shaft and trunnion are just what your getting on the DSKY there, Mike. The horizon looks cocked off to you - you look like your off in roll because the angles that we gave you to maneuver to to prevent LM reflection from fouling up your optics. We feel like a - you should go ahead and mark on the stars just as is. Over.

SC
Okay.

SC
I'll bet you a cup of coffee on it.

CAPCOM
Copy.

SC
VERB - NOUN 49 for you now, Charlie.

CAPCOM
Roger. Stand by.

CAPCOM
Apollo 11, Houston. We'd like to accept this one and give it 2 more and that will be enough. Over.

SC
Okay.

PAO
This is Apollo Control 8 hours, 8 minutes and Apollo 11 now 38,812 nautical miles from earth and traveling at a speed of 9682 feet per second. And we've just put in a call to the crew; we'll stand by for - -

SC
It just appears to me that you have to have a radical. Change it to the horizon at the point at which you mark or else your not at the substellar point here out front, laterally and therefore you're measuring a larger trunnion angle than you should.

CAPCOM
Seems so to me. Our procedures people are working on this and we'll be back with you momentarily. Over.

SC
Thanks sir.

END OF TAPE

CDT 16:43 GET 008:11 TAPE 052/1

CAPCOM
Hello, Apollo 11; Houston. We'd like you to go to ACCEPT. We'll have a PTC REFSMMAT for you momentarily. Over.

SC
Roger. Going to an ACCEPT.

PAO
The PTC REFSMMAT, which capcom, Charlie Duke, just referred to is the passive thermal control attitude that the crew will place the spacecraft in. In this attitude the spacecraft will be rotated at a rate of about 3 revolutions per hour to maintain the proper temperature balance.

CAPCOM
Hello, Apollo 11; Houston. We're through with the load. You can go back to BLOCK.

SC
In BLOCK. Thank you.

CAPCOM
Hello, Apollo 11; Houston. We'd like you to do a P52, option 1 preferred, and established PTC is listed in the flight plan at 12 hours. We'd like you to commence that right now, Mike. And we have some stars recommended for you. First star's 26, 30, and 24, when you get to attitude 000. Over.

SC
Okay, Charlie. We're off the wick right now. We understand you're ready for us to do a P52, option 1?

CAPCOM
11, it's a P52, option 1, preferred. Over.

SC
Understand. Let's see that - Spica, Menkent, and what else?

CAPCOM
Roger. Stars - codes are stars 26, 30, and 24. Over.

SC
25 - 24. Okay.

END OF TAPE

CDT 17:03 GET 008:31 TAPE 053/1

CAPCOM
Apollo 11, Houston. We notice your program alarm Mike was due to use any stars in the P23 attitude. If you'll go to 000, the stars we gave you will work, over.

SC
Okay, understand.

CAPCOM
Hello Apollo 11, Houston. Prior to you starting your P52, we'd like to give you new CSM state vector, over.

SC
Roger. When we finish the maneuvering we'll give you the - -

CAPCOM
Roger, we're standing by.

END OF TAPE

CDT 17:23 GET 008:51 TAPE 054/1

SC
Houston, Apollo 11, the DSKY is yours.

CAPCOM
Apollo 11, Houston. Go ahead over.

SC
Roger, the DSKY is yours.

CAPCOM
Roger, stand by.

PAO
This is Apollo Control at 8 hours 59 minutes into the flight of Apollo 11. The spacecraft altitude is currently reading 42 thousand 7 hundred 53 nautical miles, and we show a velocity of about 91 hundred feet per second. We are in the process now of up linking to the space craft attitude for the passive thermal control mode. Under this mode the spacecraft will be rotated about its X axis at a rate of about 3 revolutions per hour to maintain proper temperature balance within the spacecraft. The crew has completed the midcourse navigation exercise. They will shortly be aligning the spacecraft stable platform, used as a attitude reference in the guidance system. This is a routine procedure, and following that, the spacecraft will be placed in the passive thermal control mode where normally it would be left during the sleep period. The cabin temperature in the command module, has been running between 65 and 70 degrees. The current spacecraft weight is 96 thousand 4 hundred 60 pounds.

CAPCOM
Hello Apollo 11, Houston. You can do the verb 66. The computer is yours and then the P52 option 1 preferred, over.

SC
Roger.

END OF TAPE

CDT 17:43 GET 009:11 TAPE 055/1

PAO
This is Apollo Control at 9 hours, 13 minutes into the flight of Apollo 11. Based on biomedical data, a flight surgeon reports that it appears the crew removed their pressure garments - their pressure suits at about 8:00 PM for. the Commander, Neil Armstrong and Command Module Pilot, Mike Collins. Lunar Module Pilot, Buzz Aldrin apparently got out of his pressure suit about 1 hour earlier or about 7 hours ground elapsed time. The spacecraft is currently 44,529 nautical miles from earth and the velocity has dropped now to 8983 feet per second. We do have, rather poor lock with the spacecraft antenna at this time accounting for the noise on the air to ground circuit. We'll take down the circuit until we reestablish better lock and we'll record any conversations that occur in the interim. At 9 hours, 14 minutes this is Apollo Control Houston.

END OF TAPE

CDT 17:55 GET 009:23 TAPE 056/1

CAPCOM
Apollo 11, Houston. If you read, at this attitude 000 is pretty bad for our COMM. In fact, we've lost all data with you. An unreadable on the void. We recommend you do the P52, option 1 preferred. (garble)

SC
Roger Capcom as soon as we finish our alignment, we'll maneuver it toward the pad, Joe.

CAPCOM
Roger, 11. We copy. Recommend you go to this P52, option 1, preferred, and then go to PTC attitude. Over.

SC
Then we get to stop.

CAPCOM
When you get there to PTC attitude, it'll be pitch 90, yaw 0 on the high gain. Over.

SC
Houston, Apollo 11. Over.

CAPCOM
Roger, 11. You got a one by. Go ahead.

CAPCOM
Apollo 11, Houston. You're about one by. Go ahead. Over.

SC
Houston, Apollo 11. Over.

CAPCOM
Roger, 11. Reading you about 4 by. How me? Over.

SC
You're loud and clear, Charlie. We've pitched down some to get a better COMM attitude.

CAPCOM
Roger. Did you copy our recommendation note - proceeding with the P52, Mike? Over.

SC
Negative. We didn't. I've got that in work. I'm starting at the edge of it.

CAPCOM
Roger.

END OF TAPE

CDT 18:08 GET 009:36 TAPE 057/1

PAO
This is Apollo Control at 9 hours, 36 minutes into the flight of Apollo 11. The mission continuing to go smoothly at this point. The communications noise that we were experiencing previously cleared up after the crew was able to get the spacecraft in a good attitude for antenna log-on and we had one brief conversation which we taped and we're presently communicating with the crew at this time. We'll pick up the tape and then continue to follow live conversation.

SC
Houston, Apollo 11. Over.

CAPCOM
Roger 11. With you about 4 by IB. Over.

SC
Hear you loud and clear, Charlie. We pitched down some to get a better comm attitude.

CAPCOM
Roger. Did you copy our recommendation on proceeding with the P-52, Mike? Over.

SC
And even if we didn't, I've got that in work. I'm sorry (garble).

CAPCOM
Roger.

SC
Houston, Apollo 11.

SC
Houston, Apollo 11.

CAPCOM
Go ahead 11. Over.

SC
Roger. Copy our torquing angles. We forgot to torque.

CAPCOM
Roger. Stand by.:

SC
Gosh, the reason for delaying it Charlie is that - difficult to find 2 stars that are not occulted by the LM and also are not in the midst of a man made star field up here with dumps.

CAPCOM
Roger. We copy.

SC
Okay.

CAPCOM
Hello Apollo 11, Houston. You can torque to NOUN 93. Over.

SC
Okay.

PAO
That brings us up to date with the taped conversation that we had. We'll contidue to stand by for any live communications with the spacecraft. Most of that conversation with Mike Collins involved the platform alignment which the crew is involved in at the present time, aligning the stable platform used by the Guidance System as an attitude reference. Apollo 11 is presently 46,688 nautical miles from earth and the velocity is 8750 feet per second.

SC
Okay Houston, that completes the P-52. We verified the 3rd star with Antares and other optics are pointed there pretty closely. How do our platform drift angles look so far, Charlie?

CAP COM
Stand by.

CDT 18:08 GET 009:36 TAPE 057/2

CAPCOM
Hello Apollo 11, Houston. We didn't have a chance to get a good check for you. We're going to run a drift check in this alignment till the next one, approximately 12 hours and we'll have something for you later. Over.

SC
Okay.

CAPCOM
Hello Apollo 11, Houston. We'd like you to establish your PTC. We recommend you select quads Alfa and Delta. Over.

SC
Roger understand. Alfa and Delta quads.

CAPCOM
That's affirmative.

END OF TAPE

CDT 18:18 GET 009:46 TAPE 058/1

CAPCOM
Hello Apollo 11 Houston. Would you verify that the attitude set switch is in GDC, over.

SC
The set switch. Stand by one, Charlie.

CAPCOM
Roger.

SC
It is now.

CAPCOM
Roger. It was on IMU.

SC
That's affirmative.

CAPCOM
Roger, thank you.

SC
Houston, Apollo 11. How many miles out do you have us now?

CAPCOM
We have you, stand by Buzz. Roughly about 50 thousand, stand by.

SC
It's a beautiful sight. Charlie on that PTC, we're just waiting 20 minutes here for all thrustor activity to damp out. You might let us know how that's coming.

CAPCOM
Roger, will do. We have you about 48 thousand miles now.

SC
Thank you.
SC
Houston, Apollo 11. We still have our oxygen fan on for tank 2. Is that what you want?

CAPCOM
Stand by.

SC
Hey Charlie I can see the snow on the mountains out in California, and it looks like LA doesn't have much of a smog problem today.

CAPCOM
Roger Buz, copy. Looks like there's a good view out there, then. And Apollo 11, Houston. We would like you to keep the O2 fan on. It will give you an ECS configuration prior to sleep, over.

SC
Okay, fine.

END OF TAPE

CDT 18:38 GET 010:06 TAPE 059/1

SC
Charlie, with the monocular I can spot a definite green cast to the San Fernando Valley.

CAPCOM
Roger.

SC
Yes.

CAPCOM
How's the Baja California look, Buzz?

SC
Well, it's got some clouds up and down it, and it looks pretty good - circulation system a couple of hundred miles off the west coast of California.

CAPCOM
Roger. 11, we'd like you to close the waste storage vent valve right now.

SC
Okay.

SC
(Garble) Waste storage vent valves closed.

CAPC0M
Copy.

CAPCOM
Hello, Apollo 11; Houston. We'd like - the rates are looking pretty good right now on the PTC, but we'd like you to continue holding. Over.

SC
Okay, fine.

SC
(Garble)

END OF TAPE

CDT 18:48 GET 010:16 TAPE 060/1

CAPCOM
Hello Apollo 11, Houston. Your rates look really great. Now you can start your PPC.

SC
Okay, thanks Charlie.

SC
Houston, 11.

CAPCOM
Roger, go ahead 11.

SC
Roger, if you'd like to delay PPC efforts for 10 minutes or so we can shoot you from TB number 78. We'll leave that up to you.

CAPCOM
Roger, stand by.

CAPCOM
Hello Apollo 11, Houston. We'll have our answer for you on the TV in about 1 minute. Over.

PAO
This is Apollo Control at 10 hours 26 minutes into the flight of Apollo 11.

CAPCOM
Houston we are ready at Goldstone for the TV. It'll be recorded at Goldstone and then replayed back over here. Neil, anytime you want to turn her on, we're ready, over.

SC
Okay, it'll take us about 5 minutes to get the rate.

CAPCOM
Roger.

PAO
Capcom, Charlie Duke, advised the crew that we would be recording the television at Goldstone. We don't have an estimate at this time as to how long it will take to get a play back of that from Goldstone.

CAPCOM
Could you verify the reading on your O2 flow indicator? over.

SC
We're still on point 2. We just inadvertenoly touched the rapid repress button. That made a tremporary glitch in the flow.

CAPCOM
Roger, during that glitch there, did it go almost a peg high? over.

CAPCOM
Apollo 11, Houston. Could you tell us if the O2 flow indicator was pegged high prior to closing the waste storage vent valve, over?

SC
No it was not.

CAPCOM
Roger, thank you.

CAPCOM
Apollo 11, Houston. While ago we tried those scan limits, and disabled the auto drive on the high gain. We'd like you to position the antenna at pitch 30 yaw 270, go to react, that will give us narrow beam widths, over.

SC
That - -

END OF TAPE

CDT 19:03 GET 010:31 TAPE 061/1

CAPCOM
-this will give us a narrow beam width. Over.

SC
That yaw 270 and pitch 3 ze - what was the pitch?

CAPCOM
Pitch 3 zero, Nell.

SC
Okay. I think we've got you.

CAPCOM
Roger. We've got a good signal there. Thank you much.

SC
Okay Houston. We are sending picture of earth down right now so you can let us know if they're receiving us also.

CAPCOM
Roger 11. Goldstone is receiving the TV. Stand by. We'll let you know on the quality. Over.

CAPCOM
Hello Apollo 11, Houston. Goldstone says that the TV looks great. Over.

SC
Roger (Garble)

CAPCOM
Hello Apollo 11, Houston. Did you copy? Over.

SC
Roger we copied, Charlie.

CAPCOM
Roger. Your transmissions the last couple of times have been about 2 by. Over.

SC
Okay. How do you read me now?

CAPCOM
Roger. Your 5 by now.

SC
Okay. We're zooming the lens on in so that it will just about fill the monitor.

CAPCOM
Roger.

SC
Okay. It's been a full film now.

CAPCOM
Copy 11.

SC
And how about the F stops. Is 22 going to be accurate?

CAPCOM
Stand by, we'll get with the Goldstone TV guy. We don't have anything here at Houston. Stand by.

SC
It looks good on the monitor as far as the S-band goes. Therefore, we just assumed it's okay at Goldstone.

CAPCOM
Hello Apollo 11, Houston. Goldstone says it - TV looks really great, 5 by, we don't - ABC looks like it's working fine. The F-22 is good; we have no real white spots. They're real pleased with it. Over.

SC
Okay. You just got out Charlie, We understand that it's looking great. We'll leave it the way it is and wait for you to come back on.

CAPCOM
Roger. And how do you read me now? Over.

SC
5 by.

CAPCOM
Okay. My comments were - my comments were from Goldstone that they see no white spots as we saw in 10. Looks like the ABC's working real well. The F-22 looks good. Over.

CDT 19:03 GET 010:31 TAPE 061/2

SC
Okay. Very good. Well we shut out the sun coming in from the other windows into the spacecraft, so it's looking through a - a number 1 window and there isn't any reflected light. Now they ought to be pretty good pictures.

CAPCOM
Roger.

CAPCOM
Hello Apollo 11, Houston. We'd like you to keep the TV off for about 10 minutes or so, so we can get some good comparison on the camera. You can do anything your heart desires on the TV. Interior, exterior, pan in and out, anything you'd like. Over.

SC
You have it Houston. Over.

SC
Houston, Apollo 11. Over.

CAPCOM
Roger go ahead. Over.

SC
You know (garble) you keep cutting out. We heard up to "you can do anything" and then after that we didn't hear anything and we knew that wasn't right any how because we can't but what do you want us to do?

CAPCOM
Roger. We'll check this stop link on our voice. The transmission on the TV was we'd like to get about 10 minutes worth of signal at Goldstone and we can look at the camera quality back here at Houston for about 10 minutes or so, when they pass it back into us. What we were saying was that you can go interior or exterior on the camera. On the exterior shots, we'd like to look - -

SC
Say again.

CAPCOM
Stand by.

SC
Turn over what we were seeing.

SC
Hey Houston. You suppose you can turn the earth a little bit so we can get a little bit more than just water.
CAPCOM
Roger 11. I don't think we've got much control over that. Looks like you'll have to settle for the water.

CAPCOM
11, Houston. We're going to change - thinking about changing our voice uplink to another sight. If you'll stand by, we'll see if we can improve the quality. Over.

SC
Okay Charlie.

SC
We'll stand by for your call.

CAPCOM
Apollo 11, Houston. We'll try once more on this TV request. We'd like 10 minutes worth of TV. We'd like a narrative if you could give us one on the exterior shots. We also suggest you might try the - an interior position. Over.

SC
Roger. We're seeing the center of the earth as it appears from the spacecraft in the eastern Pacific Ocean. We have not - -

END OF TAPE

CDT 19:23 GET 010:51 TAPE 062/1

SC
- from the spacecraft, and the eastern Pacific Ocean - we have not been able to visually pick up the Hawaiian chain, but we can clearly see the western coast of North America, the United States, the San Joaquin Valley, the High Sierras, Baja California, and Mexico down as far as Acapulco, and the Yucatan Peninsula, and you can see on through Central America to the northern coast of South America, Venezuala and Columbia. I'm not sure you'll be able to see all that on your screens down there

CAPCOM
Roger, Neil. We just wanted a narrative such that we can - when we get the playback, we can sort of correlate what we're seeing. Thank you very much.

SC
I didn't see anything but the DSKY's so far.

CAPCOM
Looks like they're hogging the windows.

SC
You' re right.

CAPCOM
Hello, Apollo 11. Houston. On your cryos, we'd like at this time for you to place all 4 cryo heaters to AUTO and turn off all 4 cryo fans. Over.

SC
Okay. All 4 cryo heaters are AUTO. And all 4 cryo fans are off. Uh huh.

CAPCOM
Roger. That's going to be your sleep configuration.

SC
Okay.

CAPCOM
And, Buzz, we'll be terminating the battery charge in about a half hour.

SC
Roger.

CAPCOM
Hello, Apollo 11. Houston. You can terminate the TV at your convenience. We've got enough tapes. And you can start TTC at your convenience. The REG's look super for starting up. Over.

SC
Roger, Charlie.

PAO
This is Apollo Control at 10 hours, 51 minutes. That TV transmission lasted about 15 minutes. Goldstone reported that we did get good quality on it. We estimate that it will be somewhere between an hour and a half or two hours before we have the television available here in Houston to play back. The lines will have to be called up between Goldstone and Mission Control Center, and the conversion equipment brought up on line before we'll be able to play back the television from that transmission. At the

beginning of the TV transmission, the spacecraft was approximately 50,980 nautical miles from Earth, and at the conclusion they were about 52,248 nautical miles from Earth.

END OF TAPE

CDT 19:33 GET 011:01 TAPE 063/1

PAO
9 hundred 80 nautical miles from earth and at the conclusion they were about 52 thousand 2 hundred 48 nautical miles from earth.

CAPCOM
Apollo 11, Houston. We have a flight plan update for you and some P37 block data, if your ready to copy, over.

SC
Stand by.

SC
Okay, Houston, PTC is started now, and looks good to us, and we'll be ready to copy in a minute or two.

CAPCOM
Roger, copy, 11.

SC
Houston, Apollo 11. Ready to copy the flight plan update and P37.

CAPCOM
Roger, stand by 1, Buzz.

CAPCOM
Apollo 11, Houston. Coming at you with the P37 block data, over.

SC
Okay.

CAPCOM
Roger, 02744 5363 minus 165 07314 03744 8016 minus 165 07246 GETI 04644 6141 minus 165 09703 05544 8209 minus 165 09642, ready for your read back, over.

SC
Roger, 02744 5363 minus 165 07314 03744 8016 minus 165 072 46.

END OF TAPE

CDT 19:43 GET 011:11 TAPE 064/1

SC
03 744 8016 minus 165 072 46 046 44 6141 minus 165 097 03 055 44 8209 minus 165 09642. Over.

CAPCOM
Roger, 11. That was a good readback. That was the block data scheduled for 12 hours. We'd like to do - just say that on a flight plan update here, just to remind you of some things, and you can do them at your convenience, and then go to sleep early if you'd like. We don't have anything else planned, but we'd like to just remind you on the filter change, the O2 fuel cell purge. And we'd like to have LM CM DELTA-P and accomplish the presleep checklist.

SC
Okay. We've completed the filter change and we'll get started on the fuel cell purge, and stand by for the LM CM DELTA-P.

CAPCOM
Roger, 11. Would you hold off on the fuel cell purge. E COMM is saying we might not have to do that. Over.

SC
Okay.

SC
Charlie, the LM CM DELTA-P is 0.5.

CAPCOM
Copy. 0.5. Out.

CAPCOM
Hello, Apollo 11. Houston. We've just decided to delete the O2 fuel cell purge. Over.

SC
Roger. Delete the O2 fuel cell purge.

CAPCOM
Hello, Apollo 11. Houston. We've been noting some funnies on the O2 flow indicator. For instance, we kind of got a suspicion that the transducer - we expected to see an O2 flow pegged high with the waste stowage vent to VENT. It was not. We also noted some funny indications when you closed the waste stowage vent valve. We're going to take a look at this through the night, and we'll be with you in the morning with an assessment of the problem. Also, we'd like to ask specifically, when you place the waste stowage vent valve to vent does the detent - correction - does the arrow line up with the detent? Over.

SC
Stand - stand by one, Charlie. We'll give you something on the detent.

CAPCOM
Roger.

SC
Right now it's at CLOSED, and I lined up with CLOSE before the vent, and best I can recall, it was quite accurately lined up with vent. Would you like me to go to VENT again momentarily and see where it lines up ?
CAPCOM
That's negative. That question's answered. Thank you much.

SC
Okay.

SC
(Garble)

PAO
This is Apollo Control. During that last transmission you heard Cap Com Charlie Duke advise the crew that we are not seeing as high an O2, or oxygen

CDT 19:43 GET 011:11 TAPE 064/2

PAO
flow, as we would have expected at this point. This would indicate that the enrichment of the cabin atmosphere, which was 60 percent oxygen, 40 percent nitrogen at launch and which is normally enriched with pure oxygen during the course of the/flight, is not enriching as rapidly as we would expect. This could be a transducer problem - one of the devices that measuzes the O2 flow rate - or possibly a partial obstruction of one of the vents. The problem is not thought to be significant at this point, and we'll be monitoring the O2 flow during the night.

CAPCOM
Stand configuration for you. Over.

SC
Roger. Go ahead.

CAPCOM
Roger, Buzz. We'd like you to place the S-band antenna OMNI-A switch to the BRAVO position. S-band antenna OMNI switch to the OMNI position. The high gain track to MANUAL, and the high gain angles will be yaw 270, pitch minus 50. Over.

SC
Roger. Understand. OMNI to baker and OMNI MANUAL, and the angles are yaw 270, pitch minus 50, and was that narrow or wider? Over.

CAPCOM
Stand by. Buzz, we'd like it in wide, and you can set that configuration up now. Over.

SC
I've been working.

SC
(Garble)

END OF TAPE

CDT 19:53 GET 011:21 TAPE 065/1

CAPCOM
Hello Apollo 11, Houston. You can terminate battery bravo charge, and we'd like a crew status report, we're about to tell you good night, over.

SC
Roger, stand by.

SC
Houston, Apollo 11, the battery chargingis complete and the crew status report is as follows. Radiation CDR 11002, CMP 10002, LMP 09003, negative medication fit as a fiddle, over.

CAPCOM
Rog, copy 11, thank you much. We'd like to ask one question. Have you tried the gas separator on the water, how is that working, over.

SC
Yea, Mike's got a couple of comments on that.

SC
It's working good so far, Charlie. We've got one installed on the water gun and the other one installed on the spigot down in the LEV, and we - like to mention one problem with them is that they leak at the junction between the food bag and the water filter, however with that extension they seem to be working pretty good. We were getting some gas through innitially, and I think that was just getting purged out to begin with and the last tube full we poured was almost free of bubbles, over.

CAPCOM
Roger, sounds good. We'll check in on that problem with the span guys and let you know in the morning. If you have to call us tonight, we'd like you to do it on down voice back up. We're configuring the MSFN for that mode and as far as we can see you're cleared for some z's, over.

SC
Okay, maybe we'll get around to lunch.

CAPCOM
How about a peanut butter and jelly?

END OF TAPE

CDT 20:03 GET 011:31 TAPE 066/1

PAO
This is Apollo Control at 11 hours, 29 minutes into the flight of Apollo 11. We don't expect to hear a great deal more from the crew tonight. At about 11 hours, 20 minutes we said good-night to them from Mission Control and they're beginning their sleep period about 2 hours early. The additional time available for sleep was made available by deleting the mid-course correction. The first opportunity which occurred at 11 hours, 45 minutes. That mid-course correction has been moved to mid-course correction 2 to the opportunity of mid-course correction 2 of which would occur tomorrow. The last conversation we had with the crew, we received a status report and a report that they had taken no medication and were "fit as a fiddle". We also got a report from

Mike Collins on the gas separation unit which is being flown on this flight. This consists of 2 stainless steel cylinders about 5 inches long and about an inch to an inch and half in diameter. The cylinders are attached to the water gun or to the water spigot on the food preparation panel and remove the gas from the water that flows through the filter. The filter actually has 2 filters inside. One which attracts water and one which repels it, in the process removing the gas. Mike Collins reported that the filters seem to be working quite well. That the water was coming out almost free of bubbles. He did report that they had a minor problem with a leak at the junction between the food bag and the filter. Mission Control advised that we would give that some thought and try to come up with some solution to it when they wake up tomorrow. At this time, Apollo 11 is 55,522 nautical miles from earth traveling at a velocity of 7920 feet per second. This is Apollo Control at 11 hours, 32 minutes.

END OF TAPE

CDT 20:19 GET 011:47 TAPE 067/1

PAO
This is Apollo Control at 11 hours 47 minutes into the flight of Apollo 11. At this time we are receiving the television data from Goldstone. The data is coming in. It will be processed here and converted, and we estimate that it will be available for play back in about 20 to 30 minutes and we will have a firm time on that as soon as possible. At the present time Apollo 11 is 56 thousand 7 hundred 4 nautical miles from earth, and the velocity is 7 thousand 8 hundred 21 feet per second. We have had no further conversations with the crew since we passed along a good night to them at 11 hours 20 minutes. Getting them to bed about 2 hours ahead of the scheduled time on the flight plan, as a result of the deletion of midcourse correction 1. At 11 hours 48 minutes, this is Apollo Control.

END OF TAPE

CDT 20:37 GET 012:05 TAPE 068/1

PAO
This is Apollo Control at 12 hours 5 minutes. We expect to have the unscheduled television transmission, which came in to Goldmtone California. It was taped there and has been transmitted to Mission Control center ready and converted for replay in color at 8:45 PM central daylight time. That would be about 7 minutes from now. The TV transmission runs for a total time of about 16 and a half minutes and there's an exterior shot out the window of the earth. At the time of the transmission Apollo 11 was some 50 thousand 9 hundred 80 nautical miles from earth. The transmission came into Goldstone at the ground elapsed time of 10:32:40, and ended about 16 minutes, 16 and a half minutes later, when the spacecraft was at an altitude of 52 thousand 2 hundred 48 nautical miles. We'll stand by for a replay of that transmission at 8:45 PM central daylight time.

CAPCOM
Apollo 11 Houston.

PAO
This is Apollo Control at 12 hours 12 minutes, and we expect to be ready to release the television transmission from the spacecraft which was received at Goldstone, California. That should be ready to go in a little less than a minute.

PAO
And we are starting to get lock on from the tape replay and we expect that we will have a color picture shortly.

CAPCOM
3 minute TV, stand by and we'll let you know on the quality, over.

CAPCOM
Apollo 1l, Houston. Goldstone says that the TV looks great, over.

SC
Roger, we're - -

CAPCOM
Hello Apollo 11, Houston. Did you copy, over?

SC
Roger, we copied, Charlie.

CAPCOM
Roger your transmissions these last couple of times has been about 2 by, over.

SC
Okay, how do you read me now?

CAPCOM
Roger, 5 by now.

SC
Okay we're zooming the lense on in so it will just about to the moniter.

CAPCOM
Roger.

END OF TAPE

CDT 20:47 GET 012:15 TAPE 069/1

SC
-zooming the lens on in, until it just about fills the monitor.

CAPCOM
Roger.

SC
Okay. It's in full zoom now.

CAPCOM
Copy 11.

SC
And how about the F stops? Is 22 going to be accurate?

CAPCOM
Stand by. We'll get with the Goldstone TV guy. We don't have anything here at Houston. Stand by.

SC
It looks good on the monitor as far as the F stop goes. Therefore, we just assumed it's okay at Goldstone.

CAPCOM
Hello Apollo 11, Houston. Goldstone says it's - TV looks really great - 5 by.

SC
Okay. You just got out Charlie but and I understand that it's looking great. We'll leave it the way it is and wait for you to come back on.

SC
Okay. How do you read me now?

CAPCOM
5 by.

CAPCOM
Okay. My comments were - my comments were from Goldstone. They see no white spots as we saw in 10; looks like the AGC's working real well. The F-22 looks good. Over.

SC
Okay. Very good. Well we shut out the sun coming in from the other windows into the spacecraft so it's looking through the number 1 window and there isn't any reflected light right now so it ought to be a pretty good picture.

CAPCOM
Roger.

CAPCOM
Hello Apollo 11, Houston. We'd like you to keep the TV on for about 10 minutes or so, so we can get some good comparison on the camera. You can do anything your -

SC
Houston, Apollo 11. Over.

CAPCOM
Roger go ahead. Over.

SC
Charlie, I'm sorry you keep cutting out. We heard up to you can do anything and then after that, we didn't hear anything and we knew that wasn't right anyhow because we can't. But what do you want us to do?

CAPCOM
Roger. We want check the up link on our voice. The transmission on the TV was we'd like to get about - for Goldstone and we can look at the camera quality back here at Houston for about 10 minutes or so when they patch it back into us. What we were saying was - - We'd like a little - - Stand by.

SC
Start over what we were saying.

SC
Okay Houston. You suppose you could turn the earth a little bit so we can get a little bit more

CDT 20:47 GET 012:15 TAPE 069/2

SC
than just water.

CAPCOM
Roger 11. I don't think we've got much control over that. Looks like you'll have to settle for the water.

CAPCOM
11, Houston. We're going to change - thinking about changing our voice uplink to another sight. If you'll stand by, we'll see if we can improve the quality. Over.

SC
Okay Charlie. We'll stand by for your call.

CAPCOM
Apollo 11, Houston. We'll try once more on this TV request. We'd like 10 minutes worth of TV and we'd like a narrative if you could give us one on the exterior shots. We also suggest you might try an interior position. Over.

SC
Roger. We're seeing the center of the earth as viewed from the spacecraft in the eastern Pacific Ocean. We have not been able to visually pick up the Hawaiian Island chain but we can clearly see the western coast of North America, the United States, the San Joaquin Valley. The High Sierra's, Baja, California and Mexico down as far as Acapulco and the Yucatan Penninsula and you can see on through Central America to the northern coast of South America, Venezeula and Columbia. I'm not sure you'd be able to see all that on your screens down there.
CAPCOM
Roger Neil. We just wanted a narrative such that when we get the playback we can sort of correlate what we're saying. Thank you very much.

SC
I didn't see anything but the DSKY's so far.

CAPCOM
Looks like they're hogging the windows.

SC
Your right.

PAO
This is Apollo Control. The view that we have of the earth disc at this time, as near as we can tell, the north pole is to the left of the screen- -

END OF TAPE

CDT 20:57 GET 12:25 TAPE 070/1

PAO
This is Apollo Control. The view we have of the earth disc at this time as near as we can tell, the north Pole is to the left of the screen. The land mass that was visible was the western coast of the United States. The earth then would appear to be rotated 90 degrees with the North Pole to the left and South American Continent extending toward the upper right of the globe but not visible.

CAPCOM
Apollo 11 Houston. On your Cryos, we'd like at this time for you to place all 4 cryo heaters to auto, and turn off all four cryo fans, over.

SC
Okay, all four cryo heaters are auto. And all 4 cryo fans are off.

CAPCOM
Roger, that's going to be your sleep configuration. Buzz we'll be terminating the battery charge in about a half hour.

SC
Roger.

CAPCOM
Apollo 11, Houston. You can terminate the tv at your convenience. We've got enough tape and you can start PTC at your convenience, the rates look super for starting it up, over.

SC
Roger, Charlie.

PAO
That concludes the unscheduled television transmission. That transmission came in about 2 hours ago at a ground elapsed time of 10:32:40 beginning, lasted about 16 and a half minutes. At the beginning of the transmission Apollo 11 was about 50,980 nautical miles from earth and at the conclusion about 52,248 nautical miles. At the present time, the crew is in a scheduled rest period. They did indicate before going into the rest period, when we last heard from them, that they would probably use part of the time to get a bite to eat and then get some sleep. At this time Apollo 11 is 59,908 nautical miles from earth, traveling at a speed of 7,569 feet per second. At 12 hours 31 minutes, this is Mission Control, Houston.

END OF TAPE

CDT 23:59 GET 015:27 TAPE 075/1

PAO
This is Apollo Control, 15 hours, 28 minutes ground elapse time. Apollo 11 crew still asleep according to Flight Surgeon Ken Beers here in Mission Control. The flight crew is still sleeping soundly at this time according to the biomedical telemetry being beamed down to the displays on his console. Here in the Mission Control Operations Room or MCOR as it is called the black team of flight controllers is settling in for the night headed up by Flight Director Glen Lunney. Some 7 hours remaining in the crews sleep period. Distance and velocity now showing 72,009 nautical miles out from Earth. Velocity now 6,750 feet per second. And at 15 hours, 28 minutes ground elapse time, this is Apollo Control.

END OF TAPE

July 17th, 1969

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CDT 01:10 GET 016:38 TAPE 076/1

PAO

This is Apollo Control at 16 hours, 38 minutes ground elapsed time. Apollo 11, presently being tracked by the Honeysuckle Creek, Australia tracking station. Geographically the spacecraft is practically directly over or out from the Phillipine Islands. Now showing some 5 hours and 51 minutes remaining in the crew rest period. The crew still asleep at this time. Continuing to decelerate as the spacecraft gets out toward the changeover point between the Earth's sphere of influence and the Moon's sphere of influence. Velocity now showing 6493 feet per second. Apollo 11 now out 76,453 nautical miles from the Earth. And at 16 hours, 39 minutes ground elapsed time this is Apollo Control.

END OF TAPE

CDT 02:05 GET 017:33 TAPE 077/1

PAO

This is Apollo Control 17 hours 33 minutes Ground Elapsed Time. Apollo 11 now some 79,700 nautical miles out from Earth at a velocity of 6320 feet per second. Telemetry display for the crew biomedical readings now shows all three men in a fairly deep sleep. The mean heart rates in the 40's for all three men. Command Module cabin pressure holding at 4.7 pounds per square inch. Cabin temperature is 63 degrees. No measurements on the Lunar Module in terms of cabin pressure in as much as the Lunar Module has not been activated and will not be until shortly before entering Lunar orbit and the first manning for the module is checked out, systems are checked out and closed back up again. Spacecraft analysis reports coming out of the back room here in Mission Control Center read like some of the ones in Apollo 10 toward the end of the mission when they were down to one page. And most of the entries are all systems performance normal systems operation normal, no change from last report, et cetera, et cetera. In the spacecraft fuel cell, performance is normal. And the load sharing is shown within 3.2 amps. Cryogenic hydrogen and oxygen quantities now show total oxygen at 558 pounds, 279 pounds in each of the two tanks, 49 pounds of cryogenic hydrogen, 24.2 pounds in Tank 1, 24.8 in Tank 2. And the cryogenic system is performing normal. At 17 hours 36 minutes Ground Elapsed Time this is Apollo Control.

END OF TAPE

CDT 03:10 GET 018:38 TAPE 078/1

PAO

This is Apollo Control, 18 hours 38 minutes ground elapse time. Apollo 11 now some 83,644 nautical miles out from Earth, continuing to decelerate in velocity. Now some 6,114 feet per second. The reveille time for the crew of Apollo 11 in some 3 hours and 50 minutes. All systems still functioning normally aboard the spacecraft as the crew continues their nine hour rest period. All measurements normal, as the flight controllers here watch the systems on telemetry and the displays here in the control center. Have 18 hours 39 minutes ground elapse time. This is Apollo Control.

END OF TAPE

CDT 04:15 GET 019:43 TAPE 079/1

PAO

This is Apollo Control, 19 hours, 43 minutes ground elapse time. Crew now has some 2 hours, 46 minutes remaining in the scheduled sleep period. Distance out-bound from Earth now 87,409 nautical miles. Apollo ll's continuing to decelerate in velocity, now traveling at 5,930 feet per second. All going well in the Apollo 11 mission. Crew sleeping apparently in deep sleep. Systems still performing quite well. And at 19 hours, 43 minutes ground elapse time, this is Apollo Control.

END OF TAPE

CDT 05:10 GET 020:38 TAPE 080/1

PAO

This is Apollo control 20 hours 38 minutes ground elapse time. One hour 51 minutes remaining in the crew rest period. At this time, Apollo 11 on a line projected outward from earth as directly over the southern tip of the Indian sub-continent. Distance now 90,509 nautical miles. Velocity continuing to decelerate, now 5,788 feet per second. The crew is still asleep at this time, and at 20 hours 39 minutes ground elapse time, this is Apollo control.

END OF TAPE

CDT 06:10 GET 021:38 TAPE 081/1

PAO

This is Apollo Control 21 hours, 38 minutes ground elapsed time. Apollo 11 now being tracked by the tracking station at Madrid. Some 51 minutes remaining in the scheduled sleep period for the crew of Apollo 11. When the sleep period ends depends on the business of the day whether the flight controllers here and the spacecraft communicator wakes the crew up or whether they

wake up on their own accord and call in to begin the second day of the translunar coast. Upon awakening the flight plan calls for change of the carbon dioxide removing filters in the spacecraft cabin. Now a report on the differential pressure between the lunar module and the command module. Update from the ground on consumables remaining. They will remain in the passiye thermal control mode through the hour long eat period that follows the wakeup. After their breakfast meal the flight plan calls for some navigation excercises using the sextant and the program 23 computations of the onboard computer. These are star and earth horizons sightings. Presently Apollo 11 is 93,085 nautical miles out from earth. Velocity now 5638 feet per second. At 21 hours, 40 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 07:21 GET 022:49 TAPE 082/1

PAO
This is Apollo Control at 22 hours, 49 minutes ground elapse time. The crew has been awake for some time according to the surgeon. Spacecraft communicator here in mission control with the green team, Bruce McCandless, is standing by to make a call to the crew. He's in the process of taking over from Ron Evans. Flight director, Cliff Charlesworth, has asked that he make a call to the crew. We're standing by for this call momentarily.

CAPCOM
Apollo 11, Apollo 11, this is Houston. Over.

SC
Good morning, Houston. Apollo 11.

CAPCOM
Roger, Apollo 11. Good morning.

CAPCOM
When you're ready to copy, 11, I've got a couple of small flight plan updates and your consumable updates, and the morning news, I guess. Over.

SC
Apollo 11, Houston.

CAPCOM
Go ahead, 11.

SC
Roger. Standing by for your updates. Over.

CAPCOM
Okay, 11, this is Houston at time approximately 22:30 in the flight plan. In your post-sleep checklist and in all other post-sleep checklists, we'd like you to delete the statement that says AUTO RCS Jet select 16 to ON, and what we're doing here is picking this up in the procedure for exiting PTC that's in your CSM checklist. And in the CSM checklist on page foxtrot 9-8 - if you want to turn to that - we'd like to change the order of the steps in that. Over.

SC
Okay, page F 9-8. Go ahead.

CAPCOM
Okay, right now it reads to exit G and N PTC then you've got a FAN 8 change that says AUTO RCS select 12 main A and B. And then you come down to printed stuff 1. We'd like to take and move the AUTO RCS select 12 main A and B down to be the second step, so the procedure would read Step 1 Manual attitude 3 excel command, Step 2 AUTO RCS select 12 Main A B, Step 3 would be verified deployed and so on. Over.

SC
Roger, I copy. Is that AUTO RCS select 12 Main A B to be the -
CAPCOM
Roger, it should be the second step in that procedure. At time 22:40 when you get to it, we'd like to commence a charge on Battery A. And at time 24:10 we have an updated attitude for your P-52 and optics calibration. Over.

SC
Okay, 24:10. Go ahead.

CAPCOM
Roger. P-52 and optics calibration attitude ROLL 330.5, PITCH 086.3, YAW 000.0. The nominal attitude is PAN 8-10 for the P-23 is still good. At time 25:30, approximately, after you complete P-23, we're requesting

CDT 07:21 GET 022:49 TAPE 082/2

CAPCOM
a weight water dump down to nominal 25 percent. Over.

CAPCOM
Apollo 11, this is Houston. Did you copy the attitude in the waste water dump? Over.

SC
Roger -

CAPCOM
11, this is Hohston. We're not reading you at the present time. You're way out on the noise hold. Stand by.

CAPCOM
Apollo 1l, this is Houston. How do you read? Over.

SC
Roger, Houston. Apollo 11. Loud and clear. How me?

CAPCOM
Okay, beautiful. Did you copy the attitudes for the P-52 and the waste water dump? Over.

END OF TAPE

CDT 07:31 GET 022:59 TAPE 083/1

SC
- coming in.

CAPCOM
Okay, beautiful. Did you copy the attitudes for the P52 and the waste water dump? Over.

SC
Rog. Okay, we note the battery charge as soon as we get around to it, and the attitude for the P52 optics cal, roll 330.5, 086.3 and yaw all zeros. The attitude for the P23 as in the flight plan is okay, and I copy your battery charge. Crew status report as follows: 3 CDR, CMP 7, LMP 5.5, and we've completed the post sleep checklist. Standing by for a consumable update. Over.

CAPCOM
Roger. We're requesting a waste water dump at GET 25:30 down to a nominal 25 percent, and here we go with the consumables update. At a GET of 22 hours, RCS total is minus 3.5 percent, alpha minus 3.5 percent, bravo minus 1.5 percent, charlie minus 5.0 percent, minus 4.0 percent, H2 minus 2 pounds, O2 minus 4 pounds. Over.

SC
Okay, stand by. I copied those consumables, and I'll read you back our RCS quantities. We got 86 percent in alpha, 87 in bravo, 88 in charlie, and 90 in delta. Over.

CAPCOM
Roger. I copy. And did you copy the waste water request?

SC
Roger. Waste waer - and we got the time for that, and that'll be down to 25 percent.

CAPCOM
Okay.

SC
Houston, 11.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Roger. We've started charging battery A, and voltage started off a lot higher than I expected. It was just a little bit shy of 40. It looks like it's dropping down some now. This is the battery charge folder. You know yesterday when we were doing this on battery C it started out at entry, and it went lower than the battery charge before.

CAPCOM
Roger. Stand by a second, and I'll get some reading on that.

SC
On charging battery A, now it's at about 39 3 and - oh, about 1.5 amps. Looks like it's gradually increasing in the amps starter.

CAPCOM
Roger. On RCM we're showing you at 39.11 and your current's about what you reported.

SC
Okay, I guess you have to - -

CAPCOM
Alright, we're losing you in the noise again, 11. Stand by.

END OF TAPE

CDT 07:41 GET 023:09 TAPE 084/1

CAPCOM
Apollo 11, this is Houston. Over.

SC
Houston, Apollo 11. Go ahead.

CAPCOM
Roger, 11. On your battery charging question, we feel that it's probably a difference between individual batteries and it does seem to have gone away as sort of a start up transient here. Other factors that might conceivably have an influence on it would be battery temperature, things of this sort. EECOM seems to feel that it's operating within the normal design limits. Over.

SC
All right. Very good. Thank you.

CAPCOM
11, this is Houston. If you are interested in the morning news I have a summary here from PAO. Over.

SC
Okay, we're all listening.

CAPCOM
Okay,
from Jodrell Bank England via AP. Britian's big Jodrell Bank radio telescope stopped receiving signals from the Soviet Union's unmanned moon shot at 5:49 BDT today. A spokesman said that it appeared the Luna 15 space ship "had gone beyond the moon". Another quote: "We don't think it has landed", said the spokesman for Bernard Lovell, Director of the Observatory.
Washington UPI: Vice President Spiro T. Agnew has called for putting a man on Mars by the year 2000, but Democratic leaders replied that priority must go to needs on Earth. Agnew, ranking government official at the Apollo 11 blastoff Wednesday, apparently was speaking for himself and not necessarily for the Nixon administration when he said, "We should, in my judgement, put a man on Mars by the end of this Century".
Laredo, Texas, AP: Immigration officials in Nuevo Laredo announced Wednesday that hippies will be refused tourists cards to enter Mexico unless they take a bath and get haircuts. Nuberto Cazaras, Chief of Mexican Immigration in Nuevo Laredo, said authorities in Mexico City, Alcapulco, and other popular tourist spots have registered complaints about the hippies.

United Press International: Initial reaction to President Nixon's granting of a holiday Monday to federal employees so they can observe a national day of participation in the Apollo 11 moon landing mission mostly was one of surprise.

Rodney Bidner, Associated Press: London AP: Europe is moon struck by the Apollo 11 mission. Newspapers throughout the continent fill their pages with pictures of the Saturn V rocket blasting off to forge Earth's first link with its natural satellite. And the headline writers taxed their imagination for words to hail the feat. "The greatest adventure in the history of humanity has started" declared the French newspaper Le Figaro which devoted 4 pages to reports from Cape Kennedy and diagrams of the mission. The tabloid Paris Soir proclaimed, "The whole world tells them Bravo". From the Communists Daily L'Humanite led with the launch picture and devoted its entire back page to an enthusiastic moon report describing the countdown and launch, the astronauts' wives and families and backgrounding lunar activities.

Hempstead New York: Joe Namath officially reported to the New York Jets

CDT 07:41 GET 023:09 TAPE 084/2

CAPCOM

training camp at Hofstra University Wednesday following a closed door meeting with his teammates over his differences with Pro Football Commissioner Peter Roselle.

London UPI: The House of Lords was assured Wednesday that a major American submarine would not "damage or assault" the lochness monster. Lord Nomay said he wanted to be sure anyone operating a submarine in the loch would not subject any creatures that might inhabit it to damage or assault". He asked that the submarine's plan to take a tissue sample with a retrievable dart from any monster it finds can be done without damage and disturbance. He was told it was impossible to say if the 1876 Cruelity to Animals Act would be violated unless and until the monster was found. Over.

SC

Roger, thank you, Bruce. That's interesting. That number 2 item we all (garbled) before we left and we hope we get a chance to see him when we return.

CAPCOM

Roger, and I understand he was down there and really enjoyed watching the launch. We are think it was pretty magnificent and you all are doing a great job up there.

SC

Thank you.

END OF TAPE

CDT 07:51 GET 023:19 TAPE 085/1

PAO

This is Apollo Control at 23 hours 22 minutes. Apollo ll's distance from Earth is 99,308 nautical miles. Velocity is 5411 feet per second. The spacecraft weight is 96,361 pounds. A flight dynamics officer reports that in terms of distance Apollo 11 will reach the half-way mark at 25 hours 0 minutes 53 seconds. At that time the spacecraft will be 104,350 miles from both the Earth and the Moon.

END OF TAPE

CDT 08:01 GET 023:29 TAPE 086/1

All dead air and static.

END OF TAPE

CDT 08:16 GET 023:44 TAPE 087/1

PAO

This is Apollo Control at 23 hours, 48 minutes. Capcom Bruce McCandless is getting ready to put in a call to the crew momentarily. Apollo ll's distance now is 100,685 nautical miles. Velocity 5356 feet per second.

CAPCOM

Apollo 11, this is Houston. Over.

SC

Roger, go ahead Houston.

CAPCOM

Roger. Mike, we've got some comments on the performance for P-23 for today if you've got a minute to talk.

SC
He's all ears. Yes, go ahead.

CAPCOM
Okay. For today, we'd like you on P-23 to make a trunnion bias determination prior to P-23 sitings as called out in procedures and also one afterward. Our intent here is to check out the possibility that some sort of thermal effect may be giving you errors in the angular readout in the section. The bias that you get beforehand should be incorporated, that is proceed on NOUN 87 after you get 2 consecutive measurements equal it will then point 003 degrees, and of course move the trunnion off a couple of degrees between the measurements. The Earth should be a lot smaller in your field of view today, I'm sure you're a lot more qualified to tell us about that than we are, but to insure that you're getting a good angle measurement between the star and the Earth horizon, the section M-line, which is the line that runs through the 2 hash marks and is perpendicular to the R-line, should be parallel to the Earth horizon at the substellar point. And then the actual super imposition of the star on the horizon can be made at any point in the field of view of the section above, below, or on the M-line. We recommend the marks be made as rapidly as possible after the AUTO maneuver. If you feel that the amount of time between the AUTO maneuver and the time you get ready to mark is excessive or that you don't like that AUTO maneuver attitude when you get ready to mark, of course you can use a -

END OF TAPE

CDT 08:31 GET 023:59 TAPE 088/1

CAPCOM
We've got an auto maneuver attitude when you get ready to mark. Of course, you can use a VERB 94 - that's VERB 94 to get you back to the flashing 51 position to redo the auto maneuvers. Over.

SC
Roger. Stand by one, we're going to stop PTC, and then we'll talk about this P23.

CAPC0M
Okay.

PAO
Apollo 11 is now going out of the passive thermal control mode in which it was slowly rotating to maintain thermal balance. They're getting set up for the P23 activities. That's the midcourse navigation. Capcom Bruce McCandtess is passing up some changes in the procedures for this navigational operation.

SC
Houston, Apollo 11.

CAPCOM
Go ahead, 11.

SC
Okay, we're stopping PTC now and maneuvering to our P52 and optics cal attitude. And we're going to the P23. What I was trying to tell you yesterday was about that. The M line is not anywhere parallel to the horizon at the roll, pitch and yaw which you give me to go to for the substellar point, and I was trying to maneuver off to get it parallel to the horizon when you all said that was unnecessary.

CAPCOM
Roger, 11. I guess in keeping the cups of coffee strong, why you get that one.

SC
Well - okay - well, this morning, let's just see how close it comes to being parallel to the M line. Before we started marking for the first time it appeared that the computation of - of those three angles was somewhat off, and that I was wasting a lot of gas by going to those three angles and then having to make a large attitude changes after that to get the M line parallel, and in some cases it appeared to be just an accepted attitude required, and you all said that it wasn't needed. So I was marking in some cases with the M line not parallel. I thought perhaps you had some processer for computing that offset and making sense out of that data, but as far as I know we gotta have the M line parallel.

CAPCOM
Roger, 11. We don't have that capability. We do require that the M line be parallel to the horizon in order to get a good mark. We

feel that possibly the - the state vector information that you were using for your maneuver basis yesterday may have needed to be updated a little, and if you'll stand by a second we'll give you an evaluation of what we feel you'll get today by the auto maneuver.

SC
Okay.

SC
Houston, Apollo 11. Over.

CAPCOM
Go ahead, 11.

CDT 08:31 GET 023:59 TAPE 088/2

SC
Roger. I'm setting ready to do an O2 fuel cell purge. Do you have any particulars on this, and I assume you want these one at a time, or can I triple up. Over.

CAPCOM
We'd like them one at a time, and stand by. I don't think we have any sequence. You can do them in any order you want.

SC
Okay.

CAPCOM
And, we're watching you on TM down here. We wanted to -

END OF TAPE

CDT 08:46 GET 024:14 TAPE 089/1

SC
Houston, Apollo 11. You want to look at these TM 93 beore I proceed on.

CAPCOM
Yes, please, stand by a second.

SC
Okay.

CAPCOM
11, this is Houston. On our TM here we're only seeing values in 2 registars. Can you read us out the contents of registar 3, please.

SC
Registar 3 minus 3 balls 2 4.

CAPCOM
Roger, minus 3 balls, 2 4, and you can go ahead and proceed.

SC
Okay, proceeding at this time.

CAPCOM
11, Houston, after you've completed P52, we'd like the up flight you on state vector, so we can start out clean on this P23, over.

SC
Okay. Houston, are you observing the higher O2 flow on fuel cell 3? Houston, Apollo 11, it triggers the master alarm 3 times now - there it goes number 4. It goes up to about 1.4 and then oscilates back down to about 1.1 , over.

CAPCOM
Roger, we saw them 1.3 now, on TM - stand by a second.

SC
And we're through now for state vector.

CAPCOM
Roger, give us accept, please.

SC
Roger.

CAPCOM
11, Houston. On our O2 flow fuel cell 3, apparently it was flowing a little higher than the other two during purge, but the flow rate is acceptable, over.

SC
Roger, it seems to be flowing a little bit more, and actually putting out more current than the other two, also, over.

CAPCOM
Roger, we copy. 11, this is Houston. We've completed the uplink; computer's yours, and go back to block.

SC
Okay.

CAPCOM
Go ahead 11.

SC
Houston, 11, I don't believe we were calling you right now.

CAPCOM
Roger, out.

PAO
This is Apollo Control at 24 hours 22 minutes into the mission. Apollo ll's distance from the Earth is 102,436 nautical miles, velocity 5288 feet per second.

SC
Houston, Apollo 11.

CAPCOM
Apollo 11, this is Houston, go ahead.

SC
Roger, I'm in a good attitude here to do - I have in the sextant this last P52 star. What number is it? Star 37, is that all right for the optics calibration to save some gas, are do you want to go over to Star 40?

END OF TAPE

CDT 08:56 GET 024:24 TAPE 090/1

SC
- 37. Is that all right for the optics calibration to save some gas, or do you want to go over to Star 40?

CAPCOM
Star 37 will be fine for the optics calibration and we haven't noticed a VERB 66 yet after our state vector uplink. Over.

SC
Okay.

CAPCOM
When you move into P-23, we recommend that you use the CMC computer angles for your auto maneuver. See how that works out. If it doesn't bring you up with the M-line parallel to the horizon to the substellar point, we will see if we can get you some

ground computed angles. I guess the big thing here is to make sure that the M-line is parallel to substellar points so we can get a good angular measurement. Over.

SC
Yes, I believe.

CAPCOM
Roger. Roger.

PAO
Star 37 is Nunki. Apollo 11 is now in program 52 which is realignment of the platform prior to beginning the cislunar navigation operation.

SC
This is Apollo 11. Marking on this star, I get a 987 twice in a row of five balls so that's sufficient for a count.

CAPCOM
That's certainly very sufficient.

SC
Okay.

SC
Now I want to go to P00 and I am going to take your three angles and do a verify of 49 maneuver to your substellar point. Okay?

CAPCOM
Okay. We recommend that for the first star, if we gave you a new state vector, we'd like to try the CMC computed angles for your auto maneuver.

SC
Okay.

CAPCOM
And have you hit PROCEED on this display to enter the zero?

SC
Not yet.

CAPCOM
Okay.

CAPCOM
11, Houston. Over the past two hours we have seen a slight continuing increase in partial pressure of CO2. Have you in fact changed the CO2 cannister yet this morning? We don't need to do it right now, but we'd like to confirm it on our instrumentation. Is that in good shape? Over.

SC
No, we haven't changed any cannisters this morning.

CAPCOM
Okay. Then you can plan on accomplishing that after P-23 is over and you've got the LEB clear.

CDT 08:56 GET 024:24 TAPE 090/2

SC
Houston, Apollo 11. We're in process of maneuvering to P-23 in desired attitude. It likes ROLL 8.37, PITCH 61.22 and YAW 339.87. Over.

CAPCOM
Roger, we copy. And that is for Star Zero 1?

SC
Star Zero 1 right near the horizon. Code 110.

CAPCOM
Roger.

SC
Houston, Apollo 11. On this star the auto maneuver works just fine and I am right at the substellar point. Everything looks beautiful except there is no star in sight. It is just not visible.

CAPCOM
Roger. Is this for Star 01?

SC
That's correct.

CAPCOM
You are not getting any reflections or anything like that that would obscure your vision, are you?

SC
Well, of course, the earth is pretty bright and the black sky, instead of being black, has sort of a rosy glow to it and the star, unless it is a very bright one, is probably lost somewhere in that glow, but it is just not visible. I maneuvered the reticle considerably above the horizon to make sure that the star is not lost in the brightness below the horizon. However, even when I get the reticle considerably above the horison so the star should be seen against the black background, it still is not visible.

CAPCOM
Roger, we copy. Stand by a minute, please.

CAPCOM
11, this is Houston. Can you read us the shaft and trunnion angle off the counters?

SC
I will be glad to. Shaft, 331.2 and trunion, 35.85.

CAPCOM
Roger, thank you.

END OF TAPE

CDT 09:16 GET 024:44 TAPE 091/1

SC
It's really a fantastic sight through that sextant. A minute ago, during that auto maneuver, the radical swept across the Mediterranean. You could see all of North Africa absolutely clear, all of Portugal, Spain, southern France, all of Italy absolutely clear. Just a beautiful sight.

CAPCOM
Roger, we all envy you the view up there.

SC
But still no star.

CAPCOM
11, this is Houston. Over.

SC
Roger. Go ahead, Bruce.

CAPCOM
On our ground computer we confirm the shaft and trunnion angle that you have as heing pointed at the star. However, it looks as if that shaft and trunnion angle is also pointing into the structure of the LM so that while you will be getting the earth hori-

zon, the star LOS, is obscured by the LM. We recommend an auto maneuver to the attitudes in the flight plan. Roll 1772, pitch 2982 and yaw 330.0. Over.

SC
Okay, fine, let's try that.

SC
Transmission hooked on and gimbal locked on now ?

END OF TAPE

CDT 09:36 GET 025:04 TAPE 092/1

CAPCOM
11, this is Houston. While you're maneuvering, could we get an LM CM Delta P reading from you? Over.

SC
Roger. Just a tad under 1, Bruce - .95.

CAPCOM
Roger. .95.

PAO
This is Apollo Control. That reading was the difference in pressure between the lunar module cabin and the command module cabin.

CAPCOM
Apollo 11, Houston.

SC
Go ahead.

CAPCOM
Is the commander aboard?

PAO
This is Jim Lovell calling Apollo 11.

SC
This is the commander.

CAPCOM
I was a little worried. This is the back-up commander still standing by. You haven't given me the word yet. Are you GO?

SC
You've lost your chance to take this one , Jim.

CAPCOM
Okay, I concede.

SC
Houston, Apollo 11.

CAPCOM
Go ahead 11.

SC
Okay, our maneuver is complete and at this attitude the M-line is exactly 90 degrees out of phase. It is exactly pointed along the vector toward the center of the Earth instead of being parallel to the right.

CAPCOM
Roger.

SC
I'm going to hold right here for your next projection.

CAPCOM
Roger.

SC
Okay, Houston. It appears to be okay now. We've changed our attitude slightly and I have a star and I'm maneuvering to get the M-line parallel.

CAPCOM
This is Houston. Roger, we copy.

PAO
This is Apollo Control at 25 hours, 20 minutes. Apollo 11 -

SC Houston, stand by.

PAO
Distance is now 103,263 nautical miles. Velocity 5,256 feet per second.

PAO
This is Apollo Control. Delay that last announcement. Those figures are not based on the proper ground elapsed time. This display is static. We don't have the present numbers.

END OF TAPE

CDT 09:56 GET 25:24 TAPE 093/1

SC
Houston, Apollo 11. Are you copying these NOUN 49's that have been going through?

CAPCOM
Yes, we surely are. Let's see, plus .1, and a plus .2 on nautical miles and feet per second. Over.

SC
Roger.

CAPCOM
11, this is Houston, over.

SC
Go ahead.

CAPCOM
Yeah, Mike, we show you in - we're in 59 right now, over.

SC
That's right. I - I haven't entered, I gave it back to the computer for a second. I put the Mode Switch from Manual back to CMC while I fooled with the DSKY, and the computer drove the star off out of sight, so the delay here has been in going back to manual and finding the star again which I've finally done, and just a second here, I'll go to enter and get a 51 and mark on it. As I say, for some reason the computer drove the star off out of sight.

CAPCOM
Okay, roger, out.

CAPCOM
Apollo 11, this is Houston, over.
SC
Go ahead.

CAPCOM
Roger, we show you as a little less than an hour to the midcourse correction number 2 burn, and we recommend that you terminate the B23 activities here, and press on with the waste water dump which we need from you and getting ready for the burn, over.

SC
Okay.

CAPCOM
And I have your midcourse correction number 2 pad when you're ready to copy.

SC
Stand by. Roger, Houston. Apollo 11, ready to copy MCC 2.

CAPCOM
Apollo 11, this is Houston. Midcourse correction number 2, SPS G&N 63 zero 59'er plus 09'er7, minus 020, GET ignition 026 44 57 9'er 2 plus 00 118 minus 00 003 plus 00 177 Roll 277.

END OF TAPE

CDT 10:22 GET 025:50 TAPE 094/1

SC
177, roll 277355015, noun 44 block is A, delta VT 0021300300168, sextant star 302082370, the rest of the pad is N/A. GDC align vega and deneb. Roll align 007144068, no LH. LM weight 33302. For your information your heads will be pointed roughly towards the earth on this burn. Readback over.

SC
Roger. Midcourse correction number 2. SPS G&N 63059 plus 097 minus 020026445792 plus 00118 minus 00003 plus 00177277. Are you still copying? Over.

CAPCOM
Roger. Still copying. Go ahead. Apollo 11, this is - Apollo 11, this is Houston. I copied your transmission about roll 277, and go ahead from roll 277. Over.

SC
Roger. 355015 N/A 00213003001 68302082370. Vega and Deneb 007144068. No ullage. LM weight 33302. Heads towards the earth. Over.

CAPCOM
11, this is Houston. Readback correct. Out.

CAPCOM
Apollo 11, Houston. Over.

SC
Go ahead, Houston. Apollo 11.

CAPCOM
Roger. We'd like you to terminate battery A charge at GET 26 hours and reinitiate battery A charge after midcourse correction 2. Over.

SC
Follow that one, roger.

CAPCOM
Roger, out.

PAO
This is Apollo Control at 25 hours, 58 minutes. Apollo ll's distance is now 107,224 nautical miles. Velocity 5,106 feet per second.

CAPCOM
11, this is Houston. Over.

SC
Go ahead.

CAPCOM
Roger. If you can give us a step we'll send you up a state vector and a target load for the maneuver.

SC
Okay, give us one minute to check the P23 damage.

CAPCOM
Sure thing.

SC
Houston, Apollo 11. The DSKY's yours.

CAPCOM
Houston, roger, out.

PAO
This is Apollo Control at 26 hours. The ignition time for this midcourse correction will be 26 hours, 44 minutes, 57 seconds - about 44 minutes from now. It will be a service propulsion maneuver. Duration of the burn will be 3 seconds, the delta-V 21.3 feet per second.

PAO
This midcourse maneuver should reduce the pericynthion of Apollo ll's trajectory from the present 175 nautical miles to 60 nautical miles.

CAPCOM
11, this is Houston. We've

CDT 10:22 GET 025:50 TAPE 094/2

CAPCOM
completed the uplink. The computer's yours.

SC
Thank you.

END OF TAPE

CDT 10:37 GET 026:05 TAPE 095/1

SC
Houston, Apollo 11.
CAPCOM
Apollo 11, this is Houston. Over.

SC
Roger. Wonder if you have a star that might be a little closer to the direction we're turning than the one you gave us.

CAPCOM
Roger. We're going to rework the attitude in the sextant star for you in order to improve the high gain antenna coverage and we'll have that for you in a few seconds.

SC
Fine, we're already maneuvering in that attitude.

CAPCOM
Roger.

SC
Maybe you can make it just the change in roll. Apollo 11, over.

CAPCOM
Roger.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead.

CAPCOM
Roger, on your attitude for the burn we'd like you to use roll 096, pitch 356, yaw 018. That will give you a sextant star of 01, shaft 253.8, trunnion 24.2. Over.

SC
(garbled)

CAPCOM
11, this is Houston. We are having difficulty reading you through the noise. Could you read back again, please? Over.

SC
Roger, Houston, (garbled)

CAPCOM
Roger, very weakly in the noise, but I think I can copy. Go ahead.

SC
Okay, roll 096, 356 018 01.

CAPCOM
Roger, I got all of that except trunnion. It's trunnion 242. Over.

SC
Houston, Apollo 11. How do you read me now on OMNI A?

CAPCOM
Roger, loud and clear, 11.

SC
Okay, we'll stay on OMNI A for a while then.

CAPCOM
Okay. I got all your readback except the value for trunnion and if it's 242, confirm please.

SC
Roger, 242.

CAPCOM
Okay.

END OF TAPE

CDT 10:47 GET 026:15 TAPE 096/1

PAO
The Guidance Officer reports Apollo 11 is now in the attitude for the midcourse correction.

PAO
This is Apollo Control at 26 hours, 27 minutes. Apollo ll's distance from Earth now 108,594 nautical miles. Velocity 5,057 feet per second. We're about 17 and a half minutes away from the midcourse correction.

END OF TAPE

CDT 11:07 GET 026:35 TAPE 097/1

SC
Houston, Apollo 11. Could you give us a couple of high gain antenna angles, please?

CAPCOM
Roger, stand by, 11. Roger, 11, pitch minus 35, yaw 0. Over.

SC
Thank you.

CAPCOM
Okay.

SC
Houston, Apollo 11. How do you read high gain?

CAPCOM
Read you loud and clear on high gain down here, and everything's looking good from our standpoint for your burn. Over.

SC
Okay, Bruce.

PAO
This is Apollo Control at 26 hours and 40 minutes. We're Just under 4 minutes to the midcourse correction maneuver. Apollo ll's distance from the earth is 109,245 nautical miles. Its velocity is 5,033 feet per second. Spacecraft weight 96,361 pounds.

PAO
One minute to the burn. The duration will be 3 seconds. Burning. Shutdown.

SC
Houston, burn's completed. You copying our residuals?

CAPCOM
Affirmative.

SC
And Houston, looks like we saw about 87 or 88 psi on chamber pressure that time. I can't look at that on the ground.

CAPCOM
Roger, 11. We'll take a look at that and get back in a few minutes. 11, Houston. On our realtime telemetry we saw 95 to 97 psi on chamber pressure. We'll - we will look at the recordings down here though and get back with you again. Over.

SC
Okay, thank you.

CAPCOM
And we've copied your residuals,11.

SC
Roger. No, we're not going to check those residuals.

CAPCOM
Huh?

END OF TAPE

PAO
This is Apollo Control. That was a good burn. The residuals are on the order of a half a foot a second or less, and will not be trimmed. We're showing spacecraft weight now as 96,159 pounds.

CAPCOM
Apollo 11, Houston, could we get your DELTA-V counter reading, please.

SC
Minus 3. 8.

CAPCOM
Minus 2. 8.

SC
3.8.

CAPCOM
Roger, copy, 3.8.

SC
Houston, is there anything else you need on the burn status report?

CAPCOM
This is Houston, negative, over.

SC
Roger, thank you.

CAPCOM
Apollo 11, this is Houston, over.

SC
Roger, Apollo 11.

CAPCOM
Roger. I just wanted to remind you that we haven't noticed on the TM the VERB 66 after the burn. And for your information we played the recorded TV back last night, I believe, after you all turned in for you rest period, and the pictures came out quite well, over.

SC
Did you get any usable pictures out of Mila on that first pass?

CAPCOM
Not that we've seen. We had word of a voice loop, but Mila reported that they had gotten a minutes worth of TV signal and Goldstone reported that they had gotten about a minutes worth of modulation, but that they weren't able to get anything off of it.

SC
Okay, thanks.

CAPCOM
Okay, here's another input, Apollo 11, that the Mila data was recognizable as of the pictures, but we don't have any evaluation as to the quality of the pictures, over.

SC
Okay.

CAPCOM
And for our information, we've been watching a PCO2 again. Did you change a lithium hydroxide canister this morning, over?

SC
Yes, we did, and we've been seeing 1.7 percent in the spacecraft ever since.

CAPCOM
Roger, that agrees with our data.

SC
1.7 millimeters.

CAPCOM
Roger, we copy.

SC
Houston, Apollo 11, we're starting our maneuver to PTC attitude.

CAPCOM
Roger.

END OF TAPE

CDT 11:29 GET 026:57 TAPE 099/1

CAPCOM
11, this is Houston. Over.

SC
Go head.

CAPCOM
Roger. From a propellant balancing standpoint, we recommend that you use QUAD, ALPHA, and BRAVO to start the PTC maneuvers. Over.

SC
Roger, understand ALPHA and BRAVO.

CAPCOM
Roger, out.

PAO
This is Apollo Control at 27 hours, Apollo ll's distance now 110,198 nautical miles. Velocity 4984 feet per second.

CAPCOM
11, this is Houston. Over.

SC
Go ahead Houston.

CAPCOM
Roger. For cryo balancing purposes, we'd like you to turn the heater and oxygen tank number 1 off at this time. Over.

SC
Okay, stand by.

CAPCOM
Everything else in the CRYO system remains the same.

SC
Okay.

SC
Okay, we have O2 heater tank 1 off.

CAPCOM
Houston, roger, out.

PAO
This is Apollo Control at 27 hours, 7 minutes. The crew is now is the process -

SC
- is he happy with all those good things?

CAPCOM
Oh, EECOM is happy, and after you get PTC set up, we've got a little procedure from EECOM here to check out the O2 flow and the O2 flow sensor in your cabin enrichment. Over.

SC
Okay.

SC
It'll be awhile, Bruce. We're just now arriving in PTC attitude and we're going to our 20-minute of minding thruster activity.

CAPCOM
Roger, we copy. We'll be here.

END OF TAPE

CDT 11:40 GET 027:08 TAPE 100/1

PAO
This is Apollo Control. The passive thermal control being reestablished by Apollo 11 is at the rate of three-tenths of a degree per second which would be three rotations per hour.

SC
Houston, Apollo 11. Are you going to take control of the OMNI's now and switch us between D and B.

CAPCOM
This is Houston. Stand by one.

CAPCOM
Apollo 11, Houston.

SC
Go ahead.

CAPCOM
Mike, how about selecting bravo at this time and I'll give you a comp configuring these, over.

SC
That PTC sure worked well last night.

CAPCOM
Outstanding.

CAPCOM
11, Houston.

SC
Go ahead.

CAPCOM
Okay. ROLL for the COMM installation. Now, that's the antenna on the A and BRAVO, S-band antenna OMNI to OMNI, high gain track to manual and the PITCH is minus 50 and YAW is 270.

SC
You may have to repeat some of that James. We've got a LM guy taking care of the high gain right now. Yes, and he is eyeballing the earth. He's got his head out the window.
CAPCOM
I understand. I had trouble on 12 with him, too.

SC
Say again what you'd like.

CAPCOM
Okay, the S-band antenna OMNI A switch to BRAVO which you have now, and S-band antenna OMNI to the OMNI position and the high gain track to the manual
position, and the PITCH and YAW angles are minus 50 for PITCH and the YAW is 270.

SC
Minus 50 and 270.

PAO
That's Jim Lovell, the commander of the backup of Apollo 11 crew communicating with Apollo 11 at the present time. He also commanded the Gemini 12 flight in which Buzz Aldrin was his pilot.

SC
Hey, Jim, I'm looking through the monocular now and to coin an expression the view is just beautiful. It's out of this world. I can see all the islands in the Mediterranean. Some larger and smaller islands of Majorca, Sardinia and Corsica. A little haze over the upper Italian peninsula, some cumulos clouds out over Greece. The sun is setting on the eastern Mediterranean now. The British Isles are definitely greener in color than the brownish green that we have in the islands

CDT 11:40 GET 027:08 TAPE 100/2

SC
peninsula of Spain. Over.

CAPCOM
Roger. I understand that the Northern Africa - Mediterraanean area is fairly clear today, huh?

SC
Right. I see a bunch of roads with cars driving up and down, too.

CAPCOM
Do you find that the monocular is any good to you, Buzz?

SC
Yes. It would be nicer if it had another order of magnitude of power on it. It has a tendency to jiggle around a little bit and you might want to have some sort of a bracket. I hate to use that word though.

SC
There's an anti-cyclone going in the southern hemisphere southeast of Brazil and some - well, the diameter of it must be over 2,000 miles across .

CAPCOM
How does the weather look up in the southern part of the western hemisphere or up in the United States area?

SC
Well, you all are just beginning -

END OF TAPE

CDT 11:51 GET 027:19 TAPE 101/1

SC
United States area.

SC
You all are just beginning to come over the LM now I can see parts of Central America and it looks to be fairly clear there. The

islands in the Caribbean are beginning to come in and rather a few streaming lines of clouds. Looks like there is a system up to the - well, off of Greenland that has some large cloud streamers extending back down to the southwest. The east coast of the U.S. is just coming into view now and it doesn't look too bad that I can see right now. We may have some pretty good shots later on this afternoon Over.

CAPCOM
Roger, thank you.

PAO
That was Buzz Aldrin giving the description of what he could see on the Earth. The backup lunar module pilot Fred Hayes is also in the Control Center at the present time.

SC
Houston, Apollo 11.

CAPCOM
Go ahead, 11.

SC
I've got a comment about the point on the Earth where the sun's rays reflect back up toward us. In general, the color of the oceans is mostly uniform and it's, oh bright and darker blue except for that region that's about 1/8th of an earth's radius in diameter, and in this circular area the blue of the water turns a grayish color and I'm sure that's where the sun's rays are being reflected back on up toward us. Over.

CAPCOM
Roger, Buzz. We noticed the same thing, It's very similar to looking at a light shining on something like a billiard ball or bowling ball. You get this bright spot in the blue of the water and that turns it sort of a grayish color.

SC
Yes. Is there a Navy term for that?

CAPCOM
A lot of gray paint.

CAPCOM
11, Houston.

SC
Go ahead, Houston.

CAPCOM
Mike, are you satisfied with P23 now?

SC
Yes, I'm happy with the last updates we got, you know, in terms of what it did to our state vector. Still not altogether happy with the various procedures. If we could pick stars within the smaller range of trunnion angles so that you could allow P23 to pick its own maneuver and go to that substellar point and then have that star visible, that would seem to me to be the simplest and best way to do it,

CAPCOM
How about the horizon now? Is it pretty well defined where it's no longer hazy?

SC
Yes, we're far enough out now that the - I think the horizon definition variation is lost in the noise.

SC
Hey, Jim.

CDT 11:51 GET 027:19 TAPE 101/2

CAPCOM
Go ahead, Buzz.

SC
Looks like the best outstanding view is through the monocular is just steady it out and let it close when it's in front of your eye and then you kind of float up next to it so you're not touching it at all. It has a very slow drift and you get a better view that way.

CAPCOM
Sounds good.

CAPCOM
How does it feel to be airborne again, Buzz?

SC
Well, I'll tell you, I've been having a ball floating around inside here, back and forth up to one place and back to another. It's just like being outside except more comfortable.

CAPCOM
It's a lot bigger than our last vehicle.

SC
We've been busy, I'm looking -

SC
Say again, my friend?

SC
It sure is nice in here.

CAPCOM
I said it's a lot bigger than the last vehicle Buzz and I were in.

SC
Oh, yes. It's been nice. I've been very busy so far. I'm looking forward to taking the afternoon off. I've been cooking, sweeping, and almost sewing, and you know, the usual little housekeeping things.

CAPCOM
It was very convenient the way they put the food preparation system right next to the NAV station.

SC
Everything is right next to everything in this vehicle.

SC
Not if you're in the (garbled)

SC
Jim, it's been a little warm in the machine throughout yesterday and last night during the PTC. It cooled off somewhat with the windows buttoned up and -

END OF TAPE

CDT 12:01 GET 027:29 TAPE 102/1

SC
- the PTC. It cooled off somewhat with the windows buttoned up and we've seen suit temperatures of about - the high 40's and cabin temperatures in the low 60's. But this seems to be still a little bit on the warm side.

CAPCOM
I understand it got a little warm during the day and cooled down a little bit when you put the shades up, but you're still a little bit warm. Have you have any moisture condensation or anything like that on the wall?

SC
No, we haven't been able to detect any moisture anyplace in the spacecraft. It seems to be fine.

SC
One of the hydrogen filters - the one that we've got on the hot water - seems to keep flowing when you remove one of the food bags from it. Its flow rate is quite small right near the end of one out, and that contributes a little bit of moisture to the atmosphere.

SC
Yes, that hydrogen thing, it's, I'm not sure, but I think it's a back pressure problem. If the thing sees any back pressure at all, like when the bag is attached, well the flow rate will slowly decrease to where its almost zero, and you wait, and you wait, and you wait for that last ounce. You think you have it, and you remove the bag, and then you very rapidly thereafter see maybe a glob the size of a dime or a quarter come out and just hang there. That appears to be true even though the opening into the bag is not restricted.

CAPCOM
Understand.

SC
In general, I think they do quite a good job, especially on the guns when we're moving a lot of the hydrogen bubbles.

CAPCOM
Are the water temperatures good? Are you getting hot water?

SC
Yes, it seems reasonably warm.

SC
We made 3 cups of coffee today. The last one - you know when all the plumbing was warmed up, the hydrogen gun and everything, was warmest of the 3. I don't know who had that one - Neil, did you have that one? How was your coffee? You didn't drink it till later, did you? Anyway, it's pretty good. It's not piping hot, but it beats stone cold coffee.

SC
Jim, we've been sitting here a little over 20 minutes now. How does the thruster firing activity look? Are you ready to go on with this PTC?

CAPCOM
Roger, stand by.

CAPCOM
We're all set to go, Mike.

SC
Okay, I'll press ON then.

SC
Houston, Apollo 11. PTC has started and it looks good.

CDT 12:01 GET 027:29 TAPE 102/2

CAPCOM
11, Roger. This is Houston. Roger, out.

END OF TAPE

CDT 12:11 GET 027:39 TAPE 103/1

PAO
This is Apollo Control at 27 hours 46 minutes. Apollo ll's distance from the Earth is now 112,386 nautical miles, velocity 4,906 feet per second. We now have the actual numbers on the midcourse correction maneuver. Ignition time was 26 hours 44 minutes 57.92 seconds. Duration of the burn was 2.91 seconds. DELTA-V 20.9 feet per second.
CAPCOM
Apollo 11, this is Houston, over.

SC
Go ahead, Houston.

CAPCOM
Roger, if you're free for a couple of minutes, we have a procedure here that will let us verify the O2 flow transducer, and at the same time get some more of our cabin enrichment out of the way, over.

SC
Stand by.

SC
Go ahead Houston, we're ready to copy .

CAPCOM
Roger, the primary purpose of this is - as I mentioned, to let us check out your O2 flow transducer. However, we still need about 2 hours worth of cabin enrichment, so we'd like to keep the - the vent that we're going to set up going for this purpose. Okay, we want you to install the cabin -

END OF TAPE

CDT 12:21 GET 027:49 TAPE 104/1

CAPCOM
- for this purpose. Okay, so we want you to install the cabin vent quick disconnect which you'll find in compartment R6, that is Romeo 6 on the urine connector on panel 251. When this is completed verify that the waste stowage vent valve is closed and then open or position the waste management overboard drain to the dump position. Over.

SC
Okay, understand that - install the cabin quick disconnect out of R6 on the 251 urine connector and verify that the waste dump valve is closed, and say again the last part.

CAPCOM
Roger. And then put the waste management overboard drain valve off into the dump position. Over.

SC
Roger. Put the waste management overboard drain valve to the dump position.

CAPCOM
Right. That's the one down on panel 251 also. And we'll watch your O2 flow on telemetry down here.

SC
Okay, Houston. This is the configuration to set up.

CAPCOM
11, this is Houston. Say again, please.

SC
You do have the O2 flow transducer checked out - the set up accomplished.

CAPCOM
Okay, understand you have opened the drain valves this time.

SC
That's affirmative.

CAPCOM
Roger. We're not getting telemetry data from you right due to low signal strength. There it comes back. I expect it'll probably take us anywhere from 15 minutes to half an hour or so. I see an increase in 024 due to the size of the cabin and of course of the small size of the drain. Over.

SC
Alright.

END OF TAPE

CDT 12:36 GET 028:04 TAPE 105/1

SC
Houston, Apollo 11.

CAPCOM
Go ahead 11.

SC
Roger. I've got the world in my window for a change and looking at it through the monocular it's really something. I wish I could describe it properly. The weather is very good. South America is coming around into view. I can see on the - what appears to me to be upper horizon a point that must be just about Seattle, Washington, and from there I can see all the way down to the southern tip of Tierra del Fuego and the southern tip of the continent.

CAPCOM
Roger, sounds like you've got a beautiful view up there.

SC
Absolutely fantastic. I hope the pictures come out. We're rotating around where's it's going out of view again.

PAO
That's Mike Collins talking.

SC
We'll pick it up again in a second.

CAPCOM
Sounds like one of these rotating restaurants.

PAO
And Bruce McCandless is back on the CAPCOM console now,

END OF TAPE

CDT 12:46 GET 028:14 TAPE 106/1

CAPCOM
Apollo 11, this is Houston. Over.

SC
(inaudible)

CAPCOM
Apollo 11, this is Houston. Negative. We had a command computer at the Madrid go down. We had to switch over to ascension temporarily. We're now back remoting through Madrid and the computer is back, and we're ready to resume control of your OMNI's and full communication. Over.

SC
Okay, you've got it.

CAPCOM
Okay. One thing that we did miss in the dropout in the noise here is your LM CM DELTA P readings for about 28 hours GET. Over.

SC
Okay. LM CM DELTA P is .98.

CAPCOM
Roger. 0.98, and what have you been reading for O2 flow on your onboard gage? Over.

SC
Well, right now, after we put that gadget in, we've got about .35. Before that, we were reading on scale level. I think ours is relati-

vely correct, at least when time comes for the water simulators to kick in at 10 seconds, it goes on up to about .75, .8, something like that.

CAPCOM
This is Houston. Roger, out.

CAPCOM
11, this is Houston. Oh, more information based on our analysis of your last SCS burn, it looks like you got a good solid burn there. We show 94 PSI chamber pressure -

END OF TAPE

CDT 13:11 GET 028:39 TAPE 107/1

CAPCOM
It looks like you've got a good solid burn there. We show 94 psi chamber pressure, and it looks like the SPS is definitely GO, over.

SC
Good to hear it.

CAPCOM
Roger, we thought you'd feel that way about it.

SC
We're right in the middle of either (garbled) or salmon salad, or something like that. That's probably why we're not answering you right away.

CAPCOM
Okay, well we don't want -

SC
My compliments to the chef, that salad salmon is outstanding.

CAPCOM
Roger, understand that's the salad salmon, over.

SC
Something like that, salmon salad.

CAPCOM
There we go, the salmon salad, very good.

SC
Okay, Houston, coming up on the water accumulator activity, and it's going on up to .85, oh, about .95 and it reached a peak there and then gradually dropped back on down to .6 now, .4, and it looks like it's pretty well - here we are leveling off back down to .35, over.

CAPCOM
Roger, we're copying that.

PAO
At 28 hours 40 minutes, we're showing Apollo 11's distance as 114,922 nautical miles from Earth, velocity 4,819 feet per second. The crew is eating lunch at the present time, and it sounds like there music in the background that they are enjoying during their lunch period.

CAPCOM
Apollo 11, Houston.

SC
Go ahead.

CAPCOM
Roger, on that O2 flow transducer down here on telemetry our values are agreeing pretty well with what you read out onboard, and the EECOM's have been noticing this cycle, but it still looks like the indicated rate is lower than what we would expect. We're still working on the problem, and we'll let you have a more complete diagnois on it in a little while.

SC
Okay, it's a tight fix then.

SC
We run a tight ship.

CAPCOM
Roger, is that music I hear in the background?

SC
Buzz is singing.

SC
Pass me the sausage, man.

CAPCOM
Okay.

PAO
This is Apollo Control at 29 hours into the mission. Apollo 11's distance from Earth is now 115,837 nautical miles, velocity 4,788 feet per second. Spacecraft weight 96,117 pounds.

END OF TAPE

CDT 13:36 GET 029:04 TAPE 108/1

PAO
This is Apollo Control at 29 hours, 20 minutes. Apollo 11's distance from the earth is now 116,747 nautical miles, velocity 4,758 feet per second. One of the clocks in the control center is now displaying the time to landing, the landing timing based on the time in the flight plan. It shows we're 73 hours, 26 minutes, 30 seconds from the lunar landing.

END OF TAPE

CDT 13:56 GET 029:24 TAPE 109/1

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead, Houston.

CAPCOM
Roger, 11. We've been watching your activity on the DSKY there, and by selecting another major program with VERB 37 ENTER and all that, we show you COAS the dead-band in CTC and having driven the CMC rate from .3 degrees per second down to 0 degrees per second, although of course with all the auto RCS coils shut off, you're not throwing any thrusters. Over.

SC
Okay, what do you recommend?

CAPCOM
Well, you can just continue in your present configuration in PTC. However, if you go to turn any thrusters on, the CMC would then try to bring you into an attitude hold position rather than continuing with the PTC. Over.

SC
Roger. I understand.

CAPCOM
Okay.

SC
And Houston, we're just looking at you out our window here. Looks like there's a circulation of clouds that just moved east of Houston over the Gulf and Florida area. Did that have any rain in it this morning?

CAPCOM
Roger. Our report from outside says that it's raining out here, and looks like you've got a pretty good eye for the weather there.

SC
Yes, well, it looks like it ought to clear up pretty soon from our viewpoint. The western edge of the weather isn't very far west of you.

CAPCOM
Okay.

PAO
That was Neil Armstrong.

END OF TAPE

CDT 14:11 GET 029:39 TAPE 110/1

PAO
This is Apollo Control at 29 hours 40 minutes. Apollo 11's distance from Earth 117,682 nautical miles, velocity 4726 feet per second.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead, Houston.

CAPCOM
11, this is Houston. As a result of our venting through the waste management drain we concluded that your O2 flow rate sensor is in fact malfunctioning. I mentioned when you start this through the cyclic water accumulator dump that even though it was moving, probably indicating a higher flow rate, it didn't seem to be indicating a flow rate that is high enough, and based on that and the flow that we're getting right now we concluded that the transducer is malfunctioning. We'd like to continue the O2 flow for about another hour, shuting off at about 31 hours GET to get the O2 concentration in the vehicle up in the vehicles where it will be acceptable for the LM checkout. Over.

SC
Okay. Does it look to you like it just has a bias on it?

CAPCOM
Roger, 11. It does seem to bias. Looks like it has a fairly high threshold before it stops indicating. ECOM seems to think that for high flow rate purposes it will still give you a relative indication during the mission. Over.

SC
Okay, we understand. Thank you.

END OF TAPE

CDT 14:32 GET 030:00 TAPE 111/1

PAO
This is Apollo Control at 30 hours into the mission. Apollo 11's distance from earth is 105,853 nautical miles, velocity 4233 feet per second. And that was Neil Armstrong conducting a conversation with CAPCOM Bruce McCandless on the O2 flow rate transducer

PAO
This is Apollo Control. We have a correction on those last distances and velocities. That distance and velocity is in reference to the moon instead of the earth. To the moon - Apollo 11's distance from the moon is 105,729 nautical miles at the present time and the velocity in reference to the moon is 4230 feet per second.

CAPCOM
Apollo 11, this is Houston. We would like you to start terminating charging on Battery A at GET 30 plus 15. Over.

SC
Okay. GET 30 plus 15, Battery A charge terminated.

CAPCOM
Roger. Out.

PAO
This is Apollo Control. Apollo 11's distance from the earth is 119,116 nautical miles. Its earth referenced inertial velocity, 4679 feet per second.

END OF TAPE

CDT 14:46 GET 30:14 TAPE 112/1

PAO
This is Apollo Control. Based on the present projectory, Apollo 11 will enter the lunar sphere of influence as an elapsed time of 61 hours, 39 minutes, 58 seconds.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead, Houston.

CAPCOM
Roger. If you're free for a minute I'll get some updates to the P37 pad that we passed up to you yesterday afternoon, I guess. As a result of doing midcourse correction number 2 the delta-V required in the TLI plus 35, 44 and 53 pads have changed slightly. Over.

SC
Roger. Standing by to copy.
CAPCOM
Okay, TLI plus 35 pad, the delta-VT should be 7 and 992 instead of 8016, TLI plus 44 it should be 6112 instead of 6141, and TLI plus 53 it should be 8172 instead of 8209. Readback. Over.

SC
Roger. Understand. 7992, 6112, 8172. Over.

CAPCOM
Roger. Readback correct. Out.

PAO
This is Apollo Control. Goldstone reports they are receiving TV from the spacecraft and are recording it.

CAPCOM
Apollo 11, this is HousTon. Over.

SC
Go ahead, Houston.

CAPCOM
11, this is Houston. Goldstone reports they are receiving a TV picture coming down from you all - a little snowy but a good TV picture. Over.

SC
Roger. We're just testing the equipment up here.

CAPCOM
Roger.

SC
Ask them if they can read the numbers.

CAPCOM
Okay, stand by. Goldstone, this is Houston Capcom. Over. GOLDSTONE Houston Capcom, Goldstone M and O go ahead.

CAPCOM
Roger. Stand by a minute, Goldstone. 11, this is Houston. What numbers are you referring to? Over.

END OF TAPE

CDT 15:03 GET 030:31 TAPE 113/1

CAPCOM
This is Houston. What numbers are you referring to? Over.

SC
Well, I guess if they can't see any numbers, why it's kind of a lost cause.

CAPCOM
Negative. Stand by. We want to do them. We wanted to know what numbers before we asked them.

SC
Okay, I'm showing them a DSKY and I'd like to know whether they can read what's showing on the DSKY and also whether they can see PROG VERB and NOUN. Over.

CAPCOM
Roger. Stand by a second. Goldstone in on all Houston Capcom. Over.

SC
Capcom, Goldstone, go ahead.

CAPCOM
Roger. Did you copy the spacecraft request?

SC
That's affirmative. I am reading the numbers on our monitor here.

CAPCOM
Okay, that's ...

SC
Roger, that's both the numbers on the DSKY itself and the little words like program and verb, noun, computer, activity, things of this sort.

CAPCOM
Roger, I can read the numbers clearly. We can't distinguish what the words are because it is a little snowy.

SC
Roger.

CAPCOM
Okay, you read verb, noun, and program.

SC
Roger, do you see over in the left-hand corner there's a big square one that says computer activity, comp activity.

CAPCOM
Roger, I see a flash occasionally in that area.

SC
That's the one.

CAPCOM
Okay, it looks like he's moved the camera at this time.

SC
Roger.

CAPCOM
11, this is Houston. Goldstone M&O reports that they can read the numbers on the DSKY. They can also read the verb, noun, program, and see the comp activity light flashing. Over.

SC
Very good. Thank you.

CAPCOM
And they also report you appear to have panned the camera over to another location now.

SC
Yeah, we're going to work on something else.

CAPCOM
Roger.

PAO
This is Apollo Control. We do not have lines called up between here and Goldstone at the

CDT 15:03 GET 030:31 TAPE 113/2

PAO
present time, so we cannot receive the pictures in Houston. Goldstone is recording. The lines will be up for the scheduled TV pass, approximately 6:30 this evening, Central Daylight Time.

PAO
This is Apollo Control. The tape from this unscheduled TV pass will probably be fed from Goldstone to Houston following the regularly scheduled TV transmission this evening.

END OF TAPE

CDT 15:23 GET 030:51 TAPE 114/1

SC
Houston, Apollo 11.

CAPCOM
Go ahead, 11.

SC
Oh Charlie, that you?

CAPCOM
That's me, how are you there?

SC
Oh, just fine. How's the old white team today?

CAPCOM
Oh, the old white team's bright eyed and bushy tailed. We're ever alert down here.

SC
Ever alert and ready. Hey you got any medics down there watching high grade? I'm trying to do some running in place down here. I wondered just out of curiosity whether it makes my heart rate up.

CAPCOM
Well, they will spring into action here momentarily. Stand by.

CAPCOM
Hello 11, we see your heart beating.

SC
Okay well (garbled) we're all running in place up here. You wouldn't believe it.

CAPCOM
I'd like to see that sight. Why don't you give us a TV picture of that one.

SC
I think Buzz is trying. He got it.

CAPCOM
Okay, it's coming in at Goldstone, Buzz. As Bruce said, we don't have it here in the center.

SC
(garbled) didn't help out the CPC very much.

SC
I don't know whether it's a vibration or what it is, but it makes the pitch and yaw rate needles on FDAI number 1 jump up and down a little bit when we jump up and down.

CAPCOM
Rog, Rog, Goldstoners say they see you running there, Mike.

SC
Okay.

SC
Ask him what he's running from.

CAPCOM
11, Houston. Mike we see about a 96 heart now.

SC
Okay, thank you.

SC
(garbled) without getting (garbled.

CAPCOM
Rog, we copy.

SC
Goldstone should be getting about the best picture of the earth we can give them right now, Charlie.

CAPCOM
Roger, Mike, thank you much.

SC
We've got a little distortion in the horizontal direction from banding on our moniter. I wonder if they're getting the same thing?

CAPCOM
Stand by Buzz. I'll let you know.

SC
I guess it would be more described as a waviness.

GOLDSTONE
Goldstone MNO, Houston, Capcom.

CDT 15:23 GET 030:51 TAPE 114/2

GOLDSTONE
Goldstone MNO.

CAPCOM
Okay, the crew is complaining of some horizontal banding on their monitor. Do you see that on the picture.

GOLDSTONE
Stand by.

GOLDSTONE
They don't see it right now. We don't have anything in focus, Charlie.

CAPCOM
Roger, he's checking on it. I'll see if they had it earlier, stand by.

SC
I guess when we're showing the DSKY, or when we're showing the earth might be a better time.

CAPCOM
Okay.

GOLDSTONE
Houston Capcom, Goldstone.

CAPCOM
Go ahead.

GOLDSTONE
Okay, our TV people confirm they see this horizontal band.

CAPCOM
Okay.

CAPCOM
Eleven, Houston. The Goldstone TV people also see the banding when, at the same time you do, over.

SC
Okay, would they call it a horizontal waviness, instead of banding, maybe?

CAPCOM
I'm not talking to them directly. Stand by Buzz let me see how they describe it.

CAPCOM
Goldstone MNO, Houston Capcom. Could you put the TV guy on the loop please?

GOLDSTONE
Capcom, Goldstone, roger.

END OF TAPE

CDT 15:33 GET 031:01 TAPE 115/1

SC
Houston, CAPCOM Goldstone MNO Net 1.

CAPCOM
Go.

SC
The TV people do not access to Net 1 in that area. Suggest we use Net 2 for that purpose.

SC
Say go to Net 2?

CAPCOM
Hello Apollo 11, Houston. The Goldstone TV guys say they have some horizontal banding across the upper part of the picture and across the lower part. They would consider the lines just strayed; no wave in the storm at all. Over.

SC
Roger, understand. They do seem to distort vertical lines though.

CAPCOM
Say again about the vertical lines Buzz.

SC
Roger. When there's a vertical line, these horizontal bands tend to - put small waves in it.

CAPCOM
Roger. I copy. He didn't mention that. Stand by, I'll check again.

CAPCOM
Hello 11, Houston. The Goldstone TV said that when you did a sharp vertical line on a picture, was he - horizontal panning goes across it, does appear to bend it slightly. The same as Apollo 10, they said. Looks okay to them. Over.

SC
Okay, understand. It's not our monitor, it must be the transmitter or the distance.

CAPCOM
Roger. I guess so but we'll have them look into it and see if they can suggest anything.

PAO
This is Apollo Control at 31 hours, 5 minutes and here in Mission Control we're changing shifts at this time. Flight Director Gene Krantz is replacing Flight Director Clifford Charlesworth and our Capsule Communicator on this shift will be Charlie Duke.

CAPCOM
Command interface with Goldstone. We'd like you to switch to OMNI Delta. Over.

SC
Roger going to Delta.

CAPCOM
Rog.

PAO
Apollo 11, at this time, is 121,158 nautical miles from earth traveling at a speed of 4613 feet per second. We anticipate that the change of shift briefing will begin at about 4:00 P.M. Central Daylight Time.

CAPCOM
Hello Apollo 11, Houston. We'd like you to terminate the O2 purge if you have not done so already and the TV camera people say that the lines are inherent in the camera Buzz, and it's something that we expected. Over.

SC
Roger understand about the camera. Say again about the O2 purge.

CDT 15:33 GET 031:01 TAPE 115/2

CAPCOM
Roger. We can terminate the O2 purge at this time. Over.

SC
Oh, okay. Fine. Will do.

END OF TAPE

CDT 15:43 GET 031:11 TAPE 116/1

CAPCOM
Hello, Apollo 11; Houston. Please select OMNI BRAVO onboard. Over.

SC
Take on the (garble), Charlie.

CAPCOM
Roger.

SC
How's everything going down there? You guys happy with the spacecraft systems?

CAPCOM
Roger. Affirmative. Everything's looking really good to us. Over.

SC
Okay. Same here.

SC
Charlie, how far out can you pick up TV on the OMNI?

CAPCOM
Stand by.

CAPCOM
Hello, Apollo 11. Houston. We're just about to the limits where we can get any kind of picture at all on the OMNI's on the TV. It - The picture, I guess, would be just almost zero at this point.

SC
Okay. Well, for this TV program coming up in a couple of hours, you might give some thought to how you want us to stop PTC, if you do, for the best high gain angle and also it would be nice if you could stop us at such an attitude that we'd have the Earth out of one of our windows.

CAPCOM
Roger, 11. We're thinking about that.

SC
Okay.

CAPCOM
Hello, Apollo 11; Houston. We got some pipa biases and general drift updates for you if you give us to an accept. Over.

SC
Okay, Charlie. Stand by one.

CAPCOM
Roger, 11. The - Okay, thank you much. Our biggest drift on the gyros is 0.03 degrees per hour with only X-gyro. On the pipas, the wide pipa's the biggest and it's 0.006 feet per second so we just kinda tweak it up. The biggest we have is about one sigma on both gyros and accelerometers.

SC
Sounds good.

CAPCOM
The system really looks good to us.

SC
And here, Charlie.

CAPCOM
11, Houston. You can go back to block. We accept the load in.

SC
Okay. Roger.

PAO
This is Apollo Control at 31 hours, 22 minutes. We're scheduled to begin the change of shift briefing shortly. During the briefing we will record any conversations with the crew and play those back following the briefing. At 31 hours, 22 minutes, this is Apollo Control.

END OF TAPE

CDT 16:53 GET 032:21 TAPE 117/1a

PAO
This is Apollo Control at 32 hours 21 minutes. During the Change of Shift Press Conference we had about 3 minutes of conversation with the crew. During that conversation, Buzz Aldrin reported on - what appeared to be a weather disturbance off Cuba and the Caribbean and we also had some descriptions from Aldrin on the view of Earth from the spacecraft's present position. We'll played that back for you now and then stand by for any further live conversation with the crew.

SC
You sure do get a perspective in this thing in Zero G? Right now Neil's got his feet on the forward hatch and he can with his arms reach - oh - five windows. He can reach down into - oh, the LEB where the overboard drain is. He can practically reach over in the cockpit.

CAPCOM
Sounds like plastic man to me.

SC
I'm hiding under the left hand couch trying to stay out of his way.

CAPCOM
Be a good idea, Mike.

SC
All right Houston, Apollo 11. Do you have a cloud over the Houston area right now?

CAPCOM
Roger. We just had really big thunderstorm here about a hour ago. Couple of storms around the area right now.

SC
Yeah, I see one fairly large and isolated one. There are couple of more off to the left but this one looks fairly good size. It could very well be the one that just passed over you. It looks like the Cape has been having a little bit of rain too.

CAPCOM
Roger. The one we had here came in from the west and is moving east or nearly so as far as I could tell.

SC
Have news, this sextant is fantastic. I can see Alaska right up - right up along the LM and I am running the cross hairs right now down the coast of California, west coast of Mexico, Yucatan Peninsula, up around the Gulf, Florida, Cuba, down Central America and I'm running into the South now.

CAPCOM
Roger. It sounds like a pretty fantastic view.

SC
The guys in the weather office out at Patrick wanted a report on the top but I guess all we can say is that we are above them.

CAPCOM
Rog. We'll pass it on OMEGO.

SC
Houston, do you see any predominant weather systems as far as funnel type? Any buildup of tropical storm type? Over.

CAPCOM
Not any large ones. There are a couple of smaller disturbances - there is one maybe 300 miles north of Cuba but it doesn't look like.

CDT 16:53 GET 032:21 TAPE 117/1b

CAPCOM
Rog.

CAPCOM
Hello Apollo 11, Houston. We got a PV attitude for you and also an update to your CMC erasable load and your alternate contingency check list if you can break that out too over.

SC
Roger, - I am not sure I caught all of that.

CAPCOM
Roger, 11, if you will break out your alternate and contingency check list for the CSM, we got an update to some of the erasable loads on page F2-20, over.

SC
Okay, we will be getting that out and you can give us the attitude for the (garble)

CDT 16:53 GET 032:21 TAPE 117/2

CAPCOM
Roger 11. Your TV attitude will be roll 261, pitch 090, yaw 000. High gain angle pitch plus 28, yaw 271. That puts the left-hand window pointed at the Earth. We recommend exiting PTC with your updated procedure in the check list. Over.

SC
Roger. We copy roll 21 - 261, pitch 090, yaw 000, high gain pitch plus 28 Yaw 271. (garble) Over.

CAPCOM
That's affirmative.

SC
Charlie, I have a couple of questions on the PTC. It seems to me that the easiest way to stop it would be - we're essentially on course at 0 degrees yaw and close to up a 90 degree pitch. It is just a question of stopping at 260 roll roughly and how about for a procedure going manual attitude three to REG command and then seeing how our deadband has already collasped, I will turn on our Panel 8 RCS thrusters at which time it should stop at whatever attitude it binds itself in and if I will do all of that as it comes up on 261 degrees roll we should stop right there - in that position.

CAPCOM
Sounds pretty good. Stand by one

SC
In other words, it might save on gas

SC
Houston, Apollo 11. What page do you want in that revision, Over.

CAPCOM
Roger, 11, if you will turn to page F2-20, over.

SC
Okay.

CAPCOM
Roger, 11. Under Column A on page F2-20, line 5 - line 05. The new data is 01042, line 07, the new data is 00256. Skipping down to line 11 - 00070, line 12 is 00042, line 13 - 77730. In column

END OF TAPE

CDT 17:03 GET 032:31 TAPE 118/1

CAPCOM
13 per 77730. In column Bravo, lines 3, 4, and 5, which are blank should be all zeros. Line 3, line 4 is 20017 line 5 20616, over.

SC
Roger (garbled) S-band -20 column Alpha 05 01242 07 2056 11 I'll say again 1100070 1200042 1377730 column bravo 0300000 04 2001705 0616, over.

CAPCOM
Roger good read back, and stand by Mike, coming out of the PTC recommendation, over.

SC
Okay.

CAPCOM
Hello Apollo 11, Houston, with a recommendation on the exiting PTCM, over.

SC
Go ahead.

CAPCOM
Roger, Mike. We'd like to see you go to excell command on the manual attitude switches. Then to turn on the auto RCS select switches, and then go right to manned. That will prevent us from firing jets uncoupled, over.

SC
Okay, fine and I would guess go right command and roll first and then followed by pitch and yaw.

CAPCOM
Okay, that sounds good if, and when you get to the roll attitude desired just go right command at that time and that'll stop us right on.

SC
Yea I agree Charlie, that sounds right.

CAPC0M
Rog.

PAO
This is Apollo Control at 32 hours 39 minutes. This is a relative quiet period in the flight plan. The crew will be getting the spacecraft set up for the passive thermal control termination, and the Television transmission. Capcom Charlie Duke has just put in a call. We'll pick that up.

CAPCOM
Playing with the P37 while ago and we collapsed the dead-band back down. The dap assumed that the dead band was centered around the new attitude that we happened to be at at that time. Since then we've drifted out a couple of degrees in both pitch and yaw from that attitude, such that if we did the proceedure as we call it up to you of going excell command, turning on all of the auto RCS select switches and the rate command it would attempt to fly back to the pitch and yaw attitude that it had when the dead band collapsed. We can prevent that by just immediately priod to going to right command on the manual attitude switches, if you cycle the spacecraft control switch to SCS, then back CMC, over.

SC
Sounds like a winner.

CAPCOM
Okay.

SC
I'm not going to let these LM guys play

CDT 17:03 GET 032:31 TAPE 118/2

SC
with my DSKY any more.

END OF TAPE

CDT 17:13 GET 032:41 TAPE 119/1

SC
I'm not going to let these LM guys play with my DSKY any more.

CAPCOM
You sound like you'd better protect it. It looks like just about anything that you do with that DSKY is going to collapse that bad dead band back down.

SC
Understand.

SC
Charlie we just had to turn in 61 degrees roll and it looks like whoever figured it out did a good job. It's right there in the middle of window number 1.

CAPCOM
Sounds great.

SC
It looks like Houston's got a little smog over it, Charlie.

CAPCOM
We've got a constant over-cast here in the room - - stand by.

SC
- course a little cloud from up here, probably covers 8 or 10 states.

CAPCOM
Apollo 11 Houston, some of our guys just came in from outside and said that is pretty clear over the center here it's cleared up completely. All the storms have moved on.

SC
Contengient.

SC
Oh yes Charlie, I can see (garbled) now, and I can see the coast line is clear and those clouds are just inland a few miles.

CAPCOM
Okay, we copy.

SC
Looks like the south east part of the country is all socked in. California looks nice, the San Joaquin Valley shows up as a real dark spot with a lighter brown around the side of it. You can't tell that it's green, it looks just sort of dark gray or maybe even a real dark blue.
CAPCOM
How does the Mojave look? Is it clear?

SC
Yea, as usual. It looks like the clouds just to the west of the Serras, northeast of Bakersfield a little bit and crossing over into the Mojave from Bakersfield looks clear and then as you get on - -

END OF TAPE

CDT 17:23 GET 032:51 TAPE 120/1

SC
Rog. Seeing about what - It looks like there are some clouds just to the west of the Sierras, northeast of ... a little bit and then crossing over into the Mojave from ... it looks clear and then as you get on further to the southeast of there, there's a few clouds

CAPCOM
Roger, 11. Can you pick out Edwards in the sextant? Over.

SC
I can see a 104 taxing out takeoff on the runway.

CAPCOM
Man, that's super.

SC
Those damn bastards almost always have a 104 taxing out for takeoff.

CAPCOM
11, Houston. Can you pick out anything around Edwards, a dry lake or anything? Over.

SC
Negative, Charlie. I just - I don't have that resolution, but to give you some idea, I can, in the lower sextant scope, I can see, after knowing what I'm looking for, I can see Padre Island. I can just barely make out the fact that there's a thin slit of land and then there's a little dark zone which is the Laguna Madre between it and the mainland.

CAPCOM
Roger, 11. That's pretty signficant. Thank you much, Buzz.

SC
Right.

PAO
Mike Collins is sending us this description from about 126,000 miles from earth.

SC
How far out are we, Charlie?

CAPCOM
Stand by. I'll give it to you exactly. Looks like about 130,000, but stand by.

SC
Okay.

CAPCOM
11, Houston. The exact range is 125,200 miles, and you're traveling 4,486 feet per second.

SC
Pretty far and pretty slow; just passed halfway.

SC
Hey Charlie, what the latest on Luna 15?

CAPCOM
Say again, Buzz. Over.

SC
Roger. What's the latest on Luna 15?

CAPCOM
Stand by. I'll get the straight story for you.

END OF TAPE

CDT 17:33 GET 033:01 TAPE 121/1

All dead air.

END OF TAPE

CDT 17:58 GET 033:26 TAPE 122/1

PAO
This is Apollo Control at 33 hours, 34 minutes. We've been advised that we are getting television transmission from Goldstone at the present time. This is an unscheduled TV transmission apparently of the crew checking out their onboard system.

PAO
We have lost lock on the high gain antenna at this time. Apollo 11 is presently 127,991 nautical miles from Earth, traveling at a speed of about 4400 feet per second. The regularly scheduled time for the television transmission is 6:47 p.m. Central Daylight Time, and we are anticipating that that transmission will occur as scheduled.

PAO
We're getting momentary lock-on. We seem to have a somewhat better picture now. Here's a call to the crew from Capcom Charlie Duke.

CAPCOM
Hello, Apollo 11; Houston. Over.

SC
Light's on.

CAPCOM
Roger. Latest on Luna 15 - passed a - Tass reported this morning that the spacecraft was placed in orbit close to the lunar surface, and everything seems to be functioning normally on the vehicle. Bernard Lovell said the craft appears to be in an orbit of about 62 nautical miles. Over.

SC
Okay. Thank you, Charlie.

CAPCOM
And also, President Nixon has reported - declared a day of participation on Monday for all Federal employees to enable everybody to follow your activities on the surface. Many state and city governments and businesses throughout the country are also giving their employees the day off, so it looks like you're going to have a pretty large audience for this EVA.

SC
Oh, that's very nice, Charlie. I'll tell him about it.

END OF TAPE

CDT 18:13 GET 033:41 TAPE 123/1

PAO
This is Apollo Control at 33 hours, 41 minutes. We are going to be standing by here in Mission Control for the possibility that the crew would want to transmit that television pass early. The scheduled time for it was 6:47 Central Daylight time and about 15 minutes was scheduled. That would be at a ground elapsed time of 34 hours and we will have the system set up here in Mission Control to receive and release television should the crew decide to send us the transmission early.

PAO
This is Apollo Control at 33 hours, 45 minutes and we do have a correction to the time given for the beginning of that TV nominally. The flight time is beginning at 34 hours to 34 hours, 15 minutes ground elapsed time. The previous conversion of that, that we gave you for Central Daylight Time was in error, it should be 6:32 P.M. Central Daylight Time beginning, assuming we start as the flight plan nominally has a transmission listed at 34 hours ground elapsed time. At the present time, Apollo 11 is 128,431 nautical miles from earth and the velocity continuing to drop off slowly, now reads 4386 feet per second.

SC
Houston, Apollo 11. We've stopped PTC, we're in the right position, we're setting up the TV.

CAPCOM
Roger.

PAO
You've heard that comment from the crew. They've stopped their passive thermal control, they're starting up the TV and we'll be standing by for - for a picture.

END OF TAPE

CDT 18:21 GET 033:49 TAPE 124/1

CAPCOM
Apollo 11, Houston. We have you stopped in the PTC. Attitude looks good to us. In fact, I would like to get a contact. The last couple of the transmissions from the spacecraft has been garbled from especially Buzz. Could you both give me a com check over.

SC
Roger Charley, Buzz here. How do you read? 1 2 3 4 5 - 5 4 3 2 1.

CAPCOM
Roger, you are about 4 by with a slight decrease/increase in volume - sort of a weighty volume to it over.

SC
Okay, I moved my mike around. How about now? Is it any better?

CAPCOM
Hey that's beautiful right there. Thank you.

SC
Okay, Charlie. 1 2 3 4 5 - 5 4 3 2 1. How do you read me?

CAPCOM
Roger, five by. Is Neil on -

SC
-1 2 3 4 5 - 5 4 3 2 1.

CAPCOM
Roger Neil, you five by.

PAO
This is Apollo Control at 33 hours 57 minutes and we are less than 3 minutes now from the scheduled television transmission. From Apollo 11, we are continuing to standby for that. We have also been asked to advised that the Delta launch of INTELSAT III scheduled for Friday night at 10:00 PM has been postponed for 24 hours. As a repeat, the Delta launch of INTELSAT III scheduled for Friday night at 10 PM has been postponed for 24 hours. Further details on that will be available in the News Center.

END OF TAPE

CDT 18:31 GET 033:59 TAPE 125/1

CAPCOM
Hello, Apollo 11, Houston. We got the network all configured for the TV. You can start any time you want. Over.

CAPCOM
Okay, 11. We have a picture. We see the earth right in the center of the screen. Over.

CAPCOM
Okay, 11. We have a picture. We see the earth right in the center of the screen. Over.

SC
Roger, Houston; Apollo 11. Calling in from about 130,000 miles out. And we'll zoom our camera in slowly and get the most magnification we can. Over.

CAPCOM
Roger.

PAO
This view is coming to us from about 129,000 nautical miles.

CAPCOM
11, Houston. The definition is pretty good on our monitor, here. The color is not too (garbled) at least on this set. Could you describe what you're looking at. Over.

SC
You're seeing Earth, as we see it, out our left-hand window, just a little more than a half earth. We're looking at the eastern Pacific Ocean, and the north half of the top half of the screen, we can see North America, Alaska, United States, Canada, Mexico, and Central America. South America becomes invisible just beyond the terminator or inside the shadow. We can see the earth's ... a definite blue cast. See white bands of major cloud formations across the earth and can see coastlines, picked out the western US, San Joaquin Valley, the Sierra mountain range, the peninsula of Baja, California, and we see some cloud formations over southeastern US. There's one definite mild storm southwest of Alaska. Looks like about 500 to 1,000 miles and another very minor storm showing the south end of the screen near the - Oh, a long ways off of the equator, probably 45 degrees at a more south latitude. Can pick out the browns in the land forms pretty well. Greens do not show up very well. Some greens showing along the northeastern - northwestern coast of the United States and northeastern coast of Canada.

CAPCOM
Roger. It's a pretty good picture of clarity, here. We're having - Can you tell us It appears to us that there are two of the same cloud formations trending eastwest. One approximately along the equator, and one around 30 or so south latitude. Can you tell us exactly where those cross the land masses? Over.

SC
Yes. They cross just south of the lower part of Mexico, probably through Central America. That is the equatorial band which we assume to be the intertropical convergence zone. Another band, which stands about 30 south correctly seems to appear to join equator

CDT 18:31 GET 033:59 TAPE 125/2

SC
at the far left, or just beyond the horizon on the left edge of earth, or at least it looks like it's going to China. We don't have an explanation for that banding.

CAPCOM
Roger, Neil. Thank you.

SC
It also appears that just to the left of the terminator, up in the northern hemisphere, there's a cloud band trending a gap in the cloud, trending northwest southeast. It appears to us that that comes in about over the northern United States, or perhaps the Central United States. Is that about correct? Over.

SC
I can see on the monitor the thing you were talking about but right now I can't get my eye to the window to pick out just where it crosses the
shoreline.

CAPC0M
Roger.

CAPCOM
You guys are doing a good job. It's a real steady picture, here. We're - clarity is excellent. The color, it's - the clouds are - the whites are distinct. The rest of it looks like, to me anyway on the monitor I'm observing is a fairly greenish-blue is the way I'd describe it. Over.

CAPCOM
It appears that the -

SC
We can't observe much green from the spacecraft.

CAPCOM
Roger. On this monitor, the land masses appear to be just a darker grayish color rather than a brown.

SC
Well, it's true that we do not have the depths of color at this range that we enjoyed at 50,000 miles out. However, the oceans still are a definite blue and the continents are generally brownish in cast, although it is true that they're tending more toward gray now than they were at the closer range.

CAPCOM
Roger, 11. We've been - I've just been vectored to another monitor and sure enough, the browns are coming in a lot more distinctly on the ... that we have up on our screen in the control center. Over.

SC
Okay. Well, hold on to your hat. I'm going to turn you upside-down.

CAPCOM
11, that's a pretty good roll there.

SC
Oh, I'd say sloppy, Charlie. Let me try that one again.

CAPCOM
You'll never beat out the thunderbird.

CAPCOM
Apollo 11, Houston. That practice did you some good. It's looking real smooth roll, there.

CDT 18:31 GET 033:59 TAPE 125/3

SC
Oops.

CAPCOM
Spoke too soon.

SC
I'm making myself seasick, Charlie, I'll just put you back right-side-up where you belong.

CAPCOM
Roger.

SC
You don't get to do that everyday.

CAPCOM
11, Houston. Could you describe, from your view, the polar cloud cap. It appears to us to extend down the western coast of North America. Would you estimate how far it extends down. Over.

SC
Trying to fit everybody into the window. It appears that the cloud cap comes down a little bit belong the southern extremity of Alaska.

CAPCOM
Roger. We've - 11, we've lost our picture here, now.

CAPCOM
Okay. Apollo 11, Houston. We've got the picture back now.

SC
Unfortunately, we only have one window that has a view of the earth and it's filled up with the TV camera so your view now is probably better than ours is.

CAPCOM
Roger, we copy.

CAPCOM
11, Houston. If you could comply, we'd like to see a little smiling faces up there, if you could give us an interior view. I'm sure everybody would like to see you. Over.

SC
Okay, we'll reconfigure the TV for that.

CAPCOM
Roger.

CAPCOM
Apollo 11, Houston. It appears to us that we're seeing a view from outside plus a little of the inside. It appears you've taken the camera away from the left window now. Over.

SC
That's correct. We're moving it back and reconfiguring for interior lighting.

CAPCOM
Roger.

CAPCOM
We can still see the earth through the left window and it appears that we can see a floodlight off to the left, either that or some sun shafting through the hatch window.

SC
It's sunlight.

CAPCOM
Rog.

CAPCOM
Now we're coming in. Can't quite make out who that ...

SC
That's big Mike Collins, there. You got a little bit of - Yeah, hello there sport friends, you got a little bit of me plus Neil is in the center couch, and Buzz is doing the camera work just now.

CDT 18:31 GET 033:59 TAPE 125/4

CAPCOM
Roger. It's a little dark, 11. Maybe a bigger f-stop might help.

SC
Yeah, that should work.

CAPCOM
It's getting a lot better now, 11. Mike, you're coming in 5 by. I got a good -

SC
I would have put on a coat and tie if I'd known about this ahead of time.

CAPCOM
Is Buzz holding your cue cards for you? Over.

SC
Cue cards have a no. We have no intention of competing with the professionals. Believe me. We are very comfortable up here, though. We do have a happy home. There's plenty of room for the three of us and I think we're all willing to find our favorite little corner to sit in. 0 g's very comfortable but after a while, you get to the point where you sort of get tired of rattling around

and banging off the ceiling and the floor and the side, so you tend to find a little corner somewhere and put your knees up, or something like that to wedge yourself in, and that's seems more at home.

CAPCOM
Roger, looks like Neil is coming in 5 by, there, 11. Mike, see you in the background. The definition is really outstanding. The colors are good. It's a real good picture we're getting here of Commander Armstrong. We - Buzz, when you take the camera over towards the window where the sun's shafting through it, it tends to black it out, though.

SC
And Neil's standing on his head again. He's trying to make me nervous.

CAPCOM
Roger.

SC
He's disappearing up into the tunnel, of course, hasn't he, but going into the lunar module, only backwards.

CAPCOM
Roger. We can see portions of the LAP now. The Systems test meter Panel, in the lower part of the picture. We did have it anyway.

SC
Okay, and then directly behind his head are our optical instruments, the sextant and the telescope that we use to take sightings with.

CAPCOM
Roger, copy. And we see the DSKY flashing with a 651. In fact, we can read registers 1 and 2 quite clearly.
SC
The aerial high gain angles telling us which way the earth is.

CAPCOM
Copy. That's a beautiful picture. Clarity is ...

SC
We offer to give you the time of day in our system of mission elapsed time. Elapsed time 34 hours 16 minutes and umpteen seconds.

CDT 18:31 GET 033:59 TAPE 125/5

SC
Right. You see that clearly now, Charlie?

CAPCOM
Roger, Apollo 11. We can see it counting up every - every second. We got 34:17:02 now.

SC
Okay, back to the high gain angles.

CAPCOM
Roger.

SC
Now we have amputated those.

CAPCOM
11, Houston. We have beautiful rainbow there now as you move the camera around .... That looks like the star chart coming into view now. Over.

SC
Yeah, those are Buzzs two star charts that he is using right now as sun shades over the right-hand window, window number 5.

CAPCOM
Roger. We see the sun shining in through it behind him and plotting out the equatorial - correction, ecliptic plane, and the stars that you're using for the navigation.

SC
You're right. He doesn't really need the charts. He's got them memorized. There's just for show.

CAPCOM
We copy.

SC
While we're pointing up in this direction, we see out of our side windows, the sun going by and of course, out one of our windows right now we've got the earth. Now we find my window, course we have the sun, cause the sun is illuminating

END OF TAPE

CDT 18:51 GET 034:19 TAPE 126/1

SC
in this direction, we see out our side windows, the sun going by and of course out of one of our windows right now we have the earth. Now right behind my window of course we have the sun and the sun is illuminating the star charts that we see. This line represents the ecliptic plane and these line vertical lines represent our reference system that the spacecraft is using at this time. As we approach the moon, the moon will gradually grow larger and larger in size and eventually it will be in, it will be eclipsing the sun as we go behind it as we approach the lunar orbit insertion maneuver.

CAPCOM
Roger 11, we've, could you attempt a little bit better focus here, 11, over?

CAPCOM
Eleven, Houston, that's a lot better on the star chart now. We can make out the ecliptic plane and the planets and the sun and the mcon as they have gone at various placed throughout the ecliptic plane, over.

SC
Okay, Charlie. If we can get some of the wires untangled here we'll give you a demonstration of how easy push ups are up here. Come in, Roger.

CAPCOM
Just a view of Buzz there.

SC
When it gets pretty hard doing it that way, we just roll over and do it the other way.

CAPCOM
Rog, we copy, we couldn't figure out whether that was a chin up or a push up.

SC
Just take your choice I guess. Well it looks like it's probably almost your dinner time down there on earth. We'll show you our food cabinet here in a second.

CAPCOM
Eleven, Roger.

CAPCOM
Eleven Houston. We see a box full of goodies there, over.

SC
We really have them, Charlie. We've got all kinds of good stuff. We've got coffee up here in the upper left and the breakfast items and bacon in little small bits, beverages like fruit drink and over in the centerpart we have, oh all kinds of things. Let me pull one out here and see what it is.

CAPCOM
Rog.

SC
Would you believe you're looking at chicken stew here. All you have to do is 3 ounces of hot water for 5 or 10 minutes. Now we get our hot water out of a little spigot here with the filter on it that filters any gasses that may be in the drinking water out, and we just stick the end of this little tube in the end of the spigot and pull the trigger three times for 3 ounces of hot water and then mush it up and slice the end off it and there you go. Beautiful chicken stew.

CDT 18:51 GET 034:19 TAPE 126/2

CAPCOM
Sounds delicious.

SC
The food so far has been very good. We couldn't be happier with it.

SC
Could I borrow that flashlight a second?

CAPCOM
The surgeons are saying thank you there for that.

SC
And it is sort of down in a dark corner so we have a flash light here to help us see things and if I can let go of it carefully it'll just hold itself right where it is.

CAPCOM
Ah roger (garbled)

CAPCOM
Apollo 11, Houston, that's a pretty good demonstration. You started off really stable there Mike.

SC
Well no matter how careful you let go you bump it just a tiny little bit and set it in motion and once in motion there she goes. Try that again.

CAPCOM
It looks fairly stable there with flow rotation.

SC
Well so much for the food department. I'm going to close up the store down here.

CAPCOM
Roger, we copy.

SC
Charlie, we checked out the cable legnths, and we're thinking we might want to see if we can take the TV into the LM with us tomorrow for part of the time, over.

CAPCOM
Roger, good show. We'd like to see it if it'll reach that far, over.

SC
We'll give it a try.

CAPCOM
Rog.

SC
And where we sleep is down underneath this couch.

CAPCOM
Houston, Roger. Slowly sinking into the sack there.

SC
It's really comfortable. Forgot to give Buz his flashlight back.

CAPCOM
Apollo 11, Houston, could you give the folks a view of your patch on your CWG'? Over.

SC
(garbled) Charlie we can't get any closer.

CAPCOM
Alright. Eleven, Houston. We have a patch. Could you cut the, put the focus slightly, over. Eleven, Houston. The scan on the camera makes the, that's a little bit better now. The flashlight seems to flicker due to the scan on the TV. We can't see the eagle. Now it's a little bit better, over. Could you open the ESTOP a little bit more? Over.

SC
It's open all the way. We're going to have to move Buzz around a little bit.

CDT 18:51 GET 034:19 TAPE 126/3

CAPCOM
Roger.

CAPCOM
Apollo 11, Houston the color is better now. It's coming in. We could attempt a little bit better focus on it. There we go, it focuses alot better now. We see the eagle coming right in on the lunar surface, over. That's very good now.

CAPCOM
Apollo 11, Houston. That's very good now. We can see the earth in the background, Apollo 11, and the eagle coming in.

SC
It's probably pretty hard to see the olive branches.

CAPCOM
Roger, it is.

SC
Well that's what he has in his talons, an olive branch.

CAPCOM
Copy. Apollo 11, Houston. We're really impressed with the clarity and the detail that we have in the picture. The colors are, it's really an excellent picture now that I'm looking at it on moniter which is about 12 seconds before the networks can get it out due to the conversion that we have here on our TV converter. We're looking at the controls in the main display console. We can see the DSKY up on the pannel, over.

SC
That'd be nice if you could take a look at all the circuit breakers. You could be sure the right ones are in and the right ones are out.

CAPCOM
Big bubba's watching.

SC
And we're glad of it. Boy you guys have sure been doing a good job of watching us. Charlie we appreciate it.

CAPCOM
The spacecraft's been beautiful eleven. There's really no complaints at all. Things are really great.

SC
Can you see this DSKY on the embasy.

CAPCOM
That's affirmative. It appears that we can't quite tell what program when the cut went through. We see you punching in a verb 35 I think it is, over.

SC
Yea might as well tell the econs or tell the G&C's they better hold on to their hat and I'll push the inner button.

CAPCOM
Rog. We see a real display now. That was a good demonstration of how the crew has the interface with the computer talking to the programs and all that we have in the computer.

SC
Well that's right Charlie. Sometimes it tells us things and sometimes we tell it things and mostly it talks to us.

CAPCOM
Eleven, Houston. We just lost our pic - I see we're going back outside now, over.

CDT 18:51 GET 034:19 TAPE 126/4

CAPCOM
Eleven Houston. We copy, over.

SC
Roger we copy and as we pan back out to the distance at which we see the earth it's Apollo 11 signing of.

CAPCOM
Roger Apollo 11, thank you much for the show. It's a real good half hour. Appreciate it, thank you very much, out.

PAO
This is Apollo control. That TV transmission lasted about 35 minutes.

CAPCOM
Apollo 11, Houston. Would you key your - -

END OF TAPE

CDT 19:08 GET 034:36 TAPE 127/1

CAPCOM
Apollo 11, Houston. Would you T arrow reset on the DSKY please? Over.

SC
Okay, we should be straightened out now Charlie. Back in POO.

SC
Houston, Apollo 11. How dowe stand on this O2 fuel dump purge? You want to go ahead and do that as scheduled in the flight plan?

CAPCOM
Standby 11, over.

SC
Okay.

CAPCOM
11, Houston. You can commit CO2 fuel cell purge now if you would like. Over.

SC
Okay, fine.

SC
While Buzz is doing that, I'll change the aluminum hydroxide.

CAPCOM
Rog.

CAPCOM
Hello Apollo 11, Houston, over.

SC
Go ahead, Houston, Apollo 11.

CAPCOM
Roger, Buzz, the attitude that we are in right now is a convenient one to start PTC and we'd be satisified with this attitude so we would like you to disable quads CHARLIE and DELTA and we will wait about 5 or 10 minutes and then we will establish the PTC over.

SC
Roger, disable CHARLIE and DELTA and we'll wait for starting PTC.

CAPCOM
Rog.

CAPCOM
Retro, you got your block data.

END OF TAPE

CDT 19:18 GET 034:46 TAPE 128/1

PAO
This is Apollo Control at 34 hours, 46 minutes. Apollo 11 is presently 131,000 nautical miles from Earth, traveling at a speed of about 4300 feet per second. During the TV transmission the crew advised that they may possibly be able to take the color television camera into the lunar module with them tomorrow at about 56 hours, 30 minutes, ground elapsed time. They reported that the cables had been checked and are perfectly long enough to take them into the lunar module. During the next hour or so the activity here in Mission Control will be revolving on, getting the crew set up for their rest period and eat period. This will be a very long rest period tonight, scheduled 10 hours. That will begin according to the flight plan, at about 37 hours, ground elapsed time. However, we would anticipate if activities move along as they appear to be at this point, we are somewhat ahead of the flight plan, that perhaps again tonight we would be able to get the crew into their rest period and sleep period a little bit early. At 34 hours, 48 minutes, this is Apollo Control, Houston.

END OF TAPE

CDT 19:45 GET 035:13 TAPE 129/1

PAO
This is Apollo Control at 35 hours, 13 minutes. Apollo 11 is presently about 93,265 nautical miles from the moon and with respect to the moon is traveling at a speed of about 4019 feet per second. At this time we are receiving the tape play-back which Goldstone, tracking site at Goldstone, California received from the spacecraft in that earlier unscheduled TV transmission. This was a test of the system using the spacecraft on the antennas, the small OMNI directional antennas. Normally transmissions from this distance in space would be - would require the high-gain antenna. This television transmission is being processed and converted to color and we anticipate that we'll have it available for playback at about 9:00 P.M. We are in conversation with the spacecraft at this time. We'll pick up the tape recorded conversation that we have and then stand by to follow any live conversation.

SC
Houston. Would you say again what you requested.

CAPCOM
Roger 11. We'd like you to go back to attitude HOLD. Over.

SC
Roger.

CAPCOM
11, Houston. Looks like we're going to have to reinitialate - reinitialize this PTC.

SC
Right.

SC
Okay. Do you have any roll angles and see if I can drop it in Charlie? I haven't stopped it yet.

CAPCOM
Stand by. 11, Houston. It's your preference. Right now if you want to. Over.

SC
Okay.

CAPCOM
Apollo 11, Houston. Over.

SC
Houston, Apollo.

CAPCOM
Roger 11. The problem on that initial starting up the PTC was we failed to do the VERB 49 which - and load the design to initial attitude so that - that will take you back to the old attitude that we had started up in a number of hours ago that's why we picked up the rates in the other axes. We're going to obate in this attitude for about 20 minutes to damp out the rates again and then we'll proceed with the VERB 49 in LOAD I attitude that we have at this time. Over.

SC
Okay. Sounds good Charlie. When you get to the VERB 49, I'd like for you to give me the 3 gimbal angle that you want loaded.

CAPCOM
Roger. We'll do. Over.

SC
Thank you.

CAPCOM
And Apollo 11, Houston. We have

CDT 19:45 GET 035:13 TAPE 129/2

CAPCOM
your fly-by pad if you're ready to copy. Over.

SC
Stand by 1.

SC
Houston, Apollo 11. Is that P-30 pass?

CAPCOM
That's affirmative. Over.

SC
Okay. Ready to copy.

CAPCOM
All right Buzz. It's fly-by, it's a purpose. SPS G&N. 62815 plus 097 minus 020 070 54 5944 minus 00028 plus 00023 plus 00069 029 149 312 apogee is N/A plus 00221 00078 001 00034; sextant star 01 2185 227 boresight star is NA NA NA. Latitude is minus 0265 minus 16500 11899 36228 1445647. In the comment your set stars are DENEB and VEGA 007 144 068; no ullage, it's a dock burn using the PTC REFSMMAT. Stand by for your readback. Over.

SC
Okay. Would you give me the GEG of the burn again, please.

CAPCOM
Roger. 1445647. Over.

SC
Roger. Fly by SPS G&N 62815 plus 097 minus 020 070 54 5944 minus 00028 plus 00023 plus 00069 269 149 312 NA plus 00221 00078 001 00 034 01 21 85 227 NA minus 0265 minus 16500 11899 36228 1445647 DENEB and VEGA 007 144 068, no ullage dots PTC REFSMMAT. Over.

CAPCOM
Say again your roll angle Buzz. I copy - I read 029. Over.

SC
Roger 029.

CAPCOM
Roger. Good readback.

SC
Houston, Apollo 11. On the 7/10ths rate, the rate loaded into the dap is 1 or 2/l0ths.

CAPCOM
11 Roger.

CAPCOM
Hello Apollo 11, Houston. Over.

SC
It's Apollo 11, Over.

CAPCOM
Roger Mike. Would you please copy down your VERB 16 NOUN 20 after the angles now, then execute VERB 49 and load those angles, the NOUN 20 that you see on the DSKY into the VERB - into the NOUN 22 slot and prone that and that will start our 20 minute rate period. Over.

SC
Okay Charlie, I did it right now in just a matter of inches. Those numbers are plus 04511 plus 09021 and plus 35984. Over.

CAP COM
Roger.

SC
Thank you.

SC
Houston, Apollo 11. I've done that and of course I got an immediate 50 18. So I guess we're set up to proceed from here and I'll start the 20 minute timer.

CAPCOM
That's affirmative.

SC
Houston. I still question that 7/10ths rate where 2/10ths went into the damper up here.

CDT 19:45 GET 035:13 TAPE 129/3

SC
Could you explain? Over.

CAPCOM
Roger. We're working on it. Stand by 1.

SC
Okay.

END OF TAPE

CDT 19:57 GET 035:25 TAPE 130/1

CAPCOM
Apollo 11, Houston, over.

SC
Houston, Apollo 11.

CAPCOM
Roger, we got a little laser visual experiment we like to - for you to do for us. If - if you got the Earth through any of your what is it the telescope, would you so advise? Over.

SC
Can't understand. Wait a minute, Charlie. - at this lower attitude what should our high gain angles be? Maybe that would help us locate you. We don't see you on the lens .

CAPCOM
Standby.

CAPCOM
Hello Apollo 11, Houston. The high gain angles are: pitch minus 70, yaw; 90. We think the Earth has apparently pretty close to plus C axis, over.

SC
Okay.

SC
Okay, Charlie, I got you on the telescope.

CAPCOM
Roger, Apollo 11. We got a laser that we're going - it's a blue-green laser that we are going to flash on and off at a frequency of on for a second and off for a second. It's coming out of McDonald Observatory near El Paso which should be right on the terminator or right inside the terminator. We are going to activate that momentarily. Will you please take a look through the telescope and see if you can see it, over?

SC
Telescope or sextant?

CAPCOM
Either one, over.

SC
Okay, I'll try it with the telescope and if I don't see it there then I'll try the sextant.

CAPCOM
Roger, we'll give you the word when they have got it turned on, over.

SC
Okay.

CAPCOM
11, Houston, They don't have it turned on yet. We'll give you the word when they got it turned on, over.

SC
Okay.

CAPCOM
Hello, Apollo 11, Houston. We noticed the cryo pressure dropped a moment ago. Did you stir up the cryos, over?

SC
Roger, we've finished (garble) operations.

CAPCOM
Rog, copy, out.

END OF TAPE

CDT 20:07 GET 035:35 TAPE 131/1

CAPCOM
Hello, Apollo 11; Houston. McDonald's got the laser turned on. Would you take a look? Over.

SC
Okay, Charlie.

CAPCOM
It's bluish green.

CAPCOM
11, Houston. We got some shaft and trunnion for you that might tweak it up a little bit. Shaft of 141.5. Trunnion of 39.5. Over.

SC
Test that one.

CAPCOM
Apollo 11, Houston. If you see it, it should be coming up - better be coming up through the clouds. McDonald reports that there's a break in the clouds that they're beaming this thing through. Over.

SC
And I thank you.

SC
Got her.

CAPCOM
Hello, Apollo 11; Houston. You can terminate the exercise on the laser. Our REG's are steady enough now for it to commit the PTC. Over.

SC
Okay, Houston. Neither Neil nor Mike can see it. Incidentally, those shafts and trunnions just missed pointing at the world.

CAPC0M
Roger. Thank you.

SC
As we are looking at it through the scanning telescope, it would be about a - oh, maybe a third of an Earth's radii high in the left.

CAPCOM
Roger.

SC
But, we did - But, we did identify the El Paso area and it appeared to us to be a break in the cloud's there, and we looked in that break and saw nothing.

CAPCOM
Roger; thank you much. Out.

SC
Houston, Apollo 11. Over.

CAPCOM
Roger. Go ahead. Over.

SC
Weren't you following that on the DSKY?

CAPCOM
Roger. Stand by.

END OF TAPE

SC
Were you following that on the DSKY?

CAPCOM
Roger, stand by.

CAPCOM
Eleven, Houston. What's your exact question, over.

SC
I've followed the procedure through step 7 down to the point where I've got 27 303 enter and then we go to an operator light.

CAPCOM
Roger, stand by.

CAPCOM
Apollo 11, Houston, stand by a moment. We'll have a answer for you momentarily, over.

SC
Okay appreciate it Charlie. Now the light's gone out without any further DSKY action.

CAPCOM
Roger.

SC
Correction, stand by that's not right.

CAPCOM
Roger.

CAPCOM
Apollo 11, Houston.

SC
Houston, Apollo 11.

CAPCOM
Roger we've finally gotten concurrence on the problem here with 50 guys looking at it. When we were sitting in the 58 team we attempted to load the erasable before you terminated the verb 49. So Mike what we're going to have to do is call off the present CDU's, copy those down and do a verb 49. Load the present, do a proceed then an enter and then we can then set up attitude hold with step 6, over.

SC
Okay, I think that's what we did last time.

CAPCOM
It appeared to us that we attempted to load the erasable prior to entering on the verb 49 which verb 49 was still running and it clobbered the CDU's, over.

SC
Okay.

SC
Houston, Apollo 11, and we're moving at the proper rate.

CAPCOM
Halaluea.

CAPCOM
Eleven, Houston. It looks great to us now. Over.

SC
It looks fine here Charlie. The (garbled) part is the only part I don't find explained yet.

CAPCOM
Roger, Mike. We're working on that one right now. We're coming up with the story soon, over.

SC
Thank you.

CAPCOM
Eleven, Houston, we're having corn from Goldstone to Honeysuckle, over.

SC
Okay.

SC
Hello Houston, through Honeysuckle ov- -

CAPCOM
Apollo 11, Houston go ahead over.

CDT 20:17 GET 035:45 TAPE 132/2

SC
You sound good to us through Honeysuckle. How do we sound?

CAPCOM
Roger, 5 by Mike. We'd like to omni configuration as follows. OMNI ALPHA place in BRAVO, OMNI to OMNI - -

END OF TAPE

CDT 20:37 GET 036:05 TAPE 133/1

SC
- and the configuration as follows: OMNI ALPHA placed in BRAVO, OMNI to OMNI, high gain track to MANUAL, high gain yaw 270, pitch -

PAO
This is Apollo Control. At the present time we are handing over from the tracking site at Goldstone, California, to the site at Honeysuckle which accounts for the noise in the transmission -

SC
- I've got S-band OMNI Z OMNI, track to MANUAL and beam Y and pitch, better say that again, yaw 270 , over.

CAPCOM
Roger, Buzz. I broke up that pitch minus 50 at beam Y, over.

SC
Roger, copy.

SC
Houston, Apollo 11. Are you ready to copy some numbers on status report (garble)

CAPCOM
Say again, over.

SC
Roger, ready to copy some numbers on the status report, Houston.

CAPCOM
Rog. Go ahead, over.

SC
Okay, radiation CDR 11005, CMP 10006, LMP 09007. Medication negative, and I got some (garble).

CAPCOM
Go ahead, over.

SC
Battery C 37.1, pyro battery A and G both 37.1. RCS ALPHA 82, BRAVO 84, COCCO 85, DELTA 87, over.

CAPCOM
Roger, we copy. Radiation 11005 10006 09007. No medication. 37.1 37.1 37.1 82 84 85 87, over.

SC
That's affirmative. And you want a LM GM DELTA V at 1.1.

CAPCOM
Roger, copy, 11.

CAPCOM
Hello, Apollo 11, Houston. Please verify that 4 cryo heaters AUTO, the four fans OFF.
SC
Okay, we have been holding the O2 heater in the OFF position. I believe that was your last last instructions. All the other heaters are to On and all fans are OFF. Over.

CAPCOM
Roger, standby.

CAPCOM
11, Houston. We would like all heaters AUTO, over.

SC
All four on AUTO, all four fans OFF.

CAPCOM
Hello, Apollo 11, Houston. As the sun sinks slowly in the west, the white team bids you good night. If we get a story on the 7 tenths, we can give it to you in about 15 minutes or so, if not, we'll give it to you in the morning, over.

SC
Okay, sounds fine, thank you Charlie very much.

SC
Have a nice day today, Charlie.

CAPCOM
Thank you.

SC
Good night all.

PAO
This is Apollo Control at 36 hours 11 minutes. At the present time Apollo 11 is 134,000 nautical miles from Earth. The velocity is 4216 feet per second. During

CDT 20:37 GET 036:05 TAPE 133/2

PAO
that last series of transmissions from the crew, we received a status report from Buzz Aldrin and he reported that the crew has in the past 24 hours taken no medication. This is similar to the crew status report we received from them last night. We bid them good night at 36 hours 9 minutes or about 2 minutes ago. We anticipate that the crew will probably have a few more housekeeping type chores aboard the spacecraft before they actually turn in and also we'll probably be combining their eat period with the first part of that sleep period. At 36 hours 12 minutes into the flight of Apollo 11, this is Mission Control Houston.

END OF TAPE

PAO
This is Apollo Control at 36 hours, 27 minutes. We have completed the processing of the unscheduled television transmission which the crew sent down from the spacecraft at about 30 hours, 24 minutes ground elapsed time this evening. I would like to repeat that this was an apparent test of the onboard system. The crew turned the television equipment on and left it on for about 52 minutes. Some of the time we will have a picture of the parts of it. We don't have good lock-on, and I will not have a good solid picture. We should also point out that this transmission was made with the OMNI directional antennas, which, of course, don't provide nearly the signal strength that we would get from the high gain antenna, which would be used. We'll play back the tape of that transmission for you at this time.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead, Houston.

CAPCOM
11, this is Houston. Goldstone reports they're receiving a TV picture coming down from you all - a little snowy, but a good TV picture. Over.

SC
Roger. We're just testing the equipment up here.

CAPCOM
Roger.

SC
Ask them if they can read the numbers.

CAPCOM
Okay, stand by.

CAPCOM
Goldstone, this is Houston Capcom. Over.

GOLDSTONE
Houston Capcom, Goldstone M&O. Go ahead.

CAPCOM
Roger. Stand by a minute, Goldstone.

CAPCOM
11, this is Houston. What numbers are you referring to? Over.

SC
Well, I guess if they can't see any numbers, why, it's kind of a lost cause.

CAPCOM
Negative. Stand by. We wanted to know what numbers before we asked them.

SC
Okay. I'm.showing them a DSKY, and I'd like to know whether they can read what's showing on the DSKY, and also whether they can see PROG, VERB, and NOUN. Over.

CAPCOM
Roger. Stand by a second.

CAPCOM
Goldstone M&O, this is Houston Capcom. Over.

GOLDSTONE
Capcom, Goldstone; go ahead.

CAPCOM
Roger. Did you copy the spacecraft request?

GOLDSTONE
That's affirmative. I am reading the numbers on our monitor here.

CAPCOM
Okay, that's up. Stand by.

CAPCOM
Roger. That's both the numbers on the DSKY itself and the little words like program, verb, noun, computer activity, things of that sort.

CDT 21:00 GET 036:28 TAPE 134/2

GOLDSTONE
Roger. I can read the numbers clearly. We can't distinguish what the words are, because it is a little snowy.

CAPCOM
Roger. Thank you.

GOLDSTONE
Okay. I read VERB, NOUN, and PROGRAM.

CAPCOM
Roger. Do you see a - over in the lefthand corner there's a big square that says computer activity, COMP activity?

GOLDSTONE
Roger. I see a flash occasionally in that area.

CAPCOM
Roger. That's the one.

GOLDSTONE
Okay, it looks like he's moved the camera at this time.

CAPCOM
Roger.

CAPCOM
11, this is Houston. Goldstone M&O reports that they can read the numbers on the DSKY. They can also read VERB, NOUN, PROGRAM, and see the COMP activity light flashing. Over.

SC
Very good. Thank you.

CAPCOM
And they also report you appear to have had the camera over to another location now.

SC
Yes, we're going to work on something else.

CAPCOM
Roger.

SC
V.

END OF TAPE

CDT 21:10 GET 036:38 TAPE 135/1

PAO
This is Apollo Control. The view that we have at the present time appears to be out the window of the command module looking at the lunar module docking target.

PAO
And we seem to have a fairly good view here of the interior of the command module. This would look to be the panel, display panel with some of the fuel quantity dials on the right side of the cockpit.

PAO
At the time these television pictures were transmitted from the spacecraft, Apollo 11 was about 121 thousand nautical miles from earth. Where we do have signal lock on we got amazingly good quality on those little omni antennas. As we had mentioned before, normally the high gain antenna would be used for television transmission of this sort.

PA0
And we could almost make out a face in that one, and somebody's hand down at the instrument pannel.

PAO
That last view just before we lost picture lock up appeared to be the right center portion of the main display console, main display pannel in the command
module.

END OF TAPE

CDT 21:20 GET 036:48 TAPE 136/1

PAO
For a brief moment there we had a picture of a somewhat placid Neil Armstrong closing his eyes momentarily. Another crewman to his left, I'm not sure at this point, that I can make out who it was, it did appear it might have been Mike Collins.

SC
Houston, Apollo 11.

CAPCOM
Go ahead 11.

SC
Charlie, is that you.

CAPCOM
That's me, how are you today?

SC
Just fine, how's the old white team today?

CAPCOM
The old white team's bright eyed and bushy tailed. We're ever alert down here.

SC
Ever alert, hey you got any medics down there watching high grade. I'm trying to do some running in place down here and I'm wondering just out of curosity whether it brings my heart rate up.

CAPCOM
Well they will spring into action here momentarily, stand by.

PAO
That was Mike Collins commenting that he was doing some running in place exercises, and we may get a brief view of that a little later on in this transmission if this picture stabilizes and holds still for us.

CAPCOM
Hello 11, we see your heart beat.

SC
(garbled) We're all running in place up here. You wouldn't believe it.

CAPCOM
I'd like to see that sight. Why don't you give us a Tv picture of that one.

SC
I think Buz is trying. He got it.

CAPCOM
Okay it's coming in at Goldstone Buz. We don't have it here in the center.

SC
I imagine that didn't help out the PTC very much.

SC
I don't know whether it's the vibration or what it is but it makes the, pitch and yaw rate needles on the FDAI jump up and down a little bit when we jump up and down.

CAPCOM
Rog, Goldstoners say they see you running there Mike.

SC
Okay.

SC
Ask him what he's running from.

CAPCOM
Eleven, Houston. Mike we see about a 96 heart beat now.

SC
Okay, thank you.

SC
Well that's all that's reasonable without getting hot and sweaty.

CAPCOM
Alright, Rog, we copy.

CDT 21:20 GET 036:48 TAPE 136/2

END OF TAPE

CDT 21:30 GET 036:58 TAPE 137/1

SC
Goldstone should be getting about the best picture of the earth, we can get, right now Charlie.

CAPCOM
Roger Mike. Thank you much.

SC
We got a little distortion horizontal direction from our damping on our monitor. I wonder if they're getting the same thing.

CAPCOM
Stand by Buzz. I let you know.

SC
I guess it'd be more described as a waviness.

CAPCOM
Goldstone, M & O. Houston, CAPCOM.

GOLDSTONE M & O
Goldstone, M & O.

CAPCOM
Okay. The crews complaining of some horizontal banding on their monitor. Do you all see that on your picture?

GOLDSTONE
Stand by.

GOLDSTONE
No we don't see it right now. Don't have anything in focus Charlie.

CAPCOM
Roger. He's checking on it. I'll see if they had it earlier. Stand by.

SC
I guess when we were showing the DSKY or when we were showing the earth, might be the better time.

CAPCOM
Okay.

GOLDSTONE
Houston, CAPCOM Goldstone.

CAPCOM
Go ahead.

GOLDSTONE
Okay. Our TV people confirmed they see this horizontal band.

CAPCOM
Okay.

CAPCOM
11, Houston. The Goldstone TV people also see the banding when same time you all do. Over.

SC
Okay. Would they call it a horizontal waviness from our banding, maybe?

CAPCOM
I'm not talking to him directly. Stand by Buzz. Let me see how they describe it.

CAPCOM
Goldstone M & O, Houston CAPCOM. Could you put the TV down a little please?

GOLDSTONE
CAPCOM, Goldstone. Roger.

GOLDSTONE
Houston CAPCOM, Goldstone M & 0 Net 1.

CAPCOM
Go.

GOLDSTONE
The TV people do not have access to that one in that area. Suggest we use NET 2 for that purpose.

CAPCOM
Okay. Go into NET 2.

CAPCOM
Hello Apollo 11, Houston. The Goldstone TV guy said that they had some horizontal banding across the upper part of the picture and across the lower part. They would consider the lines just strayed, no waviness at all. Over.

SC
Roger understand. They do think

CDT 21:30 GET 036:58 TAPE 137/2

SC
they do distort vertical lines, though?

CAPCOM
Say again about the vertical lines, Buzz.

SC
Roger. When there's a vertical line, these horizontal bands tends to put small waves in them.

CAPCOM
Roger. I copy. He didn't mention that. Stand by, I'll check again.

CAPCOM
Hello 11, Houston. The Goldstone TV said that when you did a sharp vertical line on the picture, where the horizontal banding goes across it, does appear to bend it slightly. The same as Apollo 10, they said. Looks okay to them. Over.

SC
Okay. Understand it's not our monitor, must be the transmitter or something.

CAPCOM
Roger. I guess so Buzz. We'll have them look into it and see if they can suggest anything.

CAPCOM
Hello Apollo 11, Houston. We've lost our command interface with Goldstone. We'd like you to switch to OMNI DELTA. Over.

SC
Roger. (garble) DELTA.

CAPCOM
Roger.

CAPCOM
Hello Apollo 11, Houston. We'd like you to terminate the O2 purge if you've not done so already and the TV camera people says the lines are inherent in the camera Buzz, and it's something that we expected. Over.

SC
Roger. Understand about the camera. Say again about the O2 purge.

CAPCOM
Roger. We can terminate the O2 - -

END OF TAPE

CDT 21:40 GET 037:08 TAPE 138/1

CAPCOM
Over.

SC
Roger, I understand about the camera. Say again about the torquing purge.

CAPCOM
Roger. We can terminate the 02 purge at this time. Over.

SC
Oh, okay. Fine, we'll do.

CAPCOM
Hello Apollo 11, Houston. Please select OMNI Bravo onboard. Over.

SC
Check on to Bravo. Shall we?

CAPCOM
Rog.

SC
How's everything going down there? You guys happy with the spacecraft system?
CAPCOM
Roger. Affirmative. Everything is looking really good to us. Over.

SC
Charlie, how far out can you pick up TV off the OMNI?

CAPCOM
Stand by.

CAPCOM
Apollo 11, Houston. We're just about at the limit where we can get any kind of picture at all on the OMNI on the TV. It - The picture is, I guess, it'd be just almost zero at this point.

SC
Okay, well for this TV program coming up in a couple of hours, you might give some thought to how you want us to stop PTC. If you do, for the best high gain angle, and also it'd be nice if you could stop us at such an attitude that we'd have the earth out of one of our windows.

CAPCOM
Roger, 11. We're thinking about that.

PAO
This is Apollo Control. That concludes the replay of the test transmission from Apollo 11. That transmission occurred about 2 hours prior to the regularly scheduled TV transmission this evening. The crew, apparently, testing out the onboard system, and we received about 52 minutes of intermittant television using the spacecraft OMNI directional antennas. And as you could see, as particularly near the end, this is just - appears to be just about the limit television reception from the OMNI antennas. At the time of the transmission, Apollo 11 was about 121,000 nautical miles from earth. During the replay of that television transmission, we accumulated a very short amount of tape, one or two brief comments from the crew who are in their sleep period at this time. We'll play back that tape conversation for you now.

END OF TAPE

CDT 21:50 GET 037:18 TAPE 139/1

PAO
- replay of the test transmission from Apollo 11. That transmission occurred about 2 hours prior to the regularly scheduled TV transmission this evening. The crew apparently testing out the onboard system. We received about 52 minutes of intermittent television using the spacecraft OMNI directional antennas. As you can see it is particularly near the end. This is just - appears to be just about the limit of television reception from the OMNI antennas. At the time of the transmission, Apollo 11 was about 121,000 nautical miles from Earth. During the replay of that television transmission, we accumulated a very short amount of tape. One or two brief comments from the crew who are in their sleep period at this time. We will play back the tape conversation for you now.

CAPCOM
Hello Apollo 11, Houston. One request the optics switched to 0 and we have a lot of theories of why it maneuvered at 7/10ths a moment ago Mike, but no real definite answer. We'll be back with you later, over.

SC
Okay, no rush, Charlie.

SC
Houston, Apollo 11.

CAPCOM
Roger, Mike I think we can explain that 7/10ths rate. When we - the first half through to show through the VERB 49 so we had a large error between our actual PU and desired PU in roll and with that situation the DAP or the vehicle will roll or maneuver rather at a rate - that is loaded in which was 3/10ths plus 4/10ths rate and it will limit it 4/10ths above the desired rate. So, that is, if we have a large enough angle between the desired and the actual which we did, so therefore the rate was 4/10ths plus 3/10ths which would give you the 7/10ths, over.

SC
Okay, thank you.

CAPCOM
Roger.

PAO
At this time Apollo 11 is 137,219 nautical miles from Earth. The spacecraft is traveling at a speed of 4132 feet per second. Here at Mission Control things have settled down into a rather quiet nightime routine. We said good night to the crew about 36 hours - 36 hours 9 minutes to be exact, a little over a hour ago. We did hear from them once or twice since then and we anticipate that this time are probably getting settled down to begin their 10 hours sleep period. At 37 hours 21 minutes, this is Apollo Control.

END OF TAPE

CDT 22:58 GET 038:26 TAPE 140/1

PAO
This is Apollo Control at 38 hours 26 minutes. Here in Mission Control, we are presently going through the shift change. Flight Director Glenn Lunney and his team of flight controllers are coming on to replace Gene Kranz. The capsule communicator on the upcomming shift will be astronaut Ron Evans. Flight Surgeon John Ziegleschmidt reported that two of the 3 crewmen apparently began sleeping at about 38 hours ground elapsed time or about 26 minutes ago, and the two that are asleep are command module pilot, Mike Collins and Commander Neil Armstrong. Lunar Module pilot Buzz Aldrin at last report was still awake. We expect the change of shift press briefing will occur at about 11:15 central daylight time. At 38 hours 27 minutes this is Apollo Control, Houston.

END OF TAPE

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CDT 00:12 GET 039:40 TAPE 141/1

PAO

This is Apollo Control, 39 hours 40 minutes Ground Elapsed Time. Apollo 11 crew at this time all three soundly asleep. The space digitals display - stand by. The space digitals display here in Mission Control now showing 82,905 nautical miles out from the moon. Velocity 3897 feet per second relative to the moon. Awake time 7 hours 19 minutes away. Spacecraft presently over the west-central Pacific, if a line were projected back toward its nearest point on Earth. And at 39 hours 41 Ground Elapsed Time, this is Apollo Control.

END OF TAPE

CDT 01:30 GET 040:58 TAPE 142/1

PAO

This is Apollo control 40 hours 58 minutes ground elapsed time. Apollo 11 presently 146,300 nautical miles up from earth. Velocity 3,917 feet per second. Six hours 1 minute remaining in the sleep period - the ten hour sleep period schedule in the flight plan. Rather quiet here during the night watch or the black team which tonight is being headed up by flight director Jerry Griffin who is spelling the usual black team flight director, Gene Lunney. One clock here in mission control shows landing time 61 hours 48 minutes from now. This is similar to the entry clock which the - is used in the same position in the control room toward the end of a mission, will be refined continuously as we get down to the gnats hair, the exact second of landing. At 40 hours 59 minutes ground elapsed time, this is Apollo control.

END OF TAPE

CDT 03:00 GET 042:28 TAPE 143/1

All dead air.

END OF TAPE

CDT 04:01 GET 043:29 TAPE 144/1

PAO

This is Apollo Control. 43 hours, 29 minutes ground elapsed time. Apollo 11 presently on the spot directly above or directly out from the Malay Peninsula. Some 3 hours 30 minutes remaining in the scheduled 10 hour sleep period for the crew. And if the space digital display were up here at the time coming out of the computer we would know what the distance and velocity were. So, at 43 hours, 29 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 05:00 GET 044:28 TAPE 145/1

PAO

This is Apollo Control, 44 hours, 28 minutes ground elapse time. Apollo 11 crew has another 2 hours, 31 minutes remaining in their 10 hour sleep period. The spacecraft is now some 72,010 nautical miles out from the moon. Velocity continuing to decelerate as we'get nearer the change over point in influence between the Earth and the moon. Velocity now showing 3,811 feet per second. The spacecraft now calculated to weigh 96,068 pounds. At 44 hours, 29 minutes ground elapse time, this is Apollo Control.

END OF TAPE

CDT 06:00 GET 045:28 TAPE 146/1

PAO

This is Apollo Control, 45 hours 28 minutes Ground Elapsed Time. A little more than an hour remaining in the Apollo 11 crew sleep period. Present velocity, 3799 feet per second. Distance from moon, 69,810 nautical miles. Apollo 11 will continue decelerating as it gets to the point where the moon's sphere of influence overcomes the Earth's sphere of influence. This point will take place - This event will take place at 61 hours 39 minutes and 57 seconds Ground Elapsed Time, according to the Flight Dynamics Officer. At this point, the spacecraft-to-moon distance will be 33,822 nautical miles, spacecraft-to-Earth distance, 186,437 nautical miles. The velocity will have slowed to a relative crawl at this point. The Earth referenced 2990 feet per second, moon referenced 3772 feet per second. Clock counting down to lunar touchdown, which as mentioned before will likely be changed as the spacecraft goes into lunar orbit and the data is refined, some of the times change a few seconds one way or the other. At any rate, the landing clock now showing 57 hours 17 minutes until lunar landing. At 45 hours 30 minutes Ground Elapsed Time, this is Apollo Control.

END OF TAPE

CDT 07:00 GET 046:28 TAPE 147/1

PAO
This is Apollo control 46 hours 28 minutes ground elapsed time. A little more than a half hour remaining in the crew sleep period. Members of the green team of flight controllers headed up by prime flight director Cliff Charlesworth are coming into the control room at this time, and at each console, a handover is taking place from the black watch. At the time - at the present time, the Apollo 11 spacecraft is 67,518 nautical miles out from the moon traveling at a velocity of 3787 feet per second. Apollo 11 presently is being tracked by the Madrid S-band station, and at 46 hours 29 minutes ground elapsed time, this is Apollo control.

END OF TAPE

CDT 07:30 GET 046:58 TAPE 148/1

PAO
This is Apollo Control at 46 hours, 58 minutes into the mission. The green team led by flight director Cliff Charlesworth has just relieved Glen Lunney's black team. The flight surgeon, Dr. Willard Hawkins indicates the crew appears to be still asleep. We're'nearing the end of the scheduled rest period. Cliff Charlesworth indicates. We will put in a call to the crew within a few minutes. Apollo 11 is 158,681 nautical miles from Earth. Velocity 3578 feet per second. Spacecraft weight is 96,068 pounds.

PAO
This is Apollo Control at 47 hours, 3 minutes. Cliff Charlesworth has decided to let the crew sleep a little longer. He's just had a conversation with the flight surgeon. Dr. Hawkins reports all indications are that the crew is sleeping soundly. The flight plan does not warrant awaking them just to get them up. There's nothing in the flight plan that requires their attention at the present time, so the flight director has made a decision to not put in a call to the crew and wake them. Flight surgeon says that a look at the data throughout the night indicates that the crew slept rather well all night.

END OF TAPE

CDT 08:13 GET 047:41 TAPE 149/1

PAO
This is Apollo Control at 47 hours 41 minutes into the mission. From all indications the crew is still alseep. We're 41 minutes past the end of the scheduled 10 hour rest period now. Flight Director Cliff Charlesworth has decided to let the crew remain asleep and not awaken them from the ground. There is no need to awaken them. Nothing scheduled in the flight plan that requires their attention at this time. Apollo 11 is 160,137 nautical miles from Earth, velocity 3544 feet per second.

END OF TAPE

CDT 08:32 GET 048:00 TAPE 150/1

PAO
This is Apollo Control at 48 hours into the Apollo 11 mission. The spacecraft is 160,760 nautical miles from earth. The distance from the moon is 64,115 nautical miles. The earth referenced velocity is 3529 feet per second. The rest period has now lasted an hour longer than the 10-hour period scheduled. It is extended to 11 hours now. Flight Surgeon says there ate indications that the commander, Neil Armstrong, may be awakening. There is some stirring around, however, we have not yet put in a call to the crew. The midcourse correction 3, which was scheduled for this afternoon at an elapsed time of 53 hours, 54 minutes, has been cancelled. The velocity value for that midcourse is only eight-tenths of a foot per second, so we will not do midcourse correction No. 3. We'll continue to stand by for either a call from the ground or a call from the spacecraft.

END OF TAPE

CDT 08:41 GET 048:09 TAPE 151/1

PAO
This is Apollo Control at 48 hours, 9 minutes. We just put in a call to the crew. Here's that conversation.

CAPCOM
Apollo 11, Apollo 11, this is Houston. Over.

SC
Good morning, Houston. Apollo 11.

CAPCOM
Good morning, Apollo 11.

SC
- How's everything look up here from the ground?

CAPCOM
Apollo 11, this is Houston. Roger. Say again please.

SC
Roger. How do all our systems look?

CAPCOM
Roger, they're looking great and as far as we can tell -

CAPCOM
As far as we can tell, everything is good from down here. Over.

SC
Looks like the attitude held up real well during PTC.

CAPCOM
Yes, it did. We were showing a few remaining rolls in a circle of 10 degrees radius throughout the night. Seems to be working beautifully.

SC
How's the old green team this morning? Did you have a quiet night?

CAPCOM
Yes, it was a very quiet night. Down here the old black team is complaining they didn't get a chance to make any transmissions. Ron -

CAPCOM
Ron Evans is getting -

SC
Well, we'll be seeing them tomorrow, I guess.

CAPCOM
Yes, Ron's getting to be known as the silent Capcom.

SC
That's the best kind, Bruce.

CAPCOM
Okay.

CAPCOM
-got a couple of small items in the way of a flight plan update and your morning consumables update. Over.

SC
Apollo 11.

CAPCOM
Roger, 11. We'd like to perform a waste water dump at your convenience sometime in the near future here. No particular time scheduled. Down air at the time for midcourse correction 3, which is about 53-55, we're deleting midcourse correction number 3 and all the items associated with it. For your information, the calculated value of the burn for midcourse number 3 was 8/10 of a foot per second, that is 0.8 feet per second. Canceling this, if we decide to burn midcourse correction 4, this would then give you a burn for midcourse correction 4 of 2.0 feet per second. At 53 hours we have an IMU on P-52. We're requesting that you do this in PTC, and we plan to continue PTC throughout

CDT 08:41 GET 048:09 TAPE 151/2

CAPCOM
the day. Over.

SC
- we'll get to the -

CAPCOM
Say again, please. You're cutting out.

SC
Roger.

CAPCOM
11, this is Houston. Stand by a minute, please. We're having difficulty receiving you.

CAPCOM
Apollo 11, this is Houston. Radio check. Over.

SC
Roger, Houston. Read you loud and clear. How me? Over.

CAPCOM
Roger, reading you the same. We did a minor reconfiguration down here. Stand by.

PAO
This is Apollo Control. That first conversation was with Buzz Aldrin and Mike Collins joined in. We've not yet heard from Neil Armstrong.

CAPCOM
Okay, 11, this is Houston. We switched your OMNI antenna as you rolled through the first appropriate position. Did you copy the flight plan update item?

CAPCOM
Apollo 11, this is Houston. Over.

SC
Apollo 11, go ahead.

CAPCOM
Roger, 11. Did you copy the flight plan update items? Over.

SC
Roger. How do you read me now, Bruce?

CAPCOM
Loud and clear now.

SC
Okay. The battery charge is in the process now and waste water dump is in work. MCC has been canceled. It would have been .8 feet per second. MCC 4 now looks like about 2.4 feet per second. At around 53 hours we'll do a P-52 and PTC. Over.

CAPCOM
Roger, 11. The magnetudes of the midcourse corrections were just for your information, but midcourse 4 was down around 2.0 feet per second. Again, for your information, on SDS chamber pressure, it looks like you're onboard readout of 87 PSI corresponds to 92 PSI by our telemetry, and your value of 89 onboard corresponds to 94. Over.

CAPCOM
Apollo 11, Houston. Radio check on new power amplifier and our transmitter. Over.

SC
Roger. Read you loud and clear. How me? Over.

CAPCOM
Roger. Loud and clear. Did you copy my notes on SDS chamber pressure?

SC
Negative.

CAPCOM
Okay, just for your information again, it appears that your readout of 87 PSI corresponds to our corrected -

END OF TAPE

CDT 08:51 GET 048:19 TAPE 152/1

CAPCOM
For your information, again, it appears that your readout of 87 psi corresponds to our corrected TM readout of 92 - that's 92 psi, and 89 onboard is really 94 psi, over.

SC
Roger, I got that you were reading about 5 psi low.

CAPCOM
Roger, and are you ready for the consumable update?

SC
Ready to copy.

CAPCOM
Okay, consumables update for GET of 46 plus 00, minus 5.5 percent, minus 6.5 percent, minus 2.5 percent, minus 7.5 percent, minus 5.0 percent, minus 2 pounds hydrogen, plus 1 pound oxygen, and that's minus 5.5 percent on the RCS total corresponds to minus 66 pounds, over.

SC
Okay, I copy those, and I'll give you our percentages now. Alpha 82, Bravo 84, Coco 85, Delta 87, over.

CAPCOM
This is Houston, we copy your percentages and do you have a crew status report on sleep for us?

SC
Roger, and in descending order 8, 9, and 8, over.

CAPCOM
Houston, roger, out.

PAO
That would be Armstrong 8, Collins 9, Aldrin 8.

SC
Houston, we're getting cyro pressure light warning now in the middle of - stirring up the pumps.

CAPCOM
Roger, we copy.

PAO
This is Apollo Control. The flight surgeon reports that is not a record for sleep. The Apollo 10 crew during one rest period logged 10 hours of sleep.

END OF TAPE

CDT 09:01 GET 048:29 TAPE 153/1

SC
Houston, Apollo 11. We've got the continent of Africa raising - facing toward us right now, and of course, everything's getting smaller and smaller as time goes on. The Mediterranean is completely clear. The sun looks like it's about to set around Madagascar. The equatorial belt of Africa stands out quite clearly. We're seeing the dark green or a muddy colored green compared to the sandier colors in the southern tip of Africa and, of course, the Sahara shoreline coast of Africa. There's a rather remarkable cloud that appears in the vicinity of the border between Afganistan and Pakistan. It's just about to go into the sunset

now. It is casting a very large shadow (garble). The end of the cloud near the tropical conversions clouds all along the equator clearly separates the clockwise and the counterclockwise cloud formation for us.

CAPCOM
Roger, 11. We copy your word description on that - I understand you can see that shadow being cast by that cloud between Afganistan and Pakistan. Any estimate on how long that shadow would be? Over.

SC
It looks like it's a shadow. (garble) coming around to back that way - -

CAPCOM
We're getting a lot of background noise now, also. Will you stand by a minute or so until we roll a little further in PTC. I think things will get better.

SC
Okay, coming around to the number 1 window. We'll get you now.

CAPCOM
Roger, we're hearing you.

PAO
That's Buzz Aldrin with the description.

CAPCOM
11, this is Houston. The noise on the corn seems to have quited down now. I guess that we've rotated a new antenna into view and probably also the earth out of view in your window. Over.

SC
Okay, it looks as though the lines of the shadow of that cloud is about the same as the width of the Persian Gulf.

CAPCOM
Okay, we copy the width of the Persian Gulf, and yes that - all I can give you first hand is a single isolated data point, and that is that it was clear here in Houston this morning. That's a pretty localized observation. As a result of your waste water dump, it looks like the PTC mode has been disturbed somewhat. We're showing you about 20 degrees out in pitch right now on about 6 degrees in yaw which is significantly greater- about twice as much - a little more than twice as much as the deviation you had prior to the waste water dump. We're watching it down here, though, and we'll let you know if we think any corrective action is required. Over.

SC
Okay may be ought to next time

CDT 09:01 GET 048:29 TAPE 153/2

SC
split that in half. We could put half on one side and half on the other or something like that.

CAPCOM
Yes, we could do that. We were actually pretty interested in seeing what the effects on PTC would be in a waste water dump. We don't recall ever having performed a waste water dump during PTC on previous missions. Over.

SC
Well, now we know.

CAPCOM
Roger.

END OF TAPE

CDT 09:11 GET 048:39 TAPE 154/1

SC
Houston, Apollo 11, I am looking at the clouds now on Pakistan through the sextant and it appear to be one single cell in the later stages of development. There is a smaller, more isolated one -

CAPCOM
Apollo 11, this is Houston. We lost you down in the noise on the COMM link here about the time you were describing the single-cell cloud formation over Afghanistan-Pakistan area through the sextant. Over.

SC
Roger. It came through a lot clearer through the sextant than with the monocular and you could definitely tell it was a one-single cell in the later stages of development. It must have been up to over 50,000 feet though. The eastern Mediterranean is phenominally clear. You can see all the lakes, the Dead Sea, stood out quite well. Over.

CAPCOM
Roger. What appears to be the limit of resolution through that sextant from your current position? Over.

SC
Well, I can't see it now. It's out from the field of view.

CAPCOM
Roger.

SC
And I don't know how you'd really describe the limit of resolution. I will think about that a little.

CAPCOM
I guess the smallest object that you could pick out looking through it would give us a pretty good idea.

SC
Well, you can see the Nile River going almost up to its source. The lake is obscured by clouds, but you can tract it all the way up.

CAPCOM
Roger.

SC
I guess that is down though, isn't it?

CAPCOM
Apollo 11, Houston.

SC
Go ahead, Houston.

CAPCOM
Roger. We have been working under the assumption that we would take about an hour for the interference from a waste water dump to dissipate to the point where you can reasonably take star sightings for platform alignment navigation or something of this sort. If you have a spare minute or two, could you comment on the observation conditions now. Over?

CDT 09:11 GET 048:39 TAPE 154/2

SC
Yes. Stand by a minute, Bruce.

CAPCOM
Okay.

SC
My guess would be that a telescope is rather useless, but you can differentiate in the sextant between water droplets and stars by the difference in their motion.

CAPCOM
Okay, Mike. I guess that we've still got - what you are saying is that we've still got a lot of water droplets visible, but you can pick them out and distinguish them in the sextant then.

SC
Right. I think so, but Buzz is looking through it now. Just a second.

CAPCOM
Okay.

END OF TAPE

CDT 09:21 GET 048:49 TAPE 155/1

SC
Houston, Apollo 11. It looks like at this time the sextant would be quite usable for any alignment. There's actually very few verticals that need to be aligned.

CAPCOM
Roger, Buzz. How about the telescope? Is it useful now?

SC
Well, it's not quite as useful. It doesn't seem to be. Depending on the position of the sun it's got that band that seems to go across the center. I don't think it's because of the waste water particles that it would lack it's effectiveness . Over.

CAPCOM
Roger. What - is this band something that's deposited on the outside of the optics? Over.

SC
Now, it's a reflection from the sun.

CAPCOM
Roger.

SC
The sun bounces off the LM structure. With the LM attached the telescope is just about useless. Those star charts that Ed has provided, I think would be most useful if we had to use the - if for some reason we had to burn through the telescope we could those as a guide for what we're looking at and say, well, that bright blob over there has got to be that star because that's the position we're in, but so far we've not been able to pick out any decent star patterns while docked with the LM using the telescope.

CAPCOM
This is Houston. We copy.

END OF TAPE

CDT 09:31 GET 048:59 TAPE 156/1

PAO
This is Apollo Control at 49 hours 7 minutes into the mission. Apollo 11 is 163,040 miles from Earth, velocity 3,476 feet per second.

END OF TAPE

CDT 09:52 GET 049:20 TAPE 157/1

All dead air.

END OF TAPE

CDT 10:12 GET 049:40 TAPE 158/1

SC
Houston, Apollo 11, Over.

CAPCOM
Go ahead, Apollo 11.

CAPCOM
Apollo 11, this is Houston. Go ahead.

SC
How do you read? Over.

CAPCOM
Roger, we're reading you loud and clear.

SC
Roger. You're coming back a little scratchy. It looks like our O2 flow transducer's gotten a good bit worse. I just looked at it at the last water accumulator cycling, and it just barely registered - barely crept up above .0. Over.

CAPCOM
Roger.

CAPCOM
11, this is Houston. At the time of your cyclic accumulator stroking, we were on low bit rate data, and consequently not receiving the O2 flow parameter. We expect that what you're seeing is probably nominal, that is it's probably what we would expect from a transducer that's malfunctioning in effect and it's probably going to keep on getting worse like that. Nothing to worry about. We'll monitor things on the ground here. Over.

SC
Okay, it does look it's gradually degrading to about zilch.

CAPCOM
Roger, we copy.

PAO
This is Apollo Control at 49 hours, 52 minutes. Apollo 11's distance from Earth is 164,558 nautical miles. It's velocity is 3441 feet per second.

END OF TAPE

CDT 10:32 GET 050:00 TAPE 159/1

PAO
This is Apollo Control at 50 hours 16 minutes. Apollo 11 is now 165,346 nautical miles from Earth, traveling at a velocity of 3423 feet per second. Flight controllers report all systems well within the normal and operating very satisfactorily.

END OF TAPE

CDT 10:53 GET 050:21 TAPE 160/1

PAO
This is Apollo Control at 50 hours, 40 minutes. Apollo 11 is 166,135 miles from earth. The Capcom is going to take a radio check here, I think, with the crew.

CAPCOM
Apollo 11 CDR, this is Houston. Radio check. Over.

SC
Roger, Houston. CDR loud and clear.

CAPCOM
Roger. We're reading you the same. Out.

SC
And would you check with FAO and see where that errata sheet is? We haven't been able to locate that.

CAPCOM
Roger. I understand it's supposed to be the back page in Buzz's operation and check list.

SC
Okay.

PAO
FAO is the Flight Activities Office.

END OF TAPE

CDT 11:13 GET 050:41 TAPE 161/1

PAO
Apollo 11's 'velocity is 3404 feet per second. Spacecraft's still in the passive thermal control mode rotating at .3 of a degree per second or 3 revolutions per hour. Sporatic bursts of static that you hear on the air-ground is caused by the rotation of the spacecraft - changing the orientation of the antennas as the spacecraft slowly rotates to maintain thermal balance.

PAO
The back-up lunar module pilot, Fred Haise is at the Capcom console with Bruce McCandless.

PAO
That radio check was with the Apollo 11 commander, Neil Armstrong.

PAO
This is Apollo Control at 50 hours, 53 minutes into the mission. An important news release will be available in the Apollo News Center at 11:45 Central Daylight Time this morning. At noon, Colonel Frank Borman will be in the building 1 auditorium at MSC for a briefing concerning the news release. Repeating, an important news release will be available at 11:45 a.m. central daylight time in the Apollo news center at MSC.

END OF TAPE

CDT 11:26 GET 050:54 TAPE 162/1

PAO
This is Apollo Control at 51 hours, 7 minutes. Apollo 7 - Apollo 11's distance is 167,007 nautical miles from earth. Velocity 3,386 feet per second.

CAPCOM
Apollo 11, this is Houston. Did you find it? Over.

SC
Roger, we found it.

CAPCOM
Roger. And I see you improved if you can give us accept we'll uplink a new state vector to you and update the CMP clock. Over.

SC
Okay, you've got it.

CAPCOM
Roger.

CAPCOM
11, this is Houston. We're through with the uplink. You can go back up block.

SC
Roger. Back to block.

END OF TAPE

CDT 11:46 GET 051:14 TAPE 163/1

CAPCOM
Apollo 11, this is Houston. We would like to terminate the charge on battery B at GET of 5130. Over.

CAPCOM
Apollo 11, this is Houston. We would like to terminate charging battery BRAVO at 5130 GET. Over.

SC
Roger, terminate charging battery BRAVO 5130.

CAPCOM
Roger, out.

PAO
This is Apollo Control at 51 hours 55 minutes into the mission. Apollo 11 is 167,594 nautical miles from Earth, moving toward the Moon at a velocity of 3373 feet per second. All systems are normal. We will be utilizing this release line for the Col. Frank Borman briefing. During that briefing we will tape any air-ground transmissions and play them back after the briefing. This is Mission Control Houston.

END OF TAPE

CDT 12:30 GET 051:58 TAPE 164/1

PAO
This is Apollo Control at 51 hours, 58 minutes into the mission. Apollo 11 is 168,658 nautical miles from earth traveling at a velocity of 3,349 feet per second. We have 30 seconds of air-ground conversation taped during the news briefing. We'll play that for you now.
CAPCOM
11, this is Houston. We show you terminating battery B charge. Over.

CAPCOM
Apollo 11, this is Houston, Over.

SC
Go ahead, Houston. Apollo 11.

CAPCOM
Roger, 11. We show you terminating battery B charge at about 51 hours, 30 minutes. Over.

SC
Okay.

CAPCOM
Roger, out.

SC
I'm with you.

SC
Houston, Apollo 11. (garble) dead band. Roger.

CAPCOM
11, this is Houston. Say again both what on. Over.

CAPCOM
Apollo 11, this is Houston. Affirmative, we request hydrogen and an oxygen fuel cell purge. Over.

SC
Okay. Any slip in the switch mode?

CAPCOM
Negative. (garble).

END OF TAPE

CDT 12:47 GET 052:15 TAPE 165/1

PAO
Apollo 11 is 170,010 nautical miles from Earth, velocity 3319 feet per second.

END OF TAPE

CDT 13:17 GET 052:45 TAPE 166/1

SC
Houston, Apollo 11.

CAPCOM
Apollo 11, this is Houston. Go ahead.

SC
Roger. You copy my NOUN 93?

CAPCOM
That's affirmative. We've got it.

SC
Okay. I am going to go ahead and thrust and triangle difference is .01, but it's very difficult at three-tenths rate. I'm required to use medium speed and involed and difficult to hold the star standard long enough to get a decent mark on it.

CAPCOM
Roger. We copy and it looks okay tO us.

SC
Right.

PAO
This is Apollo Control at 3 hours, 53 minutes into the mission. Apollo 11 is 170,746 nautical miles from earth, velocity is 3303 feet per second. The crew is now in the process of realigning the spacecraft's enertial platform.

END OF TAPE

CDT 13:37 GET 053:05 TAPE 167/1

PAO
This is Apollo Control at 53 hours 20 minutes. Apollo 11's distance from Earth is 171,293 nautical miles, traveling at a velocity of 3291 feet per second. The spacecraft's weight is 6068 pounds.

PAO
This is Apollo Control. We have a correction on the orbital parameters of Luna 15 as given in the news briefing recently. The parameters given in that briefing of 72 by 156 nautical miles were based on a computation from an orbital period of 2 hours and 30 minutes instead of the correct 2 hours and 30 seconds. The orbit has been recomputed based on the proper numbers and the parameters for Luna 15, based on a period of 2 hours 30 seconds are 30 by 110 nautical miles, a perilune of 30, an apolune of 110 nautical miles.

END OF TAPE

CDT 13:57 GET 053:25 TAPE 168/1

CAPCOM
Apollo 11, Houston. Over.

SC
Go ahead, Houston.

CAPCOM
Roger. I've got the morning news here if you are interested. Over.

SC
Yes, we sure are. We are ready to copy and comment. Isn't it 2:30 there?

CAPCOM
Roger. Okay. Here we go. The interest in the Flight of Apollo 11 continues at a high level but a competing interest in the Houston area is the easing of watering rules. Mayor Louie Welch promises a lifting of lawn watering restrictions if the rains continue. Friday is partly couldy and there is a 30 percent chance of thundershowers in the afternoon. In Washington, D. C. the Senate Finance Committee approved extension of the income tax surtax but a Senate vote on the bill -

SC
You cut out, Houston, you cut out.

CAPCOM
Roger, where do you hold me cutting out? Over.

SC
Houston, Apollo 11.

CAPCOM
Apollo 11, Houston. Over.

CAPCOM
Apollo 11, this is Houston. How do you read now? Over.

SC
Loud and clear, Houston. Go ahead.

CAPCOM
All right.

SC
- rains in Houston.

CAPCOM
Roger. And Washington. The Senate Finance Committee has approved extension of the income tax surtax -

END OF TAPE

CDT 14:27 GET 053:55 TAPE 169/1

CAPCOM
Roger.
In Washington, the Senate Finance Committee has approved extension of the Income Tax Surtax, but a Senate vote on the bill apparently seemed remote.
In Austin, State Representative Ray Lemmon of Houston has been nominated as the National Director of the American Society for Oceanography. Lemmon has proposed a study of the possibility of establishing an institute of oceanography in Texas. This would be the first such institute on the Western Gulf of Mexico.
In Minneapolis, Minnesota, the weather bureau after recapping today's weather showing a high of 88 and a low of 72, has noted "snowfall: none."
From St. Petersburg, Florida, comes a radio report from a Norwegian Explorer, Thor Heyerdahl which said that the crew of his papyrus boat RA will sail into Bridgetown, Barbados, despite damage from heavy seas. The crew, however, will sleep on an escort vessel. Norman Baker, navigator of the expedition, said the crew was aboard the RA today repairing damage from storms this past week which split the footing of the mast. Part of the broken mast was jettisoned overboard. The vessel was 725 miles east of Barbados. "It is possible but uncomfortable to sleep aboard the RA," Baker said in the radio report. "But the purpose of our voyage is not a test of strength or human endurance." That is the reason why the crew was spending nights aboard the escort vessel Shenandoah, which rendezvoused with the RA on Tuesday.
In sports, the Houston Oilers are showing plenty of enthusiasm in their early preseason workouts at Kerrville and Coach Wally Lemm says he is impressed with the fine group of rookies.
National League baseball - was it yesterday - Thursday - St. Louis 11, Philadelphia 3; Montreal 5, over Pittsburgh 4; Atlanta 12, Cincinnati 2; San Franscisco 14, and Los Angeles 13.
American League - we have Baltimore 3 over Cleveland 2, Detroit 4 to Washington 3, Minnesota 8, Chicago 5. Boston and New York was rained out.
And in Corby, England, an Irishman, John Coyle has won the world's porridge eating championship by consuming 23 bowls of instant oatmeal in a 10-minute time limit from a field of 35 other competitors. Over.

SC
Roger. Houston didn't play yesterday.

CAPCOM
That's correct.

SC
I'd like to enter Aldrin in the oatmeal eating contest next time.

CAPCOM
Is he pretty good at that?

SC
He's doing his share up here.

CAPCOM
You all just finished your meal not long ago, didn't you?

SC
I'm still eating.

CAPCOM
Okay is that -

SC
He's on his 19th bowl.

CAPCOM
Roger. Are you having any difficulties

CDT 14:27 GET 053:55 TAPE 169/2

CAPCOM
with gas in the food bags like the janitor reported?

SC
Well, that's intermittently affirmative, Bruce. We have these 2 hydrogen filters which work fine as long as you don't hook them up to a food bag. But the entry way into the food bag has enough back pressure to cause the filters to start loosing their efficiency. A couple of times I've been tempted to go through that dryout procedure, but we found that simply by leaving the filters alone for a couple of hours, their efficiency seems to be restored.

CAPCOM
Roger, we copy.

SC
Their efficiency ranges anywhere from darn near perfect to terrible just depending on the individual characteristics of the food bags we're putting through it. Some of the food bags are so crumpled near the entry way that there's no way we can work them loose to prevent back pressure.

CAPCOM
Roger.

PAO
That's Mike Collins from the spacecraft.

PAO
This is Apollo Control at 54 hours, 6 minutes. Apollo 11's distance from Earth now is 172,748 nautical miles, traveling at a velocity of 3260 feet per second.

END OF TAPE

CDT 14:47 GET: 054:15 TAPE 170/1

CAPCOM
Apollo 11, this is Houston, over.

CAPCOM
Apollo 11, this is Houston, over.

SC
Hello, Houston, go ahead.

CAPCOM
Roger, 11, as you have probably noticed coning angle on the PTC mode is increased substantially as a result of a - waste water dump, the fuel cell purge and a natural coupling, so it looks like we are going to have to terminate PTC here in a little while and we would like to get your feeling as to rather you are still anticipating - trying to send back TV signals from inside the LM and if so, we will try to provide an attitude that you can hold that will give us high gain antenna lock on the Earth during the TV and LM activation period. Over.

SC
Yes, we are still planning - that activity if the coordinates work out all right and we will accept that attitude that you work up for us.

CAPCOM
This is Houston, roger, out.

SC
Work up an attitude to get high gain is there any way we could get partial sun in one of the two LM sun windows?

CAPCOM
This is Houston. We'll have a look at it.

PAO
That was Neil Armstrong confirming they will attempt TV at approximately an elasped time of 56 hours 20 minutes and then the last of the question was by Buzz Aldrin.

CAPCOM
Apollo 11, this is Houston, over.

SC
Go ahead Houston.

CAPCOM
Roger. We have a TV attitude for you if you are ready to copy.

SC
Go ahead, ready to copy.

CAPCOM
Okay, we recommend stopping PTC at GET of 54:45:00 and this should put you just about the right roll angle. The attitude we recommend is roll 263, pitch 090, yaw 000. This gives you the Earth out of window number 01 in the command module and places the high gain antenna -

END OF TAPE

CDT 15:12 GET 054:40 TAPE 171/1

CAPCOM
to 000. This gives you the earth out of window number 1 in the command module, and places the high gain antenna in the CSM window for TV at your convenience. You also have the sun shining in, or shining at the hatch on the LM and if you take down the window shades you should get some sunlight in. Now we're recommending wide deadband. Over.

SC
Roger. Thank you, Houston. We'll look at that.

CAPCOM
Roger up.

SC
Houston, Apollo 11. When we pass the proper rolling we're not anywhere near 33 chart. Do you want us to stop at the triangle we find ourselves in and then VERB 49 the three angles you give us.

CAPCOM
Stand by.

CAPCOM
Hello Apollo 11, Houston. We'd like you to stop at the proper roll angle then to a verb 49 to the roll and pitch. Over. Correction, roll and yaw.

SC
Houston, Apollo 11. Over.

CAPCOM
Go ahead, 11. Over.

CAPCOM
Hello Apollo 11, Houston. You read? Over.

SC
Houston, Apollo 11. Over.

CAPCOM
Roger, 11. Do you read me? Over.

CAPCOM
Hello, Apollo 11, Houston. Over.

SC
Stand by, Charlie.

SC
We're going to come out of PTC here at 263 roll and then to a verb 49 to the recommended attitude.

CAPCOM
That sounds fine to us. Over.

PAO
This is Apollo Control at 54 hours 45 minutes. Apollo 11 is 173,997 nautical miles from earth. Velocity is 3,234 feet per second. In the control center, the white team led by Gene Kranz is preparing to relieve Cliff Charlesworth and the green team. Capcom is Charlie Duke. We're estimating the change of shift news conference for 4:00 PM Central Daylight Time.

CAPCOM
Hello Apollo 11, Houston. Before you open the pressure equalization valve, we'd like the LM send Delta-P. Over.

SC
Okay. Let me check it again. It was about 155.

CAPCOM
Rog.

SC
I read it 158 right now, Charlie.

CAPCOM
Roger. Thank you much.

SC
Houston, Apollo 11. We're (garbled)

CAPCOM
11, Houston. You're about 1 by on this transmission. Say again. Over.

SC
Houston, Apollo 11. Do you read?

END OF TAPE

CAPCOM
11, Houston. Here's that 1 by on this transmission. Say again. Over.

SC
Houston, Apollo 11 (garble)

SC
Houston, Apollo 11. How do you read on the high gain?

CAPCOM
Hello 11. How do you read me? Over.

SC
Reading you loud and clear Charlie. We just switched to a high gain and we stopped PTC at roll 263, pitch 90, yaw 0. How do you read?

CAPCOM
Roger Mike. Your 5 by now on the high gain. We're right between the OMNI antennas and pretty horrible comm on the OMNIs. We've got you 5 by on the high gain and we copy the PTC stoppage. Over.

SC
Okay, fine.

SC
Houston. We're going to open the director 2 valve instead of pumping up the cabin.

CAPCOM
Roger copy.

CAPCOM
Apollo 11, Houston. We're going to hand over to Goldstone for uplink, in about 2 minutes. We might have a momentary dropout of comm. Over.

SC
All right. Can you hear our master alarm in the back, John? That's O2, a little high, coming through the amplifier.

CAPCOM
Roger. Copy.

SC
That photo electric cell is a good device. It's worked very well.

CAPCOM
11, Houston. Say again. Over.

SC
I say that photo electric cell amplifier for the master alarm is a good device. It's working very well, and it's a nice pleasing tone.

CAPCOM
Roger. Copy. Thank you.

SC
Makes you almost glad to get master alarm.

SC
Houston, Apollo 11. As a matter of curiosity our O2 flow meter is pegged full scale high.

CAPCOM
Roger 11. We copy that here. Over.

SC
Okay.

SC
Boy that transducer's working somewhat.

CAPCOM
Roger.

CAPCOM
11, Houston. We'd like to try to attempt to correlate your O2 flow in transducer with the flow valve that you've got open. How far open would you say you have the repress O2. Over.

CAPCOM
Correction. The Direct O2.

SC
Stand by Charlie.

CDT 15:22 GET 054:50 TAPE 172/2

SC
Okay Charlie. It's not open very far Hard to give you a good reading without shutting it again but the arrows are at about the 1:00 o'clock position. Now I reduced the flow and I'll let it stabilize here. Right now our onboard reading is about .4 and that's with the arrow in the O2 valve at the 2:00 o'clock position. Would you rather have a - comparisons of O2 flow readings or would you rather have valve position comparisons?

CAPCOM
Roger. Stand by.

CAPCOM
ECOM said they'd like to look at the valve positions. Over.

SC
Okay. Well we're holding steady now at 3/10ths of a pound per hour and our cabin pressure is about 54 and I'll close the valve momentarily and then open it again to this position and see how much travel is required.

CAPCOM
Roger.

SC
It's about 30 degrees of travel Charlie from the closed position which is with the arrow pointing at about 3 to 3:30, 4:00 o'clock.

CAPCOM
Roger.

SC
Our blowers stabilized now at .6.

CAPCOM
Roger we copy. We're reading the same.

SC
Okay.

SC
We're opening it back to the 1:00 o'clock position.

CAPCOM
Roger.

SC
Is that enough different positions, or do you want more Charlie?

CAPCOM
Mike that's good enough. We're satisfied now. Over.

SC
Okay.

END OF TAPE

CDT 15:32 GET 055:00 TAPE 173/1

SC
Houston, Apollo 11, we've terminated directo O2, our cabin pressure is 57 and, as a matter of curiosity, when we turn the off we get a master alarm just like they did in the spacecraft testing.

CAPCOM
Roger. Eleven, Houston, we have a little update for you. When you go into the LM, we'd like you to unstow and bring back to the command module the following items, over.

SC
Ready to copy.

CAPCOM
Roger, we'd like you to pick up the, out of the flight data file, the surface check list, the mission rules no go card, the DIP, APS, RCS limit cutrons, over.

CAPCOM
Apollo 11, Houston, the reason we want you to bring those three items back, we'll have some updates for you, for those 3 over.

SC
Roger, we figured you would.

PAO
This is Apollo Control at 55 hours 10 minutes. Our network controllers just advised that we are receiving live television at Goldstone. We would presume this is a test of the system, similar to what we received from the crew yesterday. The crew is planning to send television from the lunar module when they ingress. Stand by - here's a call from the crew.

CAPCOM
Flight configure here at Houston for the transmission. We'll be up in a couple of minutes, over.

SC
Rog, this is just for free. This isn't what we had in mind.

CAPCOM
Roger.

PAO
That was Capcom, Charlie Duke, advising the crew that we are not quite prepared for television reception at this time. You heard Mike Collins respond that this one is for free. We still intend to get the television transmission during the time the crew is in the lunar module, beginning about 56 hours 20 minutes ground elapsed time, which would be about 4:52 PM central daylight time. We are getting a black and white television picture in the control center at this time and we should have that in color by now. An anterior view of the command module looking up into the LM hatch, CSM land hatch area. We can't quite make out which crewman we're seeing up in the tunnel working with the probe and drogue assembly.

PAO
Getting a very good view of the work going on in the command and service module tunnel. It appears to be Neil Armstrong working in the tunnel. Working on the drogue and probe assembly. This extremely sharp clear picture is coming to us from about a 175 thousand miles distance from earth.

END OF TAPE

PAO
extremely sharp picture is coming to us from about 175,000 miles distance from earth. Presently about 48,000 miles from the moon.

PAO
That appears as if it might be all the free TV, as Mike Collins put it. After we got in we expect to get the television transmission from the time the crew is in the lunar module and that period of activity is scheduled to begin in about 56 hours 20 minutes with the ingress to the lunar module. And we understand it's starting to get a picture back again. It was in lock momentarily and now we had it back again. Neil Armstrong up in the tunnel at this point, removing the probe and drogue assembly in preparation for the ingress to the lunar module. A network controller just reported that this television is coming to us on the 210 foot dish antenna at Goldstone, California.

PAO
We just saw the probe assembly start to come loose now as Neil Armstrong is -

CAPCOM
Apollo 11, Houston. It's a pretty good show here. It looks like you almost got the probe out.

SC
Yeah, it's loose now. Can you see that?

CAPCOM
Rog, Neil. It's real good.

SC
There's not much light up in that area but certainly this TV set should pick it up.

CAPCOM
There are some bright spots shining on the probe. Apparently sun shafting on it. Gets just about enough - part to make it out. Over.

SC
Hey, how good does it look on the lights?

CAPCOM
Oh, okay. You're right.

SC
Okay, it's loose now. Coming down.

CAPCOM
Roger.

CAPCOM
Looks like it's a little bit easier than doing that in the chamber. Over.

SC
You bet. It's the only way it's pretty massive but it goes where you direct it.

CAPCOM
11, Houston. That's beautiful picture now, we've got. We're going to have 12 seconds delaying. Adjust and just bringing it down by the optics now.

SC
Mike must have done a smooth job in that docking. There isn't a dent or a mark on the probe.

CAPCOM
Rog. We're really getting a great picture, here. Over.

CDT 15:47 GET 055:15 TAPE 174/2

CAPCOM
11, Houston. With a 12-foot cable, we estimate you should have about 5 to 6 feet excess when you get the camera into the LM. Over.

SC
Roger.

CAPCOM
We can see the probe now. A correction, the drogue.

SC
Roger.

SC
Okay, drogue removal is coming next.

CAPCOM
Roger. As we suspected.

PAO
Once removal of the drogue is completed, they will have access to the LM hatch and be able to go into the tunnel.

CAPCOM
11, Houston. Now it's a good view of storage area under the couch.

CAPCOM
11, Houston. Looks like it's pretty crowded in there with that drogue. Over.

SC
Oh, it's not really bad. This TV cable is getting in the way.

CAPCOM
We see lots of arms.

END OF TAPE

CDT 15:57 GET 055:25 TAPE 175/1

CAPCOM
We see lots of arms.

SC
The only problem, Charlie, is these TV stage hands don't know where they stand.

CAPCOM
Well, you got to really have a union card there. We can't really complain too much, I guess.

PAO
This unscheduled televison transmission has now run about 18 minutes, and we have no estimate at this point as to how long it will continue. Mike Collins reported that it would - we would go ahead with the regularly scheduled one when they are in the LM.

CAPCOM
Apollo 11, Houston. Do you have a little white dot in the bottom of your monitor - TV monitor? Over.

SC
Roger. We do.

CAPCOM
Roger. I guess part of the camera's been burnt out down there. These are really beautiful pictures here, Buzz. Real clear.

SC
Okay. We might have got just a little bit of nothing there. Is it just a one small white dot?

CAPCOM
That's affirmative.

PAO
Have a good view here of the computer display and keyboard assembly with the green lights flashing.

SC
We went up in the tunnel checking the roll angle, Charlie, and it's 2.05 degrees.

CAPCOM
Roger. Copy. 2.05 on the roll cal.

SC
And that's a plus.

CAPC0M
Roger. Plus.

PAO
The reference to the roll cal, or roll calibration index marker in the tunnel, which shows how far off exact 0 the 2 vehicles were when the docking occurred.

CAPCOM
11, Houston. The tunnel looks pretty clear to us. Somebody going up there now. Over.

SC
It's Mike checking his connectors up there now.

CAPCOM
Roger.

CAPCOM
11, Houston. The lighting up in there looks very good to us at this time. Over.

SC
I think that's mostly the camera. It's subdued to say the least.

CAPCOM
Roger. It's funny. It's gathering pretty well to us. We see everything quite clearly up in there.

SC
Anyhow, the dock latches look good today just like they did yesterday. Everything up in there looks just fine.

CAPCOM
That sounds fine to us. Over.

PAO
Mike Collins reporting there on the appearance of the latches.

CDT 15:57 GET 055:25 TAPE 175/2

CAPCOM
11, Houston. We can read the decals up there on the LM hatch.

SC
Well, let me move it up and see how much you can read.

CAPCOM
Okay.

CAPCOM
We can see the LM umbilical connection quite well, Buzz. We see you zooming in on one of the decals now. It's - to reset, unlatch handle, latch behind grip and pull back 2 full strokes. That's about all we can make out.

SC
You got an A plus.

CAPCOM
Thank you very much, sir. At least I passed my eye test.

SC
I'm standing six feet from it, Charlie. You can read it better than I can. There's something wrong with your system.

CAPCOM
Roger.

PAO
An interested observer of these amazingly clear pictures coming to us from more than 175,000 miles out in space is Astronaut Gene Carnan, who got a first hand view of some of this same area of the spacecraft during his Apollo 10 flight.

CAPCOM
That's a real good view of the LM hatch handle there, 11. Over.

SC
Roger.

SC
Looks like we'll be ready to go into the LM early if that's okay with you all down there,

CAPCOM
Roger. It's fine with us, Neil. Go ahead anytime you wish. Over.

SC
Okay.

CAPCOM
11, Houston. The white spot you see on your monitor - our TV people say it is a burn spot, but they expect it to dissipate after a couple of hours. Over.

SC
Roger. Thank you.

END OF TAPE

CDT 16:07 GET 055:35 TAPE 176/1

SC
Okay, the dump valve is actuated.

CAPCOM
Roger, copy, then we see it very clarly. Is that you Buzz with your hand on it?

SC
Yeah.

CAPCOM
11, Houston. We're really amazed at the quality of the picture up in the tunnel. It's really superb, over.

SC
It is considering the amount of light up in there. Hey, we are about to open our hatch now.

CAPCOM
Rog. There is that same guy when you opened up the door, why, he is waiting there for you and he turns the lights on.

SC
How about that. It's like the refrigerator.

PA0
That conversation between Charlie Duke and Mike Collins referring to the automatic light that comes on in the LM when the hatch is opened.

CAPCOM
Buzz, the view by your left shoulder there is so good we can see the ascent engine cover, the velcro on it, and that's' about all we can make out right now. Now we see the helmets, do we?

SC
We don't see anything loose up there.

CAPCOM
Well, great. Looks good to us. We see the helmet storage space.

CAPCOM
11, Houston. We got a view of the PLSS there, off the right of our screen.

CAPCOM
11, Houston. Buzzy already in? Over.

SC
Roger. I'm halfway in, hanging out, or turning around, I guess.

CAPC0M
Roger.

PAO
Buzz Aldrin, reporting that he's halfway into the LM. His view is inside the LM cabin.

CAPCOM
Apollo 11, Houston. We'd like you to read out the LCG reservoir sight level. Over.

SC
Okay. Stand by.

CAPCOM
11, we have a good view of the window there. It looks like the sun is finally coming through the shade.

SC
Yes, I'm afraid it's - we're just about plus z toward the sun.

CAPCOM
That's affirmative. This attitude put both windows right toward the sun - the LM. Over.

SC
Well, that may be good in some ways, but -

CAPCOM
We had a view, Buzz, of the utility light cord. Utility's on.

SC
Yes, let me show you a view looking the other way.

CAPCOM
Roger. And we see right now the utility light or either the flood light up there.

CAPCOM
I think now I see the utility light is still in the stowage bag. Hey, that's a great shot right there. We see you in there. Guess that's Neil and Mike. Better be, anyway.

CDT 16:07 GET 055:35 TAPE 176/2

CAPCOM
We see you waving.

PAO
Buzz Aldrin has apparently carried the camera into the LM with him, showing us Neil Armstrong and Mike Collins back in the CSM.

CAPCOM
11, Houston. That's really a beautiful shot.

CAPCOM
11, Houston. We didn't quite decipher that signal that just came from the CMP.

SC
Just saying hello. On the LCG sight gage, you got about - it looks like - the white mark that's in the plunger is about a quarter to three eighths inch out into the green away from the red. Is that what you like to see? Over.

CAPCOM
Stand by. Right, Buzz; that looks good to us. Thank you much.

SC
It is the white index, is it not, that you're interested in comparing whether it's in the red or green?

CAPCOM
Stand by. That's affirmative, Buzz. It looks good. That's a good reading for us. Over.

SC
Okay.

CAPCOM
We had a shot momentarily - a moment ago of the suit disconnect valve.

SC
I'll open up the windows and see what the lighting condition's going to be like.

CAPCOM
11, Houston. That's a real good view we have of the AOT. You're back there, Buzz, and notice you're taking down one of the window shades. Over.

CAPCOM
The light is superb.

SC
How's the sun coming in? How's the sun coming in from this direction going to affect what you can see?

CAPCOM
It made it really super. The lighting is excellent in the LM right now. We can make out the AOT, the ISA, and the left-hand window- there's a little glare off of that, but the LMP side the - with the shade down it's really excellent. Over.

SC
Well, let's - I'm turned around, why I took the shade off my side first.

CAPCOM
Roger. We copy. The light level for the TV is really excellent. Over.

SC
The lighting in the LM is very nice, just like completely daylight, and everything is just beautiful. A good bit lighter than the tunnel was earlier.

CAPCOM
Roger. We got a good view now of the DEDA and also, Buzz's ATA.

PAO
This ingress to the lunar module came about -

END OF TAPE

CDT 16:17 GET 055:45 TAPE 177/1

CAPCOM
ACA

PAO
This ingress to the lunar module came about 40 minutes ahead of the flight plan, and we would presume that the unscheduled TV is perhaps merging with the schedule a little bit early.

SC
Every thing seems to be in place down there.

CAPCOM
Roger, we got the dump valves in view, over.

SC
Roger.

CAPCOM
Eleven, Houston. We see you're removing the ISA now, folding it up, putting it up by the AOT. The instrument pannels are coming into view behind.

SC
Yea, I think probably it'd be best since we've done an SPS burn to put it back over the instrument panel instead of putting it up over the plss on the rechart station. Would you care to comment on that one. We can do either, just as easily.

CAPCOM
Stand by we'll have an answer for you momentarily.

CAPCOM
Eleven, Houston. It's really a super shot of the thing displaying.

SC
The vehicle is suprisingly free of any debris floating around, it's very clean.

CAPCOM
Roger.

CAPCOM
Eleven, Houston. It's pretty hard to describe this view. It's really great.

SC
Now you know how we feel.

SC
Okay Neils OCS is about 57, 58 hundred.

CAPCOM
Copy.

SC
And mine is about 58 hundred also.

CAPCOM
Copy.

PAO
Aldrins hand resting on one of the portable life support systems which will be used on the moons surface.

CAPCOM
Eleven, Houston. That's a good shot of Neils PLSS there, over.

SC
Yea that's fine.

CAPCOM
Eleven Houston just a moment ago we had a good shot of your PLSS Buz, and the two helmet stowage bags, and now behind your left shoulder Buz, we have your DSKY and the ACA.

PAO
We're not quite sure who's holding the camera at this point. Apparently it's drifting freely inside the cabin. Or more likely attached to some convenient point within the LM cabin.

SC
We're going to go ahead and take all the loose data on back into the command module, Charlie.

CAPCOM
Roger.

CDT 16:17 GET 055:45 TAPE 177/2

PAO
This television transmission has now been running about 42 minutes, and the spacecraft now about 176 thousand miles from earth.

CAPCOM
Apollo 11 Houston. Buz it appears that you didn't put on the sun filter and viewing the sun through the AOT, over.

SC
Yea, unfortunately it looks like it's down a little bit more towards (garbled) than I can be able to see in the MT.

CAPCOM
Roger.

SC
We've got a beautiful view of the side of the command module out of the AOT looking in the left rear deton.

CAPCOM
Rog.

SC
I can see the hatch and all the EVA hand rails. First time we've seen the silvery outside of the command module. I can read the letters on the hatch cover, it's a boost cover release, and the big yellow arrow that points toward the opening place where the 20B goes.

CAPCOM
Rog. Great shot now back down into the -

SC
And left on the - -

CAPCOM
Go ahead Buz, over.

SC
Say again.

CAPCOM
I was just saying we got a great shot looking back into the command module.

SC
Okay. And the left decent I can see the rendezvous radar, and I move to the forward detent and that's about all I've got. I'm looking eyeball to eyeball.

CAPCOM
Rog.

PAO
Neil Armstrong has apparently been holding the camera, looking back down through the tunnel it appears now that he's handed the camera to Buz Aldrin. As he is still looking back through the tunnel we see Mike Collins in the background there.

SC
Charlie is there any concern about the duration that we ought to have the window shades open?

CAPCOM
Stand by.

SC
We don't have any circulation in here and it might get a little on the warm side.

CAPCOM
Rog.

SC
We'll put up a couple of hoses in the command module here and get a little circulation going.

CAPCOM
It sounds like a good idea, over.

END OF TAPE

CDT 16:27 GET 055:55 TAPE 178/1

CAPCOM
Apollo 11, Houston. As far as the window shapes go in this LM is nothing except for crew comfort. I don't think we've got any systems problem. Be sure to put them back up when you egress. Over.

SC
That we will do.

SC
Charlie, I'll give you a view out of the overhead window, back looking at the Command Module, right hand rendezvous window.

CAPCOM
Roger.

CAPCOM
Well we see it now. Thanks a lot Buzz. It's a good view through the over head.

SC
One (garble) is on by the overhead.

CAPCOM
Roger.

CAPCOM
There we go. We've got it now.

SC
There wasn't very much debris in the Command Module or the LM. We found very few loose particles of bolts, nuts and screws and lint Very few in each spacecraft. They were very clean.

CAPCOM
Roger. Sounds good.

CAPCOM
11, Houston. We have a good view out of the rendezvous - correction the overhead window of the LM. We don't see anybody standing back at it though. Over.

SC
Charlie can you see Mike's two eyeballs staring out through the nautical window?

CAPCOM
11, Houston. Stand by. We haven't picked him up yet.

SC
They're looking through a lot of layers of glass.

CAPCOM
11, Houston. We had a slight glimpse of Mike in the rendezvous window at that time. It's pretty murky looking in there though.

SC
Okay. Here he is. I've got him. I've got him on the monitor now.

CAPCOM
Okay. We see him staring back at us now. Hello in there.

CAPCOM
Apollo 11, Houston. Our recommendation to the ISA is to store it back over the instrument panel. Over.

SC
Roger. Will do.

PAO
This transmission has been running about 54 minutes at this point.

CAPCOM
11, Houston. We can make out the markings on the panel. We read system a assent fuel, S in oxidizer. QUADS 1, QUAD 4. It's really unbelievable the definition we're getting down here off that little camera. Over.

CAPCOM
We can even see the barber pole on

CDT 16:27 GET 055:55 TAPE 178/2

CAPCOM
- a dog bag.

CAPCOM
We can read the markings on the instruments for the glycol pressure quantity, quantity, TC O2. You can read the scale on the eight ball. Over.

CAPCOM
11, Houston. We seen across these barber pole and we had the Velcro patches back up to the RCS systems now. We can see the markings on the meters, green and red bands, in limits. We see you raised the cover on the abort stage. We don't recommend that.

SC
Yes. We're going to tape that one over.

CAPCOM
Roger.

SC
Going to tape that one over.

CAPCOM
We concur.

SC
The restraints in here do a pretty good Job of pulling my pants down.

CAPCOM
Roger. We haven't quite got that before the 50,000,000 TV audience yet.

CAPCOM
11, Houston. That's a good view of the eight ball. We see - you can read the OFF light there.

CAPCOM
You can see the signal strength meter for the radar- read the numbers on it.

PAO
At this point, we have had to take the color down momentarily. We - -

END OF TAPE

CDT 16:37 GET 056:05 TAPE 179/1

PAO
At this point, we've had to take the color down momentarily. We've run out of tape in the color conversion recorder. We estimate we'll have the black and white for about 5 minutes while the tape changes in process and then continue to convert in color after that point.

CAPCOM
Roger, stand by. We'll have an answer.

CAPCOM
11, Houston. On that TV, our commentary - The monitor I was looking at was delayed about 12 seconds, 12 to 15 seconds while it went through our color converter. It was probably - You thought I was praising, but we were looking at it 15 seconds after you broadcasted. 11, Houston.

SC
We understood that, Charlie.

CAPCOM
Okay, on the LM cameras, we'd like you to do it on LOI day with the LM power. Over.

SC
Okay, that's what we'll do.

PAO
The black and white view that you're seeing now is the unconverted color pictures that comes down from the spacecraft. The flicker, of course, is taken out in the conversion process. We've now been receiving television pictures from the spacecraft for about 1 hour.

SC
Checklist stowage packet, it's, got a 16-millimeter camera in it and it's got this little cylinder and I guess - I don't understand what it is. Maybe you can tell us.

CAPCOM
Roger. Stand by. We can't figure it out either.

SC
It's got an arrow on the back and it says "turn", but I'm afraid to turn it.

CAPCOM
11, your friendly geologist says it's the camera crank. Excuse me, for the 16 sequence camera if it jams. Over.

SC
All very well. Thank you.

PAO
The reference to the friendly geologist refers to Astronaut Jack Schmitt who is here in the control center.

SC
Here's that word again. The ancillary stowage container.

CAPCOM
Rog.

PAO
Now we're back with the color.

CAPCOM
The shades couldn't quite hack it, there, Buzz. Over.

SC
Houston, 11. Are you still getting high bit rate off the OMNI's at this distance?

CAPCOM
Stand by, Mike.

CAPCOM
Apollo 11, Houston. About 50 percent of the time we're getting high bit rate off the OMNI's when you're in PTC. Over.

CDT 16:37 GET 056:05 TAPE 179/2

SC
Okay, thank you.

CAPCOM
You' re welcome.

CAPCOM
Apollo 11, Houston. Neil, with this attitude, you look like you're about 12 feet along.

SC
It seems like I always find myself upside-down in whatever I'm doing around here.

CAPCOM
Apollo 11, Houston. Could you give us a few comments on your crew comfort with the CSM hoses moving you around? Over.

SC
Well, it's picking up a little bit of circulation in here.

CAPCOM
What do you estimate the temperature is, Buzz? Over.

SC
I'd say maybe 73, 75.

CAPCOM
Rog.

SC
It's hard to tell at this density and pressure of gas, but comfort level is about the same as the command module. It was warmer, or stuffier when we first got in, but it seems to be improving.

CAPCOM
Houston copies that.

CAPCOM
11, Houston.

SC
You may be able to see some -

CAPCOM
Go ahead.

SC
Some particles jumping around on your screen. That's just dust particles that are being eliminated by sun shafting in the window.

CAPCOM
Roger. They're very clear now. Over.

CAPCOM
And that's a good view of Neil's, correction, of Buzzes circuit breaker panel there.

END OF TAPE

CDT 16:47 GET 056:15 TAPE 180/1

CAPCOM
And that's a good view of Neils, correction of Buzz's circuit breaker panel there.

SC
I can just barely see the hand rail on the front porch from this position on the right hand window.

CAPCOM
Roger.

CAPCOM
Eleven, Houston. Our view of the panel eleven is, gets brighter then darker. Are you changing the F-stop at all, over.

SC
Now what's happening is we get pretty close to the window now and then drives the automatic light control into the stop I think.

CAPCOM
I think that's right.

SC
Yea I had the switch on outside while I was going through the overhead window. That may be what's contributing to some of it.

CAPCOM
Roger. Eleven, Houston, we seem to be picking up a few more dust particles now. We see them quite clearly on the screen now, over.

SC
Yea I'm choking on one ever so often.

CAPCOM
Eleven, Houston. Your show is going out to the US now. We're about to get this satelite up. It'll be transmitted to some other countries after that, over.

SC
Roger. I'm checking out this window bracket. Where I'll be putting it for the EVA pictures of Neil going down the ladder.

CAPCOM
Roger.

SC
Apollo 11, Houston. We keep mrveling about the color and the clear of your picture. It's really difficult to describe. It's just perfect, over.

CAPCOM
And Eleven, it doesn't look like you're having too much trouble with that bracket up there, Buzz.

SC
Roger, those new knobs really make it easy to twist the thing and get it cinched down quite tight.

CAPCOM
Rog.

CAPCOM
Eleven, Houston. Buzz, how does the alignment look?

SC
It looks pretty good as well as I can tell without the gear extended. I can't get a real definitive answer, but you couldn't fix it any place to see much more out of the window without holding it for the whole time.

CAPCOM
Roger looks like to us it's going to work real well.

SC
Give me enough room to - Yea I think so.

CAPCOM
Buzz we see you putting your window guard in place there and back up to the ISA now.

SC
Houston ask if they know if the 90 degree bracket can be stowed in the commanders stowage assembly.

CDT 16:47 GET 056:15 TAPE 180/2

CAPCOM
Stand by.

CAPCOM
Eleven Houston. Buzz are you still looking for that 90 degree bracket, over.

SC
Yea, he's looking for it now.

CAPCOM
Roger, we'll have a word for you in just a moment.

SC
Our monitor shows pretty good, clear pictures from this angle. Alley found the 90 degree bracket.

CAPCOM
Roger, it's really a super picture. We got the ACA, your ACA, the disc picture of the throttle, the 90 degree bracket. We see your handles, and now over to the bracket.

END OF TAPE

CAPCOM
start your handles and now over to the bracket.

SC
That's about the position we'll be putting the camera in after the initial descend on the ladder, and it'll be taken 1 frame per second for most of the EVA.

CAPCOM
Houston copies out.

CAPCOM
That's a real good view of that camera.

SC
Our monitor is a little bit wavey, so it's hard for us to tell when we're - when we've got a steady picture for you.

CAPCOM
11, we have no complaints at all. We don't see that waviness on our picture. It's just really great. Over.

SC
Do the edges of the window look like straight lines to you?

CAPCOM
That's affirmative.

SC
Okay, they don't in our monitor and that leads us to make some corrections to the camera, which probably aren't required sometime.

CAPCOM
Buzz, we have no complaints at all. It's a magnificent picture.

PAO
We've been receiving television now from the spacecraft for about an hour and 20 minutes. Apollo 11 presently 177,000 miles from earth.

CAPCOM
What was that, Buzz, you're chasing now?

SC
That was me picking up some particles of paint that were floating through the air in front of our camera, there.

CAPCOM
Rog. Now we got it. It appears to us that Neil's to check the velcro map there.

CAPCOM
Okay Buzz, we see the card up now.

SC
Okay, for those of you that don't know, this is where we log most of our data for each of the LM maneuvers and we have another card like this but the timeline broke that we had layed down on the table in front of the - down there at this play keyboard, and it's on this timeline that we have all our procedures. And we obviously have to hold these in place in zero "G" so we make use of the velcro patches on the back and on the table so we can attach these down here and then we just turn the pages over when we go to a new sequences in our timeline of procedures.

CAPCOM
Roger.

SC
And we're ready to copy DOI pad.

CDT 16:57 GET 056:25 TAPE 181/2

CAPCOM
Rog. We'll have the FIDOs work that one up for you momentarily.

CAPCOM
11, Houston. That was a good shot of panel 2 now we got panel 3 in view with the temp monitor switch. The ... stationing control panel, we see now, with the mode control switches. Now we can -

CAPCOM
11, that's real good camera work.

SC
That'll be the most unusual position a cameraman's ever had, hanging by his toes from a tunnel and taking the picture upside down.

CAPCOM
Roger. You're doing a super Job. We got a good view of the cross pointer, there. We had a good view of the tapemeter.

SC
We're giving you a picture now, of the floor of the cabin. I think you can see the - one of the two portable life support systems backpacks here in the center, and on each side, we have two helmet visors. I'll remove one of them and show you a little closer view of what this looks like.

CAPCOM
Roger.

SC
Inside the helmet visors, are the EVA gloves, with the blue tips. I'm about to take those out now.

CAPCOM
Rog Buzz. That's a great shot now that we're getting of the helmet, the EVA visor, and also the EVA gloves in the Background.

SC
Okay. You did say this was going out now, didn't you?

CAPCOM
Stand by. I think so.

CAPCOM
11, you got a pretty big audience. It's live in the US, it's going live to Japan, western Europe, and much of South America. Everybody reports very good color, and appreciates the great show.

SC
Roger. I understand. Thank you.

CAPCOM
Buzz -

CAPCOM
your EVA visor. Stand by. Appreciate it.

CAPCOM
I like the good view of Mr. Collins down there. We finally see him again.

SC
Hello there, earthlings.

CAPCOM Hello there.

END OF TAPE

CDT 17:07 GET 056:35 TAPE 182/1

CAPCOM
11, Houston. We noticed when you were scanning over panel 2 a moment ago, 1 and 2 the 2 8 balls were slightly in disagreement. Control said he'd like to AGS the line there.

SC
Yes. One of them's AGS, one of them's PNGCS. The problem is, we don't know whether to line AGS to PNGCS or PNGCS to AGS.

CAPCOM
Stand by.

CAPCOM
Lar and Chris says he can tell you.

SC
Okay to them both.

CAPCOM
Roger.

SC
It's like old home week Charlie to get back into the LM again.

CAPCOM
Roger. I can imagine.

SC
It's a ... from the bottom of the LM to the aft bulkhead of the Command Module. Must be about - or 16, 20 feet. It's not a disorienting one at all but it's most interesting to contemplate just pushing off from one and bounding on into the other vehicle all the way through the tunnel.

CAPCOM
Roger. Must be some experience. Is Collins going to go in and look around?

SC
We're willing to let him go but he hasn't come up with the price of the ticket yet.

CAPCOM
Roger. I'd advised him to keep his hands off the switches.

SC
If I can get him to keep his hands off my DSKY, it'd be a fair swap.

CAPCOM
Roger.

SC
That's why I've been eating so much today. I haven't had anything to do today. He won't let me touch it any more.

CAPCOM
Roger.

PAO
It appears now that we have a view of earth out the window.

CAPCOM
11, Houston. If that's not the earth, we're in trouble.

SC
That's the earth and we have a very good view of it. Today they're a few more cloudbands on than yesterday when we came down to you but it's a beautiful sight.

PAO
That description from Neil Armstrong?

SC
We had some horizontal banding in our TV monitor. Are we transmitting that to you or do you have a clear picture?

CAPCOM
Neil we have a very clear picture. The only thing that we see is a little white dot in the bottom of our screen which our TV guy says is an apparently burned out spot in the camera but it should come back. Over.

CDT 17:07 GET 056:35 TAPE 182/2

SC
Roger. We have that in our monitor also.

CAPCOM
11, Houston. We do have 3 lines across our TV. I thought it was just a transmission problem but everybody's telling me now that it's probably on the downlink. Over.

SC
No. Those are the same 3 ones that we have.

CAPCOM
0kay.

SC
How far out are we now, Charlie?

CAPCOM
Stand by. Give you exact figure.

SC
If you notice the difference between yesterday'and today. This is large in everything as we continue.

CAPCOM
Roger. If you think we're smaller, your now 177,000 miles out. Over.

SC
All right. That's nautical miles?

CAPCOM
That's affirmative.

CAPCOM
11. We -

SC
I'm still on.

CAPCOM
Go ahead. Over.

CAPCOM
11, Houston. We see - still see the banding along the intratropical convergence. I guess the most predominate one now is around the - up in the - around the equator slightly north of the equator.

SC
That's the way it looks Charlie. Same as yesterday.

CAPCOM
Roger.

SC
Just keep the Pacific Ocean nice and clear and calm on splash day is all we ask.

SC
Charlie. I'd like to say hello to all my fellow scouts and scouters at Farragut State Park in Idaho having a national jamboree there this week and Apollo 11 like to send them best wishes.

CAPCOM
Thank you Apollo 11. I'm sure that if they didn't hear that, they'll get the word through the news, so they'll appreciate that.

CAPCOM
11, Houston. We have your subspacecraft point is just off the western coast of South America, directly south of about Mexico City. Over.

SC
That looks like what we observe from here.

SC
And we're going to turn our TV monitor off now, for a short bit, while we have some other work to do. Apollo 11 signing off.

CAPCOM
Roger 11. Thank you very much. That was one of the greatest shows we've ever seen. We sure appreciated it. Over.

PAO
This is Apollo Control. That

CDT 17:07 GET 056:35 TAPE 182/3

PAO
television transmission lasted about 1 hour 36 minutes according to our first rough calculation. And during that period of time, the spacecraft traveled something over 2000 nautical miles - -

END OF TAPE

CDT 17:17 GET 056:45 TAPE 183/1

PAO
- one hour 36 minutes according to our first rough calculations. During that period of time, the spacecraft traveled something over 2000 nautical miles.

CAPCOM
Hello Apollo 11, Houston. Could you give us an idea of about how long it will be before you start close - closing the LM back up? Over.

SC
We got a little more work to do up here - Charlie, we are going to make sure that we have everything transferred around and stowed the way we want it. Try to get a little bit ahead on tomorrow's timeline. I suppose we could be out of there in another half hour or so if it was necessary.

CAPCOM
Roger, Neil. We are not trying to push you. We are just trying to get an idea of about water dumps and about starting up the PTC again. Take your sweet time over.

SC
Okay, we would like - to - get a flight plan update from you for the next couple of hours here. When you think what the various constraints might be and what - what order you might like us to do things.

CAPCOM
Roger, standby, we'll have that to you in a moment.

PAO
This is Apollo Control at 56 hours 51 minutes. Buzz Aldrin has now been in the lunar module for a little over an hour and 13 minutes. We estimate that Neil Armstrong has perhaps been in the LM about 15 or 20 minutes less than that. Due to the length of that television transmission, the change of shift press conference has been cancelled. The particpants were unable to wait for the duration of the press conference and with other duties and the press conference has been cancelled. At 56 hours 52 minutes, this is Apollo Control.

END OF TAPE

CDT 17:27 GET 056:55 TAPE 184/1

CAPCOM
Hello, Apollo 11, Houston. Mike, we'd like to go ahead and do a waste water dump. We'd like you to dump it all the way down to zero. Over.

SC
Roger. We copy that, Charlie.

SC
How did that work, Charlie?

SC
Houston, 11.

CAPCOM
11, Houston. Did you call? Over.

SC
Roger. Just noticed that the mast that the EVA light is on is charred brown. It looks as though it took quite a beating during launch.

CAPCOM
Roger.

SC
The EVA light still does work.

CAPCOM
Roger. We'll let the stand guys look at this. We'll be back with you with what we think. Over.

SC
Okay.

CAPCOM
11, Houston. We were wondering, Neil, with your closing time in on the TV, if you were going to turn it off. It's indicated that you might be considering turning it back on. We were wondering whether we want to keep the lines up. Over.

SC
Well, we want your recommendation on that. I think we would just as soon terminate the TV, but if you have a commitment to keep, we'll be more than willing to turn it back on.

CAPCOM
Roger. Stand by.

CAPCOM
Apollo 11, Hguston. We'd like to terminate the TV. We think we got a really good tape. That hour and a half show was superb, and we'd like to pick up TV - correction - PTC at about 58 hours. Over.

SC
Roger. PTC at 58 hours.

CAPCOM
And we'll have the remaining proxies in the flight plan soon. Over.

SC
Okay. Fine.

PAO
This is Apollo Control at 57 hours, 3 minutes. The decision as you heard relayed up to the crew there, that we would go into the passive thermal control mode with the spacecraft in a slow roll at 58 hours in the flight plan. I would rule out further television for today. I would also like to repeat that the change of shift press conference for the previous shift was cancelled due to the length of that television transmission, and we do expect to have a change of shift briefing following this shift probably between 11:30 and 12:pm CDT. At the present time, Apollo 11 is 178,236 nautical miles from Earth, and the velocity has dropped down now to 3146 feet per second. At 57 hours, 4 minutes, this is Mission Control, Houston.

CAPCOM
Apollo 11, Houston. Our recommendations on the activities the next hour or so as far as flight plan goes are: continue your LM familiarization as desired until

CDT 17:27 GET 056:55 TAPE 184/2

CAPCOM
about 58 hours, then ingress to the CSM, close the hatch, and establish PTC shortly thereafter. Over.

CAPCOM
And Apollo 11, Houston. Terminate the water dump. Over.

SC
Okay. Okay. Water dump being terminated now.

END OF TAPE

CDT 17:37 GET 057:05 TAPE 185/1

SC
Houston, Apollo 11.

CAPCOM
Eleven, Houston, go ahead.

SC
Roger, Houston. I'd like to do a P52 option 3 and treat the platform up prior to starting the PTC, over.

SC
Roger, eleven, stand by.

CAPCOM
Eleven, Houston, that sounds like a good idea to us, go ahead.

SC
Okay, and the platform's looking pretty good to me. It looks like worst axis drift is .01 something degrees per hours. Is that about what you figure?

CAPCOM
Eleven, Roger, we've had reports, all the marks have been good, the last couple of times you've run them. Just a moment, I'll get you some information on the apparent drift rate.

SC
Okay over, and thank you.

SC
You got the maroons on?

CAPCOM
Say again eleven.

SC
I say you got the maroons on now?

CAPCOM
Not permanently Mike. Just have a stand by here while Charlie's out checking how to use that special tool on the camera. The maroon will be on tomorrow.

SC
Okay, nice to hear your voice, how's everything going?

CAPCOM
Everything's going smoothly here. We sure enjoyed the show this afternoon, Mike.

SC
Okay.

CAPCOM
Eleven Houston. We'd suggest you go ahead and do the P52 first and we'll take a look at the angles and give you some new drift rates after taking a look at them, over.

SC
Alright, fair enough.

END OF TAPE

CDT 17:52 GET 057:20 TAPE 186/1

CAPCOM
Apollo 11, Houston, over.

SC
Go ahead, 11 here.

CAPCOM
11, Houston. Little information to you there CDR. We all have taken a momentarily brief respite from our work to have some special - to have a bite of special moon cheese that is - I understand that it has been sent directly to us from Wapakoneta.

CAPCOM
Wow' (Laughter) Congratulations - your own hometown, over.

SC
No, we can't - we can't pronounce it either. I think you will enjoy that. They make a fine brand of cheese.

CAPCOM
Roger, there, I'll polish up the grammar for the next trip.

CAPCOM
Houston 11, you are looking at the NOUN 93 and I'll proceed when you copy them.

CAPCOM
11, Houston. We got them.

SC
Okay.

CAPCOM
Hello Apollo 11, Houston. We would like POO and accept. We have a DELTA H update for you, over.

SC
All right, Charlie, just a moment.

SC
Houston, Apollo 11, POO and accept.

CAPCOM
Roger.

CAPCOM
Apollo 11, Houston. We got the load in. The computer is yours, over.

SC
Houston, rog.

CAPCOM
Hello Apollo 11, Houston. W'e would like for you to stir up the cryos now, over.

SC
Houston, Apollo 11, rog.

END OF TAPE

CDT 18:12 GET 057:40 TAPE 187/1

PAO
This is Apollo Control at 57 hours 44 minutes. We've had no further reports from the crew to indicate whether or not Neil Armstrong and Buzz Aldrin have returned to the command module. And I guess that would answer our question. Nell Armstrong reporting that they are finished with their work in the LM, will be coming out shortly. Apollo 11 is now 179,490 nautical miles from earth. Traveling at a speed of 3,121 feet per second. In a little less than 3 hours, we'll pass a milestone of sorts, as the spacecraft passes into the lunar sphere of influence. And what we mean by that, is that at that point, the spacecraft will be under the dominant influence of the moon's gravity. The moon's gravitational force will have the predominant effect on the trajectory of the spacecraft. And at that point, our displays in Mission Control monitoring velocity and altitude will switch from earth reference to moon reference. We'll then begin monitoring the progress of the spacecraft as it continues to accelerate toward the moon. At 57 hours 46 minutes, this is Apollo Control.

CAPCOM
Hello Apollo 11, Houston. We're standing by to watch your startup on the PTC at any time. You can start off at the verb 49. Over.

SC
We'll do. We're just finishing up the probe and about to close up the hatch here. We're going to be a couple of minutes late probably, getting started in the PTC.

CAPCOM
Rog. No sweat 11. We're standing by. Over.

END OF TAPE

CDT 18:32 GET 58:00 TAPE 188/1

PAO
This is Apollo Control. That was Neil Armstrong reporting that they are now reinstalling the probe and drogue, which is just about on the flight plan schedule, and they reported that they would be putting the spacecraft in a slow roll shortly to maintain passive thermal control. In that mode the spacecraft rotates at the rate of about 3 revolutions per hour to maintain even heating. We have a precise time on that sphere of influence change, the point of which the moon - for calculation purposes here. Mission Control, comes under the predominate influence - the spacecraft comes under the predominate influence of the moon's gravitational field, and we now calculate that that will occur at 61 hours, 39 minutes, 55 seconds, ground elapsed time.

CAPCOM
Hello, Apollo 11, Houston. Mike, there's no wait required where REG's are steady you can proceed on. Over.

SC
I'm doing it, Charlie.

CAPCOM
Roger.

SC
The tunnel's all taken care of and drogue, probe and hatch all back in.

CAPCOM
Roger. Copy · Out.

CAPCOM
Hello, Apollo 11, Houston. We have some new additions to your alternate contingency checklist, if you would break that out. Over.

SC
Stand by.

SC
Okay, Houston. 11's ready to copy.

CAPCOM
Roger, 11. If you'll turn to page F/2-22. Over.

SC
Okay, I have F/2-22.

CAPCOM
Roger, Neil. Under column L - that's column Lema, line 06. The new data is 00001. Line 07, the new data is 02134. Over.

SC
Okay, I have in F/2-22, column Lema, item 6, 00001. Item 7, 02134.

CAPCOM
Roger, that's correct. Thank you much. Out.

CAPCOM
11, Houston. For your information, those 2 entries are an update to your Delta-H that we have already uplinked into the CMC. Over.

SC
Roger. Thank you.

SC
Well, what was I marking on, Charlie, about an 18 parameter line or what?

CAPCOM
Our update puts you to the Delta-H to 35 parameters, Mike. Over.

SC
Okay.

END OF TAPE

CDT 18:47 GET 058:15 TAPE 189/1

CAPCOM
Hello Apollo 11, Houston. We've got some switch positions for you for the high gain, over.

SC
Okay, go ahead.

CAPCOM
Roger, Buz. Select bravo, omni, high-gain track to manual beam wide, over.

SC
Okay, Bravo, omni track manual and beam Y.

CAPCOM
Roger, and your high-gain angles are, minus 50 on the pitch, 270 on the yaw, over.

SC
Okay, going there now.

END OF TAPE

CDT 19:12 GET 058:40 TAPE 190/1

CAPCOM
Hello, Apollo 11, Houston. We have some updates and some things we'd like to talk to you about, if you aren't in the middle of your meal. If it's convenient any time for you, we're ready with some updates. Over.

SC
What are the updates going to apply to?

CAPCOM
Roger. We have a couple of changes on the LM mission rules NO/GO for your NO/GO card, Neil. One slight change on the APS DPS fuel and temp pressure cards, and we have a change to the procedure for the secondary radiator leak check, which is to be formed at - performed at 71 hours tomorrow, and also some indications that we have a couple of landing site obliques stowed in the wrong place. Over.

SC
Okay, if any of those in the flight plan. The secondary radiator, for example.

CAPCOM
That's affirmative. The secondary radiator leak check is called out in the flight plan at 71:20. That procedure is listed in your launch operations book on page 2-9, L2-9. We'd like to change that procedure. Over.

SC
Okay. Stand by.

SC
Charlie, on the secondary leak check, just read us verbatim like you want, and I'll copy directly into the flight plan and not fool around with the checklist.

CAPCOM
Roger. That's fine if you're ready to copy, stand by.

SC
Ready to copy on the leak check.

CAPCOM
Roger. It's monitor the secondary accumulator quantity. Step 2 is secondary glycol to radiator valve normal for 30 seconds then bypass. If no decrease in secondary accumulator quantity, - Are you with me?

SC
Yeah, I'm with you.

CAPCOM
Okay. If no decrease in secondary accumulator quantity. Secondary glycol to radiator valve to normal. Next step, secondary coolant loop pump AC1 or AC2. After 3 minutes, verify glycol discharge secondary pressure 39 to 51 psig. Also verify secondary EVAP APS TEMP has changed. Next step, secondary coolant loop pump, off. Secondary glycol radiator valve to bypass. That is the procedure. Over.

SC
Okay. I read back monitor secondary accumulator quantity, secondary glycol radiator valve, normal for 30 seconds then to bypass. If no decrease in secondary accumulator quantity, secondary glycol to radiator valve to normal. Secondary coolant loop pump AC1 or 2. After 3 minutes, verify glycol secondary discharge pressure 39 to 51 psig. Verify secondary evaporator outlet temp has

CDT 19:12 GET 058:40 TAPE 190/2

SC
changed. Secondary coolant loop, off. Secondary glycol radiator valve to bypass. And what's the reason for the change, Charlie?

CAPCOM
Roger. Stan is concerned that our present procedure as shown in the checklist does not really flow a glycol through the radiator and they want to verify that we do not have a plugged secondary radiator. Over.

SC
Okay. They didn't have any abnormal indications in that system, so far?

CAPCOM
Negative. This is the procedure that came up with. It's just a check, Mike. Everything's looking great to us. Over.

SC
Okay, Charlie.

SC
Charlie, we'll get back with you on these other changes in a few minutes. Okay?

CAPCOM
Roger, Neil. No hurry. Over.

END OF TAPE

CDT 19:22 GET 058:50 TAPE 191/1

PAO
This is Apollo Control at 59 hours, 9 minutes. Apollo 11 now 182,000 nautical miles from Earth, and the velocity down to 3072 feet per second. We've had very little conversation from the spacecraft in the past 40 minutes or so. At this time the flight plan calls for the crew to be getting ready to begin their eat period. That would be followed by a 9 hour rest period. We have one change to the flight plan to pass along. The television transmission which had been scheduled at 100 hours, 20 minutes to 100 hours, 50 minutes in the flight plan has been deleted. This transmission was to have occurred during the formation flying prior to the powered descent to the lunar surface. The decision to delete the TV transmission from the flight plan was made due to a lack of available satelite channels to relay the signal from the tracking site of Madrid to Houston for conversion. The intermittent music that we're getting is apparently coming from the spacecraft. The crew has onboard portable tape recorders with music on the tapes. As they store their own comments on the tape, the music of course is erased, and apparently the music is triggering the VOX operated microphones and we're getting intermittent music down from the spacecraft.

CAPCOM
11, Houston. We were wondering who's on horns.

SC
Back in Houston?

CAPCOM
We just had a little music there.

SC
I just had the urging to.

CAPCOM
Roger. That was good. You can keep it coming down, 11.

SC
Okay.

SC
Because it's a special occasion today, Houston. This is the third anniversary of Gemini 10.

CAPCOM
Roger. Happy anniversary.

SC
Stay there.

PAO
This is Apollo Control. That comment a moment ago about the tenth anniversary of - about the third anniversary of Gemini 10 came from Mike Collins, who along with John Young flew the Gemini 10 mission, July 18 through July 21, 1966.

END OF TAPE

CDT 19:47 GET 059:15 TAPE 192/1

PAO
about the third anniversary of Gemini 10 came from Mike Collins, who along with John Young flew the Gemini 10 mission, July 18th through July 21, 1966. The brief bit of music that we got from the spacecraft was coming to us from a distance of 182 thousand 190 nautical miles.

SC
Houston, Apollo 11, ready to copy your update.

CAPCOM
Roger, stand by.

CAPCOM
Okay Buzz, the first item, is that we have indications that your landing sight obliques are not in the proper position. If you will check we think that the intermediate scale landing sight oblique is stowed in the CSM lunar land mark book. We think that the large scale, landing sight oblique is stowed in the back of the LM lunar surface map book, over.

SC
I think I heard you Charlie, but I'm not sure that I understand.

CAPCOM
Roger, according to our storage list the landing sight oblique should be in the transfer bag. In the back up set of data, the intermediate scale oblique is in the CSM lunar landmark book and the large scale oblique is in the back of the LM lunar surface map book, and that's the reason we think that they might be, not where you think they are, over.

SC
Okay, we've got three obieques. The last one is one I asked for recently. It's just a blow up of the second one. The first one is one that's got dotted lines on it, indicating hidden view and 50 degree LPD, and all three of those are in the transfer book, over.

CAPCOM
Roger, fine. We were wrong in our back up set. We had those out of place. Looks like the on board data is good. We just wanted to let you check on that one. We have an update on the APS DIPS fuel cord, that you place on the panel. It's a typo error. If you'll break out that little card, we've got to correct that typo error, over.

SC
Rog.

SC
Okay, I got it.

CAPCOM
Rog, Buzz. Under the DIPS column, on the pressure side. You go down to the fourth item to the pressure greater than 150 PTCA should be greater than 65 percent, over.

SC
Okay, it's greater than 1.8 but less than 65 and greater than 150 for greater than 65.

CAPCOM
That's affirmative Al.

CAPCOM
And we have three items on the mission rules no go card, if you are ready to copy those, over.

CDT 19:47 GET 059:15 TAPE 192/2

SC
Okay, I've got the mission rules no go.

CAPCOM
Roger Buz. First entry is on the EPS, under AC bus A. The line extends all the way to high gate. Actually, the line should read at DOI it would be no go AC bus A. After that the no go would be both buses. So if you will just pencil in both buses from TDI through high gate it'll be - -

END OF TAPE

CDT 19:57 GET 059:25 TAPE 193/1

CAPCOM
- both busses from PDI through high gate. It will be correct for that line, over.

SC
Okay, I got that AC buss A for DOI and both busses no go for PDI on.

CAPCOM
That's affirmative up until high gate. You can stop at - the line in front of the column 5 minutes to low gate. Now the next line is under the G&C exchange, pitch and roll GDA. You can scratch that line completely, over.

SC
Roger, got it.

CAPCOM
Okay, Buzz. Last entry is down under RCS and it is a typo error under the three - in the line three axis attitude control. We proceed to the right at PDI plus 05 you'll see one axis. The line goes all the way to low gate to touchdown. That's incorrect. The line should stop under 5 minutes to low gate, over.

SC
Okay, we are stopping at it 5 minutes to low gate.

CAPCOM
That's affirm. That completes that card. The rest of the update are just really for your information based on our 58 hour platform - look at the platform. We are really in good shape. Your gyros have almost no drift in them since - plotted update we were looking at X of a minus 2.24 MERU, Y of . plus .87 Z of minus .11. Since the update, which was based on the 52 hour P52, I believe. We gave you a X drift of plus .79, yaw of plus 1.06, Z of plus .02 MERU. I see between the 52 hour and the 57 hour alignments work did not really give us enough time to get a real good, completely valid update on the drift check. So we're real satisfied with the way the gyros are looking. The PIPA'S are looking great also. We are in real good shape with those also, over.

SC
This is Apollo 11, radio check.

CAPCOM
Roger, reading you fly by OMNI, over.

SC
Okay, that clear. You cut out when you were talking about the platform something about 52 hours after that, we never heard you again.

CAPCOM
Roger, guess we were changing antennas standby. That's affirmative, 11. We were swapping antennas on you down here. Basically the word here is that we have a real good platform, very small drift on the gyros and very small drift in our PIPA'S, over.

SC
Roger, thank you. And I would like to have a few words of clarification if you will give them to me on the RCS reel, what that change of pitch may mean.

CAPCOM
Copy, a few words of clarification on the RCS, oh roger. The update there, Neil, you are speaking of about the one axis down to 5 minutes of low gate.

SC
Yeah, that's right. I'm not quite sure what that really means (garble).

CAPCOM
Standby, I'll make sure I got my story straight with Control. Standby.

SC
Okay.

CAPCOM
11, Houston. On the RCS, what we

CDT 19:57 GET 059:25 TAPE 193/2

CAPCOM
are saying is - if we lose control about one axis prior to low gate, we would recommend an abort. This would require a - a lost of - of two distinct jets which is not very probable but that is what we are recommending. After low gate we would - continue on. We would recommend that we continue on to attempt a landing, over.

END OF TAPE

CDT 20:07 GET 059:35 TAPE 194/1

CAPCOM
Continue on to attempt the landing. Over.

SC
Roger. I think I owed him that.

CAPCOM
Rog.

SC
Charlie, did you you say had some updates for me from the lunar surface book?

CAPCOM
Apollo 11, say again. You were Cut out. Over.

SC
Roger. Did you say you had some updates for us in the lunar surface book. Over.

CAPCOM
Negative. At this time, we do not have any updates for the lunar surface book. We wanted you to have it just in case. Over.

SC
Rog. You were cut out that time.

CAPCOM
Roger. At the present time, we do not have any updates for you on the lunar surface book. We are thinking about some, and kick him around, but they're very minor changes. Over.

CAPCOM
11, Houston. Did you copy that transmission?

CAPCOM
Apollo 11, Houston. We swapped antennas on you again. I say again that we do not have any lunar surfaces update - book updates at this time. We're considering a few minor ones, but we're ... around the MOCR Over.

SC
Apollo 11. I understand.

SC
Houston, 11. We have a current status report for you.

CAPCOM
Roger. Go ahead, 11.

SC
Okay, radiation CDR 11009, CMP 10010, LMP 09011. No medication.

CAPCOM
Roger, 11. We copy for the radiations and we're considering this PTC looks sort of weird to us so we're considering stopping and starting over again and we'll be with you in a couple of minutes. Over.

SC
Okay.
CAPCOM
Apollo 11, Houston. Would you give us the LM CM Delta-P as reading? Over.

CAPCOM
Hello Apollo 11, Houston. We switched the antennas on you again. Would you please give us the LM CM Delta-P reading? Over.

CAPCOM
Hello Apollo 11, Houston. Over.

SC
Go ahead. 11 here.

CAPCOM
Rog. We switched antennas on you there moments ago, Neil. Will you please give us the LM CM Delta-P reading? Over.

SC
It's less than 21.

CAPCOM
Roger.

END OF TAPE

CDT 20:22 GET 059:50 TAPE 195/1

SC
21 5 now Neil says, Charlie.

CAPCOM
Roger, thank you Mike, could you give us some help? This PTC is strange, it's not like anything we've seen before. We were wondering if you'all have had any events of any odd data that could help us out, over.

SC
I didn't understand that. Say again.

CAPCOM
Roger, we're looking at a, sort of a funny looking PTC. We've already drifted out to 70 degrees in pitch and we're wondering if you all had any vents or any such thing as that, that could have caused us to pick up these rates to drive us off, over.

SC
Negative, Charlie. We don't know of anything.

CAPCOM
Roger.

SC
Unless it's got something to do with that entry from the position that we want to be in. I don't know.

CAPCOM
Roger, when we started off it looked real fine to us, now it's drifting off with a funny pattern that we haven't seen previously on a flight, and we're just trying to figure out, I think we'll probably start it over again. We'll be with you momentarily, over.

SC
Okay.

CAPCOM
Apollo 11 Houston. We hate to say it, but we'd like to terminate this PTC and start over again. We have no assurance that we're going to get it through the sleep period. With this funny configuration, or funny pattern. We'd like you to stop it now and go back to pitch 090 yaw 0 and roll, whatever you stop on, over.

SC
Roger.

PAO
This is Apollo Control at 59 hours 57 minutes. A few moments ago you heard Capcom Charlie Duke advise the crew to terminate the passive thermal control mode that they are presently in and reestablish the three revolution per hour roll rate about the spacecraft longitudal axis that is used for thermal control. We had noticed a unexplained deviation from the attitude that the spacecraft was set up in. In this roll mode ideally it would roll about the longitudal axis with very little wobble and if wobble is introduced for one reason or another, the reaction control system jets would come on as soon as the motion out of the prescribed plane had ocurred and gone beyond prescribed limits, in this case 30 degrees to correct. The jet firings on past missions do tend to disturb the crews sleep. Rather than have the reaction control system jets come on during the night and perhaps have to awaken the crew to reestablish the passive thermal control at that time we elected to correct it now.

CDT 20:22 GET 059:50 TAPE 195/2

CAPCOM
You disabled Bravo and Charlie select quads ALPHA and DELTA, over.

CAPCOM
Apollo 11, Houston, over.

END OF TAPE

CDT 20:32 GET 060:00 TAPE 196/1

PAO
This is Apollo Control. We're getting quite a bit of noise on the air to ground circuit at this time as the spacecraft rotates from one OMNI antenna around to the next and we momentarily lose lock-on. At this time, Apollo 11 is 183,544 nautical miles from earth and the velocity, holding fairly constant now, at about 3042 feet per second. It's been moving down towards 3000 feet per second and seems to be leveling off somewhat.

PAO
This is Apollo Control. We're going to take the air to ground circuit down temporarily until a stronger antenna lock is - . Here's a call to the crew. We'll stand by for that.

PAO
This is Apollo Control. We will take down the air to ground circuit down at this time until we reestablish sufficient signal strength to eliminate the noise on the circuit.

END OF TAPE

CDT 20:42 GET 060:10 TAPE 197/1

PAO
This is Apollo Control at 60 hours, 10 minutes. We've reestablished good antenna lock-on this time, and we'll continue to monitor for any conversation from the spacecraft. The crew is presently reestablishing the passive thermal control rotation rate of 3 revolutions per hour. Following that we expect they will begin their rest period. At the present time Apollo 11 is 183,821 nautical miles from Earth at a velocity 3037 feet per second.

CAPCOM
Hello, Apollo 11. Hello, Apollo 11. Over.

SC
Hello, Houston. You call us?

CAPCOM
Roger. Reading you about 1 by. Looks like we picked a super attitude here for PTC stabilization. We're reading you in backup voice now. Over.

SC
You're reading me loud and clear?

CAPCOM
Roger.

SC
Should I go back another one, Charlie?

CAPCOM
I think we've got about the best configuration. We've been doing it off the ground here, 11. We'll just keep it as it is. Over.
SC
Roger.

CAPCOM
Apollo 11, Houston. Would you select COMMAND RESET and OMNI ALPHA? Over.

SC
Houston, 11. We're in OMNI ALPHA.

CAPCOM
Roger; We read you about 3 by now. Over.

SC
Roger.

CAPCOM
Apollo 11, Houston. We is stable. You can start the PTC. Over.

SC
Roll left, don't you?

END OF TAPE

CDT 20:52 GET 060:20 TAPE 198/1

SC
Houston, Apollo 11. Check this page S-9-7; I've completed step 8 and I'd like to know what you think is ideal timing between step 8 and step 9 and step 10 on that page? Over.

CAPCOM
Roger. Stand by.

CAPCOM
Apollo 11, Houston. We don't see any time constraint. We'd like you to go ahead and set up the wide deadband and then go through step 10 and 11. Over.

SC
Okay. Will do. I don't see any constraint here, Charlie. I was just checking to make sure because last time, I went from 8 to 9 to 10 to 11 a little bit more swiftly than I'd been doing in the past.

CAPC0M
Roger.

SC
Step 11 complete.

CAPCOM
Roger. We copy.

CAPCOM
Apollo 11, Houston. Would you please select OMNI BRAVO. Over.

SC
Roger. BRAVO.

SC
Houston, Apollo 11. How do you read on BRAVO.

CAPCOM
Roger. Reading you 5 by.

SC
Same here.

CAPCOM
Apollo 11, Houston. Looks like we've got a good PTC going. It's good night from the white team. Over.

SC
Okay. See you tomorrow. Thank you for everything.

END OF TAPE

CDT 21:02 GET 060:30 TAPE 199/1

PAO
This is Apollo Control at 60 hours 37 minutes. We said good bye - goodnight to the crew about 10 minutes ago. We expect that they will be settling down their rest period shortly. And at the present time, Apollo 11 is 184,600 nautical miles from earth. The spacecraft velocity is presently 3,023 feet per second. I understand there has been some interest in a comment made by Neil Armstrong during the television transmission about the EVA floodlight. Armstrong's remark was that the mast which the light is mounted on, appeared charred. He reported that the light works but had apparently the mast that supported it had apparently been damaged during the launch phase. This light would be used in the event of a contingency EVA. It would have no function in a normal mission such as we are presently flying. And in the event that a extravehicular activity was necessary for transfer of the crew from the LM into the command service module, the light would be an aid in providing exterior lighting of the hand rails, but would - repeat, that it'd have no function in a normal mission and the charring which Armstrong reported is not considered significant at this time. We don't expect to have any further conversation with the crew. We will continue to record any remarks that we get and play those back. The passive thermal control mode, which was reestablished, appears to be functioning well at this time and all spacecraft systems are functioning normally. At 100 - rather 60 hours 39 minutes, this is Apollo Control, Houston.

END OF TAPE

CDT 21:19 GET 060:47 TAPE 200/1

PAO
This is Apollo Control an 60 hours 47 minutes. We just got a call from the spacecraft requesting that we give them the position of the S-IVB in respect to the spacecraft and we're currently coming up with that bit of information, so we'll stand by.

SC
Houston, Apollo 11.

CAPCOM
Go ahead, 11, over.

SC
Do you have any idea where the S-IVB is with respect to us?

CAPCOM
Stand by.

CAPCOM
Apollo 11, Houston, the S-IVB is about 6 thousand nautical miles from you now, over.

SC Okay, thank you.

SC
Houston, Apollo 11, how is the PTC?

CAPCOM
Stand by.

CAPCOM
11, Houston. The PTC looks great to us, over.

SC
Hey do you have any idea what happened to the previous one?

CAPCOM
We have absolutely no idea, over.

SC
Okay. Did it look like it was all right and just all of a sudden start diverting?

CAPCOM
Negative, if you look at the plot which we'll save for you and let you see it post flight. It started off immediately on the first rev and just spiraled out to about oh, 20 to 20 degrees in pitch, and then it seemed to be setting up a spiral around an off set pitch point of about 20 degrees off from 90 degrees, but we didn't want to take a chance that it would become stable at that point. We thought it might diverge so we told you and started over again, over.

SC
Okay, no complaints. I was just curious as to what had happened,

END OF TAPE

CDT 21:29 GET 060:57 TAPE 201/1

No comments on this tape.

END OF TAPE

CDT 22:11 GET 061:39 TAPE 202/1

PAO
This is Apollo Control at 61 hours, 39 minutes. We've had no further conversation with the crew since our last report. Flight Surgeon says there is no indication at this time that they have begun to sleep, but we expect they'll be getting to sleep here shortly. Coming up in less than 10 seconds now, we'll be crossing into the sphere of influence of the moon. A computational change-

over will be made here in Mission Control. At this point as the moon's gravitational force becomes the dominant effect on the spacecraft trajectory, and our displays will shift from Earth reference to moon reference. At that point, which occurred a few seconds ago, the spacecraft was at a distance of 186,437 nautical miles from Earth, and 33,822 nautical miles from the moon. The velocity with respect to the Earth was 2990 feet per second, and with respect to the moon, about 3272 feet per second. The passive thermal control mode that was set up for the second time by the crew appears to be holding well at this point, and all spacecraft systems are functioning normally. Mission going very smoothly. At 61 hours, 41 minutes, this is Apollo Control, Houston.

END OF TAPE

CDT 23:00 GET 062:28 TAPE 203/1

PAO

This is Apollo Control at 62 hours 29 minutes. The flight surgeon reports that the crew appears to have been asleep now for about the past 30 minutes. The spacecraft appears to be holding its passive thermal control attitude very well and at this time Apollo 11 is about 32,000 miles from the Moon traveling at a speed of 3,782 feet per second. In the past 50 minutes or so, we have seen that velocity increase about 10 feet per second going from 3772 feet per second to the present 3782 as the spacecraft continues to accelerate toward the Moon. The Change of Shift Briefing following this shift will occur at about 11:15 PM Central Daylight Time. Flight Director Glynn Lunney and his team of flight controllers are coming on now being debriefed by the Eugene Kranz team and that shift change will be occuring shortly here. The new capsule communicator will be astronaut Ron Evans. At 62 hours 30 minutes, this is Apollo Control.

END OF TAPE

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CDT 00:01 GET 063:29 TAPE 204/1

PAO

This is Apollo Control. 63 hours 29 minutes ground elapse time. Some 5 1/2 hours remaining in the Apollo 11 crew scheduled rest period. Crew apparently soundly asleep at this time. Spacecraft now 29,715 nautical miles out from the moon. Velocity now 3,796 feet per second. Black team flight director Glynn Lunney going around the room discussing with the various flight control positions the situation for the sleep shift. Talking now to flight dynamics officer on the pros and cons of doing or not doing mid course correction burn number 4. And at 63 hours 30 minutes ground elapse time, this is Apollo Control.

END OF TAPE

CDT 01:00 GET 064:28 TAPE 205/1

PAO

This is Apollo control 64 hours, 28 minutes ground elapsed time. Some 4 1/2 hours remaining now in the scheduled Apollo 11 crew sleep period. However, since there is little likelyhood that midcourse correction burn number 4 will be done, since it's a very small magnitude maneuver, that the crew will be allowed to sleep another couple of hours. At this time, Apollo 11 is some 27,529 nautical miles out from the moon traveling at a velocity of 3,812 feet per second. The black team of flight controllers has settled in for the night. Everything running quiet here in the control room. We're anticipating a playback of yesterday afternoon's TV transmission from Apollo 11 which lasted some hour and a half in which the camera was taken into the lunar module at the end of it's cable. This will be played back for the flight controllers who, at that time, were - most of them were asleep. At 64 hours, 29 minutes ground elapsed time, this is Apollo control.

END OF TAPE

CDT 02:00 GET 065:28 TAPE 206/1

PAO

This is Apollo Control, 65 hours, 28 minutes ground elapsed time. 3 I/2 hours remaining in the scheduled sleep period for the crew of Apollo 11, however this will likely run into more like 5 1/2 hours remaining. Countdown clock for lunar landing now showing 37 hours, 18 minutes. Apollo 11 now 25,280 nautical miles out from the moon traveling in a velocity of 3832 feet per second. In terms of distance. Stand by, we thought we had some Earth reference numbers, but apparently that display is not up at this time. Present weight of the spacecraft 96,029 pounds. Presently being tracked by the tracking station at Honeysuckle Creek, Australia. And at 65 hours, 29 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 03:00 GET 066:28 TAPE 207/1

PAO

This is Apollo Control, 66 hours 29 minutes Ground Elapsed Time. Apollo 11 presently 22,952 nautical miles out from the moon, and traveling at a velocity of 3858 feet per second. 2 hours 29 minutes remaining in the sleep period. However, as mentioned earlier, this likely will run another 2 hours. Clock counting down to lunar landing, showing 36 hours 16 minutes. Still tracking through the Honeysuckle Creek, Australia tracking station, and all is rather quiet here in the Control Center during the sleep watch. At 66 hours 30 minutes Ground Elapsed Time, this is Apollo Control.

END OF TAPE

CDT 04:00 GET 067:28 TAPE 208/1

PAO

This is Apollo Control 67 hours, 28 minutes ground elapsed time. Midcourse correction burn number 4 has been deleted from the Flight Plan on the recommendation to Flight Director Glynn Lunney from the Flight Dynamics Officer, Jay Green. The maneuver, had it been carried out as planned, would be in the neighborhood of one-half foot per second velocity change. As it is now, the trajectory is being predicted to arrive at near point or closest approach of about 62 nautical miles plus or minus two miles if nothing else is done to the trajectory. That is if no maneuver is made. The spacecraft cabin pressure now holding at 4.7 pounds per square inch. Temperature 60 degrees F. The planned sleep period has another hour and one-half to go but as mentioned earlier it will likely run another couple hours in as much as midcourse correction burn number 4 will not be made and the crew will not have to spend the time preparing to do the burn, align the platform and do all the chores necessary for doing a maneuver of this sort. Clock counting down to lunar landing showing 35 hours, 17 minutes. And at 67 hours, 29 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 05:00 GET 068:28 TAPE 209/1

PAO
This is Apollo control 68 hours, 28 minutes ground elapsed time. Some 2 hours and 31 minutes remaining crew sleep period according to the revised schedule inasmuch as midcourse correction burn number 4 has been omitted. Still being tracked - Apollo 11 is still being tracked by the Honeysuckle Creek, Australia station. And, here in mission yesterday's hour and a half long television pass as the crew manned the LM for the first time in checkout is being replayed. This will be piped across to the news center for anyone who might want to view it again. At 68 hours, 29 minutes ground elapsed time, this is Apollo control.

END OF TAPE

CDT 05:58 GET 069:26 TAPE 210/1

CAPCOM
Apollo 11, Houston. Good morning.

SC
Good morning. Are you planning a course correction for us this morning?

CAPCOM
That's negative. Mid course number 4 is not required. We were going to let you sleep in until about 71 hours, if you'd like to turn over.

SC
Okay, (garble).

CAPCOM
Say again, Buz. You were cut off here.

SC
Okay, I'll see you at 71 hours.

CAPCOM
Roger.

PAO
This is Apollo Control. So much for that. Looks like they'd rather turn over and go back to sleep. At 69 hours, 19 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 07:00 GET 070:28 TAPE 211/1

PAO
Planned wake-up time for the crew is 71 hours elapsed. Cliff Charlesworth and the Green team of flight controllers has just relieved Glynn Lenney's Black team. CAPCOM now is Bruce McCandless. Apollo 11 is 13,638 nautical miles from the moon. Velocity, 4047 feet per second, lunar reference.

END OF TAPE

CDT 07:32 GET 071:00 TAPE 212/1

PAO
This is Apollo Control, at 71 hours into the mission. Apollo 11 is 12,486 nautical miles from the Moon. Approaching at a velocity of 4,087 feet per second. We will stand by here and see whether we put in a call to the crew.

PAO
We're putting a call into the crew now.

CAPCOM
Apollo 11, Apollo 11, this is Houston, over.

SC
Good morning, again, Houston, over.

CAPCOM
Roger, 11, good morning. When you -

SC
Would you like the attitude purge this morning?

CAPCOM
Yes, indeed. O2 fuel cell purge at 71 hours, and when you feel like copying I've got a flight plan update containing, I guess that, and some other items for you.

SC
Purge is first.

SC
Houston, Apollo 11, go ahead with flight plan update.

CAPCOM
Roger, 11, this is Houston. At approximately 71 hours to 72 hours, we have you down for an eat period which I imagine is probably in progress already. 71 hours O2 fuel cell purge, 72 hours, GET, CO2 filter change number 6, secondary radiator flow check, and we'll send you up at P37 block data on a 2 hour pass, pericynthion pass return mode abort. At 73 hours 00 minutes stop PTC at approximately 0 degrees roll, that is when you're coming up on 0 degrees roll angle around 73 hours we'd like you to stop PTC. And perform a P52 option 3 remaining in the PTC REFSMMAT for a drift check. 73 hours 20 minutes, we'll give you a P27 update to the landing site REFSMMAT, LOI 1 state vector and target load. 73 hours 30 minutes maneuver to 000 roll, pitch, and yaw. High gain antenna angles will be pitch 0, yaw 335, and perform a P52 option 1 using the new landing site REFSMMAT. Resume the nominal flight plan at 74 hours GET, over.

SC
Okay, we'll get started on fuel cell purge while we're eating. CO2 canister change number 6, secondary radiator purge check, (garbled) also at 72 hours, stop PTC 0 roll at 73, do a P52 option 3, we'll get your uplink REFSMMAT for the landing site, and at 000 - let's see, now was this with the old REFSMMAT or the new REFSMMAT?
CAPCOM
This is with the -

SC
And antenna -

CAPCOM
This is with the new REFSMMAT, Buzz.

SC
You said you want a P52 (garbled) attitude to REFSMMAT?

CAPCOM
Roger.

END OF TAPE

CDT 07:42 GET 071:10 TAPE 213/1

CAPCOM
Apollo 11, this is Houston. Over.

SC
Houston, go ahead.

CAPCOM
Roger, 11. Correction on my last - at 7320, we uplinked you the new refsmat, and at 7330, we'd like you to maneuver to 0 ROLL , 0 PITCH, 0 YAW in the old refsmat, and then torque around to the new refsmat and run your P-52 option 1 in that same inertia attitude. Over.

SC
Roger, understand.

CAPCOM
I've got a consumables update when you' re ready to copy.

SC
I just got up but you didn't catch me on that one.

CAPCOM
I said I have one for you.

SC
Okay, we're ready to copy that consumables
update.

CAPCOM
Roger. As of GET 6800, RCS totals minus 4.5 percent corresponding to approximately minus 53 pounds. ALPHA minus 6.0 percent, minus 1.0 percent, minus 7.0 percent, minus 3.0 percent. H2 total minus 1.2 pounds. O2 total plus 10 pounds. Over.

SC
Roger, and our readouts onboard are ALPHA 82, BRAVO is 84, COCO is 84, and DELTA is 87.

CAPCOM
Houston, Roger out.

SC
And you want us to cycle the O2 and H2 fans I imagine, huh?

CAPCOM
11, this is Houston. Affirmative. Over.

SC
Okay.

END OF TAPE

CDT 07:52 GET 071:20 TAPE 214/1

SC
Houston, Apollo 11. I have a status report for you.

CAPCOM
Go ahead, 11.

SC
Roger. On sleep, CDR, CMP 7.5, LMP 6.5. Over.
CAPCOM
Roger. 7.5 for each. Over.

SC
Negative. LMP 6.5.

CAPCOM
Roger. 7.5, 7.5 and 6.5, and I got a few words for you here on the SPS engine performance. Over.

SC
Okay, we're ready to look.

CAPCOM
Okay, 11. It turns out that the engine performance during both of your burns so far this mission has been the same as it was on

engine acceptance tests. The onboard PC reading is due to a known gage calibration factor between what you actually got in the chamber and what you' re reading out on the gage. We expect single bank operation to be 90 - that is 90 psi on the gage with an actual chamber pressure of 95 psi. In dual bank operation the chamber pressure is 94 psi on the gage with an actual of 99 psi. 80 psi on the gage onboard correlates to 83 psi actual, and we recommend that you stick to LOI termination cue of 80 psi on the gage - that is no change to the mission rules. Over.

SC
Apollo I1, roger. We got all that.

CAPCOM
Houston, out.

PAO
This is Apollo Control at 71 hours, 31 minutes. Apollo 11's distance from the moon now 11,232 nautical miles approaching at a velocity of 4,141 feet per second.

SC
Houston, Apollo 11. Houston.

CAPCOM
Apollo 11, this is Houston. Go ahead. Over. Apollo 11, this is Houston. Go ahead. Over. Apollo 11, this is Houston. Go ahead. Over.

SC
Houston, you read Apollo 11?

CAPCOM
Roger, 11. We're reading you loud and clear now. We were down in the noise as we switched antennas an hour or so ago. Over.

SC
Roger. What sort of (garbled) could you recommend for the solar corona? We've got the sun right behind the edge of the moon now.

END OF TAPE

CDT 08:06 GET 071:34 TAPE 215/1

SC
Roger. What sort of (garbled) could you recommend for that solar corona. We've got the sun right behind the edge of the moon now.

SC
Roger. It's quite an erie sight. There is a very marked three-dimensional aspect of (garbled) corona coming from behind the moon glares.

CAPCOM
Roger.

SC
And it looks as though - I guess what gives it that three-dimensional effect is the earth shine. I can see Tycho fairly clearly - at least if I right that up, I believe it's Tycho in moonshine, I mean in earthshine. And, of course, I can see the sky is lit all the way around the moon. Even on the limb of it where there's no earthshine or sunshine.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead.

CAPCOM
Roger. If you'd like to take some pictures, we recommend you using magazine uniform which is loaded with high speed black-and-white film. Interior lights off. Electric hasselblads' with the 80 millimeter lens, and you're going to have to hand hold this, I guess. We're recommending an F stop of 2.8, and we'd like to get a sequence of time exposures. Over.

SC
Okay. You want the magazine uniform instead of magazine tangle. Over.

CAPCOM
Roger. We're not trying to get you all wrapped up in a procedure here. This is on a not-to-interfere basis, of course. Over.

SC
Okay.

CAPCOM
And on the exposures, we're looking for an eighth of a second, a half a second, and if you think you can steady the camera against anything to get longer exposures, 2 seconds, 4 seconds, and 8 seconds. Over.

SC
Roger. Copy.

CAPCOM
Roger. Out.

CAPCOM
Apollo 11, Houston. Over.

SC
Go ahead, Houston.

CAPCOM
Roger. We'd like to do a little cryo tank balancing, so if you could position the oxygen tank number 1 heater switch OFF and hydrogen tank 2 heater switch to OFF leaving all the rest of the cyro switches the same, we'll let it run that way for a few hours. Over.

SC
Okay. Stand by one on those switches. We'll get it in a minute.

CAPCOM
Roger. How far out can you see the corona extending? Over.

SC
How much - a little bit like the (garbled) light? It keeps going out farther and farther. We'll talk about it a little more later.

CDT 08:06 GET 071:34 TAPE 215/2

CAPCOM
Roger, out.

SC
(garbled) We've got quite a few pictures (garbled) mission (garbled)

CAPCOM
Apollo 11, this is Houston. I think we have comm again. We heard you calling. Over.

CAPCOM
Apollo 11, this is Houston. Were you calling? Over.

SC
Houston, Apollo 11. Understand you want the heaters off for hydrogen tank 1 and oxygen tank 1. Is that affirmative?

CAPCOM
That's negative, Mike. Hydrogen tank number 2 heaters off and oxygen tank number 1 heaters off.

SC
Okay.

CAPCOM
Roger, out.

SC
We have hydrogen tank number 2 heaters off. I have oxygen tank number 1 heaters off.

CAPCOM
Roger, out.

SC
Houston, Apollo 11. The earthshine coming through the window is so bright you can read a book by it.

CAPCOM
Oh, very good.

PAO
That was Mike Collins reporting.

SC
And Houston. I suggest that along the ecliptic line we can see - throwing the light out to 2 lunar diameters from this location. The bright light only extends out about - about an eight to a quarter of the lunar radius.

CAPCOM
Roger. Understand that you can see the corona approximately 200 solar diameters out along the ecliptic, and the bright light extends out approximately 1/8 to I quarter lunar radius. Over.

SC
That's 2 lunar- 2 lunar diameters along the ecliptic in the bright part, right, a quarter to an eights of a lunar radius out, and that's perpendicular to the ecliptic line on the south pole.

CAPCOM
Roger.

PAO
That last transmission was from Neil Armstrong.

END OF TAPE

CDT 08:31 GET 071:59 TAPE 216/1

SC
Houston, it's been a real change for us. Now we are able to see stars again and recognize constellations for the first time on the trip. The sky is full of stars, just like the nights out on earth. But all the way here, we have just been able to see stars occasionally and perhaps trough the monoculars, but not recognize any star pattern.

CAPCOM
I guess it has turned into night up there early, hasn't it?

SC
Really has.

PAO
This is Apollo Control at 72 hours, 7 minutes. Apollo 11 is 9761 nautical miles from the moon, velocity 4217 feet per second. Weight 9612 pounds.

CAPCOM
Apollo 11, this is Houston. How do you read? Over.

SC
Okay. We went to high gain. Looks like you had a little trouble getting signal strength there.

CAPCOM
Roger. We missed the OMNI switch there. Over.

SC
All right. On the secondary loop check when we went to flow on secondary radiators, the quantity dropped from 40 percent down to 36 in the first 10 seconds and then stabilized at 36 for the remainder of the 30 seconds.

CAPCOM
Apollo 11, this is Houston. We believe that is the normal system of operation. The radiators are expected to be very cold right now and apparently the decrease is always due to contraction in the fluid. Over.

SC
Okay. We will go ahead with the procedure just as though there were no decrease in accumulated quantity. Right?

CAPCOM
Roger. Press on.

SC
Houston, the secondary radiator flow check is complete and satisfactory.

CAPCOM
Houston. Roger. Out.

SC
And that is a good deal because we don't have to have any meetings about whether we are going to do it or don't do it anymore.

CAPCOM
That's for sure.

PAO
That was a Mike Collins comment.

CAPCOM
Flight Director says, "Ouch".

SC
No ouch intended. I enjoyed every one of those meetings.

CAPCOM
11, this is Houston. I have your pericynthian forced tube pad, P-34, when you are ready to copy.

CDT 08:31 GET 071:59 TAPE 216/2

SC
Houston, Apollo i1, ready to copy pericynthion plus 2.

CAPCOM
Apollo 11, this is Houston. Pericynthion plus 2 hours pad. SPS G&N 62710 plus 098 minus 019, GET ignition 077462248, DELTA VX 981 plus 32148 minus 00455 minus 10377 ROLL NA, PITCH 307 and the remainder of the pad is NA. GDC align stars Vega and Deneb, ROLL 243183012 no ullage; remarks, assumes landing site REFSMMAT and docked. Over.

SC
Roger. SPS G&N 62710 plus 098 minus 019 077462248 plus 32148 minus 00455 minus 10377, NA 307, Vega and Deneb 243183012 no ullage, landing site REFSMMAT, docked, and do you have any change in LM weight? Over.

CAPCOM
No change in LM weight and readback is correct. Out.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Roger. Go ahead.

CAPCOM
Roger. We are having difficulty getting commands into the spacecraft. We would like for you to cycle your up telemetry switch to command reset and off and back to normal. Over.

SC
Okay. We'll do it.

SC
We have you on high gainer now. Do you want us to switch over to OMNI?

CAPCOM
Negative. We'd like to stay on high gain, if we can. Over.

SC
Okay.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead.

CAPCOM
Roger. We'd like you to switch to OMNI Delta as we show you approximate at the scan limit of the high gain antenna. We will then command OMNI DELTA down here after you advise us of you've switched, and then you can select BRAVO on board and we'll be back in the OMNI antenna commanding business. Over.

SC
Okay. We are going to DELTA now.

CAPCOM
11, Houston. You can go ahead and select OMNI BRAVO on board now.

SC
Roger.

CAPCOM
Roger. Out.

END OF TAPE

CDT 09:01 GET 072:29 TAPE 217/1

CAPCOM
Apollo 11, this is Houston. If you have a minute or so free, we can read you up the morning news here.

SC
Go right, ahead, let's hear it.

CAPCOM
Roger, hot from the wires of the MSC Public Affairs Office especially prepared for the crew of Apollo 11.

CAPCOM
First off, it looks like it's going to be impossible to get away from the fact that you guys are dominating all the news back here on Earth.

Even Pravda in Russia is headlining the mission and calls Neil, "The Czar of the Ship." I think maybe they got the wrong mission.

West Germany has declared Monday to be "Apollo Day." School children in Bavaria have been given the day off. Post Office clerks have been encouraged to bring radios to work and Frankfurt is installing TV sets in public places.

BBC in London is considering a special radio alarm system to call people to their TV sets in case there is a change in the EVA time on the moon.

And in Italy, Pope Paul VI has arranged for a special color TV circuit at his summer residence in order to watch you, even though Italian television is still black and white.

Back here in Houston, your three wives and children got together for lunch yesterday at Buzz's house. And according to Pat it turned out to be a gabfest. The children swam and did some high jumping over at Buzz's bamboo pole.

In Moscow, space engineer Anatoly Koritsky, was quoted by Tass as saying that Luna 15 could accomplish everything that has been done by earlier Luna spacecraft. This was taken by he press to mean Luna 15 could investigate the gravitational fields, photograph the moon and go down to the surface to scoop up a bit for analysis.

Even the kids at camp got into the news when Mike, Jr. was quoted as replying "yeah" when somebody asked him if his daddy was going to be in history - then after a short pause he asked, "What is history?"

In Washington, President Nixon is planning to use his executive power to streamline the Interstate Commerce Commission. According to industry sources, it was reported Nixon would trim the commission from 11 to 7 members by not making new appointments.

And the big news around Houston today concerns the Astros. In the Sports World the Houston Astros rallied in the 9th inning at Cincinnati to dump the Reds 7 to 4. Going into the 9th however, things looked pretty bleak. The Astros were trailing 4 to 3. Then with one out Jesus Aiou stroked a single to the right field. John Edwards hit another single to the right, Sandy Valdespino hit a double to bring in the tying run. Julio Gotay was walked and Joe Morgan dropped a bunt for the game winning play. A wild throw to the plate allowed another run to score. Then a sacrifice fly by Denis Menke Brought in the final run. They really came through in the 9th. And other games in the National League.

SC
Yeah, those Astros have really been catching those flys since they put a roof on the stadium.

CDT 09:01 GET 072:29 TAPE 217/2

CAPCOM
Good work. In other games in the National League, New York beat Montreal 5 to 2; Pittsburgh beat St. Louis 4 to 1; and Atlanta over San Diego in the first game of a double header 6 to 2. Im the American League, Detroit beat Cleveland 4 to nothing; New York trounced Washington 5 to nothing; Baltimore out hit - Boston out hit Baltimore to score 6 runs to the Orioles' 2; and Chicago beat Kansas City 6 to 1. Okay, in golf world, Tommy Jacobs, infrequent competitor in recent years took the lead in the Philadelphia Golf Classic yesterday. His second round score was 139.

You might be interested in knowing, since you are already on the way, that a Houston astrologer, Ruby Graham says that all the signs are right for your trip to the moon. She says that Neil is clever, Mike has good judgement, and Buzz can work out intricate problems. She also says Neil tends to see the world through rose colored glasses, but he is always ready to help the afflicted or distressed. Neil, you are also supposed to have quote, "intuition that enables you to interpret life with feeling," unquote. Buzz is to be very sociable and cannot bear to be alone in addition to having excellent critical ability. Since she didn't know what hour Mike was born, she has decided that he either has the same attributes as Neil or he is inventive with an unconventional attitude that might seem eccentric to the unimaginative. And last but not -

SC
Who said all that? (laughter)

CAPCOM
Ruby Graham, an astrologer here in Houston. Now that we've got a check with Flight Operations for all the signs of the mission, and then we, of course, had to make sure that everything was really all set.

SC
Houston, 11 (garbled).

CAPCOM
Apollo 11, Apollo 11, this is Houston. We're switching OMNI, can you stand by for about 2 minutes.

SC
Houston, 11, radio check.

CAPCOM
11, Houston, go ahead.

SC
Roger, you cut out after Tommy Jacobs, I guess we got into antenna switching problems.

CAPCOM
Okay, following Tommy Jacobs, we have a hot smoking word from a Houston astrologer by the name of Ruby Graham. She say that all the signs are right for your trip to the moon. Neil is clever, Mike has good judgement, and Buzz can work out intricate problems. She also says Neil tends to see the world through rose colored glasses, but he is always ready to help the afflicted and distressed. Neil, you are also supposed to have quote, "intuition that enables you to interpret life with feeling," unquote. Buzz is supposed to be very sociable and cannot bear to be alone in addition to having excellent critical ability. Since she didn't know at what hour Mike was born, she decided he either has the same attributes as Neil or he is inventive with an unconventional attitude that might seem eccentric to the unimaginative. And that's it for today, over.

CDT 09:01 GET 072:29 TAPE 217/3

SC
Thank you much there, Bruce and Fred, we appreciate that.

CAPCOM
Roger.

PAO
That was Fred Haise alternating with Bruce McCandles on the newscast.

END OF TAPE

CDT 09:11 GET 072:39 TAPE 218/1

SC
Roger.

PAO
That was Fred Haise alternating with Bruce McCandless on that news cast.

SC
Did you hear our comment about the Astro's?

CAPCOM
The one about the roof?

SC
Yes.

CAPCOM
Hey Mike, the game was at Cincinnati there, and we think that they're still using Crosby Field up there. I don't believe it has a roof on it.

SC
You got him on that one.

CAPCOM
(garbled)

SC
It'd have to be a good team in clinch.

CAPCOM
I assume they seem to be.

SC
Well, if they can do that well without a roof, think of what they're going to do with a roof.

CAPCOM
Roger, out.

SC
We're trying.

CAPCOM
An old Oiler fan is trying to comment on an alien game.

SC
You tell Michael, Jr., history or no history, he better behave himself.

CAPCOM
Roger, we'll pass that along, Mike.

PAO
This is Apollo Control at 72 hours, 45 minutes. Apollo 11 is now 8188 nautical miles from the moon approaching at a velocity of 4324 feet per second.

CAPCOM
Apollo 11, Houston. If it's convenient with you we have an LOI 1-pad that we can pass up to you now. Over.

END OF TAPE

CDT 09:21 GET 072:49 TAPE 219/1

CAPCOM
pass up to you now. Over.

SC
Stand by.

SC
Houston, Apollo 11. The next time we pass through roll 0, we're going to stop PTC and that will give us a 90 degree pitch. Now, I understand you want us to move from 90 degrees pitch to 0 degrees pitch for the platform align option 1, is that affirmative?

CAPCOM
Stand by, please.

SC
And we are ready to copy on the LOI 1.

CAPCOM
Apollo 11, this is Houston. when you stop at 0 roll you will be in approximately 90 pitch, 0 yaw and 0 roll. We'd like you to run the first P52, that is the P52 option 3, from that attitude. Then we'll uplink you a new REFSMMAT either before or while you are maneuvering to 000 and then you can torque the platform around and run the second REFSMMAT. Over. Run the second P52. Over.

SC
Okay.

CAPCOM
And I copy you are ready for the LOI 1 pad. Over.

SC
Go ahead.

CAPCOM
LOI 1, SPS G&N 62710 plus 098 minus 019 GET ignition 075 49 4965 minus 28897 minus 03944 minus 00686. Roll 358, Pitch 226 347 01692 plus 00610 29173 602 29108 Sextant star 31 1066 358. Remainder of the pad is NA. GET align Vega and Deneb 243 183 012. No ullage. The horizon will be visible just below the upper edge of the hatch window 2 minutes prior to the LOI burn. It will not be visible in the rendezvous window on the left hand side. LOS at 75 hours 41 minutes 23 seconds. AOS at 76:15:29. AOS without the LOI burn 76:05:30. The values which you will see on NOUN 42 prior to LOS burn are HA plus 431.3 HP minus 128.2. Read back. Over.

SC
Roger, LOI 1 SPS G&N 62710 plus 098 minus 019 075494965 minus 28897 minus 03944 minus 00686 358 226 347 01692 plus 00610 29173 602 29108 31 106.6 358 GET align Vega Deneb 243 183 012. No ullage. Horizon in the hatch window 2 minutes

before. Pitch AOS with an LOI 76:15:29. AOS without an LOI 76:05:30. HA before the burn 431.3, HP minus 128.2, say again LOS time.

CAPCOM
Roger, LOS time 75:41:23. Over.

SC
Understand 75:41:23.

CAPCOM
11, this is Houston. Readback correct. Out.

PAO
That was Neil Armstrong with the readback of the lunar orbit insertion burn number 1 pad. The ignition time for that burn 75 hours 49 minutes 49 seconds. That's 2 hours 57 minutes 49 seconds from this time. Duration of that burn 6 minutes 2 seconds, retrograde and the change in velocity 2917.3 feet per second. The expected orbit

CDT 09:21 GET 072:49 TAPE 219/2

PAO
following that maneuver is 169.2 by 62 nautical miles. To repeat the LOS AOS times we will lose signal with Apollo 11 at 75 hours 41 minutes 23 seconds as it goes behind the Moon. Given a successful lunar orbit insertion number 1 burn we will acquire the signal at 76 hours 15 minutes 29 seconds. If for some reason Apollo 11 can not perform the burn we will acquire the spacecraft at 76 hours 5 minutes 30 seconds.

END OF TAPE

CDT 09:31 GET 072:59 TAPE 220/1

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead.

CAPCOM
Roger. Apparently we missed getting your onboard readouts on battery Charlie and pyro batteries alpha and bravo last night. I wonder if you can give us some fresh summaries. Over.

SC
You want the readings for now?

CAPCOM
Yes, please. If it's convenient for you.

SC
Okay, all three of them are still on 37.1.

CAPCOM
Roger. 37.1 cubed. Out.

PAO
This is Apollo Control at 73 hours, 6 minutes. Apollo 11's distance from the moon now 7331 nautical miles. Velocity is 4399 feet per second. The ignition time passed up to the crew on this pad is 4 minutes, 39 seconds earlier than the LOI 1 time published in the flight plan prior to liftoff. This means that all lunar events will move forward from the published flight plan time by this amount of time - 4 minutes, 39 seconds. This time will be made up during the transearth coast, and splash should occur at the flight plan time. This is Mission Control, Houston.

SC
Houston, Apollo 11. The P52 option 3 is complete. We're maneuvering to 000.

CAPCOM
Roger. We observe your maneuvering, and we'll have some uplinks for you in a couple of minutes here.

SC
Okay.

END OF TAPE

CDT 09:42 GET 073:10 TAPE 221/1

CAPCOM
Apollo 11, this is Houston. We'll give you P00. If you'll give us ACCEPT, we'll start our uplinks.

SC
You've got it Houston.

CAPCOM
Roger, out.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead, Houston.

CAPCOM
Roger. We're on low bit rate at the present time so it's going to take us a little bit longer than normal to get this stuff up to you. Over.

SC
I guess we're in no rush.

CAPCOM
Okay, we're here if you're there.

SC
The view of the moon that we've been having recently is really spectacular. It fills about 3 quarters of the hatch window, and of course, we can see the entire circumference even though part of it is in complete shadow and part of it's in earth-shine. It's a view worth the price of the trip.

CAPCOM
Well, there's a lot of us down here that would be willing to come along.

PAO
That was Neil Armstrong.

SC
I hope you get your turn, and do.

SC
One of these days, we'll be able to bring the whole MOCR along, I hope. Save a lot of antenna switching.

CAPCOM
Say again, 11.

SC
One of these days, we could bring the whole MOCR along, ahd then that'll save a lot of antenna switching.

CAPCOM
That's Jolly.

PAO
The MOCR is the mission operations control room. That's the control center here.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead, Houston.

CAPCOM
11, this is Houston. We're still -

SC
The Czar is brushing his teeth, so I'm filling in for him.

CAPCOM
Say again, please.

SC
I said the Czar is brushing his teeth, and I'm filling in for him. What can we do for you?

CAPCOM
Roger. If you don't get in the way of the Czar while he's brushing is teeth, we'd like tou to bring up the primary accumulator quantity a little bit. We'e showing the quantity now at 20.6 percent on TM. Seems to have gone down a bit since you've gone into the shadow. We'd like it serviced to bring the quantity up to between 30 and 40 percent, preferably 35 percent. Over.

SC
Okay.

CAPCOM
The computer is your's 11. The loads are in verified. You can go back to BLOCK.

CDT 09:42 GET 073:10 TAPE 221/2

SC
We're in BLOCK.

CAPCOM
11, this is Houston. On the basis of your last P-52 alignment, the platform looks like it's indeed performing very well. No problems there. No updates required, and no PIPA bias update is required either. Over.

SC
How good.

PAO
This is Apollo Control at 73 hours, 25 minutes. Apollo 11 is 6522 nautical miles away from the moon approaching at a velocity of 4483 feet per second.

END OF TAPE

CDT 09:58 GET 073:26 TAPE 222/1

SC
Houston, Apollo 11. Are you there?

CAPCOM
11, this is Houston. Loud and clear. Over.

SC
Okay. Just checking. Do you want high gain?

END OF TAPE

CDT 10:13 GET 073:41 TAPE 223/1

SC
Okay, just a second. Do you want it high gain?

CAPCOM
Roger, if you can give it to us.

SC
Okay.

SC
Houston, Apollo 11. How do you read on that high gain?

CAPCOM
Loud and clear on the high gain.

SC
Same here. We've completed the P52 option 1.

CAPCOM
Roger, we've been looking over your shoulder on TM.

SC
Glad to have you.

END OF TAPE

CDT 10:27 GET 073:55 TAPE 224/1

SC
Houston, Apollo 11. Standing by to copy TEI 1 and TEI 4, over.

CAPCOM
Roger, I got the 1 and 4 pads here, right now. I'll be ready to read them up to you in just a second.

CAPCOM
11, this is Houston. I'm ready with the TEI 1, 4 pads, over.

SC
Ready to copy.

CAPCOM
Roger, TEI 1, SPS G&N 38 658 minus 054 plus 065, TIG 078 02 0345 plus 29'er 180 plus 03 779'er minus O1 325 roll NA pitch 041. The balance of the pad is NA. Ullage 2 Jets, 19 seconds. TEI 4 pad, SPS G&N 38 658 minus 054 plus 065, TIG 084 29'er 50 59'er, plus 31 373 plus 03 760 minus 00 968 roll NA pitch 034. The rest of the pad is NA, ullage 2 Jets, 19'er seconds. Both of these pads are for an undock maneuver. TEI plus 4 pad assumes no LOI 2, over. Make that TEl 4 pad assumes no LOI 2.

SC
Roger, TEI 1, SPS G&N 38 658 minus 054 plus 065, 078 02 0345 plus 29'er 180 plus 03 779'er minus 01 325 roll NA pitch 041, 2 jets 19 seconds undock. TEI 4 38 658 minus 054 plus 065 084 29'er 5059'er, plus 31 373 plus 03 760 minus 00 9'er 68 roll NA pitch 034, 2 jet 19 seconds undocked, assumes no LOI 2.

CAPCOM
11, this is Houston.

SC
Apollo 11, over.

CAPCOM
11, this is Houston. Read back correct, out.

PAO
That was Buzz Aldrin with the read back of that information which was for contingency transearth injection burns if required shortly after lunar orbit insertion.

CAPCOM
11, this is Houston, over.

SC
Roger, go ahead, Houston.

CAPCOM
Roger, at GET of 74 30, we'd like you to cycle the fans in all 4 cyro tanks, and position the heaters in all 4 cyro tanks to the AUTO position. We're doing this in advance of LOI in order to insure that you don't have any destratification as a result of the burn which might result in giving you a MASTER CAUTION warning during the burn, over.

SC
Okay, was that 74 30 you wanted us to cycle the heaters and turn - cycle the fans and turn all the heaters on.

CAPCOM
All heaters to AUTO: cycle the fans at 74 30 about 25 minutes from now, over.

SC
Okay.

PAO
This is Apollo Control at 74 hours 8 minutes. Apollo 11 is 4,625 nautical miles away from the moon. Velocity 4,765 feet per second. We're 1 hour 32 minutes away from loss of signal as Apollo 11 goes behind the moon, and we're about 1 hour 41 minutes away from the LOI number 1 burn .

END OF TAPE

CDT 10:53 GET 074:21 TAPE 225/1

PAO
This is Apollo Control at 74 hours, 32 minutes. Apollo 11 is traveling at a velocity of 3- stand by. We've got a static display here.

CAPCOM
11, this is Houston. Radio check. Over.

SC
Houston, reading you loud and clear.

CAPCOM
Roger, loud and clear now.

SC
Houston, Apollo 11.

CAPCOM
Go ahead, 11.

SC
Apparently this is not a very good OMNI attitude for you. We're ready to start our PTC check.

CAPCOM
11, this is Houston. We're ready except that we'd like to get the high gain antenna prior to this test. Over.

SC
Can you give us a pointing angles?

CAPCOM
Roger. From an attitude with 60 degrees ROLL around to an attitude of ROLL 058 inertial. It would be PITCH plus 30 and YAW 270 on the high gain antenna.

SC
Thank you.

END OF TAPE

CDT 11:13 GET 074:41 TAPE 226/1

CAPCOM
Apollo 11, Apollo 11, this is Houston. Radio check. Over. Apollo 11, Apollo 11, this is Houston. Radio check. Over. Apollo 11, this is Houston. Do you read? Over.

SC
Roger. (garbled)

CAPCOM
Roger. We're reading you weak but clear.

SC
Roger. We put our- our roll for MSFN track in on the wrong side. Got to get this new roll around until we get high gain here, and we'll delete the - the pitch that was scheduled after the PTC check.

CAPCOM
Say again, please, 11.

SC
Roger. We put the wrong sign in -

CAPCOM
Roger.

SC
for the roll correction to get MSFN high gain, and we're continuing rolling her around to get the proper attitude for high gain at this time. We will delete the pitch maneuver that was scheduled subsequent to - subsequent to the TV check since we already have those pictures.

CAPCOM
Roger. We copy, and - and we recommend that you go ahead and complete your TVC test onboard. If you have problems we'll talk to you when you get around to the further high gain antenna attitude. Over.

SC
Roger.

SC
Houston, how are you reading on high gain?

CAPCOM
Oh, loud and clear on high gain, 11.

SC
Roger. We're proceeding.

CAPCOM
Roger.

PAO
This is Apollo Control at 75 hours into the mission. Apollo 11 is 2241 nautical miles away from the moon. Velocity 5512 feet per second. We're 41 minutes away from loss of signal as 11 goes behind the moon. We're 49 minutes away from the lunar orbit insertion maneuver number 1.

CAPCOM
Apollo 11, this is Houston. We observed your gimbal test down here, and it looked good to us. Over.

SC
Thank you, it looked good here.

END OF TAPE

CDT 11:38 GET 075:06 TAPE 227/1

PAO
This is Apollo Control at 75 hours, 15 minutes into the mission. Apollo 11's distance from the moon now is 1516 nautical miles. Velocity 5981 feet per second.

CAPCOM
Apollo 11, this is Houston. Radio check. Over..

SC
Go ahead.

CAPCOM
Roger. And your systems are looking good from down here.

SC
Looks good up here too, Bruce.

END OF TAPE

CDT 11:58 GET 075:26 TAPE 228/1

PAO
This is Apollo Control at 75 hours 26 minutes. We're 15 minutes away from loss of signal. Apollo 11 is 9066 miles from the Moon, velocity 6511 feet per second. We're 23 minutes away from the LOI burn.

PAO
Flight Director Cliff Charlesworth polling flight controllers for the GO/NO-GO status for LOI now.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Roger, go ahead Houston, Apollo i1.

CAPCOM
11, this is Houston. You are GO for LOI. Over.

SC
Roger, GO for LOI.

CAPCOM
And we're showing about 10 minutes and 30 seconds to LOS. I would like to remind you to enable the BD roll on the auto RCS switches. Over.

SC
Roger, and confirm you want PG on low going over the hill. Over.

CAPCOM
That's affirmative, 11.
SC
Roger.

PAO
That was Buzz Aldrin confirming the GO.

SC
If you want to, I'll put it back to HIGH until just before LOS. Over.

CAPCOM
Negative 11. LOW is okay for now. Over.

SC
Roger.

SC
Houston, do you want to give me a time check, please?

CAPCOM
Roger. I'll give you a mark at 13 minutes and 30 seconds to ignition.

SC
Okay, and then a GET, please.

CAPCOM
Stand by a minute.

CAPCOM
I'll give you a time hack on the GET at 75 hours 37 minutes and I'll show you a bias at about a second and a half to allow for the time of flight.

SC
Okay.

CAPCOM
Stand by. Mark, 75 hours 37 minutes GET.

SC
Thank you.
CAPCOM
And I'll give you a time hack on time to ignition at 12 minutes to ignition. Over.

SC
Okay.

CAPCOM
Stand by for a MARK at TIG minus 12. MARK TIG minus 12.

SC
You were right on, Bruce, thank you.

CAPCOM
Roger, out.

PAO
We are 3 minutes away from loss of signal. Apollo 11 is 425 nautical miles from the Moon, velocity 7368 feet per second, weight 96,012 pounds.

CAPCOM
2 minutes to LOS.

CAPCOM
Apollo 11, this is Houston. All your systems are looking good going around the corner and we'll see you on the other side. Over.

SC
Roger. Everything looks okay up here.

CDT 11:58 GET 075:26 TAPE 228/2

CAPCOM
Roger, out.

PAO
And we've had loss of signal as Apollo 11 goes behind the Moon. We were showing a distance to the Moon of 309 nautical miles at LOS, velocity 7664 feet per second. Weight was 96,012 pounds. We're 7 minutes 45 seconds away from the LOI number 1 burn, which will take place behind the Moon out of communications. Here in the Control Center 2 members of the backup crew, Bill Anders and Jim Lovell, have joined Bruce McCandless at the CAPCOM console. Fred Haise, the third member of the backup crew, has just come in, too, and Deke Slayton, Director of Flight Crew Operations, is at that console. The viewing room is filling up. Among those we noticed on the front row in the viewing room are Astronauts Tom Stafford, John Glenn, Gene Cernan, Dave Scott, Al Worden, and Jack Swigert. With a good lunar orbit insertion burn the Madrid station should acquire Apollo 11 at 76 hours 15 minutes 29 seconds. Aquisition time for no burn 76 hours 05 minutes 30 seconds.

END OF TAPE

CDT 12:16 GET 075:44 TAPE 229/1

PAO
This is Apollo Control at 75 hours, 49 minutes. Apollo 11 should have started this long burn duration 6 minutes, 2 seconds, DELTA V 2917 feet per second. Given that burn we expect an orbit of 61 by 169.2 nautical miles. We're 24 and one-half minutes away from acquisition of signal with a good burn. The clock has not yet started counting for the other acquisition time. We'll take this lying down now and come back just prior to the acquisition in time for no burn. This is Mission Control, Houston.

END OF TAPE

CDT 12:36 GET 076:04 TAPE 230/1

PAO
- and we'll stand by.

PAO
We are passed the burn acquisition now and we have received no signal.

PAO
It's very quiet here in the control room. Most of the controllers seated at their consoles, a few standing up, but very quiet.

END OF TAPE

CDT 12:39 GET 076:07 TAPE 231/1

PAO
We're 7 minutes from acquisition time.

PAO
If Apollo 11 achieved only a partial burn, we could receive a signal any time so we will continue to stay up until acquisition time of 76 hours, 15 minutes, 29 seconds. That time is the initial acquisition time, but it could take a little longer to lock onto the signal for voice communications. We are 4 minutes away now.

PAO
There are a few conversations taking place here in the control room, but not very many. Most of the people are waiting quietly, watching and listening. Not talking.

PAO
That noise is just bring up the system. We have not acquired a signal. We're a minute and one-half away from acquisition time.

PAO
30 seconds.

PAO
Madrid AOS, Madrid AOS.

PAO
Telemetry indicates that the crew is working on the antenna angles to bring the high gain antenna to bear.

SC
(Spacecraft signal very weak - inaudible)

CAPCOM
Apollo 11, this is Houston. Are you in the process of acquiring high gain antenna? Over.

CAPCOM
Apollo 11, Apollo 11, this is Houston. How do you read?

SC
Read you loud and clear, Houston.

CAPCOM
Roger. Reading you the same now. Could you repeat your burn status report. We copied the residuals burn time and that was about it. Send the whole thing again, please.

SC
They were like perfect. DELTA T 0, burn time 557, ten values on the angles, BGX minus .1, BGY minus .1, BGZ plus .1, no trim, minus 6.8 on DELTA VC, fuel was 38.8, OX 39.0 plus 50 on balance, we ran an increase on the PUGS, NOUN 44, show us in a 60.9 by 169.9.

CAPCOM
Roger, we copy your burn status report, and the spacecraft is looking good to us on telemetry.

SC
(garble)

PAO
That burn report was by Neil Armstrong.

END OF TAPE

CDT 12:55 GET 076:23 TAPE 232/1

PAO
This is Apollo Control. We're showing spacecraft weight in lunar orbit of 72,004 pounds.

SC
Apollo 11. We're getting this first view of the landing approach. This time we are going over the Taruntius crater and the pictures and maps brought back by Apollos 8 and 10 give us a very good preview of what to look at here. It looks very much like the pictures, but like the difference between watching a real football game and watching it on TV - no substitute for actually being here.

CAPCOM
Roger. We concur and we surely wish we could see it first hand, also.

PAO
That was Neil Armstrong.

SC
We're going over the Messier series of craters right at the time, looking vertically down on them and Messier A we can see a good size blocks in the bottom of the crater. I don't know what the altitude is now but that indicates that those are pretty good size blocks.

CAPCOM
Okay. Just roughly it looks like you are about 120 miles or 130 miles right now. Make that 127 miles.

SC
We're approaching PDI point now, over.

SC
There's Secchi in sight.

SC
We're'going over Mt. Marilyn at the present time and its ignition point.

CAPCOM
Roger. Thank you. And our preliminary tracking data for the first few minutes shows you in a 61.6 by 169.5 orbit over.

SC
Roger.

CAPCOM
And Jim is smiling.

END OF TAPE

CDT 13:11 GET 076:39 TAPE 233/1

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead.

CAPCOM
11, Houston. During your SPS burn as played back on tape down here, we've observed the nitrogen tank BRAVO pressure in the SPS system dropping a little bit more than we anticipated. It's holding steady right now. We'll continue to watch it and keep you posted if anything comes up. Over.

SC
Roger. Thank you.

CAPCOM
Right. And it has held - -

SC
Currently going over mascon map.

CAPCOM
Okay.

SC
And Boothill, Duke Island, Sidewinder, looking at mass one W that's the yaw round checkpoint, and just coming into the terminator at - at the terminator it's ash and gray. If you get further away from the terminator, it gets to he a lighter gray, and as you get closer to the subsolar point, you can definitely see browns and tans on the ground according to the last Apollo 11 observation anyway.

CAPCOM
Roger, 11. We're recording your comments for posterity.

SC
Okay.

PAO
And again, that was Neil Armstrong with the report.

SC
In the background do they accuse us of being compromisers?

SC
And landing site is well into the dark here. I don't think we're going to be able to see anything of the landing site this early.

CAPCOM
Apollo 11, this is Houston. When you have a free minute, could you give us your onboard readout of N2 tank BRAVO, please, and we'd like to make sure you understand that ever since you stopped thrusting with the SPS the temperature in the tank has remained steady. Over. Make that the pressures remained steady.

SC
Rog. We understand tank pressure has stayed steady. Thank you.

SC
Roger. We're showing the N2 tank pressure and the tank BRAVO to be 1960, something like that, and alpha is, oh, about 2250. Over.

CAPCOM
Roger. We show 2249 in alpha and 1946 down here.

SC
All right.

SC
Houston, Apollo 11. How about coming up with some roll, pitch, and yaw angles in which to stop this so called orb rate that I'm doing.

CAPCOM
Roger. Stand by.

CDT 13:11 GET 076:39 TAPE 233/2

CAPCOM
We'll have them for you in a minute. Roger.

SC
Okay, and it's time to stop also.

CAPCOM
Yes indeed.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead, Houston.

CAPCOM
Roger. We show you in the flight plan today in orbital rate until about 79 hours, 10 minutes. Do you have some particular attitude or reason for wanting to go inertial? Over.

SC
No, that's fine. I just wanted to confirm that. Until 79:10 then we'll breeze around here in orbit.

CAPCOM
Roger. And we've got an observation you can make if you have some time up there. There's been some lunar transient events reported in the vicinity of Arastorckus. Over.

SC
Roger. We just went into spacecraft darkness. Until then, why we couldn't see a thing down below us, but now with earthshine, the visibility is oh, pretty fair. I'm looking back behind me I can see the corona from where the sun has just set, and we'll get out the map and see what we can find around Arastorkus.

CAPCOM
Okay, Arastorkus is at angle echo 9 on your ACO chart. It's about 394 miles north of track, however, at your present altitude which is about 167 nautical miles, it ought to be over - that is within view of your horizon, 23 degrees north, 47 west, and take a look and see if you see anything worth noting up there. Over.

SC
Hold a second.

CAPCOM
Roger, out.

END OF TAPE

CDT 13:31 GET 076:59 TAPE 234/1

PAO
That was Buzz Aldrin discussing the earth shine.

SC
Houston, 11. It might help us a little bit if you could give us a time of crossing 45 west.

CAPCOM
Say again, please 11.

SC
You might give us a time of crossing of 45 west and then we'll know when to start searching for Aristarchus.

CAPCOM
Roger, you'll be crossing 45 west at 77:04:10 or about 40 seconds from now. Over. 30 seconds from now.

SC
Okay.

CAPCOM
Apollo 11, when we lose the S-band we'd like to get OMNI CHARLIE from you and update my last. That 77:04 was the time when Aristarchus should become visible over your horizon. 77:12 is point of closest approach south of it. Over.

SC
Okay, that sounds better because we just went by Copernicus a little bit ago.

CAPCOM
Roger, we show you at about 27 'degrees longitude right now.

SC
Right.

SC
Houston, when a star sets up here there's no doubt about it. One instant it's there and the next instant it's just completely gone.

CAPCOM
Roger, we copy.

CAPCOM
Apollo 11, this is Houston. We request you use OMNI CHARLIE at this time. Over.

SC
Okay, going to OMNI CHARLIE.

CAPCOM
Roger, out.

SC
Houston, Apollo 11.

CAPCOM
Apollo 11, this is Houston. Go ahead.

SC
Roger. Seems to me we know orbits so precisely and know where the stars are precisely and the time setting of a star or a planet to a very fine degree that this might be a pretty good means of measuring the altitude of the horizon.

CAPCOM
Roger.

SC
Hey, Houston, I'm looking north up toward Aristarchus now, and I can't really tell at that distance whether I am really looking at Aristarchus, but there's an area that is considerably more illuminated than the surrounding area. It just has - seems to have a slight amount of fluorescence to it. As a crater can be seen in the area around the crater is quite bright.

CAPCOM
Roger 11, we copy.

END OF TAPE

CDT 13:46 GET 077:14 TAPE 235/1

SC
Houston, Apollo 11, looking out the same area now and it does seem to be - reflective ability of earthshine I'm not sure whether it was worked out to be about zero phase, well, at least there 'is one wall of the crater that seems to be more illuminated than the others and that one (garble) lining up with the earth and does seem to put it about at zero phase. That area is definitely lighter than anything else that (garble). I am not sure that I am really identifying any phosphorescence, but that definitely is lighter than anything else.

CAPCOM
11, this is Houston. Can you discern any difference in color of the illumination and is that an inner or outer wall from the crater. Over.

SC
I checked an inner wall in the crater.

SC
No, there doesn't appear to be any color involved in it, Bruce.

CAPCOM
Roger. You said inner wall, would that be the inner edge of the northern surface?

SC
I guess it would be the inner part of the west northwest part. The part that would be more nearly normal if you were looking at it from the earth.

CAPCOM
11, Houston. Have you used the monoculars on this? Over.
SC
Stand by one.

SC
Roger. (Garble) caused me to lose my (garble). It is supposed to be here somewhere but I can't find it.

CAPCOM
11, this is Houston. We're (garble).

SC
Houston, we will give it a try, if we have the opportunity on next - when we are not in the middle of lunch and try to find the monocular.

CAPCOM
Roger. Copied you that time and expect in the next rev you had better be getting ready for LOI, 2, so, let's wind this up and we've got some other things to start you on. Over.

SC
Okay.

PAO
Apollo 11 will be in acquisition for another 20 minutes during its first revolution of the moon .

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead, Houston. Over.

CDT 13:46 GET 077:14 TAPE 235/2

CAPCOM
11, this is Houston. We're planning to make the LOI 2 burn now using bank A only. We'll have the pad and everything for you next time around. Just trying to economize a little on bank B. Bank B is holding now.

SC
Roger. Understand.

END OF TAPE

CDT 13:56 GET 077:24 TAPE 236/1

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead.

CAPCOM
11, Houston. In order to improve the communications a little bit here, we'd like to try to get you on the high gain antenna. We're recommending a pitch angle of 0, yaw 355, I say again 355, the track switch to manual and wide beam width, over.

SC
Okay, you ready to switch to high gain now?

CAPCOM
That's affirmative. 11, Houston. Do you read?

SC
Roger. We read you. It seems to be rather marginal for the high gain.

CAPCOM
Roger. We concur.

SC
Houston, Apollo 11. Could you give us a time of crossing the prime meridian 150 west? Over.

CAPCOM
Roger. Stand by about a half a second, here. Okay, your time of crossing of 150 west meridian will be 775005. Over.

SC
Thank you.

END OF TAPE

CDT 14:06 GET 077:34 TAPE 237/1

CAPCOM
11, this is Houston. We have about 6 minutes remaining until LOS and in order that we may configure our ground lines we'd like to know if you're still planning to have the TV up with the beginning of the next pass. Over.

SC
Roger, Houston, we'll try to have it ready.

CAPCOM
This is Houston. We are inquiring if it is your plan to. Over.

SC
It never was our plan to, but it's in the flight plan so I guess we'll do it.

CAPCOM
Houston, roger, out.

CAPCOM
11, Houston.

SC
Roger, go ahead.

CAPCOM
For use in connection with the prime meridian crossing you have an orbital period now of 2 hours 8 minutes and 37 seconds. Over.

SC
Thank you.

CAPCOM
Roger, out.

CAPCOM
Apollo 11, this is Houston. A little over 2 minutes to LOS. All your systems parameters and orbit are looking good from the ground. We have AOS on the other side at 78:23:31. Over.

SC
Roger, 78:23:21.

CAPCOM
Roger, that was 31 on the end.

SC
Okay.

PAO
This is Apollo Control. We've had loss of signal from Apollo 11 on its first lunar revolution. We will acquire the spacecraft on the next revolution at 78 hours 23 minutes 31 seconds. The orbital period for Apollo 11's present orbit 2 hours 8 minutes 37 seconds, and as you heard we passed up to the crew information that we would perform the LOI 2 burn using only bank A. The banks are the drive mechanisms for the ball values in the service propulsion system. They open and close these ball valves. The valves allow the fuel and oxidizer to flow into the engine. There are redundant valves and redundant banks, banks A and B. There was apparently - they are driven by nitrogen and that was the reference to the pressure drop there. It was apparently a leak in nitrogen tank B during the LOI 1 burn. This burn was performed with both banks open. The engine can be operated with only bank. It's apparent that the tank leaked only during the burn while the bank was actuated. Pressure has held steady since the end of the burn and the experts are reducing the data and looking at the leak rate, determining whether it was constant throughout the burn, precisely what the situation is. We're showing pressure in tank B of 1960 psi. In tank A 2250 psi. Both of these are well above the red lines of 400 pounds psi.

END OF TAPE

CDT 14:20 GET 077:48 TAPE 238/1

PAO
This is Apollo Control, Houston at 77 hours, 48 minutes now into the flight of Apollo 11. Here in Mission Control Center, Houston we're at the process of changing shifts. Cliff Charlesworth's green team of flight controllers very shortly will be leaving their consoles. Meanwhile Apollo 11 is passing over the far side of the moon out of acquisition. Our last orbital parameter readings on our flight dynamics orbital digital displays indicated an apolune of 168.5 nautical miles, a perilune of 1 - correction, a perilune of 61.2 nautical miles. We're currently planning a change of shift briefing at approximately 2:30 central daylight time or soon thereafter as practicable. The change of shift briefing will include only our flight director, Cliff Charlesworth. It's expected

to be of short duration since we will have a TV pass soon after the reacquisition of the spacecraft. At 77 hours, 50 minutes into the flight of Apollo 11, this is Apollo Control, Houston.

END OF TAPE

CDT 14:50 GET 078:18 TAPE 239/1

PAO
This is Apollo Control, Houston at 78 hours, 18 minutes into the flight of Apollo 11. Apollo 11 still passing around the far side of the moon. We are less than 5 minutes now away from time of acquisition on this second revolution for Apollo 11. The station to acquire on this pass will be the Goldstone wing site which will feed the television to Mission Control Center in Houston, and thence to all parts of the country. We would expect to come up with television perhaps some several minutes after acquisition since we must first lock up on the downlink and have the scan converter in full operation. So at 78 hours, 19 minutes continuing to monitor, this is Apollo Control, Houston.

PAO
Mark 2 minutes now from time of predicted acquisition in Mission Control Center. We are standing by.

PAO
Mark 1 minute now from time of predicted acquisition. Continuing to stand by in Mission Control Centerin Houston.

PAO
Mark 10 seconds away now. Standing by for acquisition. We've had AOS by Goldstone. Television is now on. That is Bruce McCandless -
CAPCOM
Apollo 11, this is Houston. Over.

SC
Apollo 11, are you picking up our signals, okay?

CAPCOM
Apollo 11, this is Houston. Confirm. We are reading you loud and clear on voice and we have a good clear TV picture, a little gray crater on the bottom of the picture.

SC
No.

CAPCOM
I guess that is a spot on the tube.

SC
Sorry about that one.

CAPCOM
And if you give us P00 and ACCEPT, we will uplink our state vector and target load to you.

SC
Okay.

SC
Houston, Apollo 11. One of the larger craters on the back side - I noticed a small, dark speck on the outer wall and I put the monocular on it. I was able to see - oh, an area maybe a quarter of a mile in diameter. A really fresh looking dark colored pit and that seems to be in contrast with all the other fresh little craters or holes, that you can perceive on the walls of any of these craters. Around this particular one there seems to be two or three of these - especially the

CDT 14:50 GET 078:18 TAPE 239/2

SC
one that caught my attention. Quite remarkable. Over.

CAPCOM
Roger. Do you have a location on that one?

SC
No, not of (garble). I've got several pictures of it though.

CAPCOM
Roger. We copy.

PAO
That was Buzz Aldrin making a report, a geological report on that site pass.

CAPCOM
We're getting a beautiful picture in down there now, 11. The color's coming in quite clearly and we can see the horizon and the relative blackness of space and without getting into the question of grays and browns, it looks, at least on our monitor a sort of a brownish gray.

SC
(Garble) the way they're describing it. It appears to me as though it made a difference just sitting back in the tunnel and gazing at all windows, it makes a difference which one you're looking out of. For example, the camera right now is looking out the number 5 window and it definitely gives a rosier or tanner tinge, especially when you look straight through it and not at an angle. Over.

CAPCOM
Roger.

SC
G&C flight.

SC
95 or 100 degrees (garble)

SC
Still holding. Okay.

CAPCOM
Say again. Over.

SC
I'd say again we're about 95 degrees east, coming up on Smyth's Sea.

CAPCOM
Roger. And for your information, we show you at an altitude of about 92 miles above the surface right now.

END OF TAPE

CDT 15:00 GET 078:28 TAPE 240/1

SC
about 95 degrees east coming up on Smyth' s Sea.

CAPCOM
Roger, and for your information we show you at an altitude of about 92 miles above the surface right now .

SC
Okay.

SC
Houston, Apollo 11. Could you observe a difference in the N2 pressures before LOI? It seems to me as though the two were not equal on the (garbled) B tank was a little low on pressure. Over.

SC
I'm flying in an SPS minimum impulse, Houston, and it's rather difficult to keep it on a constant data. The LM wants to wander up and down. I'm not sure if it's in response to mascons or what, but I can get it completely stabiized in data and let it alone and in another couple of minutes it will have developed its own rate.

CAPCOM
This is Houston, Roger.

PAO
That was Mike Collins making that report.
SC
Houston, we'll be moving shortly from the side window to the hatch window, and we'll try and pick up some of the landmarks that we'll be looking at we approach the powered descent. Over.

CAPCOM
11, this is Houston. Roger, and we're through with the uplinks. The computer is yours, you can go to BLOCK and we'll have the information on nitrogen for you shortly. Over.

SC
Roger, copy.

SC
Okay, Houston, several minutes ago I was exactly steady on data and since then I have been moving forward, the LM pointed straight down toward the radius vector and that's been dispite a number of down minimum pitch impulses.

CAPCOM
Roger.

SC
We're over Smyth's Sea right now.

CAPCOM
Roger.

SC
We're about 88 degrees east of it I would estimate.

CAPCOM
We show you about south of the - southwest of the crater Jansky right now.

SC
The Smyth's Sea doesn't look much like a Sea. It's - the area which is devoid of craters of which is not very much is sort of a hilly looking area. It's not like the Mare at all.

CAPCOM
Roger. We copy that about the sea, and it looks like you were just giving us a zero of the crater Neper, the large crater on the left, and Jansky on the right.

PAO
That exchange between Capcom Bruce McCandless and Mike Collins aboard the Apollo 11 spacecraft.

SC
We think you're close, but not too good.

CDT 15:00 GET 078:28 TAPE 240/2

PAO
Apollo Control, Houston. We acquired TV at 78 hours, 24 minutes, 11 seconds, Currently our orbital parameters show 104. Altitude an apolune of 170.2, a perilune of 61.3 - nautical miles, those are.

CAPCOM
11, this is Houston. Would you care to comment on some of these craters as we go by?

SC
Roger. We're approaching the approach pass through ignition. This is equivalent to 12 minutes before ignition, and we're at about 83 degrees, I guess. 83 degrees east, Does that correspond to locations you're holding there presently?

CAPCOM
Roger. We're showing your present position as about 77 - 76 degrees east looking back towards the east.

SC
You should be looking back at Manzinus.

CAPCOM
Roger.

PAO
We've now heard from all three Apollo 11 crewmembers during this television pass. The individual talking earlier was Neil Armstrong.

SC
Crater Schubert and Gilbert in the center right now, and that sums it up at about a little over 12 minutes before powered descent. Instead of me looking - as they're looking back at it, we're looking straight down at it.

CAPCOM
Roger. We show you at an altitude now of about 110 miles, and of course, you'll be considerably lower at the initiation of powered descent.

SC
Say, Houston. Look at register 3 on the DSKY data. Update is increasing toward my desired 315 and I'll let the hand controller alone here and I'll bet you it reverses itself.

SC
Roger, 11. We're watching the DSKY now and it's still coming in beautifully on the TV.

SC
Okay, there's - on the right side of the screen at the present time ther's a triple crater with a small crater between the first and second, and the one at the bottom of the screen is Schubert Y. (Garble) it does have a central peak at Schubert Y. There's actually several of them. You can observe those, plus the rim craters at the bottom of your screen.

CAPCOM
Roger. We're seeing the central peak quite clearly now.

SC
Okay, we're zooming in now on a crater called Schubert N. Schubert N, very conical inside wall and the bottom of it here looks flat. Look at data on the DSKY it's stabilized and is holding steady now.

CAPCOM
Roger.

SC
Looking out the window I can see a number of tall craters on the bottom of Shubardt N. We're coming up on the Bombing Sea where I'll be doing some P22 marking on crater of my choice - name of crater Camp.

CDT 15:00 GET 078:28 TAPE 240/3

CAPCOM
Okay, we'll be watching for that.

SC
And notice register 3 has reversed itself and it's heading back the other way now without any pitch thruster firing.

CAPCOM
Roger, Mike. We confirm that you've changed the direction of your pitch rate.

END OF TAPE

SC
Generally speaking, the tendency seems to be to pull the LM down toward the - the center of the Moon as a gravity engradiant experiment.

CAPCOM
Roger, 11, we copy -

SC
It may have something to do with mascons or it may -

CAPCOM
Roger, we gotten -

SC
It may have something to do with mascons or it may just be the peculiarity of the DSKY display.

CAPCOM
Okay, we observed the behavior of your DSKY and we got the day ahead to work on it. Let us grind around a little while on it and we will report back to you probably in a rev or two.

SC
Okay, well in the meantime I am going to pitch down toward 315.

CAPCOM
Roger.

SC
Three craters, three horizontal craters, that we now have in the field of view, are immediately underneath the ground track. The right-hand, the largest crater that you see, is through' the (garble).

CAPCOM
Roger, we concur on the identification of this crater.

CAPCOM
- and we show you coming up on landmark ALPHA 1 shortly.

SC
Roger, Mike is having his first look at ALPHA 1 at the present time.

SC
Yeah, it _ is a great bright crater. It is not a large one but an extremely bright one. It looks like a very recent and I would guess impact crater with rays streaming out in all directions which should make ... correction the Foaming Sea easy to see coming up on it now. Crater ... is one of the smaller ones out on the - on the floor of the Foaming Sea.

PAO
We have been some 17 minutes now into this television pass and standing by continuing to monitor.

CAPCOM
Here we can show you over the Sea of Fertility now and we ought to have Langrenus down south of track a few degrees, about 9 degrees south of track.

SC
Now the crater that is in the center of the screen now is Webb. We'll be looking straight down on it at about 6 minutes before power descent. It has a relatively flat bottom to the crater and you can see maybe two or three craters in the bottom of it on the west end wall, the wall that is now nearest the - the camera, near the bottom of the screen we should see a dimple crater there, within the outside and then coming back toward the bottom of the screen into the left, you can see a series of depressions. It is this type of connective craters that give us most interest to discover why they are in the particular pattern that they are in. I'll zoom the camera in and try and give you a closer look at it.

CAPCOM
Roger, we are observing the dimple crater now. The central peak we can see on the other photos

CDT 15:10 GET 078:38 TAPE 241/2

CAPCOM
doesn't seem to stand out very well here.

SC
Well, they are not central peaks, they are depressions in the center.

CAPC0M
Roger.

SC
And you will notice on the pitch thruster activity, I've put in oh a dozen interim impulses and pitch down and I am still far from corrective back 315. We are moving the camera over to the right window now to give you well Langrenus. It - its several central peaks and -

CAPCOM
Roger, we got Langrenus in our screen now.

CAPCOM
Okay, 11, this is Houston. We are getting a beautiful picture of Langrenus now with its really conspicious central peak.

SC
The Sea of Fertility doesn't look very fertile to me. I don't know who named it.

SC
Well, it may of been named by - a gentleman whom this crater was named after, Langrenus. Langrenus was a cartographer to the King of Spain and made one of the early reasonably accurate maps of the Moon.

CAPCOM
Roger, that is very interesting -

SC
At least it sounds better for our purposes than the Sea of Crises.

CAPCOM
Amen to that.

CAPCOM
Okay, it looks like you are coming inside now on the camera.

SC
Well, I can't get in behind to see the monitor. I'll bring the focus in but we are going to be looking down past one of the LM quads and one of the antennas almost straight down at the ground track that we will be seeing coming in now. Guess it maybe two or three minutes before power descent.

SC
All right, that should put the LM structure about in focus and I'm going to move it out to Serenity and then expand the field of view.

SC
Crater Secchi is out my window now, window number 02.

CAPCOM
Hello Apollo 11, this is Houston. We see you coming up on the terminator at 7853. It will be about 7 minutes from now and we also got the LOS 02 and TEI 05 pad ready for you after the TV and when you ever want to terminate, over.

SC
Roger.

CAPCOM
And we are getting a good view of the track leading into the landing site now and -

CAPCOM
Okay, it looks like we got Secchi K - coming up on Apollo ridge.

CAPCOM
And in the right hand portion of our screen right now, we can see Messala, ALPHA and BRAVO with a little light color rays streaming off in one direction.

SC
I don't know if you can make out, but

CDT 15:10 GET 078:38 TAPE 241/3

SC
in the Sea of Fertility there is a number of craters that are just barely discernible, old, old craters whose outlines are just barely able to be seen.

CAPCOM
Roger, I think we can make them out. The color really inha -

END OF TAPE

CDT 15:20 GET 078:48 TAPE 242/1

SC
The outlines are just barely able to be seen.

CAPCOM
Roger, I think we can make them out. The color really enhances the ability to discern features and craters over what we see in real time on our black and white monitor.

SC
Right, at these low sun angles there's no trace of brown, it's now returned to a very gray appearance and, like the acre says, it has a look of plaster paris to it, at this sun angle which is completely lacking in earth angle.

CAPCOM
Roger.

PAO
We're now some 25 minutes into our television pass.

SC
Okay this is very close to ignition point for power descent. Just passing Mount Maryland, a triangular shaped mountain that you see in the center of the screen. At the present time with crater secchi (garbled) on top of the far northern edge of the mountain.

CAPCOM
Roger, we're getting a good view of mount Maryland and Secchi satum.

SC
And now we're looking at what we call boot hill, occurs 20 seconds into the descent.

PAO
Watching this pass with a great deal of interest here in mission control center is Pete Conrad, the commander for the Apollo 12 mission.

SC
On the right edge of the screen crater censorinus P. Now passing the 1 minute point in power descent.

CAPCOM
Roger, and for your information your current altitude is 148 nautical miles above the surface.

SC
It should be. I'm unable to determine altitude at all looking out the window. I couldn't tell whether we were down at 60 or up at 170.

CAPCOM
I bet you could tell if you were down at 50,000 feet.

SC
I wouldn't be surprised.

SC
We're passing some steep ridges here. The edge of the moon craters that were photographed by Apollo 10, and the crew of Apollo 10 was very impressed with the steepness of these ridges when they came over them at about 50 thousand feet.

CAPCOM
Roger, we can observe there also steep even from this altitude. You've got quite a shadow being casted by the sun at these low angles.

SC
The entire surface is getting considerably darker than the surface that we looked at previously when the sun was quite high above us. The crater in the, bright crater

CDT 15:20 GET 078:48 TAPE 242/2

SC
in the center of the screen, the smaller one is censorinus.

CAPCOM
Roger, and we show you low over 1 minute from the terminator at the present time.

SC
How's the brightness of that picture you're receiving? Do you think we ought to open F-stop some as we approach the terminator.

CAPCOM
Yea, the brightness is still doing quite well. You can go ahead and open it up a stop or two. The automatic white level compensation seems to be working beautifully.

SC
There's a good picture of Boot Hill.

CAPCOM
Roger.

SC
3 minutes and 15 seconds into the descent.

CAPCOM
Roger, we're seeing Boot Hill now.

SC
The next crater coming into the bottom of Duke Island there, and to the left, the crater, the largest of the craters, near the center of the picture right now is Maskelyne W. This is a position check during descent at about 3 minutes and 39 seconds, and it's our downrange position check, and cross range position check prior to yawing over face up to acquire the landing radar. Past this point, we would be unable to see the surface below us until getting very near the landing area.

CAPCOM
Roger, I imagine you get a, you'll get a real good look at that tomorrow afternoon.

SC
(garbled) is the one that was referred to in Apollo 10 as Sidewinder.

SC
That's a good name too. Sidewinder, and Diamondback, it looks like a couple of snakes down there in the lake bed.

SC
And we're approaching the terminator now. See the (garbled) has increased and only the sunlit side of these ridges remain illuminated, while the dark sides and the shadow will become completely black.

CAPCOM
11, this is Houston. The picture is getting a little grainy now. You might go ahead and open up the F-stop.

SC
Landing point is just barley in the darkness. That one crater, the upper part of which you see, lower part completely in darkness. The small well defined crater is Moltke, which is about a beam in the landing sight.

CAPCOM
Roger, we can just see it looks like a little less than half of its rim right now.

CAPCOM
And we can make out just barley some features on the surface, maybe from earth shine.

CDT 15:20 GET 078:48 TAPE 242/3

CAPCOM
Are you wide open on the F-stop, at this time.

SC
Now we are. Yea and it looks like we're just about to get the sun comming into the lens so we'll have to move the camera light.

CAPCOM
Roger.

SC
We can't see any earth shine or any surface features at all in earth shine now due to the fact that the LM is very bright and is causing our pupils to contract. It's a very fantastic view to see the terminator as you look along the edge. I think you'll agree that some of these craters that you're seeing in the picture now are really accentuated by the lengthening of the shadows, as compared to the terminator.

CAPCOM
Yes it's a very beautiful and rugged sight we've got on the screen now.

SC
And I think you've got some interesting data on thrustor firing versis pitch angle. It looks like that LM just wants to head down towards the surface is all.

CAPCOM
Roger, I have a comment here that says that's what the LM was built for, I believe.

SC
And as the moon sinks slowly in the west, Apollo 11 bids good day to you.

CAPCOM
Roger, we sort of thought it was the sun setting in the east.

PAO
There you have it. Our first glimpse of the lunar surface during the Apollo 11 mission. The eleven crew took us on a guided tour of the front side, plus talked their way through the power descent that lies ahead in tomorrows activities. At 78 hours 58 minutes into the flight of Apollo 11, this is Apollo Control, Houston, continuing to monitor.

END OF TAPE

CDT 15:30 GET 078:58 TAPE 243/1

PAO
Apollo 11. This is Apollo Control, Houston, continuing the monitor.

CAPCOM
Now here we go on the LOI2, Buzz (garble) LOI2, SPS G&N 38320 plus 166 minus 081. Tega 080113603. Noun 81 minus 01408 minus all balls minus 00743. Roll all balls 196359 00657 plus 00537. Delta-VT 01592 017 01531. Sextant star 231160 138. The rest of the pad is NA. GDC Align Vega and Deneb 243183012. Ullage 2 Jets 19 seconds. Remarks: on your DAP load we would like in Rl 20101 Vice the value which appears in the flight plan. In making the sextant star check - this must be done between GET 79:30:10, at which time the star comes above the horizon and 79:52:10, which is your local sunrise due to the fact that the star's relatively close to the sun. Your burn orientation is heads down, retrograde pitched up 28 degrees with respect to local horizontal. The calculated values for Noun 42 are HA 65.6 and HP 54.6. Both of those being plus. Readback. Over.

SC
Roger. LOI2. SPS G&N 38320 plus 166 minus 081080113603 minus 01408 minus all balls minus 00743 all zeros 196359 00657 plus 0053701592 01701531 231160 138. Vega Deneb 243183012 2 Jets 19 seconds. DAP Rl 20101. Sextant star between 79:30:10 and 79:52:10. Attitude is heads down, retrograde, pitched up 28 degrees. HA after the burn - was that Noun 42 for HA and 64.6 and HP 54.6? Over.

CAPCOM
Roger. On the Noun 42 value, the last stuff you gave, HA is 65.6, HP is 54.6. Otherwise, I readback correct. I'm standing by with your TEI5 pad. Over.

SC
Roger. HA 65.6 for Noun 42, and a rating on B.

CAPCOM
11, this is Houston. TEI5 SPS G&N 37201 minus 060 plus 047. Tega, 086 093666. Noun 81 plus 33521 plus 03441 minus 01458. Roll NA, pitch 032. The rest of the pad is NA. Ullage 2 Jets, 16 seconds, undocked. Over.

SC
Roger. TEI5 SPS G&N 37201 minus 060 plus 047086093666 plus 33521 plus 03441 minus 0145458. NA 032. Rest is NA, 2 Jets 16 seconds undocked. Over.

CAPCOM
Apollo 11, this is Houston. readback correct. Out.

CAPCOM
Apollo 11, this is Houston.

SC
Houston, you want us back on downvoice backup? Over.

CAPCOH
Apollo 11, this is Houston. That's affirmative on the downvoice backup. We'd like you to confirm your uptelemmetry switch in the normal position. Over.

SC
Roger. It's in BLOCK. Did you get us the - you got us a new CSM state vector and an LOI target load in between all that television, didn't you?
CAPCOM
That's affirmative. And, what I'm asking for is the switch over to -

CDT 15:30 GET 078:58 TAPE 243/2

SC
Yes, the uptelemmetry switch is in normal. Over.

CAPCOM
Roger. Out.

END OF TAPE

CDT 15:40 GET 079:08 TAPE 244/1

PAO
This is Apollo Control, Houston at 79 hours 9 minutes now into the flight of Apollo 11. We currently read an apolune of 170.2 nautical miles a perilune of 61.2 nautical miles. Those listing of figures that you heard passed up to the crew were maneuver pad

updates. The first group for LOI2. We're now looking at the time of burn of 80 hours 11 minutes 36 seconds, which should revise our orbital parameters to 65.7 nautical miles by 53.7 nautical miles. A Delta-V of 159.2 feet per second, and a burn duration of 17 seconds, some 17 seconds. So at 79 hours 9 minutes into the flight of Apollo 11, continuing to monitor, this is Apollo Control, Houston.

PAO
This is Apollo Control, Houston. At 79 hours 18 minutes now into the flight of Apollo 11. A quiet period at this time, as the Apollo 11 spacecraft continues its pass around the front side of the moon. Our current altitude, very close to apolune, now reading 166.7 nautical miles. Our orbital parameter is 170.2 by 61.2 nautical miles. Current spacecraft weight in orbit, 71,622 pounds. We'll continue to keep the line up and continue to monitor the Apollo 11 crew. No doubt, at this time, preoccupied very probably with the alignment of their G&N platform. At 79 hour and 19 minutes into the flight of Apollo 11, this is Apollo Control, Houston.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead, Houston.

CAPCOM
Roger. During the LOI1 burn, your engine burned a little bit more propellant than we predicted and consequently, we'd like to update, or send you a new TEI 4 pad. Over.

SC
Okay. Our chamber pressure onboard was higher that time too. It's all on the onboard tape, the time history and the chamber pressure, but to make a long story short, it worked its way up to 100.

CAPCOM
Roger. And down here we showed a chamber pressure of around the order of 103 to 104 psi during your burn on playback.

SC
Okay. Go ahead with the TEI 4.

CAPCOM
Roger. TEI 4 revised, SPS G&N, 38320, minus 055 plus 060, 084, 30, 2749, plus 31380, plus 03475 minus 01032, roll at A

END OF TAPE

CDT 15:55 GET 079:23 TAPE 245/1

CAPCOM
5 minus 01032, roll A, pitch 034. The rest of the pad is NA. Ullage 2 Jets 16 seconds. Undock. No LOI2. Over.

SC
S10 TEI4 SPS G&N 38320 minus 055 plus 060 084 302749 plus 31380 plus 03175 minus 01032. A 034. Ail the rest of the pads NA. 2 Jets 16 seconds undock, no LOI2.

CAPCOM
11, this is Houston. Readback correct. Out.

PAO
This is Apollo Control, Houston, at 79 hours, 25 minutes. That maneuver pad that was transmitted to the crew - that was TEI, or transearth injection burn for the fourth revolution, is a contingency pad only to assure that it is properly onboard the spacecraft, if any unlikely event it should become necessary to return. At the present time we read an altitude of 157.7 nautical miles descending from apolune at this time. And our orbital parameters read 170.2 nautical miles, 61.2 nautical miles. We're some 23 minutes away at the present time from loss of signal. At 79 hours, 26 minutes into the flight of Apollo 11, this is Apollo Control, Houston.

CAPCOM
Apollo 11, this is Houston.

SC
Roger. Go ahead, Houston.

CAPCOM
Roger. We've been looking at your systems data on playback and everything is looking good. In particular, the SPS looks good. I would like to remind you though of a request to perform this burn on the back A ball valves only, and you are go for LOI two. Also, we have currently in the flight plan you scheduled tomorrow to start entering the LM at about 96 hours GET and we'd like to know if you have any plans to initiate this ingress into the LM earlier. If so, we can call the people in ahead of time. Over.

SC
Well, we didn't have any plans to. No. We just wanted to be ready at that time.

CAPCOM
Well, Roger. We just wanted to make sure that we were ready when you were ready. Over.

SC
Okay. And, to get to think of a star in LOI2, that's roll 0. Is that affirm?

CAPCOM
That's affirmative. Roll 0.

SC
Okay.

PAO
This is Apollo Control, Houston. We're some 14 minutes away now from loss of signal with the nommand and service module of Apollo 11. At 79 hours, 34 minutes, this is Apollo Control, Houston, standing by.

PAO
This is Apollo Control, Houston, at 79 hours, 38 minutes now into the flight of Apollo 11. Apollo 11 now 130.4 nautical miles in altitude. Current velocity reading of 5131 feet per second. Orbital parameters: apolune 170,2 nautical miles with a perilune reading 61.3 nautical miles.

CDT 15:55 GET 079:23 TAPE 245/2

PAO
Apollo 11, at this time, has completed it's platform alignment and is maneuvering the spacecraft to its burn attitude.

END OF TAPE

CDT 16:10 GET 079:38 TAPE 246/1

PAO
3 nautical miles. Apollo 11, at this time, has completed its platform alignment and is maneuvering the spacecraft to its burn attitude. We are some 33 minutes away, now, from time of ignition for the lunar orbit insertion number 2 burn, and we're 9 minutes 40 seconds away from loss of signal with the Apollo 11 spacecraft. So at 79 hours 39 minutes, this is Apollo Control, Houston.

CAPCOM
Apollo 11, Houston. Five minutes till LOS and with respect to your request for the nitrogen bottle pressures preburn, just before the burn, we were showing 2270 pounds per square inch on bottle Alpha, and 2350 on bottle Bravo. Over.

SC
Apollo 11, roger, thank you.

CAPCOM
Roger.

CAPCOM
Apollo 11, this is Houston. 2 minutes to LOS. You're AOS on the other side is 80:33:21, and the friendly white team will see you when you come out from behind the moon.

SC
Apollo 11. Roger.

CAPCOM
Make that your friendly greens. Your friendly white team capcom will see you when you come out from behind the moon. I think it's basically the maroon team here, and we greenies are leaving.

SC
Okay, I don't blame you, Hank.

CAPCOM
I'd rather be up there.

PAO
Mark, 30 minutes - 30 seconds now from predicted time of loss of signal. Standing by. 10 seconds. Apollo 11 should now be passing out of range.

PAO
This is Apollo Control, Houston at 79 hours 51 minutes now into the flight of Apollo 11. We are some 20 minutes away, at this time, of ignition for lunar orbit insertion burn number 2. This - the fine tune second burn in the series of two as we have inserted into lunar orbit. For LOI2, the Apollo 11 will be heads down. The burn will be initiated near perilune as the spacecraft passes over the far side of the moon. Retrograde, like LOI1, but unlike Apollo's 8 and 10. The burn will not be targeted to place a spacecraft into a precise circular orbit. Taking what was learned on Apollo 10, this LOI2 burn is designed to take into account predicted perturbations and gradually circularize itself. The numbers that we're looking at for LOI2, that would be time of ignition, 80 hours 11 minutes 36 Seconds, which should change our orbital parameters, giving us an apolune of 65.7 nautical miles and a perilune of 53.7 nautical miles. The Delta-V intended for this burn, 159.2 feet per second. Burn duration anticipated 17 seconds. That's a burn of short duration, but certainly important in that it establishes the proper orbital parameters for the events that lie ahead. As you heard in earlier conversation,

CDT 16:10 GET 079:38 TAPE 246/2

PAO
between our capsule communicator, Bruce McCandless and crewmembers aboard the spacecraft. We're GO for LOI 2. During this burn, we'll utilize only the bank A ball valve. The bank referred to here, which there are two mechanisms that drive the ball valves open and shut, causing fuel and oxidizer to mix for ignition. At the present time in Mission Control Center, the last reference you've heard from our capsule communicator reflects that they, on their own peculiar shift schedule, are having a change of shift. Astronaut Charles Duke has arrived on the scene and we can assume will take over the responsibilities of the conversational flow with the Apollo 11 spacecraft, once we reacquire. At 79 hours 55 minutes into the flight of Apollo 11, this is Apollo Control, Houston.

END OF TAPE

CDT 16:42 GET 080:10 TAPE 247/1

PAO
Mark 1 minute until planned time of ignition for LOI 02. Mike Collins will be at the controls for the Lunar Orbit Insertion 02 burn just as he was far LOI 01. The burn is of short duration as we have indicated earlier, some 17 seconds of burn time anticipated. We're standing by in Mission Control Center relatively quiet. Mark 30 seconds. Continuing to monitor - or read those displays that gave us our final readout prior to our passage to the backside of the Moon. Mark 10 seconds. Mark 05 seconds. We won't know for sure how the burn comes out until we acquire. Mark, plan time for ignition. At 80 hours 12 minutes now into the flight of Apollo 11, this is Apollo Control, Houston.

END OF TAPE

CDT 17:03 GET 080:31 TAPE 248/1

PAO
Mark 2 minutes from time of predicted acquisition of the Apollo 11 spacecraft. During this up coming pass, we will have our second excursion on the part of the Apollo 11 crew into - into the lunar module. The LM is to be pressurized by a valve in a tunnel hatch and as a point of interest, will remain pressurized following of this period of activation and after the members of the Apollo crew return to the command module. For this period of activation, it's definitely planned that - Buzz will go into the LM and there is a distinct possibility that Commander Neil Armstrong could - could exercise his option and go into the LM. Our station to acquire as we come around the far side of the Moon will be Goldstone. Mark 1 minute from predicted time of acquisition and we're standing by.

PAO
Mark 30 seconds.

PAO
Mark 10 seconds from predicted time of acquisition.

PAO
Goldstone has acquired Apollo 11.

PAO
This is Apollo Control, Houston, standing by at this time at 80 hours 35 minutes.

PAO
Both Goldstone and Hawaii have acquired a signal. We will -

CAPCOM
Apollo 11, Houston, we're standing by, over.

SC
VGY minus .1, VGZ minus .1, DELTA VZminus 5.2, fuel 362, Fox 364, front balance plus 50 and our post burn now 94 66.1 by 54.4, go ahead.

CAPCOM
Roger, we copy Neil. Would you say again the DELTA VZ? We missed that, over.

SC
Roger, that was minus .1.

CAPCOM
Roger, copy the burn report. Sounds good.

SC
And I'll look it up here.

CAPCOM
Apollo 11, Houston. We missed your DELTA TIG and also your DELTA burn time, over.

SC
DELTA TIG was 0 and the burn time was 17 seconds.

CAPCOM
Copy, 17.

PAO
You heard that report from Commander Neil Armstrong indicating that LOI 02 was all - came off almost precisely as planned.

CAPCOM
Apollo 11, Houston. We'll be satisfied if you pumped up the cabin to 5.4, over.

SC
Okay, we're short about 5.2 right now.

CAPCOM
Roger.

SC
And Charlie, the LM CM DELTA P is just over one pound right now.

CAPCOM
Copy, out.

END OF TAPE

CDT 17:13 GET 080:41 TAPE 249/1

CAPCOM
Apollo 11, Houston, over.

CAPCOM
Hello, Apollo 11, Houston, over.

PAO
This is Apollo Control, Houston.

CAPCOM
Please attempt to acquire on the high gain. We're having trouble locking up on the TM and we have no voice, over.

PAO
This is Apollo Control, Houston. You copied that report. We're standing by for Apollo 11 spacecraft to acquire on the high gain antenna. Meanwhile, on board readings on orbital parameters were 66.1 nautical miles by 54.4 nautical miles, very close to the planned altitudes that were predicted prior to the LOI 2 burn. At 80 hours 46 minutes continuing to monitor, this is Apollo Control, Houston.

SC
Hello Apollo 11, Apollo 11.

CAPCOM
Roger we're reading you 5 by. Go ahead.

SC
Roger we have you on high gain now.

CAPCOM
Rog, we lost the TM and the voice for about 5 minutes here. We attempted a hand over and fouled it up in some manner but we got you back now. Thank you much.

SC
Okay, we're pressurized in the LM at this time.

CAPCOM
Copy.

PAO
This is Apollo Control Houston 80 hours 48 minutes now into the flight of Apollo 11. Very preliminary ground readings indicate an apolon of 65.6 Perilon 53.7.

CAPCOM
Hello Apollo 11, Houston. We have a P22 Auto Optics update for you if you're ready to copy, over.

SC
Ready to copy.

CAPCOM
Rog, Mike. It's landmark, Alpha 1 T1823735 T2 824250. We're 7 miles north, over.

SC
Copy P22 T1 time 823735 T2 824250 and the target is 7 miles north, thank you.

CAPCOM
Rog.

PAO
That - -

END OF TAPE

CDT 17:24 GET 080:52 TAPE 250/1

PAO
That was passed up to Mike Collins, the command module pilot, who will occupy himself during this pass on the over the front side with landmark tracking activities. At 80 hours, 53 minutes into the flight of Apollo 11, we continue to monitor.

SC
I get the distinct impression, Charlie, that Maria there laps up over the edge of the mountains at the shorelines.

CAPCOM
Roger; we copy.

PAO
This is Apollo Control, Houston, at 80 hours, 56 minutes now into the flight of Apollo 11. Our current velocity reading 5334 feet per second. Current weight of the spacecraft in orbit, 75,505 pounds.

CAPCOM
Houston. On your comment about the Maria lapping up to the terrain - mountain of terrain - is that an impression like a lava flow coming in around a prominence, Neil, or more looks like it's sloping up at that point? Over.

SC
It isn't true everywhere, but there's certainly places where there seems to be a slope downward towards the shoreline on the Maria. In other words, from the Maria down to the shoreline is a downward slope indicating that it might be a lava flow.

CAPCOM
Roger.

PAO
That was Commander Neil Armstrong talking to our Capsule Communicator Charles Duke. Our current orbital readings show an apolune of 65.5, a perilune of 53.7 nautical miles. At 80 hours, 58 minutes into the flight, we continue to monitor, and this is Apollo Control, Houston.

SC
Crossing Duke Island and Maskelyne W.

CAPCOM
Say again, Neil. Over.

SC
We're just crossing Duke Island and Maskelyne W.

CAPCOM
Roger.

PAO
This is Apollo Control, Houston, at 81 hours into the flight of Apollo 11, a period of relative quiet. No doubt the Apollo 11 crew quite preoccupied in operation for the activation of the LM. During this period of relative quiet, we'll pass along the heart rates from the LOI1 burn, that's LOI1, not LOI2. We have yet to receive those numbers. The heart rate for the Commander Neil Armstrong read 106, for Command Module Pilot Mike Collins, 66, and for the Lunar Module Pilot Buzz Aldrin we have a reading of 70. At 81 hours, 1 minute into the flight of Apollo 11, this is Apollo Control, Houston.

END OF TAPE

CDT 17:34 GET 081:02 TAPE 251/1

PAO
Apollo Control, Houston. At 81 hours 5 minutes into the flight. Still a period of relative quiet. Our ground readings indicate that the Apollo 11 spacecraft has completed its program of 52, that's to align the inertial platform. Indications from the ground are that it - this activity went very well. And at 81 hours 6 minutes continuing to monitor, this is Apollo Control, Houston.

PAO
This is Apollo Control, Houston, at 81 hours 15 minutes. It's been an extremely quiet pass. No doubt, the Apollo 11 crew, quite busy at this time. We expect, at the time entry is made into the lunar module, Apollo 11, as a matter of fact, will be out of acqui-

sition, traversing over the far side of the moon. At the present time, we read an altitude, current altitude, reading of 56.7 nautical miles. Our ground displays indicate an apolune of 65.4, a perilune of 53.8 and spacecraft velocity of 5,364 feet per second. Continuing to monitor, this is Apollo Control, Houston, at 81 hours 16 minutes into the flight.

CAPCOM
Hello Apollo 11, Houston. We're wondering if you started into the LM yet. Over.

SC
We have the CSM hatch out, the drogue and probe removed and stowed, and we're just about ready to open the LM hatch now.

CAPCOM
Roger. Thank you much, Neil. We'll be standing by.

PAO
This is Apollo Control, Houston at 81 hours 24 minutes now into the flight. The silence of conversation between Mission Control Center, Houston and the crew has broken there moments ago. Charlie Duke called up Apollo 11 and spoke with Neil Armstrong, who indicated that the hatch was out and the probe and drogue removed and they were about ready to open the lunar module hatch. Our current altitude shows 54.7 nautical miles, apolune, 65.4, perilune, 53.8. Interestingly enough, the part of the LM activation which we will follow up most closely will be at time of reacquisition following our pass over the far side of the moon. This will be on the front side. It will afford us an opportunity for a communications check with the lunar module and there will be a transfer to LM power. At 81 hours 25 minutes, this is Apollo Control, Houston.

SC
Okay, Charlie. We're in the LM. The docking index mark is the same.

CAPCOM
Roger, we copy.

PAO
You heard that report from Neil Armstrong. They are now in the lunar module.

SC
Apparently there just doesn't seem to be any slow way to get that repress to auto without making a big bang.

CDT 17:34 GET 081:02 TAPE 251/2

CAPCOM
Apollo 11, Houston. Say again. Over.

SC
Roger. There just doesn't seem to be any slow way to get the repress closed to auto and avoid a big bang. Over.

CAPCOM
We copy, Buzz. Thank you much. Out.

CAPCOM
We concur with that, Buzz.

END OF TAPE

CDT 17:59 GET 081:27 TAPE 252/1

CAPCOM
We concur with that, Buzz.

CAPCOM
Apollo 11, Houston. We'll have LOS 81:45, next AOS, standby. Next A0S 82:32, over.

SC
Okay, 82:32.

SC
Houston, Apollo 11. I am going to start a maneuver to P22 attitude this time.

CAPCOM
11, roger we copy, over.

SC
Put water inside the command module for the first time and a little puddle on the aft bulkhead sort of like 101 had.

CAPCOM
Roger.

SC
I'd like to know how EECOM wants to get rid of it. There are a number of different ways and what does he think is the best one?

CAPCOM
We'll be with you in a moment, Mike. Standby.

SC
No big rush. It will wait until the next rev or two.

CAPCOM
All right.

PAO
This is Apollo Control, Houston. 81 hours 30 minutes now into the flight of Apollo 11. The Apollo 11 Commander and lunar modules pilots appear to be a little bit ahead on their timelines in the LM activation period. Meanwhile, command module pilot Mike Collins proceeding further with his land mark tracking exercises. Mike also reported a little puddle of water inside the command module near the aft bulkhead his reference to like 101 referred to the Apollo 7 spacecraft, which was commanded by Walter Schirra. Our current altitude 54 nautical miles, current apolune 65.4, our current perilune 53.8. We now show a weight in orbit of 70,472 pounds. This is Apollo Control, Houston, continuing to monitor at 81 hours 32 minutes into the flight.

PAO
This is Apollo Control, Houston. We are now some five minutes away from loss of signal with the Apollo 11 spacecraft. We currently show an altitude of 54.2 nautical miles, apolune 65.4, perilune 53.9 nautical miles. Flight Director Milt Windler now talking with various members of his flight control team. We would expect a final bit of conversation prior to loss of signal with the Apollo 11 spacecraft. We'll keep our line up and continue to monitor conversations that could transpire prior to loss of signal. Standing by at 81 hours 41 minutes into the flight of Apollo 11.

CAPCOM
Hello Apollo 11, Houston. We've played back the LOI 2 burn. It looks really good to us. The systems were all good. We got an orbit on a limited amount of tracking. They at 65

END OF TAPE

CDT 18:13 GET 081:41 TAPE 253/1

CAPCOM
The systems were all good. We got an orbit on the limited amount of tracking at 65.4 by a 53.9. Over.

SC
Sounds good, Houston.

PAO
Mark 3 minutes now from predicted time of loss of signal.

PAO
Mark 2 minutes now from time of LOS.

PAO
Mark 1 minute now from time of LOS.

PAO
We've now had loss of signal with Apollo 11. At 81 hours, 45 minutes into the flight, this is Apollo Control, Houston.

END OF TAPE

CDT 19:01 GET 082:29 TAPE 254/1

PAO
Apollo Control, Houston. We're now within 2 minutes from time of predicted acquisition of the Apollo 11 spacecraft. As we make this pass - near side pass, on the fourth revolution, it will be the first time that we have transferred during this mission to lunar module pilot power, and a communications check will be performed on the lunar module. We should be hearing such things as long counts being given from the spacecraft. Additionally, a new display - the lunar landing site display is now up for the first time in Mission Control Center this flight. It's essentially a blowup for the landing sites 1 and 2. We expect it to stay up through the time of lunar landing. Meanwhile a Mission Control Center Flight Directer, Milt Windler, beginning to discuss with members of his Flight Control team items that might be expected after we acquire. We're less than a minute away at this time - at this time from our forecast acquisition. We'll stand by.

PAO
Standing by now for acquisition.

PAO
We have acquisition. We are receiving the telemmetry data at this time. Hawaii and Goldstone have both acquired.

CAPCOM
Hello, Apollo 11, Houston. We're standing by. Out.

SC
Okay, Houston. We'll be there. Keep right there just several minutes.

CAPCOM
Roger. We copy all that. You're looking good.

PAO
That was Mike Collins indicating he would be doing the allude - additional landmark tracking, and we shall hear further from him shortly.

PAO
This is Apollo Control, Houston, 82 hours, 38 minutes now into the flight of Apollo 11. Well, we have single contact with Apollo 11 thus far this pass, when Mike Collins identified he was still involved with program 22, the auto optics landmark tracking activity. We expect additional conversation as the pass transpires. Presently we're reading on our orbit displays an altitude of 65.1 nautical miles, apolune 65.3 nautical miles, perilune of 54 nautical miles. We currently show a velocity on the Apollo 11 spacecraft of 5318 feet per second - 5318 feet per second. At 82 hours, 39 minutes, and continuing to monitor, this is Apollo Control, Houston.

END OF TAPE

CDT 19:11 GET 082:39 TAPE 255/1

PAO
This is Apollo Control, Houston.

SC
Houston, Apollo 11.

CAPCOM
Go ahead.

SC
Roger. You copy that noun 49
on your downlink. If you've had enough time, I'll proceed.

CAPCOM
We got it. Go ahead, Mike.

PAO
This is Apollo Control, Houston at 82 hours 48 minutes now into the flight of Apollo 11. our air-to-ground sounding somewhat noisey, this being because we're utilizing the omni antenna for downlink. This, a requirement because of the attitude required for landmark tracking for program 22. At 82 hours 48 minutes, continuing to monitor, this is Apollo Control, Houston.

CAPCOM
Apollo 11, Houston We see noun 89. You can do the verb 34 now. Over. Beat me to it-

SC
Yeah, I've done it. Charlie.

CAPCOM
Rog.

SC
Houston, Apollo 11.

CAPCOM
Go ahead, 11. Over.

SC
All our procedure for P22 seem to work very well. The only thing that was a little odd, is that there was some dap thruster activity. I had mentioned excel command, and roll and yaw and rate command. And somehow, roll and yaw got excited and the dap went into a flurry of thruster firing. We've noticed the same thing in the CMS, and just written it off a CMS peculiarity.

CAPCOM
Roger. We saw that activity, Mike. We'll see if we can track it down and let you know. Over.

SC
Okay.

CAPCOM
Apollo 11, Houston. You can proceed to the sleep attitude now. Over.

SC
That's in work, Houston.

CAPCOM
Okay.

SC
Houston, we're holding initial a little while to study the approach for the landing zone.

CAPCOM
Roger.

END OF TAPE

CDT 19:26 GET 082:54 TAPE 256/1

SC
- close to the landing zone.

CAPCOM
Roger.

PAO
This is Apollo Control, Houston at 82 hours 55 minutes. Our current spacecraft altitude 62.1 nautical miles. Our orbital parameter is essentially the same at 65.3, 53.9. So at 82 hours 55 minutes, we continue to monitor and this Apollo Control Houston.

SC
Houston, this is Apollo 11. I have a (inaudible) for a landing area.

CAPCOM
Apollo 11, Houston, you are breaking up badly. Say over.

SC
Roger, I can see the primary landing area looking out the LM window, over.

CAPCOM
That's right, over.

PAO
This is Apollo Control, Houston. That was a report from the lunar module pilot Buzz Aldrin. He could see the entire landing area out the window. At 82 hours 58 minutes, this is Apollo Control Houston.

SC
(inaudiable)

CAPCOM
Apollo 11, Houston, say again, over.

CAPCOM
Apollo 11, Houston. We got a lot of noise on the down line. Would you please try your high gain in Y sequence and the angles are 180 on the yaw, pitch 0, over.

SC
Houston, Apollo 11, how do you read us on the high gain, over?

CAPCOM
All right, Mike, a lot better now, over.

SC
You want a wide beam for some reason?

CAPCOM
That's affirmative. We got you in the shadows though. You are looking right down along the engine bells towards the Earth so we need you in wide beam over.

SC
Okay, Mike. We're starting our maneuvers in sweep attitude. Roll 82 52 29 yaw 0.

CAPCOM
Roger, the angles you got in the flight plan will be good when you get there.

PAO
This is Apollo Control, Houston, at 83 hours 2 minutes into the flight of Apollo 11. Currently we show an apolune of 65.3 nautical miles, a perilune of 53.9. We would expect the transfer to lunar module power to occur momentarily and from that point on the communications check with the lunar module. 83 hours 3 minutes and standing by, this is Apollo Control, Houston.

SC
Houston, 11.

CAPCOM
Go ahead, 11, over.

SC
Okay, we are on pitch activation 12 13 step 04 and verified defense talkbacks - gray and they're barber pole.

CAPCOM
Roger, standby.

CAPCOM
Apollo 11, Houston, we would like you to take the low voltage DAP. All free system on, over.

CDT 19:26 GET 082:54 TAPE 256/2

SC
Standby, we got it. We just one circuit breaker out of position.

CAPC0M
Okay.

SC
We have a gray now.

CAPC0M
Rog.

END OF TAPE

CDT 19:36 GET 083:04 TAPE 257/1

SC
Might have them ready now.

CAPCOM
Roger.

PAO
This is Apollo Control, Houston, 83 hours 7 minutes now into the flight. We're now receiving data from the lunar module on our displays here in Mission Control Center.

CAPCOM
Should have warmed up by now.

COLUMBIA
Oh, he's transmitting that B.

EAGLE
Hey, Mike, you transmitting that B?

EAGLE
Houston, Apollo 11, Apollo 11, Eagle. Over.

CAPCOM
Roger, Eagle, this is Houston. We read you. Over.

EAGLE
Roger. I read you about 4 by 4. Could you give me a short count, please?

CAPCOM
Roger, Eagle. Coming in with the short count - 1, 2, 3, 4, 5, 5, 4, 3, 2, 1. Houston out. Over.

PAO
That was Buzz Aldrin from the lunar module using the codename for the first time.

EAGLE
REG rate. Over.

CAPCOM
Roger. We got some beautiful data here, Eagle. We're - all those guys are looking at it - systems guys. We'll have some word for you in a minute how everything looks.

EAGLE
Roger. I'm all ready to switch to high-bit rate if that's okay with you.

CAPCOM
Would you please stand by, Eagle. We want to get to the proper sleep attitude before we proceed on with the COMM's check. Over.

EAGLE
Standing by. Houston, Eagle. Go ahead with the camera checkout. I't's still on low DAP's and I assume there's no problem doing that. Over.

CAPCOM
Stand by.

CAPCOM
That's affirmative. No problem on that, Eagle. You can go ahead and power up the sequence camera. Over.

EAGLE
(Garble)

CAPCOM
Eagle, be advised. Sounds like a hot mike. Over.

EAGLE
Yes.

EAGLE
Roger. If you're reading me now, I am in hot mike because I'm in ICS first to talk, and downvoice backup. Over.

CAPCOM
Roger. We just wanted to remind you. Over.

EAGLE
Thank you.

CAPCOM
Columbia, this is Houston. Are you maneuvering to sleep attitude? Over.

CAPCOM
Eagle, this is Houston. We have lost all the voice and data with Columbia. Would you see if he is maneuvering to sleep attitude? Over.

EAGLE
Hey, Mike. You maneuvering to sleep attitude? I don't believe they can hear you, Mike. Are you maneuvering to sleep attitude?

CDT 19:36 GET 083:04 TAPE 257/2

EAGLE
Houston, Eagle. Columbia has maneuvered to sleep attitude. He's got the high gain antennas - antenna angles set in, and he should be communicating with you. Over.

CAPCOM
Roger. We don't have him. Stand by.

CAPCOM
Eagle, this is Houston. Would you please have Columbia put in COMMAND RESET? Over.

EAGLE
Wilco. C0MMAND RESET.

CAPCOM
Eagle, Houston. Since we're in sleep attitude, I'll give you another long count. If you're reading in this mode, we'd like you to switch to high bit rate. Over.

END OF TAPE

CAPCOM
Now that you're reading in this mode, we'd like you to switch to high bit rate. Over.

SC
Roger. Go ahead with your count.

CAPCOM
Roger. 1 2 3 4 5 5 4 3 2 1. We're reading you 5 by. You can go to high bit rate now. Over.

SC
Roger. Going high bit rate now.

CAPCOM
Eagle. This is Houston. Do you read? Over.

EAGLE
Houston, this is Eagle, Roger. Read you loud and clear. How do you read? Over.

CAPCOM
Roger. Reading you 5 by also, Buzz, and we got the high bit rate. It's looking beautiful for Goldstone. Giving you a count. 1 2 3 4 5. 5 4 3 2 1. Please give us a count. Over.

EAGLE
Roger, Houston. Eagle with a count. 1 2 3 4 5. 5 4 3 2 1. Over.

CAPCOM
Roger, stand by. We're reading you 5 by, Over.

EAGLE
Okay. I'm ready to go S-band first. Over.

CAPCOM
Stand by Eagle. Stand by on step 4.

PAO
This is Apollo Control, Houston. A voice count exchange between Buzz Aldrin and the Eagle, the Lunar Module and Charles Duke here in Mission Control Center.

CAPCOM
Columbia, this is Houston. Would you please give us P00 and accept. We've got a load for you. Break. Eagle we're ready to go to step 4. Please select S-band voice to voice. Over.

CAPCOM
Hello Eagle, this is Houston. How do you read - normal voice? Over.

EAGLE
Eagle - Houston, this is Eagle. Read you loud and clear and S-band, normal voice OMNI. Over.

CAPCOM
Roger. you' re beautiful in this mode, Buzz, that we're reading you 5 by. Come in with a short count and we'd like one back from you. 1 2 3 4 5. 5 4 3 2 I. Houston out.

EAGLE
Houston, Eagle. You're gorgeous also. 1 2 3 4 5. 5 4 3 2 1. Eagle over.

CAPCOM
Roger Eagle. This is better than the down voice backup. Stand by 1.

CAPCOM
Eagle, Houston. Everybody's happy as a clam with this mode. We'd like to stay here for a little bit. Telemetry looks great and the voice is great. Over.

EAGLE
Roger understand. I'm checking

CDT 19:46 GET 083:14 TAPE 258/2

EAGLE
out camera number 4 now.

PAO
This is Apollo Control, Houston. Our communications check out with the Eagle apparently going very well at this time.

CAPCOM
- here what you're checking out? Over.

EAGLE
Roger Houston. Eagle has checked out both 70 millimeter cameras and both 16 millimeter cameras and all work fine. Over.

CAPCOM
Sounds great. Stand by.

CAPCOM
Eagle, Houston. We've looked over your systems on the high bit rate. Everything looks super. We're ready to go. Over.

EAGLE
Roger stand by. You want me to go back to low bit rate now?

CAPCOM
Stand by on that. Over.

CAPCOM
Eagle, Houston. We look good through the 210 on this mode. We're going to shift data select to an 85 foot dish to see what we've got and then we'll be back to you on the 210 if you'll stand by a couple of minutes in this mode, we'll be back with you. Over.

EAGLE
Roger. Eagle standing by.

PAO
This is Apollo Control, Houston. 83 hours, 21 minutes are now in to the flight. Meanwhile, aboard the Eagle, apparently Buzz Aldrin and Neil Armstrong, although Buzz is doing most of the comm check at this time.

CAPCOM
Eagle, Houston. How do you read? Over.

EAGLE
Houston, Eagle. Read you loud and clear. Over.

CAPCOM
Roger. We're reading you 5 by. We've got the voice good through the 85, the telemetry is in and out through the 85. Stand by, we'll be back with you through the 210. Over.

CAPCOM
Eagle, Houston. You can go step 5 now. We'd like low bit rate. Over.

EAGLE
Houston, Eagle. Yes, low bit rate.

CAPCOM
Roger copy, Eagle.

CAPCOM
Eagle, Houston. Could you give me a short count - this mode. Over.

EAGLE
Houston, this is Eagle with a short count. 1 2 3 4 5. 5 4 3 2 I. Eagle over.

CAPCOM
Roger, Eagle. You're 5 by. This S-band voice is really beautiful. Over.

CAPCOM
And Eagle, Houston. We'll be standing by this mode for a minute or so. We'll be back with you if you'll just stand by. Over.

EAGLE
Roger.

END OF TAPE

CDT 19:56 GET 083:24 TAPE 259/1

CAPCOM
Eagle, this is Houston coming through 210. How do you read? Over.

EAGLE
Roger. You're loud and clear.

CAPCOM
Eagle, this is Houston. We're happy with all our data and all modes. You can power down to comm now. Over.

EAGLE
Roger. I understand. Eagle will power down to comm and we are just approaching 27 volts now. It looks like we won't have to bother with the high dap.

CAPCOM
Rog.

EAGLE
We're powering down. Out.

CAPCOM
Roger. Copy. Out.

CAPCOM
Houston, we got a TEI 11 pad for you and an update on the water dump. Over.

EAGLE
Stand by 1, Houston. Are you through with the DSKY.

CAPCOM
That's affirm. Over.

EAGLE
Okay.

PAO
This is Apollo Control, Houston. 83 hours and 27 minutes now into the flight of Apollo 11. That last exchange between Charlie Duke, our capsule communicator and Buzz Aldrin, aboard the Eagle, identifying that we're very well satisfied with the communications check on the lunar module and will proceed with powering down the spacecraft. At 83 hours 27 minutes, we now read an altitude of 54.3 nautical miles, a velocity of 5,376 feet per second. This is Apollo Control, Houston.

COLUMBIA
Houston, Columbia. Ready to copy TEI 11. Over.

CAPCOM
Rog, Columbia. Here we come with the TEI 11. SPS G&N, 37200 minus 060 plus 047. Noun 33, 098, 05, 2422, plus 41448 plus 03719 minus 02422. Roll is NA, pitch 020, the rest of the pad is NA. Set stars are NA. The ullage is 2 quads, correction, 2 jets for 16 seconds. Use Bravo and Delta. In a comment, the undocked present CSM, correction, this is up front. TEI 11 is undocked. Present onboard weight of the CSM is 37200 pounds. About 50 Alpha on your dap. Over.

COLUMBIA
Alright. I read back. TEI 11 SPS G&N, 37200 minus 060 plus 047 plus 098, 052422 plus 41448 plus 03719 minus 02422, NA 020, the rest of the pad NA, ullage two jets for 60 seconds, quads B and D. Undock present CSM weight is okay in the dap.

CAPCOM
Roger, 11, and we'd like you to do a waste water dump at 84 hours down to 25 percent. Over.

COLUMBIA
Roger, I understand. Waste water dump to 25 percent at 84 hours.

CAPCOM
Roger. And Mike, we'll have LOS in about 11 minutes at 83:44. AOS is 84:30, and prior

CDT 19:56 GET 083:24 TAPE 259/2

CAPCOM
to - or at LOS, we would like you to go configure the S-band for high gain track to react, high gain beam to narrow, and let's try that to see if we can get an automatic react at the next AOS. Over.

COLUMBIA
Good idea.

PAO
That was Mike Collins, aboard Columbia, taking down a maneuver pad.

COLUMBIA
Rog.

CAPCOM
Apollo 11, Houston. Also that water that you got on the APS bulkhead, we - if it's not too much, we just recommend sopping it up and then throwing the sponges away in the waste stowage area. If it's too much, then we recommend using the procedure in the checklist on page F 10-14. Over.

SC
Alright. Thank you.

PAO
This is Apollo Control, Houston. 83 hours 34 minutes now into the flight of Apollo 11. The lunar module communications has been deactivated. We currently show a velocity of 5,377 feet per second. Our orbital parameters now read 65.1 nautical miles

END OF TAPE

CDT 20:06 GET 083:34 TAPE 260/1

PAO
We currently show a velocity of 53 hundred and 77 feet per second. Our orbital parameters now read 65.1 nautical miles epilune, 54.2 nautical miles perilune. At 83 hours 35 minutes continueing to follow, this is Apollo Control, Houston.

CAPCOM
Apollo 11 Houston, would you have Buzz make sure he gives us the OPS pressure reading before you close up, over.

COLUMBIA
Will do.

SC
Houston 11, the OPS read 57 50 both bottles.

CAPCOM
Roger.

PAO
This is Apollo Control, Houston 83 hours 38 minutes. Apollo 11 now on CSM power.

PAO
This is Apollo Control, Houston, 83 hours 40 minutes now into the flight of Apollo 11. We're less than 4 minutes away now from time of loss of signal with the Apollo 11 spacecraft. At the present time, our velocity reading, 53 hundred and 75 feet per second. Our total weight in orbit at this time, reading 70 thousand 500 and 2 pounds. Our orbital parameter's epilune is 65.1 nautical miles perilune 54.2 nautical miles. This is Apollo Control, Houston.

PAO
This is Apollo Control, Houston at 83 hours 43 minutes now into the flight of Apollo 11. Less than a minute away from predicted time of loss of signal with the Apollo 11 spacecraft. We expect the next time we acquire Apollo 11, it's crew, Neil Armstrong, Mike Collins, and Buzz Aldrin, will have begun their rest period. And at 83 hours 43 minutes this is Apollo Control, Houston.

END OF TAPE

CDT 20:15 GET 083:43 TAPE 261/1

PAO
Apollo 11 has passed out of range with the ground, traversing now over the far side of the Moon. During this pass, we had an extremely successful communications checkout with the lunar module using its code name for the first time. Its code name of the Eagle. Buzz Aldrin performed the counting tasks in concert with Charlie Duke, the capsule communicator here on the ground, and at times Buzz's - Buzz's voice, we noted considerable enthusiasm for the way things are going, and at times Charlie Duke shared that enthusiasm and its maiden checkout in communications, the lunar module Eagle, looked good. At 83 hours 45 minutes, this is Apollo Control, Houston.

END OF TAPE

CDT 20:59 GET 084:27 TAPE 262/1

PAO
This is Apollo Control, Houston, at 84 hours and 28 minutes now into the flight of Apollo i1. We're less than 2 minutes away now from our scheduled time of acquisition with Apollo 11. Meanwhile in Mission Control Center, Astronaut Owen Garriott has now replaced Charlie Duke as our Capsule Communicator. We expect that some final advisories will be passed to the Apollo 11 crew, and final report says such as crew status will be received from Neil Armstrong, Mike Collins, and Buzz Aldrin prior to the start of their sleep period. A little over - we're a little over a minute away now from scheduled time of acquisition. We'll continue to keep the line up and continue to monitor. This is Apollo Control, Houston.

PAO
Mark 30 seconds now from time of scheduled acquisition.

PAO
Mark 20 seconds. 10 seconds. We should be acquiring shortly and we're standing by.

PAO
We have data - we've acquired data on Apollo 11.

PAO
This is Apollo Control, Houston. Owen Garriott getting ready to place a call.

CAPCOM
Over.

SC
Houston, Apollo 11.

CAPCOM
11, Houston. Roger. Reading you fine, and it looks like the automatic REACT went very well just because you came around the LM. We have several small items to discuss with you here just before you go to sleep. Over.

SC
Go ahead. Over.

CAPCOM
Okay, 11. First of all, on our LM systems checks. Everything went fine. I would like to remind you though tomorrow you may see an ascent pressure light when you activate the MC and W. There should be no problem, however. You did note that the AP - OP tank pressure was only reading 111 psi, which is normal at this point, but the below the level which will trigger your light due to the helium which has been disolved into the propellant. Over.

SC
Roger. Understand that. Thank you.

CAPCOM
Roger. And next item, the supercritical helium rise rate is nominal, and you also had that question for us about your thruster activity during the P22 on the last REV. Believe we understand that now, and you reported that your pitch was in ACCEL COMMAND and your yaw and roll were in REG COMMAND. You were firing your pitch thrusters that will couple REG into your yaw and roll axes, and the - you were at that time holding only half a degree deadband and coupling REG's into yaw and roll produced the extra firings about the yaw and roll axes. Over.

SC
Yes, that may be true. It's very peculiar coupling in that it waits longer than you would think and its

CDT 20:59 GET 084:27 TAPE 262/2

SC
reaction is greater than you would think. We were getting yaw rates of around four tenths of a degree per second per panel.

CAPCOM
Roger, Mike. We did play the data back and that's the way it looked upon analysis of the chart recordings back here. Over.

SC
Okay. Fine.

CAPCOM
They've also looked at the results of your landmark tracking. The marks all apparently were very good and we've got a full page of data here relative to the altitudes of the various track locations, which I won't read up to you, but I did want to let you know that the marks apparently went very well. I also have your consumables budget, particularly your RCS propellant quantities. They're Deltas from nominal if you should want them. Your work quad is quad Charlie, which is 9 percent low. I'll not read up the others unless you want them. Over.

SC
Okay, I got the O2 fuel cell purge. You want them now?

CAPCOM
I'll have to stand by just a moment.

SC
Okay. And then the other one is we're still charging battery A.

CAPCOM
11, Houston. We would like to delay the fuel cell purge until the back side of the moon, and you go ahead and - should terminate your battery charge at this time. Over.
SC
Okay; understand, I knew we had another O2 and H2 purge coming up in the morning, I wasn't sure whether you wanted to go through with this one or not. I'll wait until the next side and then do it.

CAPCOM
That's fine, Buzz.

SC
Terminate battery charging now.

CAPCOM
That's right and one other systems item here - in order to balance your cryo tanks, would you get your O2 and tank 1 and your H2 tank 2 heaters off. Over.

SC
Okay, I have O2 tank heater I off, and H2 tank heater 2 off.

CAPCOM
That's right, Mike, and we believe you have your quad Bravo and quad Charlie turned off in your DAP at this time, and a 5 degree deadband. We'd prefer a 10 degree deadband for your sleep period overnight here. Over.

SC
Okay.

CAPCOM
One Other item relative to a malfunction procedure. It's unlikely that you'll have to worry about this tomorrow, but in your malfunction list under docking on page Fll-9 there is a malfunction procedure for a high O2 flow rate at the top - under tunnel at the top of page 11-9. We would like to have you not use that malfunction procedure should you encounter the high O2 flow rate, and instead

CDT 20:59 GET 084:27 TAPE 262/3

CAPCOM
check back with Houston for a revised procedure should you find that situation. Over.

SC
Understand and note has been made in my checklist.

CAPCOM
11, Houston. Roger. That just about takes care of all the items we have here on the ground before time to hit the sack, and I guess you will have a presleep check for us before you go to bed.

SC
Roger. We're in the midst of cycling the O2 and H2 fans now.

CAPCOM
Roger.

END OF TAPE

CDT 21:09 GET 084:37 TAPE 263/1

CAPCOM
-we'll have a presleep check for us before you go to bed.

SC
Rog. We're in the midst of cycling the O2 and H2 fans now.

CAPCOM
Roger.

SC
And the radiation is as follows: CDR 11012 CMP 10013 LMP 09015. Negative medication, over.

CAPCOM
Roger, copy 11.

PAO
This is Apollo Control, Houston. 84 hours 39 minutes now into the flight. That conversational exchange with Owen Garriott - here in Mission Control Center and principally Buzz Aldrin; however, Mike Collins did talk briefly about Program 22, the landmark tracking activity in which he performed. At 84 hours 40 minutes, this is Apollo Control, Houston.

SC
Hey Houston, Apollo 11.

CAPCOM
11, Houston, go ahead.

SC
Roger. We're thinking about taking the monocular with us on into the LM. We think it might prove to be of some use, over.

CAPCOM
Roger, Buzz. It sounds like a good idea for some of your surveying work there inside the cockpit, over.

SC
Okay, you want to run that by with whoever might be concerned.

CAPCOM
I sure will.

PAO
This is Apollo Control, Houston. 84 hours 44 minutes now into the flight of Apollo 11. Our current spacecraft altitude is now 64.3 nautical miles with an apolune 65.2 nautical miles; perilune 54.4 nautical miles. We show an orbital period of one hour 58 minutes 40 seconds on our displays. Current weight of the spacecraft in orbit 70,502 pounds. At 84 hours 44 minutes, continuing to monitor, this is Apollo Control, Houston.

CAPCOM
Apollo 11, Houston. We have apparently lost the high gain lock. We would appreciate if you would give us a help manually so we will try to relock up on the high gain, over.

SC
Houston, Apollo 11. (inaudiable).

END OF TAPE

CDT 21:19 GET 084:47 TAPE 264/1

SC
Houston, Apollo 11. (Garble)

CAPCOM
11, Houston. Reading you very weak till - find out that noise to complete the full transmission. If you'd give us a hand on a manual relock, we'd appreciate it.

PAO
This is Apollo Control, Houston 84 hours, 48 minutes now into the flight. We're receiving noisy data at this time. We've requested Apollo 11 to give us a manual relock. Standing by at 84 hours, 49 minutes this is Apollo Control, Houston.

CAPCOM
Apollo 11, Houston. We're still unable to pick you up on the high gain antenna. We request you go to MANUAL from wide beam width. The Pitch and Yaw angles in your checklist. You should be able to find us there. Over.

SC
Houston, Apollo 11. How do you read now?

CAPCOM
11, Houston. Loud and clear this time. OMNI.

SC
Loud and clear. You faded out on your other transmissions. Over.

CAPCOM
Roger. Are you in wide-beam now?

SC
Negative, but I've got you locked back on again REACQING now.

CAPCOM
Roger. That's all we want. We want to stay in narrow and we're a little puzzled about why we lost you here a few minutes ago. Do you have any ideas?

SC
Sure don't. We're showing the background - 15 degrees for the pitch and about 270. That ought to be good and clear.

CAPCOM
We concur that. We still don't have any good ideas on why we were lost.

CAPCOM
11, Houston. Would you confirm that we did acquire automatically when you came around the LM for this passage. Over.

SC
That's confirmed.

CAPCOM
Thank you.

PAO
This is Apollo Control, Houston 84 hours, 56 minutes are now in the flight of Apollo 11. Our current apolune 65.1 nautical miles, current perilune 54.3 nautical miles. After receiving some noisy signal, Apollo 11 has locked back on in fine form. That was Buzz Aldrin speaking with Owen Garriott here in the Mission Control Center. I expect we will take a second look at why we had to lock on manually. As we receive any updates on this, we'll pass them along. We now read 84 hours, 57 minutes and this is Apollo Control, Houston.

END OF TAPE

CDT 21:29 GET 084:57 TAPE 265/1

CAPCOM
Apollo 11, Houston, over.

SC
Houston, Apollo 11.

CAPCOM
Eleven, Houston, on your RCS select switches, we show quad Bravo disabled but quad Charlie only partially disabled. Charlie 3 I believe, is the only one you have selected off, is that correct.

SC
Yea Roger, that's correct.

CAPCOM
Rog.

PAO
This is Apollo Control, Houston at 85 hours 5 minutes now into the flight of Apollo 11. We confirmed from the ground, following that conversation exchange. As was pointed out -

CAPCOM
We see them all disabled at this time, thank you.

PAO
As was pointed out, quad, RCS quad Charlie is now disabled following that conversational exchange between Owen Garriott and Buzz Aldrin. Buzz, the lunar module pilot apparently, quite obviously still awake. 85 hours 7 minutes now into the flight of Apollo 11 now continuing to monitor, this is Apollo Control, Houston..

CAPCOM
Apollo 11, Houston, over.

SC
Go ahead Houston.

CAPCOM
Eleven, Houston. We're going to try to check out this ability to automatically reacquire on the S-band and what we want to do is to secure our uplink carrier for about 30 seconds, then we will turn it back on and see if the spacecraft equipment will automatically reacquire. So if you do not get a call from us within about 3 minutes, that means we have not been able to reacquire and request your assistance on a manual acquisition, over.

SC
Okay, we understand.

CAPCOM
Eleven Houston, we also would appreciate if you will note the angles that the antenna tracks through in its attempt to reacquire, over.

SC
Roger, we'll do that.

END OF TAPE

CDT 21:44 GET 085:12 TAPE 266/1

CAPCOM
11, Houston. It looks like we're locked back up again with no delay. How does it look on board? Over.

SC
Roger. The signal strength dropped very rapidly to zero and the pitch and yaw, in about 3 seconds, moved towards 40 degrees pitch and 240 degrees yaw. Right now, we're setting on about 15 degrees pitch and roll about 265 degrees yaw. So they didn't move very far, oh, about 30 degrees apiece and then they picked right back on up again. Over.

CAPCOM
Roger. Some of the luckiest people in the background there. We copied your pitch and yaw angles.

CAPCOM
11, Houston. You give us the location of your pitch and yaw location of your position indicators. Over.

SC
Roger. They're in the same position as the antenna right now, about 15 degrees pitch and - No, wait a minute. I got them - got it at about 75 instead of 265.

CAPCOM
Okay, thank you.

CAPCOM
11, Houston. We'd like to try the same procedure once more. We'll leave the carrier a little longer and be back up for a call within 4 minutes. Over.

SC
Okay.

PAO
This is Apollo Control, Houston. At 85 hours 17 minutes now into the flight of Apollo 11. What you heard in the conversation between Owen Garriott and Buzz Aldrin was following a communications check in which we secured the uplink carrier for some 30 seconds and waited to give it a period of time of approximately 3 minutes, to see if the spacecraft would reacquire. We appeared to reacquire in fine form on this first test. We will repeat it - this test a second time, delaying approximately 4 minutes before we place a call to Apollo 11. At 85 hours 17 minutes, we currently read an altitude - spacecraft altitude of 56.1 nautical miles. Present velocity shows 5,367 feet per second. At apolune 65 nautical miles, perilune 54.4 nautical miles. Present weight in orbit remains a static 70,502 pounds. Present time in orbit as shown on our displays, 1 hour 58 minute 40 seconds. This is Apollo Control, Houston.

CAPCOM
11, Houston. We're locked back up again. Can you give us a report on how the antenna behaves?

SC
Roger. It was essentially identical as before. The pitch went to 45, 40 to 45 and then the yaw went to about 255, 245 to 255 and then it rather quickly locked up at 15 degrees pitch and 270 yaw. Over.

CDT 21:44 GET 085:12 TAPE 266/2

CAPCOM
11, Houston. Roger. Your angles of 45 and 255. Do I understand that as soon as the carrier dropped, it went to these angles, or did it only go to these angles after the uplink carrier was reenabled and the antenna began to reacquire. Over.

SC
No. As soon as the carrier dropped off, why it drifted over into those angles and stayed there. Then when it came back up again, why it hunted around for a while, but it didn't get any further off, gradually brought it on in to the angles where it is right now, and they the signal strength, would take several jumps as evidentally it goes from wide to medium to narrow.

CAPCOM
11, Houston. I understand, and on another subject, request you zero your optics for the night. Over.

SC
Roger. Zero.

END OF TAPE

CDT 21:54 GET 085:22 TAPE 267/1

PAO
This is Apollo Control, Houston, at 85 hours 27 minutes now into the flight of Apollo 11. We've run 2 tests thus far with the S-band antenna which has reacquired nicely on both occasions. While we are standing by for further possible conversations with the crew at this time, we' re some 50 minutes from predicted time of loss of signal on Apollo 11. Currently we read an apolune of 65 nautical miles - a perilune of 54.4 nautical miles. This is Apollo Control, Houston.

CAPCOM
Apollo 11, Houston. Can you confirm that you have change the fuel O2 cyclinder as per flight plan in the last hour, over?

SC
John, we're still eating. We're about to do it. We'll let you know.

CAPCOM
Roger, 11, and we got about 14 minutes to LOS. AOS is about 86:30, a hour away. We are wondering whether or not you planned to have one up at that time or would ya'11 like to be asleep inside the next hour?

SC
Somebody will be up.

CAPCOM
Roger. The thing that we are still puzzling on is the antenna and if - as long as there will be somebody up, why we would like to have somebody check the automatic REACQ on the next AOS.

SC
Okay, we'll do that. We haven't chlorinated the water yet and we haven't changed the lithium hydroxide. We're still finishing up dinner.

CAPCOM
Rog, Mike thank you.

PAO
This is Apollo Control, Houston, at 85 hours 29 minutes now into the flight. That was Mike Collins reporting to the capsule communicator Owen Garriott that the Apollo 11 crew completing dinner at this time. And earlier perhaps if you listened to the air/ground, you heard some music in the background, soft music which would indicate that the this was being played in concert

with their evening meal. When we reacquire, we expect one of the three crew members to still be, at least one to be still awake as we run a further check on our spacecraft antenna. At 85 hours 30 minutes into the flight of Apollo 11, this is Apollo Control, Houston.

END OF TAPE

CDT 22:04 GET 085:32 TAPE 268/1

PAO
This is Apollo Control, Houston.

CAPCOM
Buzz, coming up in 2 minutes now and AOS will be at 86 plus 28 plus 15. Over.

SC
We'll see you on the other side.

CAPCOM
Roger.

PAO
85 hours 40 minutes at this time. That - perhaps the last conversation we'll have with Apollo 11 until we reacquire. We're now 1 minute, 20 seconds away from loss of signal, continuing to stand by. This is Apollo Control, Houston, at 85 hours, 41 minutes.

PA0
This is Apollo Control, Houston. We've had loss of signal as the Apollo 11 spacecraft begins its pass around the far side of the moon at 85 hours, 42 minutes.

END OF TAPE

CDT 22:58 GET 086:26 TAPE 269/1

PAO
This is Apollo Control, Houston. We're now less than 2 minutes away from acquisition of signal on Apollo 11 and in Mission Control Center, Houston, we're standing by. Mark 1 minute from predicted acquisition of signal. We should be acquiring. We're standing by.

SC
Houston, Apollo 11. Over.

CAPCOM
11, Houston. Loud and clear here, over.

SC
Okay, we just appeared to get a solid lock from the last, oh about a minute. The tune-for-max needle has been wandering up and down and the pitch and yaw needles have been wandering around but it appears to have reacquired by itself solidly now. We're just finishing up our fuel cell purge hydrogen on number 3 is the last to go off. They'll be coming off just in a second.

CAPCOM
Roger, 11. Apollo 11, Houston. We believe we've tracked down the reacquisition problem we had on the previous rev. It looks like it was a receiver power supply here on the ground and no problems in the spacecraft at all. Over.

SC
Okay, glad to hear.

CAPCOM
11, that really winds things up as far as we're concerned on the ground for the evening. We're ready to go to bed and get a little sleep. Over.

SC
Yeah, we're about to join you.

CAPCOM
Rog.

PAO
This is Apollo Control, Houston, 86 hours, 33 minutes. You heard that last exchange. The Mission Control Center has isolated our earlier loss of lock on with the S-Band antenna to a faulty power supply to Goldstone which in turn introduced noisy data causing a ground based receiver to go out of lock. This power supply, a 24 volt one, has already been replaced at Goldstone. In summary, the spacecraft looks good and the difficulty was caused here on the ground. At 86 hours, 34 minutes, we now read our orbit at 64.9 nautical miles apolune, 54.6 nautical miles paralune. This is Apollo Control, Houston. This is Apollo Control, Houston at 86 hours, 52 minutes now into the flight of Apollo 11. Our current altitude on the Apollo 11 spacecraft now reads 64.9 nautical miles. This corresponds with our apolune of 64.9 nautical miles. Our perilune on this pass 54.6 nautical miles. We've had no further conversation with the Apollo 11 crew nor do we expect to do so. We will take the loop down at this time and stand by if any further conversation should develope. At 86 hours, 53 minutes into the flight, this is Apollo Control, Houston.

END OF TAPE

July 20th, 1969

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CDT 00:03 GET 087:31 TAPE 270/1

PAO

This is Apollo Control, Houston, at 87 hours, 31 minutes now into the flight of Apollo 11. The Apollo 11 spacecraft continues on it's front side pass above the moon. We're now less than 10 minutes away from loss of signal. The Apollo 11 crew in - currently in their rest period. We've received no indication yet that any of the crew members are actually sleeping, although all three appear to be in a very restful mode. This will be the final sleep period for the crew. Now at the threshhold of their prime mission objective for the final sleep period prior to landing on the lunar surface and returning. The next scheduled rest period will in fact take place on the surface of the moon. We are now past mid night Central Daylight Time. It is now July 20., the day scheduled for lunar landing. Our current orbital parameters read apolune 67. - correction 64.7 nautical miles, paralune 54.8 nautical miles.., Current spacecraft altitude 54.8 nautical miles. Our time of orbit or little period remains the same 1 hour, 58 minutes, 40 seconds. So at 87 hours, 30 minutes, we wil'l continue to stand by in the event that we have any conversation with the crew. This is Apollo Control, Houston.

END OF TAPE

CDT 00:12 GET 087:40 TAPE 271/1

PAO

This is Apollo control Houston at 87 hours, 40 minutes now in the flight of Apollo 11. Apollo 11 now less than a minute away from loss of signal as it is due to pass over the far side of the moon and out of range with the mission control center as well as the rest of the world. We've had no further conversations with the crew. All spacecraft systems appear in fine shape. We're now less then 30 seconds away from time of loss of signal and standing by. Mark 10 seconds. We've had loss of signal as Apollo 11 passes over the back of the moon.

END OF TAPE

CDT 02:10 GET 089:38 TAPE 272/1

PAO

This is Apollo Control, 89 hours 38 minutes ground Elapsed Time. Coming down - actually, we've had loss of signal on this the seventh lunar revolution of Apollo 11. Should have acquisition again at 90 hours 25 minutes through the Honeysuckle Creek, Australia station. The crew has been asleep about 2 hours, a little over 2 hours when the third man finally went to sleep, Mike Collins, after a brief interchange with the Ground. And 3 hours 57 minutes remaining in the sleep period. Cabin pressure now holding at 4.7 pounds per square inch at a temperature of 69 degrees Fahrenheit. Crew heart rates are running in the 40's. Apollo 11 presently in a lunar orbit with a pericynthion of 55 nautical miles, apocynthion of 64.4 nautical miles. Velocity in lunar orbit, 5363 feet per second. Some 44 minutes 46 seconds until acquisition of signal, as the spacecraft comes around from the far side of the moon on the eighth revolution. And at 89 hours 40 minutes Ground Elapsed Time, this is Apollo Control.

END OF TAPE

CDT 04:08 GET 091:36 TAPE 273/1

PAO

This is Apollo Control 91 hours, 36 minutes ground elapsed time. Less than 1 minute remaining until loss of signal with Apollo 11 as it goes onto the lunar far side in the eighth lunar revolution. Two hours remaining in the crew rest period which means that midway through the next front side pass the crew will be wakened if they're indeed not already awake. Flight Surgeon, Ken Beers, reported just prior to the LOS in a brief exchange here in Mission Control that the crew apparently were all asleep soundly at this time and the Flight Director, Glynn Lunney, asked the spacecraft systems engineers how the spacecraft looked as they approached the LOS point. Coming up on LOS now, mark loss of signal. The spacecraft systems were described by the systems engineers as being looking good. 45 minutes to next - 45 minutes, 28 seconds to next acquisition of signal which will be in ground elapse time 92:23. 92 hours, 23 minutes ground elapse time. And at 91 hours, 37 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 06:00 GET 093:28 TAPE 274/1

PAO

This is Apollo control 93 hours, 29 minutes ground elapsed time. Some 5 minutes away from loss of signal of the Apollo 11 on this revolution. And a wake-up call is expected from the spacecraft communicator Ron Evans here in mission control just prior to the time the spacecraft goes into the - goes over the hill on the lunar far side. Standing by as we wait for him to make his call. Presently, Apollo 11 is in an orbit measuring 64 nautical miles apocynthion, 55.5 nautical miles at pericynthion. Present orbital Velocity around the moon, 5370 feet per second. Spacecraft calculated now to weight 70,321 pounds. Still standing by for wake-up call. Standing by for Ron Evans big moment as he makes his call to the spacecraft. As being the sleep watch, his job has been rather easy or at least he hasn't had too much conversation with - here we go.

CAPCOM
Apollo 11. Apollo 11. good morning from the black team.

SC
Good morning, Houston.

CAPCOM
Good morning. Got about 2 minutes to LOS here, Mike.

SC
Oh my, you guys wake up early.

CAPCOM
Yes, you're about 2 minutes early on the wake up. Looks like you were really sawing them away.

SC
You're right.

CAPCOM
11, Houston. For planning purposes, you can go ahead and take the monocular into the LM with you.

SC
Okay. I'll tell them. All CSM systems working.

CAPCOM
11, Houston. Looks like the command module's in good shape. Black team has been watching it real closely for you.

SC
We sure appreciate that because I sure haven't.

CAPCOM
Say again.

SC
Because I sure have not.

CAPCOM
Roger.

CAPCOM
Apollo 11. Thirty seconds. AOS will be 94 plus 21.

SC
94, 21.

PAO
This is Apollo control. We have had loss of signal from Apollo 11 as it went over the hill. Now tracking through the Madrid station during this series of revolutions. Next acquisition as Apollo 11 comes back around the east limb of the moon and the next revolution will be at 94 hours, 21 minutes ground elapsed time. Some 43 minutes now, and at 93 hours, 36 minutes ground elapsed time, this is Apollo control.

END OF TAPE

CDT 06:53 GET 094:21 TAPE 275/1

PAO
This is Apollo Control. 94 hours, 21 minutes ground elapse time. Should have acquisition of signal as Apollo 11 comes around on the front side of the moon on the 10th revolution. AOS is confirmed. We'll stand by Capcom's call to the crew. We have data coming in now. After having breakfast and getting all squared away after the night's rest period, the crew will have a rather busy day including the first man landing on the moon. Some of the preliminary time's being generated now for maneuvers of the day - will include separation at - a separation burn at 100 hours, 39 minutes, 50 seconds. Here goes the call.

CAPCOM
- standing by.

SC
Houston, Apollo 11.

CAPCOM
Apollo 11, Houston. Go.

SC
Roger. How do you read the biomed in the LMP with the LCG on? Over.

CAPCOM
Roger. Stand by 11.

CAPCOM
Apollo 11, Houston. We have good data on all 3 crewmen. We'll play that - the commander we do not have yet.

PAO
This is Apollo Control following the separation burn at the time of 100 hours, 39 minutes, 50 seconds. The descent orbit insertion burn is now scheduled at 101 hours, 36 minutes, 13.5 seconds. Our descent initiation at 102 hours, 32 minutes, 05.1 seconds. We'll stay up live on the air-ground loop, and continue to monitor any further conversation between spacecraft communicator, Ron Evans, here in mission control and the crew of Apollo 11, which at this time is likely in the middle of their breakfast period.

PAO
This is Apollo Control still standing by as the Apollo 11 - about a third of the way through the front side pass on revolution number 10. Still in the midst of their breakfast period. Various console positions are preparing numbers for maneuver times, attitudes, and so on for the day's activities to pass to spacecraft communicator who in turn will pass them up to the crew. Probably during this pass - members of the white team of flight controllers headed up by Eugene Kranz are drifting into the control room now to relieve the night watch - black team headed by Glynn Lunney. Glynn Lunney will hold a brief change of shift press conference in the Apollo news center in MSC after the handover is complete. We'll continue to monitor the air-ground circuit for any further transmissions from Apollo 11.

END OF TAPE

CDT 07:14 GET 094:42 TAPE 276/1

SC
Houston, Apollo 11, you sent up a very good view of the landing site. We can pick out almost all of the features we've identified previously.

CAPCOM
11, Houston, roger, sounds real fine. And 11, I have your maneuver PAD, and consumables update when ever you want them.

SC
Stand by a little, please.

CAPCOM
Roger, we're standing by. And that's the block data on the maneuver PAD by the way.

SC
Houston, Apollo 11, it's a couple of minutes away from this rolling right 40 degrees to roll 122 pitch 29 yaw 0, over.

CAPCOM
Apollo 11, Houston, roger, we're standing by.

SC
Houston, Apollo 11, ready to copy.

CAPCOM
Roger, Apollo 11, Houston. Here's you're block data. TEI 30, over.

SC
Ready to copy.

CAPCOM
SPS G&N 36 639 your NOUN 48 minus 072 plus 051 your NOUN 33 135 24 40 00, NOUN 81 plus 32 178 plus 06 036 minus 01 304, your pitch 064 the rest is NA. Ullage 2 Jets 16 second, and it's based on LOI REFSMMAT, over.

SC
Roger, TEI 30 SPS G&N 36 639'er, minus 072 plus 051 135 24 4000 plus 32 178 plus 06 036 minus 01 304, pitch 064, 2 Jets 16 seconds, LOI REFSMMAT, over.

CAPCOM
Apollo 11, Houston, read back correct. Your consumables update -

SC
Yeah, go ahead.

CAPCOM
Roger, GET 91 plus 30 minus 7 percent, Alpha minus 8, Bravo minus 2.5, Charlie minus 10, Delta minus 6.5. H2 total minus 2 pounds, oxygen total plus 9 pounds, over.

SC
Okay, thank you, and onboard we're reading non quad Alpha at 75 percent, Bravo 78, Charlie 78, and Delta 77 percent.

CAPCOM
11, Houston, we copy. Apollo 11, Houston, I have your baseline altitude update now. If Buzz is ready to copy.

SC
Go ahead.

CAPCOM
Roger, alpha 1 is 500, that's 500 feet above the landing site, over.

SC
Okay, alpha 1 is 500 feet above the landing site, thank you.

SC
Houston, Apollo 11, our crew status report for sleep, CDR 5.5, CMP 6.0, LMP 5.0, over.

CAPCOM
Apollo 11, Houston, roger, we have that now.

END OF TAPE

CDT 07:31 GET 094:59 TAPE 277/1

PAO
This is Apollo Control. Still F line with the air-ground circuit on the tenth revolution around the moon. The crew reported that the commander had 5 and a half hours of sleep during the night, command module pilot, 6 hours, lunar module pilot, 5 hours. Now 95 hours and 5 minutes into the mission. Another 27 minutes remaining in this pass. Still loss of signal continuing to monitor air-ground circuit. We'll leave it up live until loss of signal.

CAPCOM
Apollo 11, Houston. Over.

SC
Houston, Apollo 11. Go ahead.

CAPCOM
Roger. The Black Bugle just arrived with some morning news briefs if you're ready.

SC
Go ahead.

CAPCOM
Roger. Okay. Church services around the world today are mentioning Apollo 11 in their prayers. President Nixon's worship service at the White House is also dedicated to the mission, and our fellow astronaut, Frank Borman, is still in there pitching and will read the passage from Genesis which was read on Apollo 8 last Christmas. The cabinet and members of congress with emphasis on the senate and house space committies have been invited along with a number of other guests. Buzz, your son, Andy, got a tour of MSC yesterday. Your Uncle Bob Moon accompanied him on the visit which included the LRL. Among the -

SC
Thank you.

CAPCOM
Roger. Among the large headlines concerning Apollo this morning there's one asking that you watch for a lovely girl with a big rabbit. An ancient legend says a beautiful Chinese girl called Chango has been living there for 4000 years. It seems she was banished to the moon because she stole the pill for immortality from her husband. You might also look for her companion, a large Chinese rabbit, who is easy to spot since he is only standing on his hind feet in the shade of a cinnamon tree. The name of the rabbit is not recorded.

SC
Okay, we'll keep a close eye for the bunny girl.

CAPCOM
Roger. You residents of the spacecraft, Columbia, may be interested in knowing that today is Independence day in the country of Columbia. Gloria Dies of the Phillipines was crowned Miss Universe last night. She defeated 60 other girls for the Global beauty title. Miss Dies is 18 with black hair and eyes and measures 34 and 1/2, 23, 34 and 1/2. First runner up was Miss Australia, followed by Miss Israel and Miss Japan. While you're on your way back Tuesday night the Americans and National League allstars will be playing ball in

CDT 07:31 GET 094:59 TAPE 277/2

CAPCOM
Washington. Mel Stottlemyre of the Yankees is expected to be the American League's first pitcher. No one is predicting who will be first pitcher for the National League yet. They had 9 on the roster.

END OF TAPE

CDT 07:51 GET 095:19 TAPE 278/1

CAPCOM
Even though research has certainly paid off the the space program, research doesn't always pay off it seems. The Woodstream Corp., parent company of the Animal Trap Company of America which has made more than a billion wooden spring mouse traps reports that it built a better mousetrap but the world didn't beat a door to its path - didn't beat a path to its door. As a matter of fact, the company had to go back to the old fashioned kind. They said, "We should have spent more time researching housewives and less time researching mice". And the Black Bugle is all completed for the morning.

SC
Thank you very much. We appriate the news.

SC
Black team, we'll be looking for an interesting day with you all tomorrow.

CAPCOM
Roger, we'll be going off here shortly, and we'll pick you up in the morning for sure.

PAO
This is Apollo Control, some 9 minutes 27 seconds remaining until loss of signal on this 10th revolution in lunar orbit. The crew is preparing, now that they've finished breakfast and gotten a lot of the other items out of the way such as the crew checklist and sleep status and so on, preparing for manning the LM for the second time and preparing for the day's activities which will culminate in landing this afternoon. Apollo 11 is presently in an orbit with a pericynthion of 55.7 nautical miles, apocynthion 63.8 nautical miles. Lunar orbit velocity 5368 feet per second. We'll continue to stand by on the air-ground circuit for the remaining 8 minutes of this revolution or until loss of signal. Ground elapsed time now is 95 hours 25 minutes, Apollo Control standing by.

CAPCOM
Apollo 11, Houston. 3 minutes to LOS. AOS at 96 plus 20.

SC
Apollo 11, 9620. Thank you.

PAO
This is Apollo Control. We have apparently had loss of signal from the spacecraft. Here in Mission Control we are in the process of changing shifts. Flight Director Gene Kranz and the white team of flight controllers coming on to replace Flight Director Glenn Lunney. The Capsule Communicator on this shift will be Astronaut Charlie Duke. We'll reacquire the spacecraft again in a little over 45 minutes, coming up on the 11th revolution of the Moon. At 95 hours 34 minutes, this is Apollo Control.

END OF TAPE

CDT 08:10 GET 095:38 TAPE 279/1

PAO
This is Apollo Control at 95 hours, 38 minutes. There will be a change of shift briefing following this shift. We estimate the briefing will begin in about 10 or 15 minutes in the MSC auditorium.

END OF TAPE

CDT 08:51 GET 096:19 TAPE 280/1

PAO
This is Apollo Control at 96 hours 19 minutes. We are now less than 1 minute to reacquiring the spacecraft on the 11th revolution of the moon. Flight Director Gene Kranz since taking over the shift has gone around the room, reviewed the situation with all of his flight controllers. We expect when we reacquire, Buzz Aldrin will be in the LM beginning the LM power up and check out. And he will be rejoined in a short while by Neil Armstrong. We'll stand by now for acquisition of signal as the spacecraft comes around the corner.

PAO
Network says we have acquired signal, we'll stand by for the call to the crew.

CAPCOM
Hello, Columbia, this is Houston, do you read over.

SC
(garbled) Eagle, how do you read, over.
CAPCOM
Eagle, this is Houston, did you call me, over.

SC
Roger, how do you read, over.

CAPCOM
Roger, reading you about 35 (garbled) a lot of noise on the loop. We think it's coming in from Columbia, but we can't tell. We're unable to raise voice with him. Would he switch over to high gain, over.

SC
Okay, I'll have him go to high gain (garbled) here in the background, and I'm up to the point where I turn on the AUTO switch. Would you recommend I hold off a few minutes or go ahead (garbled), over.

CAPCOM
Roger, stand by. Get your high gain to working.

SC
Houston.

CAPCOM
Eagle, this is Houston, you can turn on the IMU, over.

SC
Roger, (garbled).

SC
Houston, this is Columbia, over.

CAPCOM
Columbia, this is Houston, do you read, over.

CAPCOM
Hello, Eagle, this is Houston, we've got the noisy downlink on the down voice backup, would you please turn S-band voice to VOX, over.

CAPCOM
Columbia, this is Houston, do you read, over.

SC
Houston, Columbia, read you loud and clear, how about me?

CAPCOM
Roger, about 3 by. Mike, we've got a lot of noise in the background. It's clearing up now. Eagle, Houston, do you read, over.

SC
Houston, Eagle, about four by four, over.

CAPCOM
Roger, just getting a voice check. Say the page you're of the activation check list, over.

CDT 08:51 GET 096:19 TAPE 280/2

SC
Roger, I'm on page 27, over.

CAPCOM
Roger, understand 27, we copy, out.

CAPCOM
Columbia, this is Houston. Would you please give us P00 in accept, we have a state vector for you, over.

SC
Stand by one.

SC
Houston, Columbia, we have P00 in accept, and how are you reading me now.

CAPCOM
Roger, understand, we have P00 in accept. You're about 3-by in - on the voice, Mike, over.

SC
Okay, you're coming in loud and clear, and I'm - speaking in normal voice. If you've got any switch changes, let me know.

CAPCOM
Roger, we've got the noise somewhere in the system down here, I think. We're working on it. And I've got a 130 landmark update for you, and also a DAP load whenever you're ready to copy, over.

SC
Stand by.

SC
Go ahead with the 130 update.

CAPCOM
Roger, Mike. Coming at you with the 130, T1 is 98 37 35, P2 9'er8 42 44, 4 miles north, over.

SC
Alright, T1 is 98 37 35, P2 98 42 44, 4 miles north of track, and go ahead with your DAP load.

CAPCOM
Roger, CSM weight 36 651, LM 33 627, pitch trim minus .72, yaw trim plus .51, over.

SC
36 651, 33 627, minus .72, plus .51, over.

CAPCOM
Those are good readbacks, out.

SC
Houston, Eagle, are you satisfied with the LGC self test, over.

CAPCOM
Roger, understand, you passed the LGC self test, over.

SC
Negative, I was asking you if you were satisfied with it. As far as I can tell it's satisfactory, and also the primary evap flow is actuated to number 1 and 96 05, over.

CAPCOM
Roger, copy on the primary evap, we've got the low bit rate, Buzz, we couldn't see that LGC self test, over.

SC
Okay.

SC
Houston, Columbia, the docking tunnel index angle remains unchanged.

CAPCOM
Roger, copy, out.

SC
Houston, Eagle is going to secondary transmitter-receiver and secondary power amplifier, and I'll check with you in 60 seconds, over.

CAPCOM
Roger, stand by. We're standing by, over.

END OF TAPE

CDT 09:05 GET 096:33 TAPE 281/1

CAPCOM
Okay.

SC
Roger, Houston. We are through with the computers. You can go back to block. Over.

SC
Houston, Eagle. On secondary transmitter receiver and power amplifier, how do you read? Over. 1, 2, 3, 4, 5. Over.

CAPCOM
Roger. Reading you 5 by, Buzz. How me? 1, 2, 3, 4, 5, 5, 4, 3, 2, 1. Out.

SC
Roger. About the same as before. Switching back to primary.

CAPCOM
Rog.

SC
Houston, Eagle. Back on primary, and I'm ready to proceed with the steerable antenna activation.

CAPCOM
Roger. We're standing by, Buzz. Go ahead. Over.

SC
And I'll go to biomed left - right monentarily.

CAPCOM
Roger.

PAO
LM communications, engineer reports that we're on the LM steerable antenna. This apparently accounts for the quiet communications we're getting at this point.

SC
Houston, eagle. Got a really nice lock on - lock on on the steerable antenna, and you should be receiving biomed light and PCMI. Over.

CAPCOM
Rog, Eagle. We got you 5 by. It's really beautiful. We've got the high bit rate and the biomed. Out. Eagle, Houston. Do you copy? Over.

SC
Roger, copy.

CAPCOM
You got CMP on IRIG 5 and LMP on IRIG 7.

SC
Houston, Eagle. For your information we're doing a glycol pump check now.

CAPCOM
Roger, copy.

SC
And there's the secondary glycol pump.

CAPCOM
Roger.

SC
And I'm on secondary - number 2 pump right now, and I'll hold you for a couple of seconds and then switch back to number 1.

CAPCOM
Roger.

END OF TAPE

CDT 09:15 GET 096:43 TAPE 282/1

CAPCOM
Columbia, Houston. Over.

COLUMBIA
Houston. Go ahead Houston.

CAPCOM
Roger, Columbia. We noticed your DAP configuration. We'd like you to turn off B-3 and C-4, Mike, and for register 2 in the DAP, we'd like all 1's. Over.

COLUMBIA
B-3 and C-4 are both OFF on panel 8 and I understand you want - say again what you want on register 2.

CAPCOM
Roger. In the DAP, we'd like you to load all 1's. Over.

COLUMBIA
All right.

CAPCOM
Columbia, Houston. Did you hit the command reset around - after LOS on the last pass? Over.

COLUMBIA
That's affirmative. When we were having difficulty getting you Charlie, I pushed the command reset to make sure I had control of high gain.

CAPCOM
Roger. Thank you much. We're in good shape now. Over.

COLUMBIA
Okay.

EAGLE
Houston, Eagle. Can you tell me if you're picking up BIOMEDS on the CDR now? Over.

CAPCOM
Stand by.

CAPCOM
Eagle, Houston. We're not getting any BIOMEDS on the CDR now. Over.

EAGLE
Roger, understand.

CAPCOM
Eagle, Houston. We got the BIOMED on the commander now. Over.

EAGLE
Very good. Thank you.

EAGLE
Houston, Eagle. We're ready for an E-Memory dump if you are. Over.

CAPCOM
Roger, we're ready. Go.

CAPCOM
Eagle, this is Houston. We see the OPTICS zero switch on. Before you take some marks, don't forget to cycle it back OFF and ON, and then ON. Over.

EAGLE
Roger, Houston, Eagle. I wish we had one of those OPTICS. I'll tell Mike about it

CAPCOM
Roger. Columbia, excuse me. Sorry about that.

PAO
This is Apollo Control. Armstrong is now in the lunar module, in Eagle, and the LM activation and checkout appears to be going along very well somewhat ahead of schedule.

END OF TAPE

CDT 09:25 GET 096:53 TAPE 283/1

CAPCOM
Eagle, Houston. Could you give us a hack on the time that you switched to LM power and also to verify that we're on glycol pump 1. Over.

EAGLE
This is Eagle. We're on pump 1, stand by for the switchover time.

CAPCOM
Roger.

EAGLE
The switch time to LM power is 95:54:00. Over.

CAPCOM
Roger, copy, Neil. Is Buzz back in the Columbia now? Over.

EAGLE
Yes, he is.

CAPCOM
Roger, thank you.

PAO
This is Apollo Control. We have about 33 minutes left in this pass before loss of signal. Neil Armstrong confirmed that the LM power switch occurred at 95 hours 54 minutes, which would have put that activity about 30 minutes ahead of the flight plan's schedule, and that appears to be about the pace that the crew is holding, that Armstrong and Aldrin are holding and getting the LM activated and checked out. At this time Buzz Aldrin has returned to the command and service module where he will be donning his pressure garment and then rejoin Armstrong in Eagle.

EAGLE
Hello Columbia, this is Eagle on simplex B. How do you read?

COLUMBIA
You are loud and clear in simplex B, Nell.

EAGLE
Roger, read you loud and clear.

EAGLE
Okay, would you configure for simplex A, please.

COLUMBIA
Roger, going to simplex A.

EAGLE
Columbia, Eagle. How do you read on VHF A?

COLUMBIA
Reading you loud and clear on A.

EAGLE
Roger, read you loud and clear.

EAGLE
And I'm ready to get a time hack from you. Load the CSM time.

COLUMBIA
Okay.

COLUMBIA
Do you want the TFM first?

EAGLE
Lets get your clock first and then we'll get TFM.

COLUMBIA
Okay.

EAGLE
Give me a time for load.

COLUMBIA
97:01:30. Correction on that, Neil. 97 - make that 97:03:30.

EAGLE
Okay, I have 97:03:30 put in.

COLUMBIA
Okay, and you've got about a minute to go.

EAGLE
Okay.

COLUMBIA
15 seconds to go. It's in. 5, 4, 3, 2, 1 Mark it. 97:03:30.

EAGLE
Got it.

CDT 09:25 GET 096:53 TAPE 283/2

EAGLE
Okay, lets do a 0665 on my mark.

EAGLE
Did you get that, Mike?

COLUMBIA
Standing by for your mark.

EAGLE
Okay, 3, 2, 1, Mark.

COLUMBIA
97:04:03.86.

EAGLE
Okay, I'm within 3/100th. That's within our ability to keep together, I think.

COLUMBIA
Right.

END OF TAPE

CDT 09:37 GET 097:05 TAPE 284/1

CAPCOM
Okay, now you want to give me CSM verb 05, noun 01 ENTER?

SC
Okay, I give verb 05, noun 01 inert. We're on 17 06 ENTER.

CAPCOM
Roger.

SC
Get ready to copy.

CAPCOM
Go ahead.

SC
Roger. Register 1, 5 balls; register 2, 20017; register 3, 20616. Over.

CAPCOM
Understand R1, 50's; R2, 20017, R3, 20616.

CAPCOM
That's correct. I'm standing by configured to record your PCM data. And I'm ready to start on a ... time ... course align when you are, and when you're ready go min deadband and hold.

SC
Okay, Skipper.

CAPCOM
The minimum deadband attitude, hold.

CAPCOM
Okay, now I need your noun 20.

SC
Okay, I got verb 06, noun 20, give me a mark on it.

CAPCOM
Okay. Mark.

SC
Ready to 1, plus 11202 plus 20741 plus 00211. Over.

CAPCOM
Copy, 11202 20741 00211.

SC
That's correct.

CAPCOM
Eagle, Houston. That course align looked good to us.

SC
Roger.

CAPCOM
Okay, Mike. Your attitude hold's no longer required.

SC
Thank you.

CAPCOM
Okay, Mike. I' d like to copy a noun 20 again - 06 noun 20. Be on my mark.

SC
Standing by for your mark.

CAPCOM
3, 2, 1, stand by. Take it again.

SC
Okay.

CAPCOM
3, 2, 1, MARK.

SC
Okay, I read plus 11154 plus 20792 plus 00230. Over.

CAPCOM
I get - you get 11154, 20792, 00230.

SC
That's correct.

CAPCOM
Eagle, Houston. I -

SC
Okay, Houston. Did you copy your -

CAPCOM
Eagle, Houston. We have the angles. I'll read them back. Over. For the command module,

CDT 09:37 GET 097:05 TAPE 284/2

CAPCOM
11154, 20792, 00230. For the LM, 18995, 02852, 35863. Over.

SC
That's correct for Eagle and Command Module.

CAPCOM
Rog.

SC
Did you get the time? We're 97:14:20.

CAPCOM
Roger, copy. Eagle, out.

CAPCOM
Columbia and Eagle, LOS for both spacecrafts 97:32, AOS 98:18. Houston, out.

END OF TAPE

CDT 09:54 GET 097:22 TAPE 285/1

CAPCOM
Eagle, Houston. We have your gyro torquing angles if you' re ready to copy. Over.

EAGLE
Roger, we're ready to copy.

CAPCOM
Roger, Eagle. For X, minus 00060, Y plus 00620, Z plus 01080. Over.

EAGLE
Understand. X minus 00060, Y plus 00620, Z plus 01080.

CAPCOM
Roger, Eagle. Good readback. Out.

EAGLE
Houston, this is Eagle. Do you want us to go ahead and do a VERB 42 at this time?

CAPCOM
Stand by.

CAPCOM
That's affirmative, Eagle. We'd like you to go ahead and fine align. Over.

EAGLE
Okay.

EAGLE
Houston, Eagle. LMP how do you read? Over.

CAPCOM
Roger, 5 by 5, Buzz. How me? Over.

EAGLE
Oh, loud and clear. I'm going to be going through an ascent battery check. You want to check my BIOMEDS briefly? Over.

CAPCOM
Roger. Go ahead.

CAPCOM
Eagle, Houston. We got a good BIOMED on you, Buzz. Over.

EAGLE
Okay, let me know where it ought to be at this point.

CAPCOM
Roger. You can stay there at that point. When we go LOS, we'd like you to go OFF on the BIOMED. Over.

EAGLE
Roger.

EAGLE
Do you copy those angles, Houston - torquing angles?

CAPCOM
Roger, they're correct. You can torque. Over.

CAPCOM
Apollo 11, Houston. We have about 4 minutes LOS. It makes AOS 98:18. Over.

EAGLE
Eagle, roger.

COLUMBIA
Columbia, roger.

COLUMBIA
Eagle, Columbia.

EAGLE
Columbia, Eagle. Go ahead.

COLUMBIA
Roger, the capture latch is in the probe engroved in the drogue. Would you like to check them from your side?

EAGLE
Allright. Stand by.

EAGLE
Houston, Eagle. ED battery A is 37.0 and battery B is 36.9. Over.

CAPCOM
Roger, copy both of those, Buzz. Out.

CAPCOM
Eagle, Houston. We looked at the E-Memory. It's GO. Over.

EAGLE
Roger, E-Memory, GO.

CDT 09:54 GET 097:22 TAPE 285/2

EAGLE
Mike, the capture latches look good.

COLUMBIA
Thank you.

CAPCOM
Eagle, Houston. We'd like you to go to the OMNI antenna and next AOS, we'd like you to be in FORWARD. Over.

EAGLE
Roger, going to - which OMNI do you want now, AFT?

CAPCOM
Eagle, Houston. We'd like AFT now and FORWARD at AOS. Over.

EAGLE
Roger.

CAPCOM
Apollo 11, Houston. 30 seconds to LOS. Both spacecraft looking good - going over the hill. Out.

PAO
This is Apollo Control. We've had loss of signal now. We'll next acquire the spacecraft in about 46 minutes at a ground elapse time of 98 hours, 18 minutes. During that pass, Armstrong and Aldrin in the lunar module begin checking out activating the lunar module, and they appeared to finish about 30 minutes ahead of the scheduled time in the flight plans. They began early and have maintained the pace. Both spacecraft looking very good at this time. Everything progressing very smoothly. On the next revolution, revolution 12, the crew will continue activation and checkout of lunar module systems. The following revolution, revolution 13, they will undock from the command and service module. At 97 hours, 33 minutes, this is Apollo Control.

END OF TAPE

CDT 10:48 GET 098:16 TAPE 286/1

PAO
This is Apollo Control at 98 hours, 16 minutes. We are now less than 2 minutes from reacquiring the spacecraft in its 12th revolution of the moon. At this time Armstrong and Aldrin should be completing pressure checks on their spacesuits. Coming up in this revolution, they will be running checks on the guidance platform of their LM guidance system. They will also be running checks on the reaction control system thrusters and their descent propulsion system, as well as the rendezvous radar. We will also be giving them the GO/NO GO for undocking in the following revolution. The checkout and activation up to this point has been moving along very smoothly. All systems performing well and we were ahead of the flight plan at the end of the last revolution. We will stand by now to reacquire the spacecraft. The LM and CSM are still docked and Armstrong and Aldrin within the LM. That will be their home for the next 30 hours or so. Now about 45 seconds from reacquiring. We are now about 15 seconds from reacquisition of Apollo 11. Spacecraft currently in an orbit with an apocynthion of 63 and one-half nautical miles and pericynthian of 55.9, as we are continuing to see the apocynthion drop and pericynthian raise as the orbit becomes more and more

circular. We should have acquisition of signals shortly. We will have some noise on the circuits until the LM ,steerable and the CSM high gain antennas are brought into play. CAPCOM Charlie Duke putting in a call to the crew. We'll continue to stand by.

PAO
Charlie Duke asking the crew to verify in the LM that they are on their forward OMNI antenna. We are still awaiting lockup and a stronger signal. We will continue to have noice on the circuit until we get a stronger signal. We do have telemetry data from the spacecraft at this time.

END OF TAPE

CDT 10:58 GET 098:26 TAPE 287/1

COLUMBIA
Houston, Columbia, down voice backup 3.

CAPCOM
Roger, we read you. Columbia did you call over?

COLUMBIA
Affirmative, Don, down voice backup, how do you read me?

CAPCOM
Roger, better, Mike, we're reading you now about 4 by. No voice at all with you earlier. Let's stay in this configuration. Eagle, are you in voice mode, over.

EAGLE
Roger, Eagle is in voice mode, how do you read, over.

CAPCOM
Roger, you're about 3 by now, Buzz. We're satisfied with this COMM configuration, let's stay with where we are, over.

COLUMBIA
Houston, Columbia, is on OMNI Charlie down voice backup, and if you get a chance would you look up the coordinates of 1 30 for me, please. I have been conflicting information between my cue card and my flight plan. I'd like to know which coordinates you want me to use.

CAPCOM
Roger, stand by.

CAPCOM
Columbia, Houston, we're satisfied with what you already have loaded in P22 for these coordinates, over.

COLUMBIA
Thank you, Houston.

CAPCOM
Columbia, Houston, the coordinates you have loaded in 22 are - we have are site 1 30 prime, do you concur, over.

COLUMBIA
No, I have the coordinates loaded on the que card which are for crater 1 30.

CAPCOM
Columbia, Houston, we made an error on those coordinates. We'd like you to load for latitude in a NOUN 89 plus 01 243, longitude over 2 plus 11 844, altitude minus 00 146 as shown in the flight plan, over.

COLUMBIA
Okay, Houston.

CAPCOM
Eagle, Houston, could you give us an idea where you are in the activation, over.

EAGLE
Roger, we're just sitting around waiting for something to do. We need a state vector and a REFSMMAT, mat, (garbled). And we need you to watch our (garbled) load and (garbled) check, over.

CAPCOM
Roger, Eagle, we'll have the state vectors and the REFSMMAT as soon as we get the high gain, over. It will be about another 10 minutes or so before we get through the P22, and when we maneuver to attitude and get the high gain, we'll have the updates for you, over.

EAGLE
Roger, we'll go ahead with the DAP throttle check (garble), okay.

CAPCOM
Roger, understand your going to the adapt throttle check, that's affirmative.

PAO
This is Apollo Control. We'll continue to have rather noisy communications from the spacecraft until the orbital navigation is completed. Mike Collins is preparing

CDT 10:58 GET 098:26 TAPE 287/2

to take marks on a landmark near the prime landing site. This information will be received here in Mission Control and will be used to update the Ground's knowledge of where the spacecraft is, and in turn that information will assist them in setting the precise time for the powered descent. Once the orbital navigation is completed we'll be able to get a high gain antenna and LM steerable antenna lock and we should see some improvement in the communications.

END OF TAPE

CDT 11:10 GET 098:38 TAPE 288/1

EAGLE
Houston, Eagle.

CAPCOM
Go ahead, Eagle. Over.

EAGLE
Roger. In the first of - on page 47 step 1 we had the guidance control in PGNCS and mode control PGNCS AUTO and of course the circuit breakers are not in on the thrusters yet. So when we started through the DAP and proceeded on NOUN 46 and we're looking at NOUN 47 now, so we've got an RCS CWA light and we've got 4 out of the 8 other bright colored red flags. I think that this is explained by the fact that we are in PGNCS and AUTO and unable to fire the thrusters. Over.

CAPCOM
Roger, stand by.

CAPCOM
Eagle, Houston. You are correct. The lights are there and the flags because we haven't closed the breakers yet. Over.

EAGLE
Roger.

EAGLE
And Houston, Eagle. Are you going to use the high gain before you can look at our GDA position indicator?

CAPCOM
Stand by.

CAPCOM
Eagle, Houston. We can see all the throttle data.

EAGLE
I can.

CAPCOM
Go ahead. Over.

EAGLE
I could give you high bit rate on the OMNI if that would help any.

CAPCOM
Negative, we have all the throttle data we need. You can stay low bit rate. You can proceed through the BRAVO test, but do not do the gimbal trim, over. Repeat, do not do the gimbal trim.

EAGLE
Roger, understand.

COLUMBIA
Boy, you just can't mess with the check point (garbled)

COLUMBIA
Auto optics are pointed just a little bit north of crater 130.

CAPCOM
Roger, copy, Columbia. Out.

COLUMBIA
(garbled)

EAGLE
Houston, Eagle. We are ready to pressurize the RCS. Over.

CAPCOM
Stand by.

CAPCOM
Eagle, Houston. You can go ahead with your RCS pressurization, but we would like to hold off on the RCS checkout until we get the high bit rate. Over.

EAGLE
Roger.

CAPCOM
And Eagle, Houston. Have you deployed the landing gear yet? Over.

EAGLE
That's affirmative. The landing gear is out and (garbled)

CAPCOM
Roger.

COLUMBIA
Houston, Columbia. I've completed my marks. I've gone XL command in all 3 axis to prevent that thruster firing that last time.

CDT 11:10 GET 098:38 TAPE 288/2

CAPCOM
Roger.

PAO
Mike Collins reporting that he has completed the marks for landmark tracking. We also got a report from the LM that they have deployed the landing gear, and that report came at 98 hours 45 minutes.

COLUMBIA
Houston, Columbia. Say again on the necessary data on the down link. Let me know and I'll proceed.

CAPCOM
Columbia, stand by on the NOUN 49. Over.

COLUMBIA
Standing by, Houston.

CAPCOM
Columbia, Houston. We got your NOUN 49, you can proceed. Over.

COLUMBIA
Roger.

CAPCOM
Colum - correction, Eagle, Houston. We see the master arm, you can go ahead and correct. We see the press now. Over.

END OF TAPE

CDT 11:20 GET 098:48 TAPE 289/1

SC
Roger. Looks good.

CAPCOM
Roger, Buzz. If you've got - would like, I've got your AGS abort constant. Over.

SC
Ready to copy.

CAPCOM
Roger. For your AGS address 224 plus 60267 225 plus 58148226 plus 70312227 minus 50031. Over.

SC
Roger. 224 plus 60267225 plus 58148226 plus 70312227 minus 50031. Over.

CAPCOM
Roger. Good readback. Out.

SC
Eagle. Columbia, my P22 is complete. I'm continuing this maneuver to AGS cal. attitude.

CAPCOM
Roger, fine. We copy.

SC
Roger.

CAPCOM
Eagle, Columbia, your high gain angles are - corrected Eagle, Houston. Your high gain angles are 165 pitch, yaw 66. Over.

SC
Stand by about another (garbled).

SC
Houston, Eagle. I think I've got you on the high gain antenna now. Roger, out.

CAPCOM
Columbia, Houston. If you go to reacq on the high gain we can acquire you now. Over.

CAPCOM
Eagle, Houston. We got some loads for you if you'll give us P00 and data. Over.

SC
You've got P00 and data.

CAPCOM
Roger. We've got both of you on the high gains now. It sounds great now. Over.

SC
Copy. Rog.

CAPCOM
Columbia, Houston. I have a sep pad if you're ready to copy. Over.

SC
Stand by one.

SC
Ready to copy.

CAPCOM
Roger, Mike. Sep pad. RCS/G&N noun 47 and noun 48 are N/A, noun 33, 100395000, noun 81 is N/A, roll 000007000. Rest of the pad is N/A.

SC
Sep, RCS/G&N at a (garble) of 13950 roll 0 pitch 007 yaw 0. Over.

CAPCOM
Roger. Good readback.

SC
Houston, Eagle. Are you ready for us to start the RCS checkout now?

CAPCOM
As soon as we finish the uplink. Stand by one. Over.

SC
Okay.

SC
Houston, Columbia. Comment on P22. Worked just fine. The crater I marked on is a small crater down inside crater 130 as described by John Young.

CAPCOM
Rog, we copy. Eagle, Houston. On our load - during our load we had to do a verb 96 to stop integration. We're going to start over again on this load.

CDT 11:20 GET 098:48 TAPE 289/2

CAPCOM
Over.

SC
Eagle, rog. And Eagle, here I read out address in the AGS 404, 405 and 406, and I had believed that 405 and 406 would both be all zeros, and I would propose maybe that I reset them to zero. I realize that 404 should be a negative number, and it is minus 13495. Over.

CAPCOM
Roger. Copy.

CAPCOM
Eagle, Houston. Over.

SC
Go ahead.

CAPCOM
Roger. We've got - the only thing we're missing here is the drift check. After we finish our load, we'd like you to do the drift check with Columbia. Over.

END OF TAPE

CDT 11:30 GET 098:58 TAPE 290/1

CAPCOM
Eagle, Houston. The 404, 405, 406 look fine to us. Over.

EAGLE
Roger. I am going to be setting up to zero for undocking. The question is do you want me to reset 404, 405, 406 back to the number that they are now, or can I leave them zero. I intend to set 404 to a minus 13495. Over.

CAPCOM
Stand by.

CAPCOM
Eagle, Houston. We would like you to zero as call out the timeline all three addresses 404, 405, 406 before undocking, after dokking you can load them back to the values that you have right now. Over.

EAGLE
Eagle. Roger.

EAGLE
Houston, Eagle here. Both RCS helium pressures are reading 2900. Over.

CAPCOM
Copy. Out.

CAPCOM
Eagle, Houston. Over.

EAGLE
Go ahead.

CAPCOM
Roger, Buzz. There seems to be some confusion here on 405 and 406. We'd like you to zero them out prior to undocking and after undocking you can - we'd like them still zeroed. Over.

EAGLE
Roger. I agree with that. Thank you.

CAPCOM
Eagle, Houston. We've got the load in - we have reselected P00, your intergration is going again for you. The computer is yours. We'd like to do the drift check now. Over.

EAGLE
Roger. In word. Columbia with flick of the 0620 when you are ready.

COLUMBIA
Standing by here, Neil.

EAGLE
Okay. 3 - 2 - 1 - MARK

COLUMBIA
358.1.64020.73 359.54. Over.

EAGLE
Copy 358.64020.73 and 359.54.

COLUMBIA
That's correct.

CAPCOM
Eagle, Houston. We've copied the angles and will readback if you are ready. Over.

EAGLE
Go ahead.

CAPCOM
Right, Neil.

CAPCOM
For Columbia 3586402073 35954. For Eagle 303742007800053. Over.

EAGLE
That's correct and GET 99 hours and 4 minutes even.

CAPCOM
Roger. Copy. Out.

CAPCOM
Eagle, Houston. Have you initialized the AGS yet? Over.

CDT 11:30 GET 098:58 TAPE 290/2

EAGLE
Negative. I haven't had a state vector yet.

CAPCOM
Roger. Buzz, have you done the 377 yet?

EAGLE
Roger. Standing by for your state vector.

CAPCOM
Roger. Stand by.

CAPCOM
Columbia, Houston. We have a load for you. Could we have P00 and ACCEPT? Over.

COLUMBIA
You got it.

CAPCOM
Roger. Thank you, Mike. And for Eagle, we've got a state vector for you. Over.

EAGLE
Roger. Free to copy.

CAPCOM
Roger, Buzz. K factor coming at you. 90000015. Over.

EAGLE
Roger. 90000015.

CAPCOM
Roger. That's good. That's a good enter there.

END OF TAPE

CAPCOM
Eagle, Houston. We recommend the AGS initial - well, we see it coming up on the AGS initialization. Over.

EAGLE
Roger.

CAPCOM
Eagle, Houston. After the AGS initialization we'll be ready for the RCS checkout.

EAGLE
Roger.

CAPCOM
Columbia, Houston. We got the load in, you can go back to BLOCK.

COLUMBIA
Thank you.

CAPCOM
Columbia, Houston. Did you get a copy in the LM data low-bit rate behind the moon? Over.

COLUMBIA
That's affirmative.

CAPCOM
Roger, stand by.

COLUMBIA
Or at least I've configured for it. I'm not sure Eagle sent it or not.

EAGLE
No, we did not send V-data. Eagle, over.

CAPCOM
Roger, copy.

CAPCOM
Eagle, Houston. The alignment in the initialization looked good to us. Over.

EAGLE
Roger, thank you.

CAPCOM
Apollo 11, Houston. LOS is 99:30, next AOS 100:16. Over.

EAGLE
100:16. Roger.

COLUMBIA
Eagle, Columbia. Let me know when you copy-your RCS hot fire checks so I can disable my ROLL. (garble).

EAGLE
Roger, we're right there now. And we'd like you in CSM in min-deadband and HOLD. Over.

Columbia
That's where I am.

EAGLE
And Houston, you have high bit-rate with us now I believe. We're ready to proceed with the RCS heck.

CAPCOM
Roger, Eagle, we're standing by. We're ready. Over.

EAGLE
Columbia, we'd like wide-deadband at HOLD. Over.

COLUMBIA
Okay, in wide-deadband and HOLD.

COLUMBIA
You got it.

COLUMBIA
Are you' going to do your hot fire now?

EAGLE
Roger.

COLUMBIA
Okay, I'm disabling my ROLL.

COLUMBIA
ROLL is disabled.

EAGLE
Roger.

END OF TAPE

CDT 11:51 GET 099:19 TAPE 292/1

PAO
This is Apollo Control. We have less than 10 minutes now until loss of signal on the twelfth revolution. Before losing contact with the spacecraft, we'll be passing along a GO-NO/GO decision for undocking. That will occur early on the next revolution just prior to reacquiring the spacecraft. Flight Director, Gene Kranz, is going around the control center talking to his flight controllers. We're viewing status in preparation for making the GO-NO/GO decision for undocking.

COLUMBIA
Roger. Would you believe you've got thrusters onboard that vehicle.

EAGLE
He called his decision hot fire is complete.

CAPCOM
Rog, out.

SC
Houston, Eagle. The RCS hotfire is complete. How do you observe it? Over.

CAPCOM
Stand by. Eagle, Houston. The RCS hotfire looks super to us. We're all GO.

EAGLE
Roger. Mike, would you confirm that thruster B3 and B4 are off. Over. And your radar transponder are off.

COLUMBIA
B4 is off B3 is off. Transponder is to heater which is the same as being off, and I've got my roll Jets back on now.

EAGLE
And you're maneuvering. Right?

COLUMBIA
Will be shortly, Neil

CAPCOM
Apollo 11, Houston. We're GO for undocking. Over.

EAGLE
Roger. Understand.

COLUMBIA
Starting a true maneuver to AGS cal attitude.

SC
Houston, Columbia.

CAPCOM
Go ahead, Columbia. Over.

SC
Roger. There will be no television of the undocking. I have all double windows either bullet heads or cameras, and I'm busy with other things.

CAPCOM
We occur. Over.

SC
Okay.

CAPCOM
And, Eagle, Houston. We'd like you to select AFT omni now. It will be good for both LOS and AOS. Over.

EAGLE
Roger. Going to AFT omni.

CAPCOM
Apollo 11, Houston. One minute to LOS.

SC
Columbia, out.

SC
Hello, Columbia. Systems looking good.

PAO
This is Apollo Control. We've had loss of signal now. We'll reacquire the spacecraft again on the thirteenth revolution in about 45 minutes. At the

CDT 11:51 GET 099:19 TAPE 292/2

PAO
end of this pass, we passed along the GO for undocking. That maneuver will occur just before we reacquire the spacecraft on the thirteenth revolution and will be followed in about 30 minutes later by a small separation maneuver performed by Mike Collins in the command module. Checkout of the LM has been going extremely well up to now ahead of schedule. Both vehicles look very good. At 99 hours, 31 minutes, this is Apollo Control, Houston.

END OF TAPE

CDT 12:46 GET 100:14 TAPE 293/1

PAO
This is Apollo Control at 100 hours, 14 minutes. We are now less than 2 minutes from reacquiring the spacecraft on the thirteenth revolution. When next we hear from them the lunar module should be undocked from the command and service module. We're presently about 25 minutes away from the separation burn which will be performed by Mike Collins in the command module to give the LM and the CSM a separation distance after descent orbit insertion maneuver of about 2 miles. We have

some times on the upcoming evnts. The separation maneuver is scheduled to occur at a ground elapsed time of 100 hours, 39 minutes, 50 seconds, the descent orbit insertion maneuver which will be performed on the backside of the moon set for 101 hours, 36 minutes, 14 seconds, and the beginning of the powered descent at 102 hours, 33 minutes, 4 seconds. We're now 55 seconds from reacquiring Apollo 11 on the thirteenth revolution. During this revolution we will be doing the separation maneuver. We'll also be giving the crew on the lunar module a GO-NO/GO for the descent orbit insertion maneuver. We'll stand by now to reacquire the spacecraft. We have confirmation of acquisition of signal. We'll stand by for a call to the Crew.

END OF TAPE

CDT 12:48 GET 100:16 TAPE 294/1

CAPCOM
Hello, Eagle, Houston. We're standing by. Over.

EAGLE
Houston. We see you on the steerable. Over.

EAGLE
Roger. Eagle. Stand by.

CAPCOM
Roger. How does it look?

EAGLE
The Eagle has wings.

CAPCOM
Roger.

EAGLE
Looking good.

CAPCOM
Roger, Neil. We got a - if you will give us 2 and data, we got the loads for you.

EAGLE
Okay, you've got it. 2 and data.

CAPCOM
Roger. Let us' know when you are ready to copy. We have a DOI pad, and a PDI pad. Over.

EAGLE
You check that tracking light, Mike? Back on? Okay, I'm ready to start my YAW maneuver if it suits you, Mike.

EAGLE
Look like you are going to be able to do this without burning thrusters, Mike?

EAGLE
Go ahead, Houston, Eagle is ready to copy.

CAPCOM
Roger, Eagle. Coming at you with a DOI pad. 101361407 981 minus 00758 plus all balls plus 00098 plus corrections 00572 perigee plus 00085 00764 030000293 986 minus 00759 plus all balls plus 00090 rest of the pad is NA. Stand by on your readback. If you are ready to copy the PDI data, I have it for you. Over.
EAGLE
Go ahead.

CAPCOM
Understand you are ready to copy the PDI data, Eagle. Over.

EAGLE
That's affirmative. Go ahead with the PDI.

CAPCOM
Roger. PDI pad, PIG 102330436 0950 minus 00021 182287000 plus 56919 , PDI aborts less than 10 minutes. 105123000, PDI abort greater than 10 minutes, 103400000 107113000, no PDI plus 12, 102442700, NOUN 81 plus 01223, minus all balls, plus 01889, 01520 plus 00110, 02250, burn time 046000190 plus 01187 plus all balls plus 01911 NOUN 11 103310700, NOUN 37 105123000. Ready for your readbacks. Over.

CAPCOM
Eagle, Houston. We are through with the computer. You can go back to bark. Over.

EAGLE
Roger. Back to bark and DOI, 101261407 minus 00758 plus all zeros, plus 00098 00572 plus 0085 00764 030000293 minus 000759 plus all zeros plus 00090 . NA. Over.

CDT 12:48 GET 100:16 TAPE 294/2

CAPCOM
That was a good readback, Buzz. Go ahead. Over.

EAGLE
Okay. PDI pad. 102330436, 0950 minus 00021, 182287000 plus 569019. PDI less than 10. 105123000 PDI greater than 10, 103400000 107113000, no PDI plus 12 abort. 102441700, plus 01223 minus all zeros, plus 01889 01520 plus 00110, 02250 046 000 190 plus 01187 plus 00000 plus 019011 103310700 105123000. Over. CAPCOM Roger. Good readback, Buzz. Out.

END OF TAPE

CDT 12:59 GET 100:27 TAPE 295/1

COLUMBIA
Neil, I'm maneuvering in roll.

EAGLE
Roger, I see you.

EAGLE
Houston, Eagle Are you copying the (garbled) large numbers for range and range rate in VERB 83, and did you just give us a state vector that changed one of the 2 vehicles? Over.

CAPCOM
Roger, Eagle. We gave you a LM state vector. We have not changed the CSM state vector, however. Over.

EAGLE
Okay, that explains it. Over.

CAPCOM
Columbia, Houston. On my mark 9:30 to ignition. Mark, 9:30.

CAPCOM
Eagle, Houston. Would you have Columbia go to the high gain, yaw 0, pitch minus 20. Over.

EAGLE
You want him to go to high gain yaw 0? Say again the numbers.

CAPCOM
Roger, Neil. Yaw 0, pitch minus 20 high gain angles. Over.

EAGLE
Okay, yaw 0, pitch minus 20 on the high gain.

CAPCOM
That's affirmative. We've lost all data with him.

EAGLE
Columbia?

EAGLE
He says he'll do that as soon as he gets around there.

CAPCOM
Roger.

EAGLE
Okay.

CAPCOM
Columbia, Houston. How do you read?

COLUMBIA
I hear you loud and clear, Houston. How me?

CAPCOM
Roger, Mike, 5 by. On my mark 7 minutes to ignition. Mark 7 minutes.

COLUMBIA
I got you.

COLUMBIA
Everything's looking real good.

PAO
This is Apollo Control. We are now 6 minutes 8 seconds from ignition and -

CAPCOM
Houston. You are looking good for separation. You are GO for separation, Columbia. Over.

COLUMBIA
Columbia, understand.

COLUMBIA
We're really stabilized, Neil. I haven't fired a thruster in 5 minutes.

COLUMBIA
I made a small trim maneuver.

EAGLE
Mike, what's going to be your pitch angle at SEP?

COLUMBIA
007 degrees.

EAGLE
Okay.

COLUMBIA
Is that close enough for you or do you want it to a couple of decimal places.

CDT 12:59 GET 100:27 TAPE 295/2

EAGLE
No, that's good.

COLUMBIA
I think you've got a fine looking flying maching there, Eagle, despite the fact you're upside down.

EAGLE
Somebody's upside down.

END OF TAPE

CDT 13:09 GET 100:37 TAPE 296/1

COLUMBIA
Okay Eagle, 1 minute until T. You guys take care.

EAGLE
See you later.

COLUMBIA
Houston, Columbia. My DSKY is reading 4.9, in X, 5.0, make it and EMS 105.4. Over.

CAPCOM
Roger, copy. Columbia, it looks good to us. Over.

CAPCOM
Columbia, Houston. We'd like you to terminate average G. Over.

COLUMBIA
Roger, in P00.

PAO
This is Apollo Control. That separation was performed as scheduled. In the command module, a DELTA V of about 2.5 feet per second, which give a separation to the 2 vehicles of about 1100 feet at the beginning of the descent orbit insertion maneuver.

EAGLE
Going right down U.S. 1, Mike.

END OF TAPE

CDT 13:19 GET 100:47 TAPE 297/1

COLUMBIA
Eagle, at your convenience, I would like to switch over to VHF ranging marks.

EAGLE
Roger. Let's go to VHF ranging now.

COLUMBIA
On your MARKS.

COLUMBIA
Eagle, Columbia. I am reading you loud and scratchy. Neil is not coming through too well on his box. Could you be quiet for 15 seconds while I get this locked on.

EAGLE
Okay.

COLUMBIA
I've got a solid lock on a heading (garble) .27 miles.

CAPCOM
Eagle, Houston. We've got a state vector for you. We'd like P00 and data. Over.

EAGLE
You have it.

CAPCOM
Thank you, sir.

CAPCOM
Columbia, Houston. We have a CSM rescue pad if you are ready to copy. Over.

COLUMBIA
Ready to copy.

CAPCOM
Thanks, Mike. Phasing PIG 103400000 TPI for PDI less than 10, 105123000, TPI for PDI greater than 10, 107113000. Over.

COLUMBIA
Roger. PIG's follow phasing 10340 PDI less than 10 1051230 more than 10 1071130. Over.

CAPCOM
Good readback. Out.

CAPCOM
Eagle, Houston. When you are ready to copy, I have a lunar surface data pad for you. Over.

EAGLE
Roger. Stand by.

CAPCOM
We've got the load in, Eagle. You can go back up datalink. Over.

EAGLE
Roger.

CAPCOM
Columbia, Houston. At your convenience we'd like P00 and ACCEPT. We have a couple of state vectors for you. Over.

COLUMBIA
Okay. Go into P00 and ACCEPT and I just got some unexplained ROLL thruster activity. I may have bumped the hand control.

CAPCOM
Roger. We will look at it.

COLUMBIA
(Garble)

EAGLE
Eagle is ready to copy lunar surface data pad.

CAPCOM
Roger, Buzz. Starting with the P2, P2 PIGS 102542900 103515600 106373500 109100000. In the remarks P2 occurs at PDI plus 2126. P3 PIG 104394100 001581500 001585400, NOUN 11 105362300107113000. Ready for your readback. Over.

CDT 13:19 GET 100:47 TAPE 297/2

EAGLE
Roger P2 102542900 103515600 106373500 109100000 P2 is PDI plus 2126 P3 104394100 001581500 001585400 105362300 107113000. Over.

CAPCOM
Roger. Good readback, Eagle. Out.

COLUMBIA
Put your tracking light on, please.

EAGLE
It's on, Mike.

COLUMBIA
Thank you.

CAPCOM
Columbia, Houston. We've got the load in. You can go back to block. Over.

COLUMBIA
Is that for Columbia.

CAPCOM
That's affirmative, Columbia.

COLUMBIA
Okay. Thank you.

END OF TAPE

CDT 13:29 GET 100:57 TAPE 298/1

CAPCOM
Mike, you want to gives us a mark when you're at 7 miles - I mean 7/10ths of a mile.

COLUMBIA
Will do.

CAPCOM
Okay, we just got 7/lOths on the radar.

COLUMBIA
Mark, I'm oscillating between 69 and 7/10ths.

CAPCOM
Very good, we got 4200 on the data meter.

COLUMBIA
I'm steady on 70 now. I read you sort of scratchy, but I read you.

COLUMBIA
Houston, Apollo, or Houston, Columbia, over.

CAPCOM
Roger, Columbia, over.
COLUMBIA
Do I still need a DOI P76 pad, and a PDI plus 12 P76 pad sometime at your convience.

CAPCOM
Roger, stand by.

CAPCOM
Columbia, Houston. DOI P76 pad, if you' re ready to copy, over.

COLUMBIA
Ready to copy.

CAPCOM
Roger, Mike. NOUN 80 - correction NOUN 84 minus 00 758 plus all zero's plus 00 09 8, NOUN 33 101 36 14 00, and stand by for the PDI plus 12.

COLUMBIA
Roger.

CAPCOM
Columbia, Houston, with the PDI plus 12 NOUN 84, if you're ready to copy.

COLUMBIA
Ready to copy.

CAPCOM
Roger, NOUN 84 plus 01 223 minus all zero's, plus 01 889, NOUN 33 102 44 27 O0 PDI plus burn time is 046, burn time for DOI is 030. Ready for your read back, over.

COLUMBIA
Roger, PDI P76 84 minus 00758 all balls plus 00098, at 101 36 1400 plus 01 223 minus all balls plus 01 889 102 44 27 O0 burn 46 and 30 seconds.

CAPCOM
Roger, one error, Columbia, on the TIGN for DOI, seconds was 14 07, over.

COLUMBIA
Roger, 14 07.

CAPCOM
Roger. Columbia, Houston, we'd like you to turn off your rotational direct - rotational control power direct number 2 off, over.

COLUMBIA
It's off, thank you.

CAPCOM
Columbia, Houston. On those P76's a friendly reminder from your Fido, add half the burn time to the TIGN, over.

COLUMBIA
Roger.

END OF TAPE

CDT 13:39 GET 101:07 TAPE 299/1

CAPCOM
On those P76's a friendly reminder from your FIDO, and half the burn time to the TIG. Over.

COLUMBIA
Roger.

PAO
This is Apollo Control. We're coming up on 15 minutes now until loss of signal with the lunar module. Flight Director, Gene Kranz, has - has advised his flight controllers to review all their data, take a good close look at the spacecraft, and in preparation for a GO-NO/GO decision on the descent orbit insertion.

CAPCOM
Columbia, Houston. We've lost our data with Eagle. Will you please have him select AFT omni. Over.

COLUMBIA
Eagle, this is Columbia. Houston would like you to select AFT omni.

EAGLE
Rog. I got it now. Houston, you reading Eagle now on AFT omni?

CAPCOM
That's affirmative, Eagle. Reading you 5 by.

EAGLE
Roger.

CAPCOM
Columbia, Houston. We'll have LOS at 101:28. AOS for you 102:15. Over.

COLUMBIA
Thank you.

END OF TAPE

CAPCOM
Eagle, Houston. It appeared to us when you were doing the P52 maneuvering the S-band, the high gain, went into the stop. Verify that both S-band breakers are in. Over.

EAGLE
Roger, I think I'd gone up to 90 0 before it went there. The one on this side is in and I'll check the other later.

CAPCOM
Okay, thank you, Buzz.

CAPCOM
Eagle, Houston, you are GO for DOI. Over.

EAGLE
Roger, GO for DOI. Do you have LOS and AOS times?

CAPCOM
Roger, for you LOS at 101:28. AOS 102:16. Over.

EAGLE
Roger, copy.

CAPCOM
And Buzz, our S-band steerable update for you on the angles after AOS 219 and yaw 30. Over.

EAGLE
Roger, that's in the flight plan. Thank you.

COLUMBIA
Houston, Columbia. How are all the systems looking?

CAPCOM
Say again. Over.

COLUMBIA
Just wanted to get a systems check from you sometime prior to LOS.

CAPCOM
Roger.

EAGLE
Houston, Eagle. You can - torquing angles NOUN 93 on 4 zeros and a 3 are minus 00292 plus 00289 minus 00094.

CAPCOM
Roger, copy. Stand by.

CAPCOM
Roger, Eagle, you can torque it. Over.

EAGLE
Roger, copy.

CAPCOM
Columbia, Houston. Your systems are looking good going over the hill. Approximately 7 minutes to LOS.

COLUMBIA
Thank you.

CAPCOM
Eagle, Houston. Flick the biomed to commander. Over.

EAGLE
Roger, he's on.

CAPCOM
Thank you, sir.

CAPCOM
Eagle, Houston. We've lost the high bit rate. Would you please select low bit rate? Over.

EAGLE
(garbled)

CAPCOM
And Eagle on my mark we'll have 12 minutes to ignition. Over.

EAGLE
Roger.

CAPCOM
Eagle, Houston. Stand by for my mark. Mark 12 minutes to ignition.

EAGLE
We copy.

CAPCOM
Columbia, Eagle, Houston. 3 minutes LOS. Both looking good going over the hill.

COLUMBIA
Columbia, roger.

EAGLE
Eagle rog.

END OF TAPE

CDT 13:59 GET 101:27 TAPE 301/1

PAO
This is Apollo Control. We've had loss of signal now, and the spacecraft Eagle has been given a GO for descent orbit insertion. That maneuver to occur in 7 minutes 40 seconds. Out of contact - out of radio contact, the DOI maneuver scheduled to come at 101 hours, 36 minutes, 14 seconds, and it will be a 76.4 foot per second burn. The burn duration 29.8 seconds, and the resulting orbit for the LM will be 57.2 by 8.5 nautical miles. When next we acquire the lunar module, it should be at an altitude of about 18 nautical miles on its way down to a low point of about 50,000 feet from where the powered descent to the lunar surface will begin. As the spacecraft went around the corner, all systems on both vehicles looked very good. Everything is GO here in mission control and aboard the spacecraft for the descent orbit insertion to occur in 6 minutes, 38 seconds. This is Apollo Control, Houston, at 101 hours 29 minutes.

END OF TAPE

CDT 14:07 GET 101:35 TAPE 302/1

PAO
This is Apollo Control at lOl hours, 35 minutes. We're. now. less than one minute from the scheduled time for the descent orbit insertion maneuver performed by the lunar module on the backside of the moon. Of course, we don't have radio contact with the spacecraft. In mission control here normally maneuvers of that sort would be monitored on plot boards in front, and we have the boards set up there for the powered descent. To occur about 1/2 rev from now over landing site 1. Flight controllers standing around in little groups. Not much that we can do at this point until reacquiring spacecraft. We're now 20 minutes - or 20 seconds rather from ignition on the descent orbit insertion. It will be a 29.8 second burn of the 9800-pound thrust descent propulsion system. We should be burning at this time. The result of this maneuver will be to put the spacecraft into an orbit 57.2 by 8.5 nautical miles, and it would remain in that orbit until powered descent.

PAO
We should have a cut off by this time. That should have completed descent orbit insertion maneuver. We would expect to reac-

quire the command module first. Command module acquisition time is 102 hours, 14 minutes, 38 seconds. That will be just about 2 minutes prior to the time that we will have reacquired the lunar module. The LM acquisition time is 102 hours, 16 minutes, 25 secomds. That is about 37 minutes, 20 seconds from now on the CSM at about a little less than 2 minutes longer than that for the LM. At 101 hours, 37 minutes, this is Apollo Control, Houston.

END OF TAPE

CDT 14:26 GET 101:54 TAPE 303/1

PAO
This is Apollo Control at 101 hours, 54 minutes. We're now about 20 minutes, 45 seconds from reacquiring the command module on the 14th revolution. The time until the ignition for the power descent is 38 minutes, 55 seconds. Here in mission control, people still standing and waiting. I believe back in the viewing room, we probably have one of the largest assemblages of space officials that we've ever seen in one place. Included among the viewers are Dr. Thomas Paine, NASA Administrator, Jim Elms, Director of the Electronic Research Center at Cambridge, Dr. Abe Silverstein, Director of NASA's Lewis Research Center, Rocco Petrone, Director of Launch Operations at Kennedy Space Center is there. From Marshall Space Center, we have Dr. Wernher von Braun, the Director, and his Deputy, Dr. Eberhard Rees. Also a large number of Astronauts including Tom Stafford, Gene Cernan, Jim McDivitt, and John Glenn. We also see Dr. Kurt Debus, Director of the Kennedy Space Center, Dr. Edgar Cortright, Director of the Langley Research Center. Dr. S. Draper, Director of the Massachusetts Institute of Technology Instrumentations Laboratory is also in the viewing room. Here in the control room proper down on the floor a number of Astronauts including Pete Conrad, Fred Haise, Jim Lovell, and Bill Anders, and Donald K. Slayton, Director of Flight Crew Operations at the Manned Spacecraft Center. Sitting beside us in the back row of consoles here is Dr. Robert Gilruth, Director of the Manned Spacecraft Center. Further down on the line is General Sam Phillips, Director of the Apollo Program. Also Chris Kraft is here, Director of Flight Operations at the Manned Spacecraft Center, and George Low of the Apollo Spacecraft Program Manager. We also see in the back viewing room, Secretary of the Air Force, Seamans, and many others who I'm sure we can't see through the glass. We're now 18 minutes, 10 seconds until reacquisition of the spacecraft. Ignition for the power descent to the lunar surface is 36 minutes, 30 seconds away. At 101 hours, 57 minutes, this is Apollo Control, Houston.

END OF TAPE

CDT 14:44 GET 102:12 TAPE 304/1

PAO
This is Apollo Control at 102 hours 12 minutes into the flight of Apollo 11. We're now 2 minutes 53 seconds from reacquring the spacecraft, 21 minutes 23 seconds from the beginning of the powered descent to the lunar surface. It's grown quite quiet here in Mission Control. A few moments ago Flight Director Gene Kranz requested that everyone sit down, get prepared for events that are coming, and closed with a remark "Good luck to all of you". Here on the front of our display boards we have a number of big plot boards which will be used to keep track of the burn progress. Along the more important of those is one which will show the performance on onboard guidance systems, both the primary and the back up guidance system and compare the guidance systems with the Manned Space Flight Network tracking. These displays, by the time this is all over, will look a great deal like a combination Christmas tree and Fourth of July. We're now 1 minute 39 seconds from reacquiring the command module, Columbia. Acquisition of the lunar module will come a little less than 2 minutes after that. At the time we acquire the LM it should be at an altitude of about 18 nautical miles descending toward the 50,000 foot pericynthion from which point the powered descent to the lunar surface will be initiated. If for any reason the crew does not like the way things look as they are coming across the pericynthion, simply by not initiating the maneuver they will remain in a safe orbit of 60 miles by 50,000 feet, and if they desired they would be able to attempt the powered descent on the following revolution at a ground elapsed time of about 104 hours 26 minutes. We're now coming up on 30 seconds to acquisition of the command module and we'll stand by for that event.

PAO
Now work controller says we have acquisition of signal from the command module.

CAPCOM
Columbia, Houston. We're standing by. Over.

CAPCOM
Columbia, Houston. Over.

COLUMBIA
Houston, Columbia. Reading you loud and clear. How me?

CAPCOM
Roger. 5 by, Mike. How did it go? Over.

COLUMBIA
Listen, babe, everything's going just swimmingly. Beautiful.

CAPCOM
Great. We're standing by for Eagle.

COLUMBIA
Okay, he's coming around.

CAPCOM
We copy. Out.

CAPCOM
And Columbia, Houston. We expect to loose your high gain sometime during the powered descent. Over.

COLUMBIA
Columbia. Roger. You don't much care do you.

CAPCOM
No, sir.

PAO
We have acquisition of sign'al from the LM.

CDT 14:44 GET 102:12 TAPE 304/2

EAGLE
Houston, Eagle. How do you read?

CAPCOM
5 by, Eagle. We're standing by for your burn report. Over.

EAGLE
Roger. The burn was on time. The residuals before knowing: minus 0.1 minus 0.4 minus 0.1, x and z now to zero.

PAO
We're attempting to restore antenna lock through the big 210 foot dish at Goldstone. We'll stand by.

CAPCOM
Columbia, Houston. We've lost all data with Eagle. Please ask him to reacquire to high gain. Over.

COLUMBIA
Eagle, this is Columbia. Houston would like you to reacquire on the high gain antenna.

COLUMBIA
Eagle, did you copy Columbia?

CAPCOM
Eagle, Houston. Did you call?

EAGLE
Eagle, Houston - Houston, Eagle. How do you read now?

CAPCOM
Roger. 5 by, Neil. We copied up to the AGS residuals. Would you please repeat the AGS residuals in the trim- correction - the sun check? Over.

EAGLE
Roger. AGS residuals: minus O. 1, minus 0.2, minus 0.7, and we used the PGNS Noun 86 for Delta-Vz which was 9.5, which is yours which is 9.1, and I believe that may explain the difference. Apogee 57.2, perilune 9.1, sun check, the 3 mark Noun 20 minus Noun 22, plus 0.19 plus 0.16 plus 0.11. Over.

CAPCOM
Roger. Copy. Looks great.

PAO
Guidance says we're GO.

PAO
Now 12 minutes, 54 seconds to ignition. Gene Kranz just replied his flight controllors were off to a good start. Play it cool.

PAO
12 minutes now until ignition for powered descent. Everything still looking very good at this point.

PAO
We presently show the LM at an altitude of 12.9 nautical miles and descending.

EAGLE
It's Eagle again. Landing side of the high gain. Over.

COLUMBIA
Eagle, this is Columbia. Houston reminds me again to request you go to - try the high gain.

CAPCOM
Eagle, Houston. We have you now. How do you read? Over.

EAGLE
Loud and clear.

CAPCOM
Roger. We see your Verb 47.

EAGLE
Yes, I know what the problem was there. It just started oscillating around in yaw. According to the needle we're picking up a little isolation right now, as a matter of fact.

CAPCOM
Roger. We'll work on it.

PAO
Aldrin is referring to the LM steerable antenna. That comment about the oscillations.

CDT 14:44 GET 102:12 TAPE 304/3

EAGLE
Horizon checklist right on time.

CAPCOM
Roger.

EAGLE
Did you copy the star - I mean the sun check, Charlie?

CAPCOM
That's affirmative. We did, Buzz. Out.

PAO
Eagle is now at 10.7 nautical miles, 7 minutes 37 seconds from ignition.

CAPCOM
Eagle, Houston. The AGS initialization looked good to us. Over.

EAGLE
Roger.

EAGLE
Our radar check indicates 50,000 foot build in our visual altitude checks. It's 80 and out about 53,000.

CAPCOM
Roger, copy.

EAGLE
And, Houston, we got a 500 alarm early in the program. Went to descent I, proceeded on it and we're back at AUTO again. Over.

CAPCOM
Roger. We saw that, Buzz. Thank you much. Out.

EAGLE
Alright. I think in - okay, that wasn't an alarm. That was a code. Okay.

CAPCOM
Roger. We saw that.

CAPCOM
Eagle, Houston. We recommend if you yaw 10 right, it will help us on the high gain signal strength. Over.

PAO
Coming up on 5 minutes to ignition. Gene Kranz getting a GO/NO GO for. descent.

CAPCOM
Eagle, Houston. If you read, you're a GO for powered descent. Over.

COLUMBIA
Eagle, this is Columbia. They just gave you a GO for powered descent.

CAPCOM
Columbia, Houston. We've lost them on the high gain again. Would you please - we recommend they yaw right 10 degrees and reacquire.

COLUMBIA
Eagle, this is Columbia. You're GO for a PDI and they recommend you yaw right 10 degrees and try the high gain again.

COLUMBIA
Eagle, you read Columbia?

EAGLE
Roger, read you.

COLUMBIA
Okay.

CAPCOM
Eagle, Houston. We read you now. You're go for PDI. Over.

EAGLE
Roger. Understand. Elevate the GO circuit breaker. Second gimbal AC, closed. Second gimbal AC closed? Circuit breaker and override off. Gimbal enable. 8 scale 45.

CAPCOM
Eagle, Houston. You're alignment is GO on the AGS. On my mark, 3:30 until ignition.

EAGLE
Roger.

CAPCOM
Mark, 3:30 until ignition.

EAGLE
Roger. Copy. Our translation force is -

CDT 14:44 GET 102:12 TAPE 304/4

EAGLE
Balanced couple ON, TA throttle, MINIMUM, throttle, AUTO, CDR, STOP BUTTON, RESET, STOP BUTTON, Check ABORT-ABORT STAGE RESET, ATT. CONTROL, 3 of them to MODE CONTROL, PGNS MODE CONTROL is SET, AGS is reading 400 plus 1, standing by for arming.

PAO
Buzz Aldrin reading off the checklist there to Neil Armstrong.

EAGLE
Hit VERB 77. Okay, sequence camera coming on.

CAPCOM
Eagle, Houston. If you'd like to try high gain pitch 212, yaw 37. Over.

EAGLE
Roger. I think I've got you on high gain now.

CAPCOM
Roger.

PAO
Coming up on 1 minute to ignition.

EAGLE
Say again the angles. Over.

CAPCOM
Roger.

EAGLE
We put them in to use them before we yaw around.

CAPCOM
Roger. Pitch -

END OF TAPE

CDT 15:05 GET 102:33 TAPE 305/1

EAGLE
angle bolt, let them in to use them before we go around.

CAPCOM
Roger. PITCH 212, YAW plus 37.

EAGLE
Copy. Over.

PAO
Current altitude about 46,000 feet, continuing to decend.

EAGLE
AGS on. (Garble) ten percent

CAPCOM
Columbia, Houston, we lost em tell em to go aft OMNI. Over.

EAGLE
(Garble)

COLUMBIA
Say again, Neil.

EAGLE
I'll leave it in SLEW. See if they have got me now. I've got good signal strength in SLEW.

COLUMBIA
See if you're getting them now, Houston.

CAPCOM
Eagle, we've got you now. It's looking good. Over.

EAGLE
You think that looks good?

CAPCOM
Eagle, Houston. Everything is looking good here. Over.

EAGLE
Roger. Copy.

CAPCOM
Eagle, Houston. Aft Yaw around angles S-band PITCH minus 9 YAW plus 18.

EAGLE
Copy.

EAGLE
AGS and PNGS agree very closely.

CAPCOM
Roger.

EAGLE
Rate on. Altitudes are a bit high.

PAO
2 minutes, 20 seconds everything looking good. We show altitude about 47,000 feet.

EAGLE
Houston. I'm getting a little fluctuation in the AC voltage now.

CAPCOM
Roger.

EAGLE
Could be our meter, maybe huh?

CAPCOM
Stand by. Looking good to us. You're still looking good at 3, coming up 3 minutes.

EAGLE
(Garble) Looks real good. (Garble). Our positions check downrange here seems to be a little long.

CAPCOM
Roger. Copy.

EAGLE
Altitude rate about 2 feet per second greater than it ought to be. (Garble).

EAGLE
Altitude (Garble) I think it's gonna drop.

END OF TAPE

CDT 15:10 GET 102:38 TAPE 306/1

CAPCOM
I think it's going to stop.

CAPCOM
Eagle, Houston. You are go. Take it all at 4 minutes. Roger, you are go - you are go to continue power descent. You are go to continue power descent.

EAGLE
Roger.

PAO
Altitude 40,000.

CAPCOM
And Eagle, Houston. We've got data dropout. You're still looking good.

EAGLE
PGNCS we go good lock on. Altitude lights out. Delta H is minus 2900.

CAPCOM
Roger. We copy.

EAGLE
And the earth right out our front window.

EAGLE
Houston, you're looking at our Delta H. Program alarm.

CAPCOM
That's affirmative. It's looking good to us. Over.

EAGLE
12 02, 12 02.

PAO
Good radar data. Altitude now 33,500 feet.

EAGLE
Give us the reading on the 12 02 program alarm.

CAPCOM
Roger. We got - we're go on that alarm.

EAGLE
Roger. P30.

CAPCOM
6 plus 25 throttle down.

SC
Roger, copy. 6 plus 25.

PAO
We're still GO. Altitude 27,000 feet.

EAGLE
Alarm. It appears to come up at 16 68 up.

CAPCOM
Roger, copy. Eagle, Houston. We'll monitor your Delta-H.

EAGLE
Delta-H is looking good now.

CAPCOM
Roger, Delta-H is looking good to us. Right on time.

EAGLE
Throttle down better than in the simulator.

CAPCOM
Rog.

EAGLE
AGS and PGNCS look real close.

PAO
Altitude now 21 thousand feet. Still looking very good. Velocity down now to 12 hundred feet per second.

CAPCOM
You're looking great to us, Eagle.

EAGLE
Okay, I'm still on slough so we may tend to loose as we gradually pitch over. Let me try auto again now and see what happens.

CAPCOM
Roger.

EAGLE
Okay, looks like it's holding.

CAPCOM
Roger, we got good data.

CDT 15:10 GET 102:38 TAPE 306/2

PAO
Seven minutes 30 seconds into the burn. Altitude 16 thousand 3 hundred feet.

CAPCOM
Eagle, Houston, it's descent 2 fuel to moniter, over.

EAGLE
72.

PAO
Altitude 13 thousand 5, velocity 91 hundred feet per second.

EAGLE
Made it switch over time please, Houston.

CAPCOM
Roger, stand by, you're looking great at 8 minutes.

PAO
Correction on that velocity, now reading 760 feet per second.

CAPCOM
It's the P64.

EAGLE
Good, Roger.

PAO
FIDO says we're go, altitude 92 hundred feet.

CAPCOM
8 30 you're looking great.

PAO
Descent rate 129 feet per second.

CAPCOM
We copy.

CAPCOM
Eagle you're looking great, coming up 9 minutes.

PAO
We're now in the approach phase of it, looking good. Altitude 52 hundred feet.

EAGLE
Manual auto attitude control is good.

CAPCOM
Roger, copy.

PAO
Altitude 42 hundred -

END OF TAPE

CDT 15:15 GET 102:43 TAPE 307/1

CAPCOM
Roger, copy.

PAO
Altitude 4200.

CAPCOM
Houston. You're go for landing. Over.

EAGLE
Roger, understand. Go for landing. 3000 feet.

CAPCOM
Copy.

EAGLE
12 alarm. 1201.

EAGLE
1201.

CAPCOM
Roger. 1201 alarm.

EAGLE
We're go. Hang tight. We're go. 2,000 feet. 2,000 feet into the AGS. 47 degrees.

CAPCOM
Roger.

EAGLE
47 degrees.

CAPCOM
Eagle looking great. You' re go.

PAO
Altitude 1600. 1400 feet. Still looking very good.

CAPCOM
Roger. 1202. We copy it.

EAGLE
35 degrees. 35 degrees. 750, coming down at 23. 700 feet, 21 down. 33 degrees. 600 feet, down at 19. 540 feet, down at 30 - down at 15. 400 feet, down at 9. (garbled) 8 forward. 350, down at 4. 330, 3-1/2 down. We're pegged on horizontal velocity. 300 feet, down 3-1/2. 47 forward. (garbled) Down 1 a minute. 1-1/2 down. 70. Got the shadow out there. 50, down at 2-1/2. 19 forward. Altitude-velocity lights. 3-1/2 down, 220 feet. 13 forward. 11 forward, coming down nicely. 200 feet, 4-1/2 down. 5-1/2 down. 160, 6-1/2 down, 5-1/2 down, 9 forward. 5 percent. Quantity light. 75 feet, things looking good. Down a half. 6 forward.

CAPCOM
60 seconds.

EAGLE
Lights on. Down 2-1/2. Forward. Forward. Good. 40 feet, down 2-1/2. Picking up some dust. 30 feet, 2-1/2 down. Faint shadow. 4 forward. 4 forward, drifting to the right a little. 6 (garbled) down a half.

CAPCOM
30 seconds.

EAGLE
(garbled) forward. Drifting right. (garbled) Contact light. Okay, engine stop. ACA out of detent. Modes control both auto, descent engine command override, off. Engine arm, off. 413 is in.

CAPCOM
We copy you down, Eagle.

EAGLE (Armstrong)
Houston, Tranquility base here. The Eagle has landed.

CAPCOM
Roger, Tranquility, we copy you on the ground. You've got a bunch of guys about to turn blue. We're breathing again. Thanks a lot.

CDT 15:15 GET 102:43 TAPE 307/2

TRANQUILITY
Thank you.

CAPCOM
You're looking good here.

TRANQUILITY
I tell you. We're going to be busy for a minute. Master arm on. Take care of the descent. (garbled) Very smooth touchdown. Looks like we're venting the oxidizer now.

CAPCOM
Roger, Eagle. And you are stay for T1. Over. Eagle, you are stay for T1.

END OF TAPE

CDT 15:20 GET 102:48 TAPE 308/1

CAPCOM
Roger, Eagle, and you're stay. Press E 1, over. Eagle, you are stay for T1.

EAGLE
Roger, and we're stay for T1.

CAPCOM
Roger, and we see you getting the OX.

EAGLE
Roger.

EAGLE
And our circuit breaker.

EAGLE
- copy NOUN 60 - NOUN 43, over.

CAPCOM
Roger, we have it.

COLUMBIA
Houston, do you read Columbia on the high gain?

CAPCOM
Roger, we read you 5 by, Columbia. He has landed, Tranquility base. Eagle is at Tranquility, over.

COLUMBIA
Yeah, I heard the whole thing.

CAPCOM
Rog, good show.

COLUMBIA
Fantastic.

CAPCOM
(garble)

PAO
The next major stay, no stay will be for a T2 event, that is at 21 minutes 26 seconds after initiation for power descent.

COLUMBIA
Columbia set up telemetry command reset to reacquire on the high gain.

CAPCOM
Copy, out.

PAO
We have an unofficial time for that touchdown of a 102 hours 45 minutes 42 seconds and we will update that.

CAPCOM
Eagle, Houston. You loaded R2 wrong. We want 10254.

EAGLE
Roger.

EAGLE
That is V horizontal 5515.2.

CAPCOM
That's affirmative.

PAO
We are now less than 4 minutes from our next stay, no stay. The stay will be for 1 complete revolution of the command module.

EAGLE
Mike, AGGS the things align, over?

CAPCOM
Say again.

EAGLE
Mike, the AGGS the things align, over.

CAPCOM
Roger, we are standing by for it.

PAO
One of the first things that Armstrong and Aldrin will do after getting their next stay, no stay will be to remove their helmet and gloves.

EAGLE
Our quantity, (garble).

CAPCOM
Eagle, Houston. You are stay for T2, over.

CAPCOM
A correction, your-

EAGLE
Have your stay for T2, we thank you.

CAPCOM
Roger, sir.

PAO
That stay for another 2 minutes plus. The next stay no stay will be for 1 revolution.

END OF TAPE

CDT 15:25 GET 102:53 TAPE 309/1

PAO
steady for another 2 minutes plus, the next stay no stay, will be for 1 revolution. We don't expect much in the way of a visual description of the landing area from the crew until after we get through these critical stay, no stay periods and have gotten the status to remain on the lunar surface for at least 1 command and service module revolution. All spacecraft systems continue to look good to us here on the ground.

EAGLE
Tranquility base, Houston, we recommend you exit PI2, over.

EAGLE
Houston, that may have seemed like a very long final phase. The auto targeting was taking us right into a football field, football field sized crater, with a large number of big boulders and rocks for about 1 or 2 crater diameters around us, and it required a (garbled) on the 366 and flying manually over the rock field to find a reasonably good area.

CAPCOM
Roger, we copy. It was beautiful from here, tranquility, over.

EAGLE
We'll get to the details of what's around here, but it looks like a collection of just about every variety of shapes, angularities, granularities, every variety of rock you could find. The colors vary pretty much depending on how you're looking relative to the 0 phase point. There doesn't appear to be too much of a general color at all, however it looks as though some of the rocks and boulders, of which there are quite a few in the near area, it looks as though there going to have some interesting colors to them, over.

CAPCOM
Roger, copy. Sounds good to us tranquility. We'll let you press on through the simulated count down, and we'll talk to you later, over.

EAGLE
Roger.

EAGLE
Okay, this 16G is just like the airplane.

CAPCOM
Rog, tranquility, be advised there's lots of smiling faces in this room, and all over the world.

END OF TAPE

CDT 15:30 GET 102:58 TAPE 310/1

EAGLE
- yeah, just like an airplane.

CAPCOM
Rog, Tranquility - be advised that there is a lot of smiling faces in this room and all over the world, over.

EAGLE
There is 2 of them up here.

CAPCOM
Rog, that was a beautiful job, you guys.

COLUMBIA
And don't forget one in the command module.

CAPCOM
Rog.

PAO
That last remark from Mike Collins at an altitude of 60 miles. The comments on the landing on the manual take-over came from Neil Armstrong. Buzz Aldrin followed that with a description of the lunar surface and the rocks and boulders that they are able to see out the window of the LM.

CAPCOM
Tranquility, Houston. We had you pitch up about 4 and 1/2 degrees, over.

EAGLE
That's confirmed by our local observation.

CAPCOM
Roger.

COLUMBIA
And thanks for putting me on relay, Houston. I was missing all the action.

CAPCOM
Roger, we'll enable this in relay.

COLUMBIA
I just got it, Larry.

CAPCOM
Rog, Columbia. This is Houston. Say something they should be able to hear something, over.

COLUMBIA
Roger, Tranquility base. It sure sounded great from up here. You guys did a fantastic job.

EAGLE
Thank you. Just keep that orbiting base ready for us up there now. (garble)

COLUMBIA
Will do.

PAO
That request from Neil Armstrong.

PAO
Here in Mission Control, Flight Director Gene Kranz is going around the -

EAGLE
We have 10327, AOS 10413, over.

COLUMBIA
Thank you.

PAO
We have just gotten a report from the TEL COM here in Mission Control that the LM systems looked good after that landing. We're about 26 minutes now from loss of signal from the command module.

CAPCOM
Tranquility base, Houston. All of your consumables are solid. You are looking good in every respect. We copy the dips of any. Everything is copagetic, over.

EAGLE
Thank you, Houston.

EAGLE
Houston, the guys had said we wouldn't be able to tell precisely where we are or the winners today -

END OF TAPE

CDT 15:35 GET 103:03 TAPE 311/1

EAGLES
The Czar has said that we wouldn't be able to tell precisely where we are the winners today. We were a little busy, worrying about program alarms and things like that. Part of the descent where we would normally be picking out our landing spot and aside from a good look at several of the craters we seen over in the final descent, I haven't been able to pick out the things on the horizons. I haven't had the reference as yet.

CAPCOM
Roger Tranquility. No sweat. We'll figure it out. Over.

EAGLE
You might be interested to know that I don't think I noticed any difficulty at all in adapting to 1/6g, At least, immediately natural to move in in this environment.

CAPCOM
Roger Tranquility. We copy. Over.

PAO
Neil Armstrong reporting there. No difficulty adapting to the one-sixth gravity of the moon.

EAGLE
Window is a relatively level plain crated with a fairly large number of craters of the five to fifty foot radi and from ridges small 20, 30 feet high I would guess and literally thousands of little one and two foot craters around the area. We see some angular blocks out several hundred feet in front of us that are probably 2 feet in size and have angular edges. There is a hill in view, just about on the ground track ahead of us, difficult to estimate but might be a half a mile or a mile.

CAPCOM
Roger Tranquility. We copy. Over.

COLUMBIA
Sounds like it looks a lot better now than it did yesterday at that very low sun angle. It looked rough as a cob then.

EAGLE
It was really rough Mike over the targeted landing area but it was extremely rough cratered and large numbers of rocks that were probably some, many larger than five or ten feet in size.

COLUMBIA
Laying down - land long.

EAGLE
So we did.

CAPCOM
Tranquility, Houston. After you get through this P57, we'd like to E-Memory dump. Over.

TRANQUILITY
Roger after this first P57 you want a E-Memory dump?

CAPCOM
That's affirmative.

CAPCOM
Columbia, Houston. We have a P22 update for you, if you're ready to copy. Over.

COLUMBIA
At your service sir.

CAPCOM
Roger Mike. T1 1043218 T21043728 and that is 4 miles south. This is based on a targeted at landing site. Over.

CDT 15:35 GET 103:03 TAPE 311/2

COLUMBIA
Then Roger understand based on a targeted landing site T1 104 at 3218 T2 1043728 and 4 miles south.

CAPCOM
Roger.

COLUMBIA
Do you have any idea where they landed left or right of centerline; just a little bit long. Is that all we know?

CAPCOM
Apparently that's about all we can tell. Over.

COLUMBIA
Okay. Thank you.

CAPCOM
Tranquility, Houston.

TRANQUILITY
Houston, our mission timer is now reading 9023447 and static.

CAPCOM
Roger. Copy your mission timer's now static. Say again the time.

TRANQUILITY
9023447.

CAPCOM
Roger copy Tranquility. That gravity align looks so good, we see you recycling.

TRANQUILITY
Well, no. I was trying to get time, 16 65 out and somehow it was heated on to the 622 before I could do a VERB 32 enter. I want to log the time here and then I'd like to know whether you want me to proceed on the torquing angles or go back and reenter again before torquing. Over.

CAPCOM
Roger Buzz. Stand by.

CAPCOM
Tranquility, Houston. We'd like you lo recall P57 and run through the gravity align one more time. Over.

TRANQUILITY
Roger. I concur with that.

CAPCOM
And Roger Tranquility, for your mission timer, two suggestions. Set the circuit breaker panel 11 also reset and attempt to start. That man in the first digit might have something to do with it. Over.

TRANQUILITY
Okay. Retried both of those. The circuit breaker is in when I reset the - put it in reset, I get 9020440 when I release it, now I get 9020449. I'm going to cycle the circuit breaker.

CAPCOM
Roger.

TRANQUILITY
I cycled the circuit breaker and got all nines and right now reset for all nines.

CAPCOM
Roger.

CAPCOM
Tranquility, Houston. We'll research this problem and be back with you momentarily on the mission event - correction the mission timer.

TRANQUILITY
Okay.

END OF TAPE

CDT 15:45 GET 103:13 TAPE 312/1

EAGLE
I'd say the color or the, the local surface is very comparable to what we observed from orbit at this sun angle, about 10 degrees sun angle, or that nature, it's pretty much without color. It's gray and it's a very white, chalky gray, as you look into the zero phase line and it's considerably darker gray, more like ash ashen gray as you look up 90 degrees to the sun. The, some of the surface

rocks in close here that have been fractured or disturbed by the rocket engine are coated with this light gray on the outside but when they've been broken they display a dark, very dark gray interior and it looks like it could be country basalt.

CAPCOM
Roger. Tranquility, we see the noun 93, verb 34.

EAGLE
Roger, I assume you wanted it, roger.

CAPCOM
Tranquility, Houston, please vent fuel and ox again, over, it's building back up.

EAGLE
Okay, ox going now.

CAPCOM
Tranquility, Houston, you can open both fuel and ox vent now, over.

EAGLE
Okay.

EAGLE
Houston, tranquility, standing by for go on AGS to PNGCS aligned and a lunar align, over.

CAPCOM
Stand by.

CAPCOM
Tranquility, Houston, you are go four the AGS to PNGCS align, and then the lunar align, over.

EAGLE
Roger.

CAPCOM
Tranquility, Houston, please vent the fuel, it's increasing rapidly, over.

EAGLE
We show 30 PSI in the fuel and 30 in the oxidizer.

CAPCOM
Roger, we're reading somewhat different than that, stand by.

EAGLE
The fuel temperature is reading 64 in the descent and the oxidizer, descent 2 and the oxidizer is off scale low. Descent 1 is showing 61 in the fuel and 65 in the oxidizer.

CAPCOM
Roger, stand by. Tranquility Houston, please take the fuel vent switch and hold it open, over.

EAGLE
Okay, we're holding it open, indicating about 24 PSI onboard.

CAPCOM
Roger.

EAGLE
Now indicating 20 PSI in the fuel side.

CAPCOM
Roger.

CDT 15:45 GET 103:13 TAPE 312/2

EAGLE
And 22 in the ox.

CAPCOM
Roger.

EAGLE
Now indicating 15 PSI and no tanks.

CAPCOM
Roger.

CAPCOM
Tranquility, Houston. If you haven't done so you can release the fuel vent switch now, over.

EAGLE
Roger.

CAPCOM
Tranquility, Houston. We have indication that we've frozen up the descent fuel helium heat exchanger and there's some fuel trapped in the line between air and the valves and the pressure we're looking at is increasing
there, over.

EAGLE
Roger, understand.

CAPCOM
Tranquility base, Houston. If you have not done so please close both fuel and ox vents now, over.

END OF TAPE

CDT 15:55 GET 103:23 TAPE 313/1

CAPCOM
Houston. If you have not done so, please close both fuel and ox vents now. Over.

SC
They're closed.

CAPCOM
Thank you, sir.

SC
From the surface, we could not see any stars out the window, but I had my overhead patch. I'm looking at the earth. It's big and bright and beautiful. Buzz is going to give a try at seeing some stars through the optics.

CAPCOM
Roger, tranquility. We understand. It must be a beautiful sight. Over.

PAO
We would like to point out that the fuel pressure problem that had been called to the attention of the crew, is in the descent system and it is probably the downstream of the tanks where a small amount of fluid has been trapped in a line and we don't expect it to cause any problem. The line should be able to take far more pressure than the fluid would exert. In the event that there was an overpressurization, we would expect that the line would spring a small leak, the pressure would drop rapidly. Again, we point out that we do not see this as a significant problem.

CAPCOM
Columbia, Houston. 2 minutes to LOS. You're looking great going over the hill. Over.

COLUMBIA
Okay, thank you. My glad to hear the system's looking good. You have a suggested attitude for me. This one here seems'alright.

CAPCOM
Stand by.

COLUMBIA
Now you know when it's lunchtime. Right?

CAPCOM
Say again.

COLUMBIA
Oh, disregard.

CAPCOM
Columbia, Houston. You got a good attitude right there.

COLUMBIA
Okay, thank you.

PAO
This is Apollo Control. We've had Loss of Signal now from the command module and of course, we'll maintain constant communications with the lunar module on the lunar surface. We have some heart rates for Nell Armstrong during that power descent to the lunar surface. At the time the burn was initiated, Armstrong's heart rate was 110. At touchdown on the lunar surface, he had a heart rate of 156 beats her minute, and the flight surgeon reports that his heart rate is now in the 90's. We do not have biomedical on Buzz Aldrin.

PAO
This is Apollo Control at 103 hours 32 minutes. We have an update on that touchdown time on the lunar surface. This still is not the final, official time which we will get from readout of data, but the refined time is 102 hours 45 minutes 40 seconds, which would have been 12 minutes 36 seconds after initiating the powered descent. That was 102 hours 45 minutes 40 seconds for touchdown and a total time of powered descent 12 minutes 36 seconds, and we would expect then those numbers to change perhaps a little when we get final data readouts.

END OF TAPE

CDT 16:06 GET 103:34 TAPE 314/1

CAPCOM
Tranquility base, Houston. If you want me to I can give you a acq on the omission time, every 30 minutes, over.

CAPCOM
Tranquility, Houston, I'm counting down to T 3 time. If you'd like to give me a hack we can set up on our vent timer over.

EAGLE
Roger, How about counting up?

CAPCOM
Roger, you want it counting up? Stand by.

CAPCOM
Tranquility, Houston. On my mark 62 30 mark, 62 30 from pass PDI.

EAGLE
What we're looking for, Charlie is the time counting up to T2 that'll be equal to 60 minutes, or T3, be equal to 60 minutes on T3.

CAPCOM
Roger, we'll have it for you.

CAPCOM
Tranquility base, Houston, reset the event timer to zero and on my mark at 103 39 41. We'll give you a hack and it'll be 1 hour, over.

EAGLE
Roger.

CAPCOM
And we've got about almost 3 minutes to go, Neil, over.

EAGLE
Okay.

CAPCOM
Tranquility base, stand by on the event timer.

CAPCOM
Tranquility base, Houston. On my mark start your event timer.

CAPCOM
5 4 3 2 1, mark.

EAGLE
Roger, we got it, thank you.

CAPCOM
Rog, Neil.

END OF TAPE

CDT 16:16 GET 103:44 TAPE 315/1

PAO
This is Apollo Control at 103 hours 44 minutes. There will be a brief statement from Dr. Thomas Paine, NASA Administrator, in the building 1 autitorium at 4:30. We also have some updated information on the landing point. It appears that the spacecraft, Eagle, touched down at 799 degrees north, or just about on the lunar equator. And 23.46 degrees longitude, which would have put it about 4 miles from the targeted landing point downrange. We're now 54 minutes - rather 27 minutes from reacquisition of the command module, and of course, we're in constant contact with the lunar module on the surface. At this point, all LM systems seem to look very good.

CAPCOM
Tranquility, Houston. We see the star angle difference. Looks good.

EAGLE
Okay, that last star was Navi, and it wasn't too well distinguishable. I can see where that error could come in. I think for the gravity alignment, with one star it (garbled) will be quite good.

CAPCOM
Roger. Stand by on the noun 93.

CAPCOM
Hello Tranquility Base, Houston. We'd like you to torque that. Over.

EAGLE
Houston, this is Tranquility. Do you want us to accept this position? Over.

CAPCOM
Tranquility, Houston. We're looking at it. Stand by. We'd like you to pull the circuit breaker on panel 11 for the mission timer. Over.

EAGLE
Rog. I've already done that, Charlie.

CAPCOM
Okay.

CAPCOM
Tranquility, Houston. We'd like you to reject that RLS. Over.

EAGLE
Roger.

CAPCOM
And Tranquility Base, Houston. We'd like you to call - after this, call P00, and give us a E-memory dump.

EAGLE
Okay, here comes the E-memory dump.

CAPCOM
Roger.

EAGLE
And we got 1106.

CAPCOM
Roger.

CAPCOM
Hello Tranquility Base, Houston. Did I copy program alarm 1106 from you? Over.

EAGLE
Rog. That's affirmative.

CAPCOM
Okay, stand by.

EAGLE
Could that, by any chance, be due to the fact that I flashed the updata link switch to data while that was going on? Over.

CAPCOM
Stand by.

CAPCOM
Hello Tranquility Base, Houston. The span guys think that's conceivable. Stand by. I think we want another verb 74.

EAGLE
Okay, standing by.

CDT 16:16 GET 103:44 TAPE 315/2

CAPCOM
Hello Tranquility Base, Houston. We'd like another verb 74. Over.

END OF TAPE

CDT 16:26 GET 103:54 TAPE 316/1

TRANQUILITY
Roger, here it comes.

CAPCOM
Tranquility base, Houston. On my mark it will be GET 103:53:00. Mark 103:53. Correction 54.

TRANQUILITY
Roger.

CAPCOM
Hello Tranquility, Houston. We have the LM ascent package. Ready to go, over.

TRANQUILITY
Standby.

TRANQUILITY
Roger, ready to copy the LM assest pad.

CAPCOM
Rog, Tranquility. TIG 104 39 47 00 55 35 8 00 32 2 plus 00 22. T to 47 plus 37 13 0 minus 70 615 plus 58 620 plus 56 936, over.

TRANQUILITY
Roger, LM assest pad: 104 39 47 O0 55 35 8 00 32 2 plus 00 22 plus 37 13 0 minus 70 615 plus 58 620 plus 56 936, over.

CAPCOM
Roger, Tranquility, good readback. We also have a CSI pad if you are ready to copy.

TRANQUILITY
Okay, we are ready to go.

CAPCOM
Roger, coming at you with a CSI. NOUN 11 105 35 37 00. 107 11 30 00. 05 38 minus all zeros. At the AI is NA 09 37 correction 09 356 10 31 5 plus 05 38 minus all zeros plus 0012, over.

TRANQUILITY
Rog, say again R1 and NOUN 86.

CAPCOM
Roger, R1 is plus 0 53 8 and we have a load for you. Will you please give us P00 and data, over.

TRANQUILITY
Roger, before I do that I would like to designate the, rendezvous radar app to plus X.

CAPCOM
Roger.

PAO
This is Apollo Control at 103 hours 57 minutes. We will be taking the release line down briefly for a statement from Thomas Paine, NASA Administrator. We will be recording further conversations with the spacecraft and will played those back following the statement. This is Apollo Control at 103 hours 58 minutes.

END OF TAPE

CDT 16:42 GET 104:10 TAPE 317/1

PAO
This is Apollo Control at 104 hours 10 minutes. We understand there's been a brief delay in the statement from Nasa Asministrator Thomas Pane. We will catch up with the tape recorded conversation that we have had with Eagle on the lunar surface, at this time.

EAGLE
Noun 86, plus 0 538 +all 0, and the last one was 0012 and what's the sign of that please?

CAPCOM
Tranquility, Houston the Delta-v Y is minus all zeros. The Delta-v Z is +0012, over.

EAGLE
Roger +0012.

CAPCOM
Roger, good read back.

EAGLE
Houston, tranquility base, the DSKY's yours and up data linking data.

CAPCOM
Roger, thank you Tranquility.

CAPCOM
Hello Tranquility base, Houston. On my mark it will be 37 minutes to T3, over.

EAGLE
Okay.

CAPCOM
Stand by, mark 37 minutes till T3.

EAGLE
Okay, thank you.

CAPCOM
Tranquility, this.is Houston. It's your computer. We got the load in. You can start your P57.

EAGLE
Roger, thank you.

EAGLE
Houston, Tranquility base. Does somebody down there have the light button keyed, over?

CAPCOM
Stand by and we'll check.

CAPCOM
Tranquility, Houston, do you still hear it now, over.

EAGLE
Yea I still hear it. It sounds like somebody banging some chairs around in the back room.

CAPCOM
Roger, that's a yoga that you hear for the CSM to keep the noise down on the loop. Maybe we got a msfn relay, stand by.

EAGLE
Okay

CDT 16:42 GET 104:10 TAPE 317/2

CAPCOM
Tranquility, Houston, we got the MSFN relay in. You' re hearing the vogua which is a noise supression device. We'll try to take it out, over.

EAGLE
Alright, thank you.

CAPCOM
Tranquility, Houston. It ought to be a little quieter up there now. We disabled the MSFN relay.

EAGLE
Okay, I think the noise has stopped now, thank you Charlie.

CAPCOM
Rog.

END OF TAPE

CDT 17:03 GET 104:31 TAPE 318/1

PAO
This is Apollo Control, Houston at 104 hours, 31 minutes now into this historic mission, Apollo 11. During the news conference

with NASA Administrator Dr. Thomas Paine, we had conversation with both Eagle and Columbia and we'll play that tape for you now.

CAPCOM
Tranquility base, Houston. On my mark, 25 minutes to T3. Stand by. Mark, 25 minutes until T3.

EAGLE
Roger. Thank you, Charlie.

COLUMBIA
Houston, Columbia. How's it going?

CAPCOM
Columbia, Houston. We're reading you about 3 by. Over.

COLUMBIA
I'm on OMNI, Charlie. How's it going?

CAPCOM
Roger. Understand. OMNI Charlie. Mike, be advised. We have an update for you on the P22 for the LM. We estimate he landed about 4 miles downrange. Your T1 times are updated and your T2, if you're ready to copy. Over.

COLUMBIA
Ready to copy.

COLUMBIA
Ready to copy.

CAPCOM
Roger, Columbia. T1 1043224 1043733 2 miles south. Time of closest approach is 1043908.

CAPCOM
Hello, Tranquility base, Houston. We copy the Noun 93. You can torque them. Over.

COLUMBIA
Houston, 4 miles long. Is that correct Houston ?

CAPCOM
That's affirmative, Columbia. It's about 4 miles, long. Stand by. We'll have you a map location momentarily. Over.

EAGLE
Houston, Tranquility base. Do you have an update? I'm waiting for it. Over.

CAPCOM
That's affirmative. Stand by on the DAP. DAP Pad for you is LM weight 10906. Over.

EAGLE
Roger. 10906.

CAPCOM
Roger.

CAPCOM
Columbia, Houston with a latch of latitude longitude over 2 update the LM position. Over.

CAPCOM
Columbia, Houston. Over.

COLUMBIA
Go ahead, Houston.

CAPCOM
Roger, Mike. We got an update on the latch longitude for the LM, if you're ready to copy. Over.

COLUMBIA
Go ahead.

CAPCOM
Roger. Columbia, it's plus 7 - correction - plus 0.799, but latch, plus 11.730 for the longitude over 2. Over.

COLUMBIA
Thank you. You want me to read that back?

CAPCOM
Say again. Over.

COLUMBIA
Does the altitude (garble)

CAPCOM
That's affirmative.

CAPCOM
Hello, Tranquility base, Houston. You are stay for a T3. We have some surface blockdata if you're

CDT 17:03 GET 104:31 TAPE 318/2

CAPCOM
ready to copy. Over.

EAGLE
As we understand, we're stay for T3. Stand by.

EAGLE
Okay, Houston. Go ahead with your block data.

CAPCOM
Roger, Tranquility. T4 1063802, T5 1083615, T6 1103430, T7 1123245. Over.

EAGLE
Copy. T4 1063807, T5 1083615, T6 1103430, T7 1123245.

CAPCOM
Roger, Tranquility. Stand by one. Tranquility, Houston. Say again your T4 copy. Over.

EAGLE
T4 1063807.

CAPCOM
Roger. Correction on T4 1063802. Over.

EAGLE
Got T4 1063802.

CAPCOM
Roger.

CAPCOM
Hello, Columbia, Houston. We will not come up on the MSFN relay. We'd like you to come on panel 9, turn on your VHF TR. Over.

COLUMBIA
Okay, I'm on panel 9. Ready to receive. You want me to transmit for some reason or other?

CAPCOM
Say again. (garble)

EAGLE
(garble) stand by. Roger. Always bad.

COLUMBIA
Roger. Panel 9 is configured. VHF, receive. You want me to transmit with the VHF or something? Why do you want me there?

CAPCOM
Columbia, this is Houston. We don't want you to transmit, Mike. We just want you in that position in case you want to talk to Tranquility. Break. Tranquility, Houston. Say again. Over.

EAGLE
Roger. I have a fairly good sized difference between battery both on 5 and 6. 6 is reading 33.5 and 5 is reading 36.5. Is that what you expect? Over.

CAPCOM
Roger. Stand by. Tranquility, Houston. There both coming up in voltage. No problem. We're still go. Over.

EAGLE
Roger.

CAPCOM
Hello, Tranquility base, Houston. Could you please give us a readout now of all of your descent tank pressures? Over.

EAGLE
Okay, Houston. On descent 1, fuel and oxidizer are reading 10 psi. And descent 2, fuel only is reading 10 psi, oxidizer 11 psi.

CAPCOM
Roger, Tranquility. Thank you much. Out.

END OF TAPE

CDT 17:13 GET 104:41 TAPE 319/1

TRANQUILITY
Houston, Tranquility base is ready to go through the power down and terminate the simulator countdown.

CAPCOM
Roger, standby.

CAPCOM
Hello Tranquility base, Houston. You can start your power down now, over.

TRANQUILITY
Roger, they have been started.

CAPCOM
And Tranquility base the white team is going off now and let the maroon team take over. We appreciate the great show. It was a beautiful job, you guys.

TRANQUILITY
Roger, couldn't of had better beaming from all of you back there.

TRANQUILITY
Houston, Tranquility.

CAPCOM
Go Tranquility, over.

TRANQUILITY
Roger, a recommendation at this point is planning an EVA with your concurrent starting about 8:00 this evening, Houston time. That is about three hours from now.

CAPCOM
Standby.

TRANQUILITY
We will give you the time check about that.

CAPCOM
Tranquility base, Houston. We though about. We will support it. We're go at that time, over.

TRANQUILITY
Roger.

CAPCOM
You guys are getting prime time TV there.

TRANQUILITY
Hope that little TV set works but we'll see.

CAPCOM
Rog.

CAPCOM
Hello Tranquility base, Houston. With your 8:00 Houston time a reference to opening the hatch or starting the prep for EVA at that time, over?

TRANQUILITY
That's the hatch opening.

CAPCOM
That's what we thought. Thank you much.

TRANQUILITY
That might be a little later than that but in other words, start the prep in about an hour or so.

COLUMBIA
Houston, Columbia, copy NOUN 49.

CAPCOM
Standby, Columbia.

CAPCOM
Tranquility base, Houston. That's fine. We are ready to support you any time, over.

TRANQUILITY
All right.

CAPCOM
Break. Columbia, we see the NOUN 49, standby.

CAPCOM
Columbia, Houston. We got the data. We would like a VERB 34, over.

COLUMBIA
All right, standby, Charlie, for the next VERB.

CAPCOM
Roger, Columbia. Did - how did Tranquility look to you down there, over?

COLUMBIA
It really looks smooth, but I was unable to see him. I just picked out a distinguishable crater nearby and marked on it.

CDT 17:13 GET 104:41 TAPE 319/2

CAPCOM
Roger.

COLUMBIA
But it looks like he made it there you know.

CAPCOM
Hello Columbia; Houston. I understand you could not see Tranquility. What was you marking on, over?

COLUMBIA
Houston, Columbia. Say again, I could not see him. Auto optics pointed at a spot nearly close to the coordinates which you gave me so I picked a tiny crater in that area and marked on it so I will be able to have repeateable data, but I was unable to see him.

CAPCOM
Roger, copy.

PA0
This is Apollo Control, Houston at 104 hours 44 minutes. You heard that last exchange and there is a very strong indication we might have an early EVA with the hatch opend perhaps at 8:00 Houston time. One other item of significance that this the pressure rise in - depth descent propellant line downstage of the tanks has relieved all aspects of the mission, looking very good at this time. At 104 hours 45 minutes now into the flight of Apollo 11, this is Apollo Control, Houston.

CAPCOM
Hello, Tranquility base, Houston. On our depth venting and that fuel problem heat exchanges is cleared up. We heard that the ice is melted and we are in good shape now, out.

TRANQUILITY
Houston, Tranquility is going to put the track modes and slow down.

PAO
This is Apollo Control, Houston at 105 hours now into the flight of Apollo 11. We expect a - our - our capsule communicator Owen Garriott to pass along data to spacecraft Columbia, momentarily. We're standing by for that. Meanwhile, I think we should discuss a little further the projected EVA. Our current plan is to have crewmembers above the Eagle to eat and relax for a little while prior to starting EVA preps. We won't know with certainity or have a reasonable time hack until about an hour before the scheduled event. Right it looks like it could occur at 8:00 Houston time. We have conversation going now with the spacecraft. We'll pick that up.

PAO
This is Apollo Control, Houston. We will shutdown the line at this time and turn to the news conference.

END OF TAPE

CDT 18:02 GET 105:30 TAPE 320/1

PAO
This is Apollo Control, Houston at 105 hours 30 minutes on to the mission, Apollo 11. The spacecraft Columbia is now out of range with Mission Control Center, Houston, passing over the far side of the Moon. As it passed out of sight, we read an apolune of 63 nautical miles; a perilune of 56 nautical miles; a velocity of 5367 feet per second. We had conversation both with Tranquility base and Columbia during this span of time. Also, as will come up in that course of conversation. Lunar module pilot Buzz Aldrin delivers a message to people everywhere listening. We'll play those tapes for you now.

CAPCOM
Columbia, Houston. We noticed that you are maneuvering very close to gimbal lock. I suggest you move right away, over.

COLUMBIA
Yeah, I am going around it. I've noticed GMC auto maneuvers in this pass. Roll 270, pitch 101, yaw 45.

CAPCOM
Roger, Columbia.

COLUMBIA
I assumed that the (garbled) gimbals (garbled- inaudiable)

CAPCOM
Columbia, Houston, you were unreadable. Say again please.

COLUMBIA
Disregard

CAPCOM
Columbia, Houston. Several items for you over.

COLUMBIA
Ready to copy.

CAPCOM
Columbia, Houston. First of all we'd like a waste water dump to 10 percent on the backside. Secondly, it does not look like we will need any plane change at this time, so we will not be uplinking a new REFSMMAT. Third item I would like all of your cryo heaters to AUTO and we are ready for a battery charge, battery BRAVO. It will last about 7 hours. If you should go to sleep, we will be terminating that charge, but at the moment we can go ahead and start the BAT charge on BAT BRAVO, and a final item for your SMRCS configuration for your rest period. Register 01 for the dap is 11 111, dap register 02 O1 100, and your auto RCS select switches - quad ALPHA pitch jets on only, quad BRAVO are on, quad CHARLIE and quad DELTA all off, over.

COLUMBIA
Roger, waste water to 10 percent on the backside, no new REFSMMAT, cryo heaters on to AUTO, (garbled) dap is 11 111, O1 100 (garbled) quad A pitch Jet on (garbled), over.

CAPCOM
Columbia, Houston, Roger.

CAPCOM
Columbia, Houston. We will have a state vector update for you a little later. We are not prepared with it right now and another subject from Tranquility base, they are prepared to begin their EVA early. They expect to begin depress operations in about 3 hours at 108, approximately 108 GET, over.

COLUMBIA
Sounds good to me. Tell Neil to

CDT 18:02 GET 105:30 TAPE 320/2

COLUMBIA
watch where he goes.

CAPCOM
Columbia, Houston. We would like your PRD readout when possible and we have checked over your EM dump, it all looks okay.

CAPCOM
Tranquility base, Houston, over.

TRANQUILITY
All right, Houston.

CAPCOM
Tranquility, Houston. We would like your PRD readout, and we have double checked your EM dump and it all looks okay, over.

TRANQUILITY
Rog, I understand our EM dump was good, PDR assimulator is 11014, and LMP is 09011.

CAPCOM
Roger, Tranquility, break-

CAPCOM
Columbia we would like for you to react with your high gain and attempt a manual lockon, over.

COLUMBIA
(inaudible)

TRANQUILITY
Houston, Tranquility here. The LMP's readouts may very possibly be 09017, over.

CAPCOM
Tranquility, Houston. Roger, 01097 is an update on your readout.

COLUMBIA
Columbia -

TRANQUILITY
I'll let you know for sure when it goes to either 12 or 18.

CAPCOM
Tranquility, Houston. Roger, the medics report your latter reading 17 appears to be the correct one, over.

TRANQUILITY
Roger.

COLUMBIA
Columbia's is in the high gain.

CAPCOM
Roger, Columbia, sounding much better now.

CAPCOM
Columbia, Houston. Request P00 and accept and we will uplink another state vector, over.

COLUMBIA
Roger, go P00 and accept.

CAPCOM
Columbia, Houston. I suggest you put BAT A on your BAT-relay buss, over.

COLUMBIA
Okay.

CAPCOM
Columbia, Houston. We are through with your computer. You can go to block.

COLUMBIA
Roger, block.

CAPCOM
Tranquility base, Houston, over.

TRANQUILITY
Go ahead, Houston, Tranquility base.

CAPCOM
Tranquility base, Houston. We've reviewed the checklist and about the only change in order to advance the EVA that we've found is that you will want to delay your lithium hydroxide change until after the EVA rather than before, over.

TRANQUILITY
Roger, we'd just assumed to make a change in jettersoning the old one, over.

CAPCOM
Tranquility base, Houston. We would like to delay that LOIH change until after the EVA. There is a possibility you could jetter-son the canister when you

CDT 18:02 GET 105:30 TAPE 320/3

CAPCOM
Jettison your (garble)

TRANQUILITY
All right. We'll planned it that way, over.

CAPCOM
Roger, Tranquility.

CAPCOM
Columbia, Houston, over.

COLUMBIA
Houston, Columbia.

CAPCOM
Columbia, Houston. We show your evap out temperature running low. Request you go to manual temperature control and bring it up. You can check the procedures in ECS MAL 17, over.

COLUMBIA
Roger.

CAPCOM
Columbia, Houston. I have a P22 update for you.

COLUMBIA
Columbia, go ahead.

CAPCOM
Columbia, Houston. Your P22 auto - auto optics landmark ID on LM. P1 106 plus 30 plus 31. P2 106 plus 35 plus 41. Two nautical miles south. Your TCA 106 plus 37 plus 16. Shaft angle 357.9 and trunnion angle 44.3, over.

COLUMBIA
(garbled)

CAPCOM
Columbia, Houston. We have your LOS and at 3 minutes AOS will be 106 plus 11, over.

COLUMBIA
Roger.

END OF TAPE

CDT 18:12 GET 105:40 TAPE 321/1

EAGLE
Houston, Tranquility. Over.

CAPCOM
Tranquility, Houston. Go ahead.

EAGLE
Roger. This is the LM pilot. I'd like to take this opportunity to ask every person listening in, whoever and wherever they may be, to pause for a moment and contemplate the events of the past few hours, and to give thanks in his or her own way. Over.

CAPCOM
Roger, Tranquility Base.

EAGLE
- is about ready to fall off. As a matter of fact, it just doesn't look like it sunk any at all.

PAO
This is Apollo Control, Houston at 105 hours 42 minutes into the flight of Apollo 11. You have heard that statement in our tapes transmission from lunar module pilot, Buzz Aldrin. Our projected time for extravehicular activity, at this point, is still very preliminary. I repeat, it could come as soon as 8:00 p.m. Houston time. We won't know for sure about the time, with reasonable certainty until about an hour before the event. Meanwhile, as we'll soon be progressing toward man's first step on the lunar surface, we have an interesting phenomena here in the mission control center, Houston. Something we've never seen before. Our visual of the lunar module, our visual display now standing still. Our velocity digitals for Tranquility Base now reading zero. Reverting, if we could, to the terminology of an earlier form of transportion, the railroad. What we're witnessing now, is man's very first trip into space with a station stop along the route. At 105 hours 43 minutes, continuing to monitor the loop, this is Apollo Control, Houston.

CAPCOM
Tranquility Base, Houston. We'd like some estimate of how far along you are with your eating and when you may be ready to start your EVA prep. Over.

EAGLE
I think that we'll be ready to start EVA prep in about a half an hour or so.

CAPCOM
Roger, Tranquility.

END OF TAPE

CDT 18:22 GET 105:50 TAPE 322/1

PAO
This is Apollo Control, Houston at 105 hours 51 minutes now into the flight of Apollo 11. We've only had one brief conversation over the past several minutes with Tranquility base. Capsule Communicator Owen Garriott asked when Tranquility base might start it's EVA prep, and Armstrong replied, about a half an hour or so. A normal time line for preparations for EVA would be approximately 2 hours. At 105 hours 52 minutes now into the flight of Apollo 11, this is Apollo Control, Houston.

PAO
Mark 1 minute now from time of acquisition on Columbia, now on it's 16th revolution around the moon.

COLUMBIA
Houston, Columbia, how do you read?

CAPCOM
Columbia, Columbia, this is Houston.

EAGLE
This is Tranquility base. We are beginning our EVA prep.

CAPCOM
Tranquility Base, this is Houston, Roger copy, you're beginning EVA prep. Columbia, Columbia, this is Houston. Reading you loud and clear, over.

COLUMBIA
You're loud and clear. Waste water dump is down to 10 percent. I have a question on the P22. Do you want me to do another P22 or is all that information just for my own use in tracking the LM for photographic purposes?

CAPCOM
Columbia, this is Houston. We request that you perform another P22. We'd like you to let the auto optics take care of the tracking and devote your energies to trying to pick out the LM on the Lunar surface. If you can find the LM, of course. We're looking for marks on it, but tracking of geographical features doesn't do us all that much good, over.

COLUMBIA
Okay, I'll do it. And on the ESCS system, we're having a problem with it. It seems to have gone away without any changing of J52 sensors or anything like that my glycol evaporator outlet temp is up above 50 now and it's quite comfortable in the cockpit so we'll talk more about that one later.

CAPCOM
Roger, Columbia. Did you shift into manual control or did the problem resolve itself under auto control? Over.

COLUMBIA
The problem went away under auto.

CAPCOM
Roger - -

COLUMBIA
I did cycle out of auto, I did cycle out of auto into manual, back into auto.

CAPCOM
Houston Roger, up.

PAO
The capsule communicator you heard there is Bruce McCandless now on duty. Cliff Charlesworth's team of green flight controllers, by in large have returned to the

CDT 18:22 GET 105:50 TAPE 322/2

PAO
Control Center at this point. McCandless talked with both spacecraft and as you heard Neil Armstrong reporting from Tranquility Base, started that EVA preperations are now under way. At 106 hours 14 minutes now into the flight this is Apollo control Houston.

END OF TAPE

CDT 18:47 GET 106:15 TAPE 323/1

CAPCOM
Tranquility Base, Tranquility Base, this is Houston. Over.

EAGLE
Go ahead, Houston.

CAPCOM
Tranquility, this is Houston. We need a second set of PRD readings so that we may establish a rate. Over.

EAGLE
Okay. Stand by.

EAGLE
CDR is reading 11014. LMP is reading 09017 and 3/4.

CAPCOM
Tranquility, this is Houston. We copy your readings. Out.

PAO
The reference there is to dosimeter readings from the commander and the lunar module pilot. You noted the precision of Buzz Aldrin on that last reading. At 106 hours 24 minutes into the flight of Apollo 11, continuing to stand by, this is Apollo Control, Houston.

COLUMBIA
Houston, Columbia. flow do you read on OMNI D, Dog?

CAPCOM
Columbia, this is Houston. We're reading you loud with background noise on OMNI D. Over.

COLUMBIA
Okay, I'll stay on D here for awhile (garbled)

CAPCOM
Roger. Out.

COLUMBIA
Houston, Columbia. I'm coming up from a time for the first (garbled)

CAPCOM
Well, when we got time, you can.

COLUMBIA
the LM. Do you have any topographical cues that might help me out here. Auto optics is tracking between two craters. One of them is the LM stage. It would be long at 11 o'clock. The other would be short and behind him at 5 o'clock. And they're great big old craters. Depressions.

CAPCOM
Stand by.

CAPCOM
Columbia, this is Houston. The best we can do on a couple of features, is to advise you to switch to the west of the irregularly shaped crater, and then work on down to the southwest of it. Over.

CAPCOM
Columbia, Houston. Another possibility is the southern rim of the southern of the two old-looking craters. Over.

COLUMBIA
Roger, Houston. Columbia no joy I kept my eyes glued to the sextant that time, hoping I'd get a flash of vector light off the LM, but I wasn't able to see any of my skim areas that you suggested.

CAPCOM
Roger. On that - southern of the old craters, there's a small bright crater in the southern rim of - one slot would put him slightly to the west of that small bright crater, about 500 to 1000 feet. Do you see anything down there? Over.

CDT 18:47 GET 106:15 TAPE 323/2

COLUMBIA
It's not bad now, Bruce, but I scanned that area that you talked about very closely and nowhere did I see anything.

CAPCOM
Roger. Out.

CAPCOM
Columbia, this is Houston. Over.

COLUMBIA
Go ahead.

CAPCOM
Columbia, this is Houston on your LAM 2 mat. We'd like to confirm the topographical area in which

END OF TAPE

CDT 19:12 GET 106:40 TAPE 324/1

CAPCOM
Columbia, this is Houston. On your LAM2 map, we'd like to confirm the topographical area in which you were looking on this last period of sighting. As we understand you, you were looking in the vicinity of Poppa 7 to November 8. Is that correct? Over.

COLUMBIA
Stand by one.

CAPCOM
Roger.

COLUMBIA
Houston, Columbia.

CAPCOM
Go ahead, Columbia.

COLUMBIA
Well, the craters I was telling you about is located exactly at Mike 6. 7.

CAPCOM
Roger. We found that one.

COLUMBIA
The other one was located at 7 - the other one was located at 7.2 - just turns it away from Mike to Nan.

CAPCOM
Roger. We believe you're looking a little too far to the west and south. Over.

CAPCOM
Roger. Understand. I was looking where our optics was tracking on the average and understand that it should have been more to the north and more to the west. Actually, a tiny bit outside the circle, huh?

CAPCOM
More to the north and a little more to the east. The feature to that was just gravity of the small bright crater around the rim of the large fairly old crater, would be about Mike 0.8 and 8.2. Over.

COLUMBIA
Well, just give me your best estimate as the new location and the coordinance system and I'll plot it on my map and go from there.

CAPCOM
Tranquility base, this is Houston. Can you give us some idea of where you are in the surface checklist at the present time? Over.

EAGLE
Okay, we're on the top of page 27.

CAPCOM
Roger, out.

COLUMBIA
Houston, Columbia. Over.

CAPCOM
Go ahead, Columbia.

COLUMBIA
Roger. I finally got you back on OMNI-D. I've been unsuccessfully trying to get you on the high gain, and I've gone COMMAND RESET to PROCESS. How do you read me now?

CAPCOM
Roger. Reading you loud with background noise. Understand that's OMNI-DELTA or OMNI-BRAVO? Over.

COLUMBIA
OMNI-DELTA and you were cut out. I never got your coordinates or estimated LM position. Over.

CAPCOM
Columbia, this is Houston. Estimated LM position - a latitude plus 0.799, longitude over 2 plus 11.730. On your chart we would place it. Stand by on the chart and readback on the latitude longitude.

COLUMBIA
Yes, the latitude and longitude over 2, 799 and 11730 are the ones that I been giving you in P22. But what I'm interested in is a drift cord into an S-band

CDT 19:12 GET 106:40 TAPE 324/2

COLUMBIA
precinct.

CAPCOM
Roger. We'll have them for you in a second.

COLUMBIA
Thank you.

COLUMBIA
Houston, Columbia. Did you enable the S-band relay at least one way affirm Eagle to Columbia so I can hear what's going on?

CAPCOM
Roger. There's not much going on at the present time, Columbia. I'll see what I can do about the relay.

CAPCOM
Columbia, this is Houston. Are you aware that Eagle plans the EVA about 4 hours early? Over.

COLUMBIA
Affirmative. When's hatch open time in GET estimated?

CAPCOM
Roger. Somewhere around 108 hours. We'll have an update for you in that a little later.

COLUMBIA
Okay, I haven't heard a word from those guys, and I thought I'd be hearing them through your S-band relay.

CAPCOM
Roger. They're about page Surface 27 in the checklist, proceeding in good time.

COLUMBIA
Glad to hear it.

COLUMBIA
You got a ground there in MCC?

CAPCOM
Roger, your last, Columbia.

COLUMBIA
Roger, I expect you probably have about 3 Capcoms and 11 Flight Directors with no place to plug in.

CAPCOM
Roger. Out.

COLUMBIA
The ratio might even be reversed.

COLUMBIA
My coevapsrator temperature is 50 degrees and the compressor is just fine.

CAFCOM
Roger. We copy.

END OF TAPE

CDT 19:27 GET 106:55 TAPE 325/1

EAGLE
Glycol evaporator on the temperature is 50 degrees and the comfort in here is just right.

CAPCOM
Roger we copy 50 degrees on the glycol, and comfort index fine.

EAGLE
If you'll excuse me a minute I'm going to have a cup of coffee.

CAPCOM
Roger.

CAPCOM
Columbia, this is Houston. Your map coordinates are POPPA decimil 2 and 6 decimil 3 on the land 2 chart, over.

CAPCOM
Columbia, this is Houston. Did you copy the coordinates for the LM, over.

CAPCOM
Columbia, Columbia, this is Houston. Did you read we request high gain antenna Yaw 180, pitch zero. I say again Yaw 180, pitch zero on the high gain, over.

CAPCOM
Columbia, Columbia, this is Houston do you read, over.

COLUMBIA
Houston, Columbia how do you read.

CAPCOM
Columbia, this is Houston reading yo.u loud and clear, over.

COLUMBIA
Read you loud and clear, Bruce.

CAPCOM
Roger, Mike I have the coordinates -

COLUMBIA
What's new.

CAPCOM
What's new, is I think we have some more coordinates for you on the LM location, over.

COLUMBIA
Ready to copy.

CAPCOM
Roger, Mike POPPA .2 and 6.3 on your LAM 2 chart, over.

COLUMBIA
Roger, POPPA .2 and who .3?

CAPCOM
6.3, I say again, 6.3.

COLUMBIA
Thank you POPPA .2 and 6.3 I'll try them.

CAPCOM
Roger.

END OF TAPE

COLUMBIA
Okay, what you are saying is if you look at the catch pond and that just about oh - his middle finger, about 1 to 2 o'clock from his middle finger. Is that right?

CAPCOM
Roger, about 1 to 2 o'clock from his middle finger if you are using 12:00 being to the west, over.

COLUMBIA
There must be a (garbled). Okay I'm with you.

CAPCOM
Okay, and I got LOS and AOS times for you.

COLUMBIA
Go ahead.

COLUMBIA
Go ahead, Houston.

CAPCOM
Roger, your LOS at 107 plus 23 plus 08. AOS at 108 plus 09 plus 06. The next pass for coast tracking. Your time of closest approach is 108 35 28. That's three miles south of track, over.

COLUMBIA
I understand all right but this new information I would like to try P22 and look for him in a different spot.

CAPCOM
Standby a minute, please.

COLUMBIA
Okay, I was looking in the wrong place last time. Auto optics were not pointing at the coordinates you gave me.

CAPCOM
Roger.

CAPCOM
Columbia, this is Houston, over.

COLUMBIA
Go ahead.

CAPOM
On your next pass Columbia rather than performing a P22 as scheduled, we would like you to look into the center of the coordinates we gave you which is our best analysis based on MAP physics trajectory and we also have another set of coordinates that we would like you to search in the vicinity of. This last one being based on an interpretation of the geological features that were seen by the crew on the way down. The coordinates of this second site are MIKE .7 and 8.0. I say again. MIKE .7 and 8.0. Over.

COLUMBIA
Roger, copy. MIKE .7 and 8.0. The only thing is my best tool for looking is the sextant and if I bring the sextant up, I might as well let P22 go at the same time or don't you think -

CAPCOM
Roger, if you want to go that way, crank it up and then you can drive it around and look where you want, over.

COLUMBIA
Okay.

CAPCOM
And if you can find the LM then by all means track it or make a note of where is was and we can track it on the next rev. If you are ready we have a RFSMMAT update that we can pass up to you at this time if you will give us P00 and accept, over.

COLUMBIA
Okay, P00 and accept you got and this is an updated landing site RSFMMAT. We still believe that a plane change is not required. Is that affirmative?

CAPCOM
That's affirmative, Columbia.

CDT 19:38 GET 107:06 TAPE 326/2

COLUMBIA
All right.

PAO
This is Apollo Control at 107 hours 15 minutes. We'll still have acquisition of Columbia for another 8 minutes. All systems in Eagle still looking good. Cabin pressure 4.86 pounds showing a temperature of 63 degrees in the Eagle's cabin.

CAPCOM
Columbia, this is Houston. We are through with the uplink. It's your computer.

COLUMBIA
Roger, thank you.

PAO
This is Apollo Control. Our best information at this time on the orientation of Eagle that the plus Z axis, that's the leg with the ladder on it, is yaw 13 degrees south of the ground track. The sun behind Eagle with the - the leg with the ladder on it in a generally westly direction along the ground track, but yaw at 13 degrees south from that ground track.

END OF TAPE

CDT 19:49 GET 107:17 TAPE 327/1

COLUMBIA
Houston, Columbia.

CAPCOM
Go ahead, Columbia.

COLUMBIA
On our next pass I'd appreciate the S-band relay mode, over.

CAPCOM
Roger, we're working on that. There haven't been any transmissions from Tranquility Base since we last talked to you. We can not give you a full S-band relay without being assured of high gain antenna. We're working on the partial relay for you, over.

COLUMBIA
Okay, understand, Bruce. Thank you very much.

CAPCOM
Columbia, this is Houston. Approximately 2 minutes to LOS all your systems are looking good from down here, over.

COLUMBIA
Does it look to you like the 240 controller is properly controlling the glycol evaporator outlet temp. It looks alright up here.

CAPCOM
Roger, Columbia, doing this pass on the front side it looked okay to us.

COLUMBIA
Okay, thank you.

PAO
This is Apollo Control at 107 hours 23 minutes, and we've had loss of signal on Columbia. The clock here in the control center counting down to depressurization time on Eagle shows we're 36 minutes 39 seconds away from that event. We believe the crew is pretty well on the time line in EVA preperations. We will next acquire Columbia at 108 hours 9 minutes 6 seconds. Columbia's closest approach to Eagle on this next revolution will come at 108 hours 35 minutes 28 seconds when it should be 3 miles south of the track.

END OF TAPE

CDT 19:59 GET 107:27 TAPE 328/1

EAGLE
Houston, Tranquility Base.

CAPCOM
Go ahead Tranquility Base.

EAGLE
Okay. We are on about the middle of page 28, clear from 28.

CAPCOM
Roger, Tranquility. We copy.

PAO
This is Apollo Control. Based on that checklist report from Eagle, the crew appears to be about behind the timeline in EVA preparations.

END OF TAPE

CDT 20:14 GET 107:42 TAPE 329/1

EAGLE
I think we'd - like to put -

PAO
This is Apollo Control at 107 hours 52 minutes. We're 16 minutes away from acquisition of Columbia on it's 17th revolution of the moon. We do not at this time have a good estimate for the start of the EVA. We'll have to wait until Eagles crew, Neil Armstrong, and Buzz Aldrin, give us some more information about how they're coming along in the preperations for the EVA. Indications are now that they are running on the order of 30 minutes behind the nominal time, preparations line. Maybe a little bit longer. But we'll have to wait until we hear from them again before we can get a good estimate on the time for starting the EVA.

CAPCOM
Tranquility Base this is Houston, over.

EAGLE
Roger, go ahead, Houston.

CAPCOM
Roger, Tranquility, we're coming up in about 6 minutes on GET at 108 if you'd like to start your event timer we can give you a hack at 108 00 over.

EAGLE
Wilco.

EAGLE
Houston, Tranquility, we're ready to start with the electrical check out. We're going to S-band modulate FM over.

CAPCOM
Roger, Tranquility this is Houston, we copy. Go ahead with the FM and we missed the mark at 108. Do you want us to try and give you one at 108 05, over.

EAGLE
I think we've got the timers on. We've got 1 minute and 30 seconds mark. Roger, we copy and you're in sinc with us.

END OF TAPE

CDT 20:34 GET 108:02 TAPE 330/1

PAO
This is Apollo Control at 108 hours, 2 minutes. This latest report that the crew is getting the electrical checkout indicates they're about 40 minutes behind the timeline. We will acquire Columbia in 6 minutes.

TRANQUILITY
Help you on that?

TRANQUILITY
Feed it, or disconnect to her?

TRANQUILITY
Say again.

TRANQUILITY
Switch electrical umbilical to - on the F type - have to get up straight - up. Radio comm.

TRANQUILITY
That's got it.

TRANQUILITY
Lift.

TRANQUILITY
That's the parking lift.

TRANQUILITY
Park.

TRANQUILITY
All jets. A1 we've got antennas down and not real good, is it? Okay, here. Up. I'll put my antenna up.

COLUMBIA
Okay, how do you read now?

TRANQUILITY
Okay.

COLUMBIA
Okay. I think that's going to be better.

TRANQUILITY
You read me all right now?

COLUMBIA
Yes.

TRANQUILITY
Okay. That sounds pretty good. I guess it's a combination of the volume and the antenna. May have been just the volume that was bad too high. Why don't you try it - start it again, see if (garble).

COLUMBIA
Okay.

TRANQUILITY
All right. 1 2 3 4 5. 5 4 3 2 1. That sounds pretty good.

COLUMBIA
Better.

TRANQUILITY
Better keep it pretty close to your mouth though.

TRANQUILITY
Okay. Open up your audio circuit breaker and disconnect the LM corem cable.

PAO
We have acquisition of Columbia.

CAPCOM
Columbia, Columbia. This is Houston. Over.

COLUMBIA
Houston, probe me a better gain. How do you read?

COLUMBIA
Roger Columbia. Reading you loud and clear on the high gain. We have enabled the one way MSFN relay that you requested. The crew of Tranquility Base is currently donning slippers. The LMP has his PLSS on, COMM checks out and the CDR is checking his COMM out now. Over.

COLUMBIA
Yes, I guess. Thank you kindly.

COLUMBIA
Houston, the TPI increased the platform up on the back side. I have a P-52 option to clear when you're ready to copy the data.

CDT 20:34 GET 108:02 TAPE 330/2

CAPCOM
Go ahead, Columbia.

COLUMBIA
Roger on stars 43 and 44, the angle difference 4 balls 1. NOUN 93 plus 00057 plus 00166 minus 00022 and the time is 1073038. Over.

PAO
Audio TECH coast to coast. VH A OFF, VH B OFF. I've got for you PTP COMMAND.

CAPCOM
Columbia, this is Houston. Copy star angle difference of 4 balls 1 NOUN 93 plus 00057 plus 00166 minus 00022 time of 1073038. Over.

COLUMBIA
You got it.

CAPCOM
Roger. Are you reading Tranquility base now?

COLUMBIA
Okay. You've got an 0 and a B.

CAPCOM
What is your O2 quantity by the way?

COLUMBIA
O2 quantity is about 91.

CAPCOM
I've got 92.

COLUMBIA
Okay now. I'm going to mode select B.

CAPCOM
- are you in B?

COLUMBIA
I'm in B.

END OF TAPE

CDT 20:44 GET 108:12 TAPE 331/1

EAGLE
Are you in B?

EAGLE
I'm in B.

EAGLE
A.

EAGLE
A.

EAGLE
I'm in A.

EAGLE
Okay, how do you read me?

EAGLE
I read you.

EAGLE
You're loud and clear.

EAGLE
(garbled) one I didn't do. (garbled)

EAGLE
By a mountain. Okay?

EAGLE
Both. That's verb select to A, on.

EAGLE
A, on.

EAGLE
How do you read?

EAGLE
Took you to 1 and down.

EAGLE
I got one.

EAGLE
Got it? Okay, one antenna is out. Verify plus O2 bottle pressure greater than 85 (garbled) Do you have voice with (garbled)

EAGLE
Yeah.

EAGLE
Houston, Tranquility. How do you read? Over.

CAPCOM
Neil, Neil, this is Houston through Tranquility radio check. Over.

EAGLE
Roger. Houston, this is Neil. How do you read?

CAPCOM
Neil, this is Houston. We're reading you loud and clear. Break, break. Buzz, this is Houston through Tranquility. Over.

EAGLE
Roger, Houston. This is Buzz through Tranquility. How do you read? Over.

CAPCOM
We're reading you loud and clear, Buzz. Out.

EAGLE
And are you getting a signal on the TV? Over.

CAPCOM
That's affirmative, Neil. The data that we're receiving looks good and we are receiving sync pulses and signal on TV.

EAGLE
Okay, I still find that the area around the ladder is in a complete dark shadow so we're going to have some problem with TV, but I'm sure you will see the - you'll get a picture from the lighted part.

CAPCOM
This is Houston. We copy and right toward the end of your transmission you mentioned lighted horizon. You trailed off down into the noise level, Neil. Over.

CAPCOM
Columbia, this is Houston. Are you reading Tranquility alright on the relay? Over.

COLUMBIA
I believe so. I haven't heard

CDT 20:44 GET 108:12 TAPE 331/2

COLUMBIA
anything fairly lately breaking up, but up until about 3 minutes ago, I was reading them loud and clear.

CAPCOM
Roger. Sounds like you're getting it all.

COLUMBIA
Thank you.

CAPCOM
Tranquility base, this is Houston. We request you open the TV circuit breaker at the present time. We've had it on about 15 minutes now with the mesa closed. Over.

TRANQUILITY
Roger.

TRANQUILITY
(garbled)

CAPCOM
Say again, Neil.

CAPCOM
Neil. Neil. This is Houston. I can hear you trying to transmit although your transmission is breaking up. Over.

CAPCOM
Buzz. Buzz. This is Houston. Do you read? Over.

ALDRIN
Roger, Houston. This is Buzz. I hear you. Over.

CAPCOM
Roger. You're coming through loud and clear, Buzz. It's a beautiful signal.

ALDRIN
Neil's got his antenna up now. Let's see if he comes through any better now.

ARMSTRONG
Okay. Houston, this is Neil. Do you read?

CAPCOM
Neil, this is Houston. Reading you beautifully.

ARMSTRONG
My antenna's scratching the roof.

CAPCOM
We copy. Your antenna is scratching the roof. Roger.

ARMSTRONG
Do we have a go for cabin depress ?

ALDRIN
I hear everything but that.

ARMSTRONG
Houston, this is Tranquility. We're standing by for a go for cabin depress. Over.

CAPCOM
Tranquility base, this is Houston. You are go for cabin depressurization. Go for cabin depressurization.

TRANQUILITY
Roger. Go for cabin depressurization.

CAPCOM
Roger. Thank you.

ALDRIN
Houston, this is Buzz. Verify cabin (garbled) circuit breaker open. Over. (garbled) We'll have to pull that one out. Over.

END OF TAPE

CDT 20:54 GET 108:22 TAPE 332/1

COLUMBIA
Wait a minute.

CAPCOM
Columbia, this is Houston. Your LM line of sight time acquisition will be, Tranquility base, is 108 plus 29. LOS is 108 plus 42, over.

COLUMBIA
Circuits is in rebound, AUTO.

CAPCOM
In AUTO.

TRANQUILITY
Eagle (garbled)

CAPCOM
We'll pick you up on OMNI C or D. Standby please.

(?)
(garbled) a slight recess.

(?)
(INAUDIBLE)

TRANQUILITY
Takes a while for the water separator.

TRANQUILITY
I don't understand. Dew fan number 01 circuit breaker opened.

CAPCOM
Buzz, this is Houston. We would like you to pull the suit fan DELTA C circuit breaker on panel 16 over.

TRANQUILITY
Roger, I have it. (inaudible). (INAUDIBLE)

TRANQUILITY
Very good.

TRANQUILITY
Okay there it is. The TS latch on water separator.

TRANQUILITY
Main booster isolation valve to 25 -

TRANQUILITY
Thank you.

TRANQUILITY
Got it. (garbled) prime rows is.

TRANQUILITY
Okay.

TRANQUILITY
(garbled)

TRANQUILITY
Let me do that for you.

TRANQUILITY
(INAUDIBLE)

TRANQUILITY
Mark 1.

TRANQUILITY
(garbled) valves.

TRANQUILITY
(garbled)

TRANQUILITY
Okay.

TRANQUILITY
(garbled) locked in the stones.

TRANQUILITY
Okay.

TRANQUILITY
All of the (garbled)

TRANQUILITY
(garbled) locked and lock-lock.

TRANQUILITY
Did you put it -

TRANQUILITY
Oh, wait a minute.

TRANQUILITY
Should be (garbled).

TRANQUILITY
(garbled).

TRANQUILITY
Roger, (garbled).

TRANQUILITY
I'll try it on the middle.

TRANQUILITY
All right check my (garbled) valves vertical.

TRANQUILITY
Both vertical.

TRANQUILITY
That's two vertical.

TRANQUILITY
Okay.

TRANQUILITY
(garbled).

TRANQUILITY
Locked and doubled locked.

TRANQUILITY
Okay.

CDT 20:54 GET 108:22 TAPE 332/2

TRANQUILITY
Miss marked.

TRANQUILITY
Sure wished I would of shaved last night.

PAO
That was a Buzz Adrin's comment.

TRANQUILITY
Have any down movements that you might swing over.

TRANQUILITY
I verified this move to (garbled).

TRANQUILITY
Do what?

COLUMBIA
All right you guys can read me on VHF, but you sure sound good down there.

TRANQUILITY
Handlocked.

TRANQUILITY
Okay.

TRANQUILITY
All right the vent window's clear. And we will leave it on the engine cover.

TRANQUILITY
Verify (garbled).

TRANQUILITY
How's the count now, Houston?

CAPCOM
All right, this is Houston. The count is very good. You are coming in loud and clear, and Mike passes on the word that he is receiving you and following your progress with interest.

TRANQUILITY
(garbled).

TRANQUILITY
Very well, thank you.

TRANQUILITY
Have you got all the material up in the back?

TRANQUILITY
Complete.

END OF TAPE

CDT 21:04 GET 108:32 TAPE 333/1

EAGLE
On lock. That's locked and aligned.

EAGLE
Now I see them. Pull the R-seater down.

EAGLE
Wonder if we're triggering all the time. I don't think so.

EAGLE
Houston, Neil. How do you read?

CAPCOM
Neil, this is Houston. We read you loud and clear and I read both the comments that were said, "I wonder if we're triggering all the time." and "I don't think so." Prior to that it was relatively quiet. Over. Roger. Out.

EAGLE
Okay, we're hearing a little bit of background noise and I just wanted to make sure that we weren't continually keyed.

CAPCOM
Doesn't sound like it.

EAGLE
Want to put the light back up?

CAPCOM
Neil, this is Houston. Would you verify your RC vent window's clear. Over.

EAGLE
They're clear. Over. That's verified.

CAPCOM
Roger. Out.

EAGLE
That's good.

EAGLE
Do we move it?

EAGLE
Okay, we can stow this.

EAGLE
Pan's dirty. Alright, prep for EVA. First you connect the water hose. Okay, let me get your - Okay, now we should be able to stow these up.

PAO
Cabin pressures on both vehicles reading 4.9 pounds per square inch. Columbia's temperature - 70 degrees F. Eagle's temperature 61 degrees F.

CAPCOM
Columbia, this is Houston. Any joy on the LM left pass? Over.

EAGLE
Okay, there all stowed. _nd clip water hose to PGA. I can't lift it from that.

EAGLE
Okay, that's in unlock. Okay.

EAGLE
Houston, Buzz here. Over.

CAPCOM
Go ahead, Buzz. This is Houston.

EAGLE
Roger. Our COMM didn't seem to clear up a good bit. Did CSM just go over the hill?

CAPCOM
Negative. He's been over the hill I figure for a minute or so.

EAGLE
I don't remember -

CAPCOM
Correction - he should be losing contact with you in about 8 minutes.

EAGLE
About 8? The flag lock system. Yes, flight suit check, blue monster check, lock locks, red lock, purge lock, and on this side (garble) and lock locks on both sides, AUTO lock, and the COMM.

END OF TAPE

CDT 21:14 GET 108:42 TAPE 334/1

EAGLE
(garbled) mark.

CAPCOM
Columbia, this is Houston. Do you read, over.

COLUMBIA
Columbia reads you loud and clear on onmi C Charlie.

CAPCOM
Roger, Columbia, I have a LOS and AOS signs for you this pass with MSFN. LOS 109, +21 +12, AOS coming around on the corner 110 07 35, over.

COLUMBIA
Okay, that's fine.

CAPCOM
Roger, up.

TRANQUILITY
(garble)

TRANQUILITY
Okay.

TRANQUILITY
All right, verify your diverter valve open.

TRANQUILITY
What position?

TRANQUILITY
Diverter valve up.

TRANQUILITY
Diverter valves up.

TRANQUILITY
Just a minute here.

TRANQUILITY
Switch on.

TRANQUILITY
Mine's running also, and it's cooling all right.

TRANQUILITY
Thank you.

TRANQUILITY
Got them both on, verify cooling. That's what it yea verify cooling. Why don't you bend down and let me stow that. Mine is back to EMU. He did that pretty well.

TRANQUILITY
Pretty well complete.

CAPCOM
Columbia, this is Houston, over.

COLUMBIA
This is Columbia, go ahead.

CAPCOM
Roger, were you successful in spotting the LM on that pass, over.

COLUMBIA
Negative, I checked both locations.

CAPCOM
Okay if you'd like to look again next pass we have a different set of coordinates based on the on board C57 solution of the LM. These are echo .3 and 4.8. I say again echo .3, 4.8 same chart, over.

COLUMBIA
Roger I'll look down and how about putting that in your machine and come up with the coordinates for latitude and longitude over Q and altitude for P22 so it can help me as best it can.

CAPCOM
Roger.

COLUMBIA
(garbled) is still pointing in the wrong place.

CAPCOM
Columbia, this is Houston, latitude plus 0.523, longitude divided by 2, 11.710, over.

COLUMBIA
Roger understand +00523 and +11710 thank you.

CAPCOM
Houston roger up.

CDT 21:14 GET 108:42 TAPE 334/2

CAPCOM
Columbia this is Houston. We're requesting high gain antenna, pitch, yaw, pitch 0, yaw 200, that is pitch 0, yaw 200, over.

COLUMBIA
(garbled)

PAO
In the control center, a clock has been set to record the operating time on Neil Armstrong's portable life support system. EVA will be counted from that time.

TRANQUILITY
This is Neil, how do you read.

CAPCOM
Neil, this is Houston. Loud and clear.

TRANQUILITY
That's a little bit better now. There we go read you and clear. You're not too loud square, but I think it's the same problem. Houston, how do you read Buzz.

CAPCOM
Buzz, this is Houston. Loud and clear, you're really coming in beautifully, over.

TRANQUILITY
Very good. Okay. (garbled) repress (garbled).

TRANQUILITY
Okay.

END OF TAPE

CDT 21:25 GET 108:53 TAPE 335/1

ARMSTRONG
Now - that was for gynmastics.

ALDRIN
What?

ARMSTRONG
Now comes the gymnastics.

ALDRIN
I think it will be a lot easier.

ARMSTRONG
Okay, I want to go to South and go down to 3.5 and back to AUTO.

ALDRIN
Okay, going dump -

ALDRIN
And it's down to 4.2 - 4.1.

ARMSTRONG
At 35.

ALDRIN
Are you in AUTO?

ARMSTRONG
Yes. Standby. Cabin pressure at 35 and lens two circuit pressure between 36 and 43.

ALDRIN
It is -

ARMSTRONG
What ?

ALDRIN
The circuits are about to (garbled).

ARMSTRONG
Okay.

ARMSTRONG
Standby for PG and pressures above 45 minus 46.

ALDRIN
Minus 47.

CAPCOM
Neil this is Houston. Will you give us a hack when you set your thermometer, over.

ARMSTRONG
Roger.

ALDRIN
Give it to them later.

ARMSTRONG
Okay.

ARMSTRONG
Okay, lets go to dump.

ALDRIN
Dump - go to dump.

ARMSTRONG
Houston, I'll set my watch at 56, over.

CAPCOM
Roger.

ALDRIN
3 2 1 mark.

COLUMBIA
Houston, Columbia back on the high gain.

CAPCOM
Roger, Columbia. Loud and clear, and we copied your mark there Buzz.

COLUMBIA
Clear and we copied your mark there Buzz.

ARMSTRONG
(garbled) the window.

ALDRIN
Right away.

ARMSTRONG
Is that yours?

ALDRIN
Got mine.

ARMSTONG
Okay.

ARMSTRONG
Blood pressure going toward zero. There by lens the circuits 36 to 43. That's very fine. And my GTA pressure above 4.5. (garbled) above .75, coming down. Open hatch when it gets to zero.

ALDRIN
Do you want to bring down one of your risers now or leave them up?

ALDRIN
Now read

ARMSTRONG
Okay.

ARMSTRONG
Okay, roger down.

ARMSTRONG
4/10ths of a pound in the cabin.

CDT 21:25 GET 108:53 TAPE 335/2

ARMSTRONG
Down about .2.

CAPCOM
Coming up on 5 minutes of operation on Neil Armstrong's Portable Life Support System now.

ARMSTRONG
It took us a long time to get all the way down, didn't it?

ALDRIN
Yes.

ARMSTRONG
You better let me see if it will open now,

ALDRIN
Okay.

ARMSTRONG
Open my RCE there, would you mind?

END OF TAPE

CDT 21:35 GET 109:03 TAPE 336/1

ARMSTRONG
Push that one.

ARMSTRONG
Is it light?

ALDRIN
It's unlocked, yes.

ARMSTRONG
Unlocked. That's good.

ARMSTRONG
I rig it up.

ALDRIN
It'll pop open.

ALDRIN
Get a steady tone in the background?

ARMSTRONG
I have static.

ARMSTRONG
It went in Static.

ALDRIN
I've got a little bit of a steady tone.

ARMSTRONG
I don't guess I hear that.

CAPCOM
Neil, this is Houston. What's your status on hatch opening. Over.

ARMSTRONG
Everything is GO here. We're just waiting for the cabin pressure to bleed so - to blow enough pressure to open the hatch. It's abbut .1 on our gage now.

ALDRIN
Very dependant on that thing. Alternative would be to open Noun 42.

CAPCOM
Neil, this is Houston. Over.

ARMSTRONG
Go ahead, Houston.

CAPCOM
Roger. We're showing a real low static pressure on your cabin. Do you think you can open the hatch at this pressure of about 1.2 psi?

ARMSTRONG
We're going to try it.

CAPCOM
Roger.

ARMSTRONG
The hatch is coming open.

ALDRIN
Okay, hold it from going closer and I'll get the valve 2.

ARMSTRONG
Okay.

ALDRIN
No, I'd better get up first.

PAO
Hatch reported coming open at 109 hours, 8 minutes, 05 seconds.

ALDRIN
Okay, the valves have gone open.

ARMSTRONG
Okay.

PAO
Correction - 109:07:35.

ALDRIN
Spur up to forward.

ARMSTRONG
The window clank yet? The water went to clean yet?

ALDRIN
It was, yes.

ARMSTRONG
Mine, hasn't cleared yet.

CAPCOM
Columbia, this is Houston. Over.

COLUMBIA
You want me? Go ahead.

CAPCOM
Columbia, this is Houston. We'd like you to cycle the fans in cryo hydrogen tanks number 1 and LOS this orbit is 111:19:31.

CAPCOM
Correction - make that for the next orbit. You already have the AOS/LOS for this orbit.

COLUMBIA
Roger on the time and you want to cycle the fan in cryo hydrogen tank 1.

CDT 21:35 GET 109:03 TAPE 336/2

CAPCOM
Roger. Out.

END OF TAPE

CDT 21:41 GET 109:09 TAPE 337/1

EAGLE
Open on my request.

CAPCOM
Roger out.

EAGLE
Have you got your water valve on there ?

EAGLE
Yes.

PAO
They've been on the PLSS now for 16 and 1/2 minutes.

CAPCOM
Columbia, this is Houston. We show you near the high gain antenna stand limits. When you lose lock on us, we request OMNI DELTA. OMNI DELTA when you lose lock. Over.

COLUMBIA
Roger. OMNI DELTA.

PAO
We're 8 minutem away from loss of signal on Columbia.

ARMSTRONG
Okay. My windows cleared. I'm going to go - turn my cooling up a little bit.

ALDRIN
Okay. My window's clear.

TRANQUILITY
All RCU windows are clear.

ARMSTRONG
(garble) circuit is 42, 43. And I got SN pressure light, a BS light and a ECS light.

ALDRIN
We've got a water separater light.

TRANQUILITY
Hold it and I'll check.

ALDRIN
And I'll look at your cabin vent and one (garble) and you look (garble) secondary.

PAO
Neil Armstrong's suit pressure 4. -

ARMSTRONG
Is it cool now?

ARMSTRONG
(garble)

ARMSTRONG
Okay. Glycol pump secondary circuit breaker open?

ALDRIN
I can see that.

ALDRIN
I have to lean this way.

ARMSTRONG
I can't go any further. Cabin span 1.

ALDRIN
(garble)

ARMSTRONG
It's open.

ALDRIN
Verified.

ARMSTRONG
Okay. (garble) radar circuit breaker's open.

ALDRIN
I'm looking head on at it. I'll get it.

ARMSTRONG
Okay. You'll have to fix your antenna.

END OF TAPE

ARMSTRONG
Well (garbled)

ALDRIN
About ready to go down and get some -

ARMSTRONG
Is my indicator down? Okay, now we're ready to hook up the LEC here.

ALDRIN
Now that should go down (garbled) put the bag up this way, that's even. Neil are you hooked up to it?

ARMSTRONG
Yes.

ARMSTRONG
Okay now we need to hook this.

ALDRIN
Leave that up there.

ARMSTRONG
Yes.

ALDRIN
Okay, your visor. Your back is up against the (garbled). Alright now it's on top of the DSKY. Forward and up, now you've got them, over toward me, straight down, relax a little bit.

ARMSTRONG
(garbled)

ALDRIN
Neil you're lined up nicely. Toward me a little bit, okay down, okay made it clear. (garbled)

ARMSTRONG
To what edge?

ALDRIN
Move, here roll to the left, okay now you're clear, You're lined up on the platform. Put your left foot to the right a little bit. Okay, that's good. Roll left.

ARMSTRONG
Okay now I'm going to check these bags here.

ALDRIN
Okay, not quite squared away. Roll to the, roll right a little. Now you're even.

ARMSTRONG
That's okay?

ALDRIN
That's good. You've got plenty of room for your left it's still close on the one that comes back.

ARMSTRONG
How am I doing?

ALDRIN
You're doing fine.

ALDRIN
Now do you want those bags?

ARMSTRONG
Yea. Got it.

ARMSTRONG
Okay, Houston, I'm on the porch.

CAPCOM
Roger, Neil.

ALDRIN
Okay right now, Neil.

CAPCOM
Columbia, Columbia, this is Houston 1 minute and 30 seconds to LOS all systems go, over.

ALDRIN
Stay where you are a minute, Neil

ARMSTRONG
Okay.

ALDRIN
Need a little slack.

PAO
Neil Armstrong on the porch at 109 hours 19 minutes 16 seconds.

ARMSTRONG
You need more slack, Buzz?

ALDRIN
No hold it just a minute.

CDT 21:47 GET 109:15 TAPE 338/2

ARMSTRONG
Okay.

END OF TAPE

CDT 21:52 GET 109:20 TAPE 339/1

ARMSTRONG
You need more slack, Buzz?

ALDRIN
No, hold it just a minute.

ARMSTRONG
Okay.

PAO
25 minutes of PLSS time expended now.

ALDRIN
Okay, everything's nice and sunny in here.

ARMSTRONG
Okay, can you pull the door open a little more?

ALDRIN
(garbled)

ALDRIN
Did you get the mesa out?

ARMSTRONG
I'm going to pull it now.

ARMSTRONG
Houston, the mesa came down alright.

CAPCOM
Houston. Roger, we copy, and we're standing by for your TV.

ARMSTRONG
Houston, this is Neil. Radio check.

CAPCOM
Neil, this is Houston. You're loud and clear. Break, break. Buzz, this is Houston. Radio check and verify TV circuit breaker in.

ALDRIN
Roger, TV circuit breaker's in. Receive loud and clear.

CAPCOM
Man, we're getting a picture on the TV.

ALDRIN
Oh, you got a good picture. Huh?

CAPCOM
There's a great deal of contrast in it, and currently it's upside-down on our monitor, but we can make out a fair amount of detail.

ALDRIN
Okay, will you verify the position, the opening I ought to have on the camera.

CAPCOM
Stand by.

CAPCOM
Okay, Neil, we can see you coming down the ladder now.

ARMSTRONG
Okay, I just checked - getting back up to that first step, Buzz, it's not even collapsed too far, but it's adequate to get back up.

CAPCOM
Roger, we copy.

ARMSTRONG
It takes a pretty good little jump.

CAPCOM
Buzz, this is Houston. F 2 1/160th second for shadow photography on the sequence camera.

ALDRIN
Okay.

ARMSTRONG
I'm at the foot of the ladder. The LM foot pads are only depressed in the surface about 1 or 2 inches. Although the surface appears to be very, very fine grained, as you get close to it. It's almost like a powder. Now and then, it's very fine.

CDT 21:52 GET 109:20 TAPE 339/2

ARMSTRONG
I'm going to step off the LM now.

ARMSTRONG
That's one small step for a man. One giant leap for mankind.

ARMSTRONG
As the -The surface is fine and powdery. I can -I can pick it up loosely, with my toe. It does adhere in fine layers like powdered charcoal to the sole and sides of my boots. I only go in a small fraction of an inch. Maybe an eighth of an inch, but I can see the footprints of my boots and the treads in the fine sandy particles.

CAPCOM
Neil, this is Houston. We're copying.

END OF TAPE

CDT 21:57 GET 109:25 TAPE 340/1

ARMSTRONG
There seems to be no difficulty in moving around as we suspected. It's even perhaps easier than the simulations at 1/6g that we performed in the simulations on the ground. It's actually no trouble to walk around. The descent engine did not leave a crater of any size. There's about 1 foot clearance on the ground. We're essentially on a very level place here. I can see some evidence of rays emanating from the descent engine, but very insignificant amount. Okay, Buzz, we're ready to bring down the camera.

ALDRIN
I'm all ready. I think it's been all squared away and in good shape. Okay? Okay, you'll have to pay out all the LEC. It looks like it's coming out nice and evenly.

ARMSTRONG
Okay, it's quite dark here in the shadow and a little hard for me to see if I have good footing. I'll work my way over into the sunlight here without looking directly into the sun.

ALDRIN
Okay, it's taut now.

PAO
Unofficial time on the first step - 109:24:20.

ALDRIN
Yes, I think it's pulling the wrong one.

ARMSTRONG
Okay, I'm with you. Pull it down now. There was still a little bit left in the -

ALDRIN
Okay, don't hold it quite so tight. Okay?

ARMSTRONG
Looking up at the LM, I'm standing directly in the shadow now looking up at Buzz in the window. And I can see everything quite clearly. The light is sufficiently bright, backlighted into the front of the LM, that everything is very clearly visible.

ALDRIN
Okay, I'm going to be changing this hook hanger.

ARMSTRONG
Okay.

PAO
The Surgeon says that -

ARMSTRONG
Camera installed on the RCU bracket.

PAO
The Surgeon says the crew is doing well. Data is good, crew is doing well.

ARMSTRONG
I'm storing the LEC on the secondary strut.

END OF TAPE

CDT 22:02 GET 109:30 TAPE 341/1

ARMSTRONG
I'll step out and take some of my first pictures here.

CAPCOM
Roger, Neil, we're reading you loud and clear. We see you getting some pictures and the contingency sample.

ALDRIN
He's getting some pictures and the contingency sample.

PAO
35 and a half minutes of PLSS time expended now.

CAPCOM
Neil this is Houston. Did you copy about the contingency sample, over.

ARMSTRONG
Rog, I'm going to get to that just as soon as I finish these picture series.

ALDRIN
Okay, going to get the contingency sample now, Neil.

ARMSTRONG
Right.

ALDRIN
Okay, that's good. Okay the contingency sample is down and it's (garbled). Looks like it's a little difficult to dig through -

ARMSTRONG
This is very interesting. It's a very soft surface but here and there where I plug with the contingency sample collector, I run into a very hard surface but it appears to be very cohesive material of the same sort. I'll try to get a rock in here. Here's a couple.

END OF TAPE

CDT 22:06 GET 109:34 TAPE 342/1

ARMSTRONG
A couple.

ALDRIN
That looks beautiful from here, Neil.

ARMSTRONG
It has a stark beauty all its own. It's like much of the high desert of the United States. It's different but it's very pretty out here. Be advised that a lot of the rock samples out here, the hard rock samples have what appear to be vesicles in the surface. Also I am looking at one now that appears to have some sort of phenocryst.

CAPCOM
Houston. Roger, out.

ALDRIN
Container handle is off the (cut out) - in about six or eight inches under the surface. I could (cut out)

ARMSTRONG
It is. It's - I'm sure I could push it in further, but it's hard for me to bend down further than that.

ALDRIN
Now you can -

ARMSTRONG
You can really throw things a long way out there. That pocket open, Buzz?

ALDRIN
Yes it is, but it's not up against your suit. Hit it back once more. More toward the inside. Okay, that's good.

ARMSTRONG
That in the pocket?

ALDRIN
Yes, push down. Got it? No, it's not all the way in. Push it. There you go.

ARMSTRONG
Contingency sample is in the pocket. I - Oxygen is 81 per cent. I have no flags, and I'm in minimum flow.

CAPCOM
This is Houston. Roger and out.

ALDRIN
Okay. I have got the cameras on at one frame a second

ARMSTRONG
Okay.

ALDRIN
And I've got the 80 per cent, no flags.

ARMSTRONG
Are you getting a TV picture now, Houston?

CAPCOM
Neil, yes we are getting a TV picture. Neil, this is Houston. We're getting a picture here. It's the first time we can see the bag on the LEC being moved by Buzz, though. Here you come into our field of view.

ARMSTRONG
(Garble).

ALDRIN
Roger.

ARMSTRONG
Hold it a second. First let me move that over the edge for you.

ALDRIN
Okay. Are you ready for me to come out?

ARMSTRONG
Yes. Just stand by a second. I'll move this over the handrail. Okay?

ALDRIN
Alright. That's got it. Are you ready?

ARMSTRONG
All set. Okay, you saw what difficulties I was having. I'll try to watch your PLSS from underneath here.

ALDRIN
Alright. The backup camera is

END OF TAPE

CDT 22:11 GET 109:39 TAPE 343/1

ALDRIN
- all right the back up camera's position.

ARMSTRONG
Okay. Your PLSS is - looks like it is clearing okay. The shoes are about to come over the sill. Okay, now drop your PLSS down. There you go you're clear and spiderly you're good. About an inch clearence on top of your PLSS.

ALDRIN
Okay, you need a little bit of arching of the back to come down. (Garbled) How far are my feet from the -

ARMSTRONG
Okay, you're right at the edge of the porch.

ALDRIN
Okay. Back in - all little of foot movement - porch. Little arching of the back. Hope it comes up and cleared the bulk head without any trouble at all.

ARMSTRONG
Looks good.

PAO
45 minutes PLSS time expended.

CAPCOM
Neil, this is Houston. Based on your camera transfer with the LEC do you forsee any difficulties in SRC transfer? Over.

ARMSTRONG
Negative.

PAO
It's the sample return containers, the rock boxes that CAPCOM -

ALDRIN
Now, I want to back up and partially close the hatch. Making sure not to lock it on my way out.

ARMSTRONG
A good thought.

ALDRIN
That's our home for the next couple of hours and I want to take good care of it. Okay, I'm on the top step and I can look down over the RCU, landing gear pads. That's a very simple matter to hop down from one step to the next.

ARMSTRONG
Yes, I found it to be very comfortable and walking is also very comfortable. You've got three more steps and then a long one.

ALDRIN
Okay, I'm going to leave that one foot up there and both hands down to about the fourth rung up.

ARMSTRONG
There you go.

ALDRIN
Okay. Now I think I'll do the same.

ARMSTRONG
A little more. About another inch. There you got it. That's a good step. About a three footer.

ALDRIN
Beautiful, beautiful.

ARMSTRONG
Isn't that something. Magnificent sight down here.

ALDRING
Magnificent definition.

PAO
Both PLSS's nominal on consumables.

ALDRIN
Looks like the secondary strut has little thermal effects on it right here, Neil.

ARMSTRONG
Yeah, I noticed that. That seems to be the worst although similar effects are on - all around.

ALDRIN
Both talking at once. - isn't it.

CDT 22:11 GET 109:39 TAPE 343/2

ARMSTRONG
Isn't it fun.

ALDRIN
Right in this area I don't think there's much of any (cut out) bounce together and it's hard to tell whether it's a cloud or a rock.

ARMSTRONG
Notice how you can pick it up.

ALDRIN
Yeah it bounces and then

END OF TAPE

CDT 22:16 GET 109:44 TAPE 344/1

ALDRIN
Reaching down fairly fast, getting my suit dirty at this stage.

ARMSTRONG
The mass of the backpack does have some effect on inertia.

ALDRIN
There's a slight kendancy I can see now to - backwards - due to the soft, very soft texture.

ARMSTRONG
You're standing on a rock, a big rock there now.

ALDRIN
This pad sure didn't.

ARMSTRONG
No, it didn't.

ALDRIN
There's no crater there at all from the engine.

ARMSTRONG
No.

ALDRIN
I wonder if that right under the engine is where the probe might have hit.

ALDRIN
- side like that.

ARMSTRONG
Yes, I think that's a good representation of our sideward velocity at touchdown there.

ALDRIN
I see that probe over on the minus Y strut. It's broken off and bent back up.

ARMSTRONG
(Garbled) bent over.

ALDRIN
Can't say too much for the - for the visibility here without the visor up. (Garbled) it looks like there is a (garbled) the surface of it is not bound in rock. And incidently, these rocks - a very powdery surface.

CAPCOM
Try again please Buzz, you're cutting out.

ALDRIN
I say that the rocks are rather slippery.

CAPCOM
Roger.

ALDRIN
Very powdery surface when the sun hits. They split up all the very little fine porouses. We will attempt to slide over it rather easily.

CAPCOM
Neil Armstrong getting ready to move the TV camera now out to it panorama position.

ARMSTRONG
Traction

ALDRIN
(garbled)

ALDRIN
About to lose my balance in one direction and recovery is a (garbled). And moving arms around Jack doesn't (garbled) the surface. Not quite that light footed.

ARMSTRONG
And I have the insulation off the MESA now and MESA seems to be in good shape.

ALDRIN
Got to be careful that you are leaning in the direction you want to go otherwise you (garbled). In other words, you have to cross your foot over to stay underneath where your center of mass is. And Neil didn't I say we might see some purple rocks?

ARMSTRONG
Find the purple rocks?

ALDRIN
Yes. They are small, sparkly (garbled) are the box.

END OF TAPE

CDT 22:21 GET 109:49 TAPE 345/1

ARMSTRONG
- find the purple rocks?

ALDRIN
No. Pretty small sparkly (cut out) - fragments (cut out) - on in places (cut out) - I would take a first guess, some sort of biotite. We'll leave that to the Lunar Analysis, but (cut out).

ARMSTRONG
Bio compacts underneath (cut out)- completely (cut out) - no, I say you don't sink down more than a quarter of an inch.

PAO
Biotite is a brown mica substance.

ARMSTRONG
Okay, Houston. I'm going to change lenses on you.

CAPCOM
Roger, Neil.

PAO
Life Support Consumables still looking good.

ARMSTRONG
Okay, Houston. Tell me if you're getting a new picture.

CAPCOM
Neil, this is Houston. That's affirmative. We're getting a new picture. You can tell it's a longer focal length lens, and for your information, all LM systems are GO. Over.

ARMSTRONG
We appreciate that. Thank you.

ALDRIN
Neil is now unveiling the plaque (cut out) -

CAPCOM
Roger. We got you fore-sighted but back under one track.

ARMSTRONG
For those who haven't read the plaque, we'll read the plaque that's on the front landing gear of this LM. First there's two hemispheres, one showing each of the two hemispheres of the Earth. Underneath it says " Here Man from the planet Earth first set foot upon the Moon, July 1969 A.D. We came in peace for all mankind." It has the crew members' signatures and the signature of the President of the United States. Ready for the camera? I can -

ALDRIN
No, you take this (garble)

ARMSTRONG
That's the LEC length.

ALDRIN
Now I'm afraid these barbed materials are going to (cut out) - The surface material is powdery, but (cut out) - how good your lens is, but if you could (cut out). Very much like a very finely powdered carbon, but it's very pretty looking.

ARMSTRONG
Do you want to pull out some of my cable for me, Buz?

END OF TAPE

CDT 22:26 GET 109:54 TAPE 346/1

ARMSTRONG
- my cable for me?

ALDRIN
Houston. How close are you able to get things in focus?

CAPCOM
This is Houston. We can see Buzz's right hand. It is somewhat out of focus. I'd say we're approaching down to probably about 8 inches to a foot behind the position where he is pulling out the cable.

ALDRIN
Okay. Let's have the temperature from you.

CAPCOM
Temperature of the cabin is showing 0.

ALDRIN
I'm a little cool. I think I'll (garbled).

ALDRIN
I'm on immediate now Houston, and I show 3.78. 5, 7 - -

CAPCOM
Houston. Roger. Out.

ALDRIN
And, we'll probably need a little (garbled) back location television camera.

ALDRIN
Neil, look at the minus (garbled) The direction you travel at from right to left.

ARMSTRONG
Right.

ALDRIN
This one over here underneath the ascent engine. It has a broken front tip. (garbled)

ARMSTRONG
Have I got plenty of cable?

ALDRIN
You've got plenty.

ALDRIN
Okay. I think I've got the end of it.

ARMSTRONG
Something interesting. In the bottom of this little crater here. It may be - -

ALDRIN
Keep going. We've got a lot more.

ARMSTRONG
Okay.

ALDRIN
Being a little harder to pull out here.

PAO
If you stand on the ladder facing forward, the minus Y strap is the landing gear to your left.

ARMSTRONG
Afraid I am, Buzz.

ALDRIN
40, 50 feet. Why don't you turn around and let them get a view from there and see what the field of view looks like.

ARMSTRONG
Okay.

ALDRIN
You're backing into the cable.

ARMSTRONG
Okay.

ALDRIN
Turn around to your right I think, would be better.

ARMSTRONG
I don't want to go into the sun if I can avoid it.

ALDRIN
That's right, Neil.

CDT 22:26 GET 109:54 TAPE 346/2

ARMSTRONG
I just (garbled) and walk around it.

ALDRIN
Houston. How's that field of view going to be except the mesa? All right?

CAPCOM
Good.

CAPCOM
Neil, this is Houston. The field of view is okay. We'd like you to aim it a little more to the right. Over.

ARMSTRONG
Okay.

ALDRIN
Okay, that's all the cable we have. We're going out. I'll start working on - -

CAPCOM
A little bit too much to the right. Can you bring it back about 4 or 5 degrees?

CAPCOM
Okay. That looks good Neil.

ARMSTRONG
Okay, now. Do you think I ought to be farther away or closer?

ALDRIN
Can't get too much further either way.

ARMSTRONG
Let's try it like that for a while. I'll get a couple of panaramas with it, too.

CAPCOM
Roger. You look as far as distance goes, Neil. And, we'll line you up again when you finish the panarama. Now, you're going too fast on the panarama sweep. You're going to have to stop for it.

ARMSTRONG
I haven't stopped - I haven't set it down yet. That's the first picture in the panarama right there.

CAPCOM
Roger.

ARMSTRONG
It's taken (garbled) about north, northeast.

END OF TAPE

CDT 22:31 GET 109:59 TAPE 347/1

ARMSTRONG
thinking about north or northeast. Tell me if you've got a picture, Houston.

CAPCOM
We've got a beautiful picture, Neil.

ARMSTRONG
Okay. I'm going to move it.

CAPCOM
Okay, here's another good one. Okay, we got that one.

ARMSTRONG
Okay, now this one is right down front straight west and I want to know if you can see an angular rock in the foreground.

CAPCOM
Roger, we have a large angular rock in the foreground and it looks like a much smaller rock a couple of inches to the left of it. Over.

ARMSTRONG
All right and then on beyond it about 10 feet is an even larger rock that's very rounded. That rock is about - the closest one to you is about sticking out of the sand about 1 foot and it's about a foot and onehalf long and it's about 6 inches thick but it's standing on edge.

CAPCOM
Roger.

ALDRIN
Okay, Neil, I've got the table out and the pack deployed.

CAPCOM
We've got this view now.

ARMSTRONG
Straight south.

CAPCOM
Roger, and we see the shadow of the LM.

ARMSTRONG
Roger, the little hill just beyond the shadow of the LM is a pair of elongated craters about - that will be the pair together is 40 feet long and 20 feet across and they're probably 6 feet deep. We'll probably get some more work in there later.

CAPCOM
Roger. We see Buzz going about his work.

ARMSTRONG
How's that for a final.

CAPCOM
For a final orientation, we'd like it to come left about 5 degrees. Over. Now back to the right about half as much.

ARMSTRONG
Okay?

CAPCOM
Okay. That looks good there, Neil.

ARMSTRONG
Okay.

PAO
1 hour, 7 minutes time expended.

ARMSTRONG
Okay, you can make a mark, Houston.

CAPCOM
Roger.

ARMSTRONG
And incidently you can use the shadow that the staff makes to (garble).

PAO
Buzz is erecting the solar wind experiment now.

ALDRIN
Some of these small depressions (garbled) 3 inches. I could suggest exactly what the surveyor pictures showed when they pushed away a little bit. You get a force transmitted through the upper surface of the soil and about 5 or 6 inches of bay breaks loose and moves as if it were

CDT 22:31 GET 109:59 TAPE 347/2

ALDRIN
caked on the surface when in fact it really isn't.

ARMSTRONG
I notice in the soft spots where we have foot prints -

END OF TAPE

CDT 22:36 GET 110:04 TAPE 348/1

ALDRIN
-- were taped on the surface when, in fact it really isn't.

ARMSTRONG
I noticed in the soft spot where we had foot prints nearly an inch deep that the soil is very cohesive and it will retain a - slope of probably 70 degrees (cut out) foot prints.

PAO
All LM systems still looking good.

ARMSTRONG
Okay?

ALDRIN
Yes. I think that's excellent.

ALDRIN
That didn't come out?

ALDRIN
(garble)

ARMSTRONG
It's up front. Come out here with me. (garble)

ALDRIN
You'll have to extend that one.

CAPCOM
Columbia, Columbia. This is Houston. AOS.

COLUMBIA
Houston. AOS.

PAO
Neil Armstrong has been on the lunar surface now almost 45 minutes.

COLUMBIA
Houston. Columbia in high gain. Over.

CAPCOM
Columbia. This is Houston reading you loud and clear. Over,

COLUMBIA
Yes. This is History. Yes. Read you loud and clear. How's it going?

CAPCOM
Roger. The EVA is progressing beautifully. I believe they are setting up the flag now.

COLUMBIA
Great.

CAPCOM
I guess you're about the only person around that doesn't have TV coverage of the scene.

COLUMBIA
That's right. That's all right. I don't mind a bit. How is the quality of the TV?

CAPCOM
Oh, it's beautiful, Mike. Really is.

COLUMBIA
Oh, gee, that's great. Is the lighting half way decent?

CAPCOM
Yes, indeed. They've got the flag up and you can see the stars and stripes on the lunar surface.

COLUMBIA
Beautiful. Just beautiful.

ARMSTRONG
That's good. See if you can pull that end to pop open. Take that end emblem.

ALDRIN
It won't pull out. Okay.

CAPCOM
Neil. This is Houston. Radio check. Over.

ARMSTRONG
Roger. Houston. Loud and clear.

CAPCOM
Roger. Out.

ALDRIN
Loud and clear, Houston.

CAPCOM
Roger, Buz.

ALDRIN
I'd like to evaluate the various phases that a person can - traveling on the lunar surface. I believe I'm out of your field of view. Is that right, -

CDT 22:36 GET 110:04 TAPE 348/2

ARMSTRONG
- - Tom, Houston?

CAPCOM
That's affirmative, Buz.

CAPCOM
You are now in our field of view.

ALDRIN
You do have to -

CAPCOM
You're in our field of view.

ALDRIN
Okay. You do have to be rather careful to keep track of where your center of mass is. Sometimes, it takes about 2 or 3 paces to make sure you've got you're feet underneath you. About 2 to 3 or maybe 4 easy paces can bring you to a nearly smooth stop. Next direction like a football player, you just have to split out to the side and cut a little bit. One called a kangeroo hop does work but it seems that your forward ability is not quite as good.

END OF TAPE

CDT 22:46 GET 110:14 TAPE 349/1

ALDRIN
kangaroo hop. It does work, but it seems that your forward ability is not quite as good as it is in the conventional or conventional one foot after another. It's hard to say what a strained pace might be. I think it's one that I'm using now. Could get rather tiring after several hundred - But this may be a function of this suit, as far as lack of gravity forces.

CAPCOM
Tranquility Base, this is Houston. Could we get both of you on the camera for a minute, please?

ARMSTRONG
Say again, Houston.

CAPCOM
Roger. We'd like to get both of you in the field of the view of the camera for a minute.

CAPCOM
Neil and Buzz, the President of the United States is in his office now and would like to say a few words to you. Over.

ARMSTRONG
That would be an honor.

CAPCOM
Go ahead Mr. President, this is Houston. Out.

PRES NIXON
Neil and Buzz, I am talking to you by telephone from the Oval Room at the White House. And this certainly has to be the most historic telephone call ever made. I just can't tell you how proud we all are of what you ... for every American, this has to be the proudest day of our lives. And for people all over the world, I am sure they, too, join with Americans, in recognizing what a feat this is. Because of what you have done, the heavens have become a part of man's world. And as you talk to us from the Sea of Tranquility, it inspires us to double our efforts to bring peace and tranquility to earth. For one priceless moment, in the whole history of man, all the people on this earth are truly one. One in their pride in what you have done. And one in our prayers, that you will return safely to earth.

ARMSTRONG
Thank you, Mr. President. It's a great honor and privlege for us to be here representing not only the United States but men of peace of all nations. And with interest and a curiosity and a vision for the future. It's an honor for us to be able to participate here today.

PRES NIXON
And thank you very much and I look forward - all of us look forward to seeing you on the Hornet on Thursday.
ARMSTRONG
Thank you.

ALDRIN
I look forward to that very much, sir.

CDT 22:46 GET 110:14 TAPE 349/2

CAPCOM
Columbia, Columbia, this is Houston. Over.

COLUMBIA
Loud and clear, Houston.

CAPCOM
Roger. I got a P22 auto optics - auto optics pad for you.

COLUMBIA
Ready to go ahead.

CAPCOM
Roger. P22 landmark ID, LM TI, 110, 26, 56. T2, 110, 32, 06, 3 miles south. Time of closest approach, 110, 33, 40. Shaft, 353.855. Trunnion, 46.495. Rol1, O. Pitch, 250. Yaw, 0. Over.

END OF TAPE

CDT 22:51 GET 110:19 TAPE 350/1

CAPCOM
- roll zero, pitch 250, yaw zero. Over.

COLUMBIA
Roger. Thank you. You read back very clear.

CAPCOM
Roger. Out.

ALDRIN
Houston, it's very interesting to note that when I kick my foot (cut out) - there's no atmosphere here, and this gravity (cut out) -

they seem to leave, and both of them have about the same angle of departure and velocity. From where I stand, a large portion of them will know by impact that they're a good two thousand. Several - the percentage is, of course, is ruled by impact. Different reasons (cut out) - it's highly dependent upon depth, the initial trajectory upward, where most of the - already the particles are found especially strange.

CAPCOM
Roger, Buz. And break, break, Columbia, this is Houston. When you track out of high gain antenna, then let's request OMNI Delta, OMNI Delta. Over.

COLUMBIA
I'm in.

ARMSTRONG
I noticed several times in going from the sunlight into the shadow that just as I go in, there's an additional reflection off the LM that - along with the reflection off my face onto the visor - makes visibility very poor just at the transition - Sunlight into the shadow. I think we have so much glare coming off of my visor, that my (cut out) - no one actually gets on. Then it takes a short while for my eyes to adapt to the lighting conditions. But this time the (garble).

ALDRIN
Yes. Visibility, as we said before, is not too great, but both visor's up. (Garble). What sort of footprints we have in the (Garble).

ARMSTRONG
Then after being out in the sunlight a while, it takes - Buz, you're nearly on the cable.

ALDRIN
Okay.

ARMSTRONG
Lift up your right foot, right foot. Your toe is still hooked in it.

ALDRIN
That one?

ARMSTRONG
Yes, it's still hooked in it. Wait a minute. Okay, you're clear now.

ALDRIN
Thank you.

ARMSTRONG
Now, let's move that over with me.

PAO
Neil Armstrong has the scoop for the bulk sample collection.

ALDRIN
The blue color of my boot has completely disappeared now into this - still don't know exactly what color to describe this other than ash-cocoa color. It appears to be covering most of the lighter part of the boot (Garble) very fine particles (Garble).

CAPCOM
Buz, this is Houston. You're cutting out on the end of your transmissions. Can you speak a little more forward into your microphone. Over.

CDT 22:51 GET 110:19 TAPE 350/2

ALDRIN
Roger. I'll try that.

CAPCOM
Beautiful.

ALDRIN
Now I had that one inside my mouth that time.

CAPCOM
It sounded a little wet.

PAO
Neil's been on the surface a hour now. Buz not quite twenty minutes; less than that.

ALDRIN
In general, time spent in the shadow doesn't seem to have any (cut out) effects. (Cut out) inside the suit. There is a difference, of course, in the coming radiation and the helmet. So I think there's a tendancy to feel a little poor in the data (Garble).
CAPCOM
Columbia, this is Houston. Over.

PAO
One hour and a half expended on the PLSS's now.

CAPCOM
Columbia, this is Houston. Over.

CAPCOM
Columbia, this is Houston. Over.

COLUMBIA
Houston, coming in Delta.

CAPCOM
Roger. You should have VHF AOS with the LM right about now with VHF LOS will be about 40 minutes 15 seconds. Over.

COLUMBIA
Thank you.

PAO
Heart rates on both crewmen have been averaging between 90 and 100. Flight surgeon reports they're right on the predicted number of the Btu units expended in energy of work. And he thinks they're in great shape.

ARMSTRONG
As I look around the area, the contrast in general is - comes about completely by virtue of the data (Garble) - down sun through a very, very light-colored gray, light gray color. A halo around my own shadow, around the shadow of my helmet. Then as I look off across, the contrast becomes (Garble) in that the surrounding color is still fairly light as you look down into the sun. A larger amount (cut out) of that area is looking toward us. The general color of the (cut out) dark area, without sun, the contrast is not as big. Surveying of all the dusty area that we've picked up, considerably darker in (Garble)

END OF TAPE

CDT 23:01 GET 110:29 TAPE 351/1

ALDRIN
- - considerably darker in texture. Now, I've picked up one and I imagine that this is (garbled) survey along the area that we're walking. This is due to the fact that there are footprints there. General terrain where I've been out on this surface, there is generally of a darker contrast in the color.

PAO
You can Neil Armstrong bringing scoop - -

ARMSTRONG
- - about 30 or 40 feet out.

ALDRIN
- - the plus V strap.

CAPCOM
Roger.

ALDRIN
Right in this area, there are two craters. The one that's right in front of me now - they look in about the 11 o'clock position from the spacecraft. About 30 to 35 feet apart. There's several rocks and boulders about 6 to 8 inches across (garbled).

PAO
Neil is filling the bulk sample bag attached to a scale as seen in the picture. Buzz is behind the LM at the minus Z strut. That's the landing gear directly opposite the ladder. Neil's been on the surface about an hour and 10 minutes.

ARMSTRONG
I'm now in the area of the minus Y strut taking some photographs.

END OF TAPE

CDT 23:06 GET 110:34 TAPE 352/1

PAO
Buzz is making his way around the LM photographing it from various angles, looking at its condition on all sides. Neil still occupied with the bulk sample. 1 hour 40 minutes time expended on the PLSS's now.

ALDRIN
How's the bulk sample coming Neil?

ARMSTRONG
Bulk sample is (garble) sealed.

COLUMBIA
Houston, Columbia.

CAPCOM
Columbia, this is Houston. Go ahead. Over.

COLUMBIA
Roger. No marks on the LM that time. I can see a suspiciously small white object - the coordinates are -

CAPCOM
Go ahead with the corrdinates on the small white object.

COLUMBIA
(Garbled) .3, 7.6 but I (garbled) right on the southwest end of a crater. I think they would know it if they were in such a location. It looks like their LM would be is pitching up quite a degree. It's on the southwest wall of the far crater.

CAPCOM
Roger, copy echo decimal 3 and 7decimal 6 and -

CAPCOM
Columbia, this is Houston while I'm talking to you; LOS will be at 111:19:31; AOS 112:05:43. Over. Columbia, this is Houston. Did you copy LOS, AOS times? Over.

COLUMBIA
Negative Houston. You broke just in time to where I couldn't run up the flight plans.

CAPCOM
Roger out.

END OF TAPE

CDT 23:11 GET 110:39 TAPE 353/1

ALDRIN
The docked deflector that's mounted on quad 1 seems to be a good bit more wrinkled (garbled) on quad 4.

CAPCOM
You're breaking up again, Buzz.

ALDRIN
I say the Jets deflector that's mounted on quad 4 seems to be - the surface of it seems to be more wrinkled than the one that's on quad 1. Generally underneath part of the LM seems to have stood up quite well to the (garbled) get some pictures in the aft part of the LM that will illuminate the thermal effects much better than we could get them up here at the front.

CAPCOM
Roger, out.

ALDRIN
We're going to get some paticular photographs of the bulk sample area in the LM.

CAPCOM
Okay.

ALDRIN
And Houston, Buzz here. I'm showing 3.78 psi, (garbled)

ARMSTRONG
Roger, and Neil here is 66 percent O2, no flags, minimum cooling and the suit pressure is 382.

CAPCOM
Houston. Roger, out.

PAO
Neil has finished collecting and packing the bulk sample.

CAPCOM
Buzz, this is Houston. Have you removed the close up camera from the MESA yet? Over.

ALDRIN
Negative, thank you. You should get the panorama view.

ARMSTRONG
Okay.

ALDRIN
Did you get it?

ARMSTRONG
Houston, how does our time line seem to be going?

CAPCOM
Roger. It looks like you're about a half hour slow on it. We're working on consumables, over.

ARMSTRONG
All right.

CAPCOM
Neil and Buzz, this is Houston. To clarify my last -

END OF TAPE

CDT 23:16 GET 110:44 TAPE 354/1

CAPCOM
Neil and Buzz, this is Houston. To clarify my one, your consumables are in good shape at this time. The 30 minutes difference was respectively nominal time line. Over.

ALDRIN
I can understand that.

PAO
Neil's been on the surface now slightly over an hour and 20 minutes.

ARMSTRONG
I don't note any abnormalities in the LM. The pods seem to be in good shape. The primary and secondary struts are in good shape. Antennas are all atrace. There's no evidence of problem underneath the LM due to engine fault or drainage of any kind.

CAPCOM
Roger. Out.

ALDRIN
It's very surprising, the surprising lack of penetration of all four of the foot pads. I'd say if we had gone farther below the surface, they would have penetrated maybe another three inches. Wouldn't you say, Neil?

ARMSTRONG
At the most, yes. But, I could tell they settled even less than that.

ARMSTRONG
(garbled)

ALDRIN
I get a picture of the XY strut taken from near the descent stage, and I think we'll be able to see better what the facts are. Seem to be quite minimum.

ALDRIN
There's one picture taken in the right rear of the spacecraft looking at the skirts of the descent stage. Quite darkening of the surface color A rather minimum amount of radiating, edging away, or erosion of the surface. On descent, both of us remarked that we could see a very large amount of very fine dust particles moving about. It was reported beforehand that we would probably see enough gassing from the surface after engine shutdown, but as I recall, I was unable to find that.

END OF TAPE

CDT 23:21 GET 110:49 TAPE 355/1

ALDRIN
This is too big an angle, Neil.

ARMSTRONG
Yes, I think you are right.

ARMSTRONG
We're back at the minus Z strut now. There you (garbled) very little force of impact that we actually had.

ALDRIN
And Neil, if you pick the camera holder to work on the (garbled).

ARMSTRONG
Okay.

CAPCOM
Columbia, Columbia this is Houston.

ALDRIN
I notice that -

CAPCOM
Go ahead Buzz.

ALDRIN
Taking some close-up pictures of that rock.

ARMSTRONG
I was saying that Houston - stop and take a photograph or something and then want to start moving again sideways inspite of a tendancy to start doing it with just gradual sideways hops until you start getting (garbled).

CAPCOM
Roger.

ARMSTRONG
Can you see us underneath the LM over at the SEQ Bay, Houston?

CAPCOM
Yes indeed Buzz. We can see your feet sticking out underneath the structure of the LM descent stage.

ARMSTRONG
Okay, I'm just on the other side of the -

CAPCOM
Now we can see you through the structure of the minus Z secondary strut.

PAO
The SEQ Bay contains the scientific experiments to be left on the surface of the moon; the laisor reflector.

CAPCOM
They're open and it looks like they are going to stay up without any problem.

CAPCOM
Columbia, Columbia this is Houston. We are about to lose you on the OMNI's. Request high gain antenna. React mode fish 20, yaw 135. Over.

ALDRIN
Gonna pick an area, Neil?

CAPCOM
Make that yaw 175, Columbia yaw 175 on the high gain.

COLUMBIA
(garbled) on the high gain Houston.

CAPCOM
Roger, out.

PAO
The surgeon says everything looks fine.

END OF TAPE

CDT 23:26 GET 110:54 TAPE 356/1

PAO
An hour and a half of lunar surface time for Neil Armstrong.

ALDRIN
Houston. The passive seismometer has been deployed manually.

CAPCOM
Roger.

PAO
They've been in the portable life support systems for 2 hours now.

ARMSTRONG
The manual deployment of the LR cubed. The spring that is at the end of the string pulled off of the picks head; however, I'm able to reach up and get hold of the picks head and pull it loose. It will be deployed manually, also.

CAPCOM
Roger.

ARMSTRONG
And, the panorama is complete and LM - got the LM at 7:30 position at about 60 feet.

PAO
That's Neil Armstrong to the left of the screen. That - -

ARMSTRONG
Doors are closed and locked.

CAPCOM
Roger.

CAPCOM
Have you got us a good area picked out?

ARMSTRONG
Yes. I think out on that rise out there is as good as any. I'll probably stay on the high ground there and - -

ALDRIN
Right at the edge of that crater drops - -

ARMSTRONG
Kind of a drop-off, isn't it?

ALDRIN
Take a couple of close-ups on these big round and large boulders.

PAO
Buzz Aldrin coming into view on the right carrying the two experiments.

ARMSTRONG
About 40 feet out - I'd say out at the end of that next - -

ALDRIN
It's going to be a little difficult to find a good level spot here.

ARMSTRONG
What about next to the ridge there. Wouldn't that be a pretty good place?

ALDRIN
All right. Should I put the LR cubed vehicle here?

ARMSTRONG
All right.

ALDRIN
Bring it up on the other side of this rock here.

ARMSTRONG
I would go right around that crater to the left there. Isn't that a level spot there?

ALDRIN
It's slanting just a little.

PAO
And, they will be out of the cameras field of view while setting up these experiments.

END OF TAPE

CDT 23:31 GET 110:59 TAPE 357/1

PAO
- - while setting up these experiments.

ARMSTRONG
These boulders look like basalt and they have probably a 2 percent white minerals in them, the white crystals. And the thing that I reported as the vesicular before, I'm not - I don't believe I believe that any more - I think that small craters - they look like little impact craters where shot - BB shot has hit the surface.

ALDRIN
Houston. I have the seismic experiment flipped over now and I'm combining it, but I'm having a little bit of difficulty getting the BB up in the center. It wants to move around and around on the outside. (cut out)

CAPCOM
You're cutting out again, Buz.

ALDRIN
I say I'm not having too much success in leveling the PSE experiment.

ARMSTRONG
The laser reflector has been installed and the bubble is leveled and the alignment seems to be good.

CAPCOM
Neil. This is Houston. Roger. Out.

ALDRIN
Hey. You want to take a look at this BB and see what you make out of it?

ARMSTRONG
I find it pretty hard to get perfectly level, too.

ALDRIN
That BB likes the outside. It won't go on the inside.

END OF TAPE

CDT 23:36 GET 111:04 TAPE 358/1

ARMSTRONG
- but a little cup is convex now instead of concave.

ALDRIN
I think you're right.

ARMSTRONG
Believe it is.

ALDRIN
Houston, I don't think there's any hope for using this leveling device to come up with an accurate level. It looks to me as though the cup here that the bubble is in is now convex instead of concave. Over.

CAPCOM
Roger, 11. Press on. If you think you can level by eyeball, go ahead.

ALDRIN
Okay.

PAO
The bubble they're discussing is on a leveling device on the passive seis monitor.

ARMSTRONG
(Garble) Thank you. Good work.

ALDRIN
Thank you.

ARMSTRONG
Hey, stop, stop. Back up.

ALDRIN
Houston, the dial of spacing the PSC, the right-hand solar ray deployed automatically. The left-hand I had to manually - bending the bar at the far end. All parts of the solar ray are clear on the ground now.

CAPCOM
Buz, this is Houston. I understand that you did sucessfully deploy both solar rays. Over.

ALDRIN
Roger. That's affirmative. I don't have any way of telling whether that's lined up. I'd get - no, well maybe I can get down here. Neil, how does that seem to be pointing?

CAPCOM
Neil, this is Houston. Over.

ARMSTRONG
Go ahead, Houston. Over. Go ahead, Houston.

CAPCOM
Roger. We've been looking at your consumables, and you're in good shape. Subject to your concurrence, we'd like to extend the duration of the EVA 15 minutes from nominal. We will still give Buz a hatch at 10 minutes for heading in. Your current elapsed time is 2 plus 12. Over.

ARMSTRONG
Okay. That sounds fine.

CAPCOM
Roger. Out.

PAO
Two twelve is the time expended on the PLSS.

CAPCOM
This is Houston. If you're still in the vicinity of the PSC, could you get a photograph of the moral rubble. Over.

ARMSTRONG
I'll do that, Buz.

ALDRIN
Right. We'll get a photograph of that. Houston, what time would you estimate we could allow for the documented sample. Over.

ARMSTRONG
Oh, shoot. The grain of the ball is right in the middle now.

ALDRIN
Wonderful. Take a picture before it moves.

CDT 23:36 GET 111:04 TAPE 358/2

CAPCOM
Neil, this is Houston. We're estimating about 10 minutes for the document sampling. Over.

CAPCOM
Columbia, Columbia, this is Houston. Over.

COLUMBIA
Go ahead, Houston, Columbia.

CAPCOM
Roger. Like you to terminate charging battery BRAVO at 111 plus 15. Over.-

END OF TAPE

CDT 23:41 GET 111:09 TAPE 359/1

ARMSTRONG
How late are we now?

CAPCOM
Roger. Buzz, this is Houston. You've got about 10 minutes left now prior to commencing your EVA termination activities, over.

ALDRIN
Roger, I understand.

CAPCOM
Tranquillity Base, this is Houston. The passive seismic experiment has been uncaged and we're observing short period oscillations yet. Over.

PAO
Neil Armstrong has been on the surface now about an hour and fifty minutes. In the foreground Buzz Aldrin is collecting a core tube sample.

ALDRIN
I hope you're watching how hard I have to hit this into the ground to the tune of about 5 inches Houston.

CAPCOM
Roger.

ALDRIN
It almost looks wet.

END OF TAPE

CDT 23:46 GET 111:14 TAPE 360/1

ARMSTRONG
- - got a sample.

ARMSTRONG
Wait a minute. Wait a minute. Cut the cable again.

CAPCOM
Neil and Buzz, this is Houston.

ALDRIN
Wait a minute.

ARMSTRONG
That's it?

ALDRIN
Not quite.

CAPCOM
Neil, this is Houston. We would like you all to get two core tubes and the solar wind experiment. Two core tubes and the solar wind. Over.

ARMSTRONG
Roger.

PAO
The core tubes provide material- -

ALDRIN
Get the next one. Maybe you can clear away the rocks a little bit.

ARMSTRONG
Hope I can.

CAPCOM
Buzz, this is Houston. You have approximately three minutes until you must commence EVA termination activities. Over.

ALDRIN
Roger. Understand.

CAPCOM
Columbia. This is. Houston. You have approximately 1 minute to LOS. Over.

COLUMBIA
Copy. Roger.

CAPCOM
And, do you plan on commencing your sleep on the back side this pass? If so, we'll disable uplink to you while we're talking to the LM. Over.

COLUMBIA
Negative that.

ALDRIN
Houston. Were you able to record the documentary when the two tube samples were taken?

CAPCOM
Negative.

ARMSTRONG
I didn't get it (garbled) but they are right in the vicinity of the LOM.

CAPCOM
Neil, this is Houston. I see you've got the core tubes and the solar wind. Anything else that you can throw into the box would be acceptable.

ARMSTRONG
Right-o.

ARMSTRONG
(garbled)

ALDRIN
I got the cap.

ARMSTRONG
Got the cap?

ALDRIN
They both have got caps on them.
ARMSTRONG
Okay.

ALDRIN
And, you want to pick up some stuff, and I'll - -

ARMSTRONG
(garbled)

ALDRIN
Put the solar wind.

PAO
That's Buzz Aldrin retrieving the solar wind experiment.

END OF TAPE

CDT 23:51 GET 111:19 TAPE 361/1

CAPCOM
Buzz, this is Houston. It's about time for you to start your EVA close out activities.

ALDRIN
Roger.

PAO
They've been on their life support systems 2 hours and 25 minutes. Neil appears to be picking up rocks to the right of the screen.

CAPCOM
Neil and Buzz, this is Houston. We'd like to remind you of the close up camera magazine before you start up the ladder.

ALDRIN
Okay. Got that over with you, Neil?

ARMSTRONG
No, the close up camera's underneath the MESA so I'll have to pick it up with the box. I'm picking up several pieces of really vesicular rock out here now.

ALDRIN
You didn't get anything in those environmental samples, did you?

ARMSTRONG
Not yet.

ALDRIN
I don't think we'll have time.

CAPCOM
Roger, Neil and Buzz. Lets press on with getting the close up camera magazine and closing out of the sample return container. We're running a little low on time.

ALDRIN
Roger.

PAO
We want to keep a good margin in those portable life support systems.

ALDRIN
Okay, can you quickly stick this in my pocket Neil and I'll get on up the ladder. I'll hold it and you open the packet up.

ARMSTRONG
(Garble) let the pocket go. (Garble.)

ALDRIN
Get it.

ARMSTRONG
Okay.

ALDRIN
Adios amigo.

ARMSTRONG
Okay.

ALDRIN
Anything more before I head on up, Bruce?

CAPCOM
Negative. Head on up the ladder, Buzz.

PAO
That white dot, right above the horrizon on the right is a phosphorus spot from the TV converter.

END OF TAPE

CDT 23:56 GET 111:24 TAPE 362/1

PAO
spot from the TV converter in the park station in Australia.

ALDRIN
How are you coming Neil?

ARMSTRONG
Okay.

ARMSTRONG
Did you get that (garbled).

ALDRIN
Right. That's it right there.

ARMSTRONG
Okay.

ALDRIN
Do you think you can reach the - (garbled) hanging over here. You might entertain the idea of sensing up the second one that way.

ARMSTRONG
Okay.

ALDRIN
Did you get the film off of that?
ARMSTRONG
Yes.

ALDRIN
Okay, I'm heading on in.

ARMSTRONG
Okay.

ALDRIN
And I put the LEC already in the box.

PAO
Neil's been on the surface a few minutes longer than two hours. Buzz, approximately 20 minutes less than that.

CAPCOM
Neil, this is Houston. Did the Hasselblad magazine go off on that sample return container. Over?

ARMSTRONG
I've got the Hasselbald magazine hooked to the SRSC now.

CAPCOM
Roger.

ARMSTRONG
How are you doing, Buzz?

ALDRIN
I'm okay.

ALDRIN
Reading to be sending up the LEC?

ARMSTRONG
Just about.

END OF TAPE

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ALDRIN
Okay. That's got it clear.

PAO
Transferring the sample containers into the LM cabin now.

ARMSTRONG
Oh. (garble) came off, I mean the (garble) came off.

ALDRIN
All right. Just ease it down now. Don't pull so hard on it. All right. Let it go.

ARMSTRONG
While your getting that, I've got to get the camera

ALDRIN
(garble)

ARMSTRONG
No problem. Okay. Stand by a second.

CAPCOM
Neil. This is Houston. Request an EMU check. Over.

ARMSTRONG
Roger. Got 3.8. And I got 54 on the O2 and no flags. And my flow is in N.

PAO
The Lick Observatory in California reports a return on that lazer experiment.

CAPCOM
Neil and Buz, for your information your consumables remain in good shape. Out.

ALDRIN
Roger.

ALDRIN
How's it going, Neil?

ARMSTRONG
Okay. I've got one side hooked up to the second box and I've got (garbled)-

ALDRIN
Okay. Good.

ARMSTRONG
I've got bilge from on the LEC. It's kind of falling all over me, while I'm doing this.

ALDRIN
Kind of like soot, huh?

ARMSTRONG
It looks like down here.

ALDRIN
I think my watch stopped now.

ALDRIN
No. It didn't either. Second hand.

ALDRIN
Okay. If you can just hold it now, I think I can do the pulling.

ARMSTRONG
Okay. Stand by a minute, Let me move back.

END OF TAPE

CDT 00:06 GET 111:34 TAPE 364/1

ALDRIN
Okay, easy. All right, easy in the hatch now.

ARMSTRONG
Okay. I got it the rest of the way. And I'll give it to you to (Garble) away. Just a second. Never mind.

PAO
Two hours and 40 minutes on the PLSS's.

ARMSTRONG
Buzz.

ALDRIN
Okay. Turn up.

ARMSTRONG
How about that package out of your brief. Get that?

ALDRIN
No. Now I'll get it. Get up there. Better now?

ARMSTRONG
Let go. Okay?

ALDRIN
Okay.

CAPCOM
Neil, this is Houston. Did you get the Hasselblad magazine.

ARMSTRONG
Yes, I did. And we got about, I'd say, twenty pounds of carefully selected, if not documented, samples.

CAPCOM
Houston. Roger. Well done. Out.

PAO
Unofficial time off the surface at 111:37:32.

ALDRIN
Okay, now start arching your back. That's good. Plenty of room. Now arch your back and move your head up against (cut out). Roll right just a little bit. Head down. And in good shape.

ARMSTRONG
Thank you. I'm open now?

ALDRIN
Now you're clear. You're rubbing up against me a little bit.

ARMSTRONG
Okay?

ALDRIN
Right. That's right. (Garble). Okay. Now move your foot, and I'll get the hatch.

ARMSTRONG
Okay.

ALDRIN
Okay, the hatch is closed and latched. And we're up by it secure.

ARMSTRONG
Okay. Now we burn the feed-water valve. And I got your PLSS antenna stuck.

ALDRIN
Okay. Feed-water valve closed, and the antenna's stuck.

ARMSTRONG
Okay.

ALDRIN
Somebody broke the hinges.

ARMSTRONG
That's out. (Garble) but I did my part of it. Okay. (Garble.)

END OF TAPE

CDT 00:11 GET 111:39 TAPE 365/1

CAPCOM
This is Houston. Go ahead.

CAPCOM
You're cutting out Neil. You're not readable. I understand you said something about contingency sample container on the ascent engine?

CAPCOM
We are not reading you Neil. Buzz, Buzz, this is Houston. Do you read? Over.

CAPCOM
Tranquility Base, this is Houston. We are reading neither one of you but standing by.

PAO
Cabin pressure coming up about 2. 789 pounds. Up to 3 now. 4 psi.

PAO
We assure the cabin at 4.8 now.

END OF TAPE

CDT 00:16 GET 111:44 TAPE 366/1

PAO
The LM's systems look good. Crewmen should now be transferring back to Tranquillity Bases environmental control system and later we'll switch to the vehicles communications system. We estimate it will be another 10 to 15 minutes before their on the LM communication system.

END OF TAPE

CDT 00:21 GET 111:49 TAPE 367/1

PAO
And the replica of the American flag on the lunar surface is now being erected here in the Control Center. And a replica of the plaque on the Tranquility Base has been hung on the wall.

CAPCOM
Neil, this is Houston. Neil, this is Houston. Radio check. Over.

CAPCOM
Buzz, Buzz, this is Houston. Radio check, radio check. Over.

CAPCOM
This is Houston. A copy of transmission calling Houston. All LOS's broken up. Over.

CAPCOM
Neil, this is Houston. If you read, we suggest you install one course antenna so we can have communications. Over.

ARMSTRONG
I receive.

CAPCOM
Neil, this is Houston. We seem to be reading you now. How do you read us? Over.

ARMSTRONG
(Garbled)

END OF TAPE

CDT 00:27 GET 111:55 TAPE 368/1

TRANQUILITY
Houston, this is Tranquility. How do you read?

CAPCOM
Tranquility Base, this is Houston. Loud and clear. How us?

TRANQUILITY
Loud and clear. We're in the process of switching over to LM Comm.

CAPCOM
Roger.

CAPCOM
Tranquility Base, this is Houston. We'd like to verify your steerable antenna and track mode 2. We're going to do a communications handover here on Earth. Over.

TRANQUILITY
Roger. That's affirmative. We're in track mode 2.

CAPCOM
Roger, out.

END OF TAPE

CDT 00:32 GET 112:00 TAPE 369/1

CAPCOM
Columbia, Columbia, this is Houston. Over.

COLUMBIA
Roger, Columbia to Charlie. How do you read?

CAPCOM
Roger, Columbia. This is Houston. We're reading you loud and clear on OMNI Charlie. The crew of Tranquillity Base is back inside their base, repressurized and they're in the process of dopping the PLSS's. Everything went beautifully. Over.

COLUMBIA
Hallelujah.

CAPCOM
And we'd like to get P00 and accept from you -

END OF TAPE

CDT 00:37 GET 112:05 TAPE 370/1

ALDRIN
Hallelujah.

CAPCOM
And, we'd like to get a P00 and accept from you. We have a state vector up light. And, after that, we'd like you to realign your platform to the new F marker we sent up a rev or two ago. Over.

ARMSTRONG
Alright. Understand. You want a option 1, 82 option 1.

PAO
This is Apollo Control. Dr. Charles Berry reports that heartrates during this EVA period ranged from a low of 90 for both crewmen to a high of about 125 for Buzz Aldrin at 2 periods. And, a high of 160 for Neil Armstrong at 3 periods. That top reading coming during the time he was transferring the rock boxes into the LM. Dr. Berry says the data they got indicates Neil Armstrong was working very hard at that time.

CAPCOM
Columbia, this is Houston. We're going to up with your (garbled) and then we'll send rest up again because sending the state vector up will wipe out the one that you have onboard and then you can do a P52 or option 1. Over.

COLUMBIA
This is true.

END OF TAPE

CDT 00:43 GET 112:11 TAPE 371/1

CAPCOM
Columbia, this is Houston. Do you read? Over.

COLUMBIA
Roger Houston. I read you.

CAPCOM
Okay, Columbia. We've completed the uplink. The computer is yours. You can go block; however, we would like for you to hold off on the P52 option on the line until after you have passed landing site 2 and we requested that you perform another P22 and attempt to find the LM's path. I've got the numbers for you when you are ready to copy. Over.

COLUMBIA
(garbled)

COLUMBIA
Ready to copy.

CAPCOM
Roger, Columbia. P22 landmark ID is lunar module - make that Tranquility Base; P1:112:25:08; P2 112:30:17 four nautical miles south; final closest approach 112:31:52; shaft 357 decimal 051; trunnion 047 decimal 432; roll zero; pitch 250; yaw zero. Readback over.

CAPCOM
Columbia, this is Houston. Did you copy my P22 update? Over.

END OF TAPE

CDT 00:48 GET 112:16 TAPE 372/1

COLUMBIA
Houston, Columbia.

CAPCOM
Columbia, this is Houston. Did you copy my P22 pass? Columbia, this is Houston. Do you copy my pad, over?

COLUMBIA
Negative Bruce. Just give me the latitude and longitude over 2, altitude and the grid square never mind the other you're broken up.

CAPCOM
Stand by.

COLUMBIA
(Garbled) new information otherwise I'll just use the old numbers.

CAPCOM
No, wait a minute we've got new information.

COLUMBIA
Okay.

PAO
This is Apollo Control at 112 hours, 19 minutes. The inhabitants of Tranquillity Base are still in the post EVA clean up period. Still have not fully configured the voice communications, however, we are getting telemetry - good telemetry from Tranquiltity Base showing a cabin pressure of 5 pounds per square inch, temperature of 60 degrees. We expect to establish communications before too long. During this period the crew is removing the portable life support systems, checking over their spacecrafts systems, getting ready for jettisoning equipment from Tranquillity Base. The cabin will be depressurized before too long and equipment will be jettisoned onto the lunar surface.

CAPCOM
Tranquillity Base, this is Houston. Can you give us some idea of how yon're progressing on the PLSS dossing and preparation for depress?

TRANQUILLITY
Roger, Houston. Tranquillity Base. We're in the process of using up what film we have and I'm just getting ready to change the primary ECS canister. Over.

CAPCOM
Roger, Tranquillity. We'd like to hold off as long as possible on the philipium hydroxide canister make that one of the last things you do in getting ready for the depress if you can. Over.

TRANQUILITY
Roger. We're planning on doing that. I was just wondering how much longer we want to wait though. We've probably got another half an hours worth of picture taking and I guess we could run through an eat cycle and that changed canister in S depress. Over.

CAPCOM
Roger. That sounds fine to us.

TRANQUILITY
Well it will be a little crowded in here for a while.

CAPCOM
We don't mind a bit.

COLUMBIA
Houston, Columbia. You got the new coordinates?

CAPCOM
Columbia, this is Houston. -

END OF TAPE

CDT 00:54 GET 112:22 TAPE 373/1

CAPCOM
Columbia. This is Houston. Go ahead.

COLUMBIA
Roger. Have you got the new coordinates for me?

CAPCOM
Roger. Latitude 00.691, that would be plus 00.691 and Longitude over 2 is plus 11.713. The altitude is minus 1.44 nautical miles. Over.

COLUMBIA
Roger.

CAPCOM
Columbia. This is Houston. On latitude, make that plus 00.692, rounding off. Over.

COLUMBIA
Okay. Read back plus 00.692 plus 11713 and minus 00144. Can you have a grid square for me?

CAPCOM
Roger. Stand by.

CAPCOM
Columbia. This is Houston. Grid coordinance kilo decimal 9, 6 decimal 3, on LAM 2. Over.

COLUMBIA
0.9 and 6.3. Thank you. One of these grid squares is as much as you can stand on a single pass.

CAPCOM
Roger.

CAPCOM
And for your information, Columbia, you're approaching the VHF line of site, comm limit with tranquility base. LOS will be at 38 minutes plus 25 seconds. Over.

COLUMBIA
Roger.

CAPCOM
Roger. We've had to disable the one way miss in relay owing to a ground site reconfiguration down here. Over.

END OF TAPE

CDT 00:59 GET 112:27 TAPE 374/1

All dead air.

END OF TAPE

CDT 01:04 GET 112:32 TAPE 375/1

COLUMBIA
Houston, Columbia. (Garble.)

CAPCOM
This is Houston. Go ahead. Over.

COLUMBIA
Roger. I can't see them.

CAPCOM
Roger. I guess that takes care of the news for today, Mike.

COLUMBIA
Roger.

CAPCOM
You might be interested in knowing, Mike, we have gotten reflections back from the laser reflector ray they deployed, and we may be able to get some information out of that a little later.

COLUMBIA
Right. I need a very precise division, because I can only do a decent job of scanning maybe one of those grid squares at a time. We've been sweeping covers - 10's and 20's and 30's of them.

CAPCOM
Roger. We understand this is intended to be your last C-22. We don't want to use up too much fuel in this effort. Over.

COLUMBIA
Roger. The fuel (garble).

CAPCOM
Roger. There's no problem fuel-wise. It's just that there seems to be a limit to the number of C-22's and the number of grid squares we can search over. Over.

COLUMBIA
Roger. Well, I'll continue this maneuver, then to roll 82, pitch 218, yaw zero, if that's okay with you. And do a P-52 in that attitude. And that'll be a (garble).

CAPCOM
Roger. That's fine with us. A P-52 in that attitude. Roger, a P-52 and then the sleep attitude.

END OF TAPE

CDT 01:08 GET 112:36 TAPE 376/1

CAPCOM
Tranquility base, this is Houston. Over.

TRANQUILITY
Houston, Tranquility base. Go ahead.

CAPCOM
When you all have a free moment, I have your P8 through P12 flight data. Over.

TRANQUILITY
Roger. Stand by.

TRANQUILITY
Houston, Tranquility base. Ready to copy.

CAPCOM
Roger, Tranquility. P8, 114, 30, 57. P9, 116, 29, 10. P10, 118, 27, 23. P11, 120, 25, 36. P12, 122, 23, 49. Read back. Over.

TRANQUILITY
Roger. P8, 114, 30, 57. P9, 116, 29, 10. P10, 118, 27, 23. P11, 120, 25, 36. P12, 122, 23, 49. Over.

CAPCOM
Readback correct. Houston out.

COLUMBIA
Houston. Columbia

TRANQUILITY
Houston, Tranquility base.

CAPCOM
Columbia. Columbia. This is Houston. Over.

COLUMBIA
Coming into high gain.

CAPCOM
Roger. Reading you loud and clear on the high gain, Columbia.

COLUMBIA
Roger. Going into P52 attitude, (garbled)

CAPCOM
Say again, Columbia.

END OF TAPE

CDT 01:22 GET 112:50 TAPE 377/1

ALDRIN
I say again, I am maneuvering to the P52 attitude and do you want a crew status report?

CAPCOM
Roger and go ahead with your crew status report.

ALDRIN
Roger. No medication radiation 100.16.

CAPCOM
Houston, we copy.

ALDRIN
Houston, Tranquility Base.

CAPCOM
Go ahead Tranquility.

ALDRIN
Roger. The weight of the RCU was 12 ounces by itself without the bag and the weight of the water from the CDR's PLSS was 12 1/2 ounces. That's reading zero with the bag on.

CAPCOM
This is Houston. We copy. And for your information the new LM weight after jettison of equipment including lithium hydroxide canister is 10837. Over.

ALDRIN
Okay. 10837.

COLUMBIA
Houston, Columbia. Did you copy the P52.

CAPCOM
Columbia, this is Houston. Affirmative.

COLUMBIA
Okay.

CAPCOM
Tranquility Base, this is Houston. In the flight plan configuration, we show that the stability control circuit breaker ACCA on Channel 16 should be open at this time. Over.

ALDRIN
Houston, Tranquility. Say again which one should be closed.

CAPCOM
Roger. Panel 16 row 2 stab control ACCA that is A-C-C-A. It should be open at this time. Over.

ALDRIN
Roger. Coming open.

CAPCOM
Roger. Out.

ALDRIN
Houston, Tranquility. Do you have a way of showing a configuration of the engine arm circuit breaker? Over. The reason I am asking is because the end of it appears to be broken off. I think we can push it back in again. I'm not sure we could pull it out if we pushed it in though. Over.

CAPCOM
Roger, we copy. Standby please.

CAPCOM
Tranquility Base, this is Houston. Our telemetry shows the engine arm circuit breaker in the open position at the present time. We want you to leave it open until it is normally scheduled to be pushed in, which is later on. Over.

ALDRIN
Roger. Copy.

END OF TAPE

CDT 01:30 GET 112:58 TAPE 378/1

TRANQUILITY
Houston, Tranquility Base. The CDR's TDR reads 11014.

CAPCOM
Roger. 11014 for the CDR.

TRANQUILITY
Roger. LMP reads 09018. Over.

CAPCOM
Roger. 09018.

PAO
This is Apollo Control. Dr. Berry reports those dosimeter readings have not changed since yesterday afternoon indicating that the crew was not subjected to radiation on the surface of the moon or if any a very negligable amount.

COLUMBIA
Houston, Columbia. Over.

CAPCOM
Columbia, this is Houston. Go ahead.

COLUMBIA
Roger, Bruce. When you get a few minutes could you give me some words on tomorrows activities when they're going to start?

CAPCOM
Roger.

END OF TAPE

CDT 01:41 GET 113:09 TAPE 379/1

CAPCOM
Columbia. Columbia. This is Houston. Over.

CAPCOM
Columbia. This is Houston. Over.

COLUMBIA
Go ahead.

CAPCOM
Roger, Mike. Couple of quick flight plan updates, here. First off, we'd like to get an O2 fuel cell purge at time 113:30. Are you copying. Over.

COLUMBIA
Roger. Copy.

CAPCOM
Secondly, we will return to the nominal time life with your scheduled wake up of 121 hours and 12 minutes. We sort of slipped by the lithium hydroxide canister change number 9 during the EVA and EVA prep, and we'd like you to accomplish that now. The comm per sleep will be the normal lunar comm configuration. The RCS configuration, we're requesting that you use quad alpha and Bravo. A data load for R2 should be 01111. Read back. Over.

COLUMBIA
Roger. Oxygen in fuel cell purge at 113:30. Return to the nominal time line at 121 hours wake up lithium hydroxide change number 9 right now. Normal lunar comm sleep configuration, I'm in that now. On the RCS I understood before that you wanted to move the dap register to 011000 which made sense on (garble) to pitch only on quad A enable all in quad B to C and D off, but you don't want to do that any more, huh?

CAPCOM
Columbia. This is Houston. On your dap load in R2, we were requesting a 01111. Over.

COLUMBIA
Okay .... going in right now.

CAPCOM
Roger. And you'll be enabling quads alpha and bravo on the LORCS select, so you'll disable Charlie and Delta.

CAPCOM
And we have a little less than 2 minutes to LOS. If you're still up, LOS next time around will be 11404. Over.

COLUMBIA
Roger

CAPCOM
And Columbia, if it's agreeable with you, we'd like for you to stay awake until we have one successful acquisition on the high gain antenna, and I guess you can plan on turning in shortly after LOS in this next pass. Over.

COLUMBIA
Copy.

CAPCOM
Roger. Out.

CAPCOM
Tranquility, base. Tranquility, Base. This is Houston. Radio check. Over.

TRANQUILITY
Go ahead. Houston.

CAPCOM
Reading you loud and clear. Just wanted to make sure we had comm.

TRANQUILITY
We're just finishing up our eat period. Be ready to go back into prep for press.

PAO
This is Apollo Control - -

END OF TAPE

CDT 01:50 GET 113:18 TAPE 380/1

PAO
This is Apollo control 113 hours, 18 minutes. We have had loss of signal from Columbia. We have asked Mike Collins to stay awake through acquisition on the next rev which will be number 20 so that we can check the automatic acquisition mode of the high gain antenna. Once we've verified that, he will start his rest period. The planned wake up for command module pilot 121 hours.

PAO
This is Apollo control. We're estimating the change of shift news briefing for 2:00AM central daylight time. 2:00AM central daylight time for the change of shift briefing.

END OF TAPE

CDT 02:00 GET 113:28 TAPE 381/1

PAO
This is Apollo Control at 113 hours 29 minutes. The change of shift news briefing is about to start. We will take any air-ground transmissions during this period for playback after the briefing. If the equipment jettison occurs during the briefing, we will come back up and provide that for you live.

END OF TAPE

CDT 02:33 GET 114:01 TAPE 382/1

PAO
- hours one minute. We have about 2 minutes worth of tape. We'll play that for you now.

CAPCOM
(Garble.) This is Houston. Over.

EAGLE
Roger. Go ahead, Houston.

CAPCOM
Roger. On your next depressurization, it's acceptable to use the overhead hatch dump valve in addition to, or instead of the forward hatch dump valve to speed up the depressurization of the cabin. I have a P-13 update for you, and if you could sometime there give us PU and data, we'll uplink you a new CSM space vector. Over.

EAGLE
You've got the DSKY.

CAPCOM
Roger. Your P-13 time is 124:22:02. Over.

EAGLE
Roger. It's P-13 124:22: - is that O2? Over.

CAPCOM
That's affirmative. That is O2, and do you have a time estimate for us until you're ready to start cabin depress. Over.

EAGLE
15 minutes maybe?

CAPCOM
Roger. Tranquility Base, this is Houston. Uplink complete. The computer's yours, and you can go out of data.

EAGLE
Roger.

TRANQUILITY
Go ahead. Tranquility Base here.

CAPCOM
Roger. I guess you guys know that since you're an hour and a half over the time line, and we're all taking a day off tomorrow, we're going to leave you. See you later.

TRANQUILITY
I don't blame you a bit.

CAPCOM
That's a real great (garble). I really enjoyed it.

TRANQUILITY
Thank you. You couldn't have enjoyed it as much as we did.

CAPCOM
Roger. It sure was great. Sure wish you'd hurry up and get that trash out of there, though.

TRANQUILITY
Well, we're just about to do it.

CAPCOM
Okay.

PAO
We're live now. The CAPCOM voice on that last transmission was Deke Slayton, the director of Flight Crew Operations here at MSC.

CAPCOM
Tranquility Base, this is Houston. We showed a suit release valve still on the AUTO position. It should be closed. Over.

CAPCOM
Columbia, this is Houston. Over.

COLUMBIA
Houston, Columbia. Go ahead.

CAPCOM
Roger. We've sucessfully reacquired high gain antenna. Unless you have some other traffic with us, I guess we'll bid you a good night and let you get some sleep, Mike. Over.

CDT 02:33 GET 114:01 TAPE 382/2

COLUMBIA
Okay. Sounds fine.

CAPCOM
And we're going to power down the voice subcarrier part of our uplink to you, in order that we don't disturb you while we're talking to Tranquility Base. If you need us, just give us a call and we can respond with a time lag of about a minute to a minute and a half and get it reconfigured. Over.

COLUMBIA
Okay.

CAPCOM
Roger and good night.

COLUMBIA
Okay and thanks a lot.

PAO
We said good night to Mike Collins and Columbia at 114 hours 6 minutes. And the cabin is coming down now on Tranquility Base. And it's down to about three and a half pounds now and holding that.

CAPCOM
Columbia, this is Houston. We'd like you to Enable the thrusters for BRAVO 1 and BRAVO 2. AUTO RCS Select. Over.

COLUMBIA
BRAVO 1 and BRAVO 2 Enable.

CAPCOM
Roger. Out.

PAO
The Tranquility Base pressure coming on down now, one and a half pounds.

CAPCOM
Tranquility, this is Houston. For a reference, which Dump valve are you using. Over.

TRANQUILITY
We read the following dump valve until about 2 psi, and we're using the overhead now.

CAPCOM
Roger. Out.

TRANQUILITY
(Garble), they're both open now.

PAO
Less than half a pound of pressure now.

END OF TAPE

CDT 02:43 GET 114:11 TAPE 383/1

PAO
Unofficial time for start of this second depressurization 114 hours, 8 minutes, 12 seconds. Suit pressur2 is holding at about 3.9 pounds per square inch. The cabin pressure down to about a tenth of a pound now. .04 pounds now. There went something. Looked like a portable life support system. Here comes the other PLSS. Cabin is being repressurized now. The experiments console reports the seismometer recorded both the impacts of those portable life support systems. Cabin pressure up over 1 psi. Up to 2 now. 3 pounds per square inch. 4 pounds. Leveling off to about 4.8.

TRANQUILITY
Houston, Tranquility Base. Repress complete.

CAPCOM
Roger, Tranquility. We observe your equipment jetison on TV and the passive seismic experiment reported shocks when each PLSS hit the surface. Over.

TRANQUILITY
You can't get away with anything anymore can you.

CAPCOM
No indeed.

PAO
Items scheduled to be jetisoned were the two portable life support systems, the lithium hydroxide canister, and the arm rests from the LM. We expect the crew to turn off the TV very shortly switching over to the -

END OF TAPE

CDT 02:53 GET 114:21 TAPE 384/1

PAO
Switching over to another telemetry mode when they turn off the TV switch.

CAPCOM
Tranquility Base, this is Houston. Over.

ALDRIN
Go ahead Houston.

CAPCOM
Roger. When you get back into your surface checklist and come over to a comm lead configuration on base surface 45. We would like you to enable the ranging feature on your S-Band; that is when you come down to S-Band configuration instead of caution warning electronics enable TV, we would like for you to go into the range position and leave it there for as long as you conveniently can till you get ready to commence your rest period and we'll try to get a little more ranging data on you. Over.

ALDRIN
Roger, copy.

CAPCOM
And of course when you get ready to turn in, go back into caution warning enable and we would like to say from all of us down here in Houston and really from all of us in all the countries and in the entire world, we think that you have done a magnificent job up there today. Over.

ALDRIN
Thank you very mmuch. It has been a long day.

CAPCOM
Yes, indeed. Get some rest there and have at it tomorrow.

ALDRIN
Houston, Tranquility. Did you all come up with any other solution that we might try to the mission timer problem? Over.
CAPCOM
Standby Tranquility. We'll be back with you in just a minute.

ALDRIN
Houston, Tranquility. Have you had enough TV for today?

CAPCOM
Tranquility this is Houston. Yes, indeed; a mighty fine presentation.

ALDRIN
Okay, signing off. See you tomorrow.

CAPCOM
Roger.

PAO
And the TV went off at 114 hours 25 minutes 47 seconds.

CAPCOM
Columbia, Columbia this is Houston. Over.

COLUMBIA
Go ahead Houston.

CAPCOM
I'm sorry to bother you Columbia. Two things. We request that you select 10 degree dead band in your dap in accordance with the procedures on foxtrot 9-7 in your checklist and secondly we would like to lead a display on the DSKY that is not one that is cycling being continuously updated. What you would have when you get through winding the dead band would be a static display and that will be satisfactory. Over.

COLUMBIA
Okay.

CAPCOM
Roger. Goodnight again.

CAPCOM
Tranquility Base, this is Houston. Over.

ALDRIN
Roger, go ahead.

CDT 02:53 GET 114:21 TAPE 384/2

CAPCOM
Roger, on your mission timer we wanted to pull a circuit breaker and let it cool down for an hour and a half to two hours. I believe the breaker is currently open. It has been off so go ahead and reset the mission timer circuit breaker. Put the timer control to reset and hold it in reset for 30 seconds and then slue it to your desired setting left to right and voice the timer control to start. Over.

ALDRIN
Okay, we'll try it.

CAPCOM
Houston, our mission timer seems to be slueing okay. You want to give us a time hack?

ALDRIN
Can we get it off the CMP - LGC I mean?

CAPCOM
Roger Tranquility. I'll give you a time hack at 114:31:00. It's about 30 seconds from now. Over. Standby for a mark at 114:31. Standby. Mark.

END OF TAPE

CDT 03:03 GET 114:31 TAPE 385/1

CAPCOM
Tranquility, this is Houston. Did you copy by mark at 114:31?

TRANQUILITY
Roger. Thank you, and our mission timer is ready now.

CAPCOM
Roger. Very good. And, I've got a consumables update for you if you are ready to copy. Over.

TRANQUILITY
Okay. Go ahead.

CAPCOM
Okay. RCS alpha is 81 percent, RCS bravo 75 percent. Coming up on 115.0 is GET. Descent oxygen is 31.8 pounds or 59 percent. Descent amp hours 858, and ascent amp hours 574. Over.

TRANQUILITY
Roger. Copy. Thank you very much.

CAPCOM
Roger. Out.

CAPCOM
Tranquility, this is Houston. We also have a set of about 10 questions relating to observations you made, things you may have seen during the EVA. We can either discuss a little later on this evening or sometime later in the mission. It's your option. How do you feel? Over.

TRANQUILITY
I guess we can pick them up now.

CAPCOM
Okay, and your friendly green team here is pretty well been relieved by your friendly maroon team, and I'll put Ward on with the questions.

TRANQUILITY
Okay. Thank you, Bruce.

CAPCOM
Tranquility, Houston. First question here is your best estimate of the yaw on the - of the LM as compared to the nominal of crew flight plan. Over.

TRANQUILITY
We got 13 degrees left on the ball, and I think that's probably about right. Looking at the shadow, we probably have about 13 degrees left of the shadow.

CAPCOM
Roger, that's 13 degrees left of the shadow. And, next question relates to the depth of the bulk sampling that you obtained near the first part of the EVA, and any changes in composition that you might have observed during the bulk sampling interval. Over.

TRANQUILITY
I'm not sure I understand that question, but we got a good bit of the ground mass in the bulk sample plus a sizeable number of selective rocks of different types.

CAPCOM
Roger, Neil. One of the implications here is the depth from which the bulk sample was selected. Did you manage to get down there several inches or nearer the surface? Over.

TRANQUILITY
We got some down from as much as 3 inches in the area where I was looking at (garbled)

CDT 03:03 GET 114:31 TAPE 385/2

TRANQUILITY
the variation with depth at ... with the bulk sample, that there really was an appreciable difference, and I didn't run into any hard bed. Later on, other types and other areas where I got just a short distance - an inch or two - and couldn't go any further.

CAPCOM
Roger. Believe we understand down as deep as 3 inches, did not hit any hard bed, and no significant changes in composition to that depth. Next question, the second SRC was packed rather hurriedly due to the time limitations, and wonder if you would be able to divide any more detailed description of the samples which were included in the second SRC. Over.

TRANQUILITY
We got 2 core tubes and a solar wind, and about half of a big sample bag full of assorted rocks which I picked hurriedly around the area. I tried to get as many representative types as I could.

CAPCOM
Roger, Neil. Next topic here relates to the rays which luminate from the DPS engine burning area. We were wondering if the rays luminating from the - beneath the engine are any darker or lighter than the surrounding surface. Over.

TRANQUILITY
The ones that I saw back in the back end of the spacecraft appeared to be a good bit darker, and of course, viewed from the aft end, well they did have the sun shining directly on them. It seemed as though the material had been baked somewhat and also scattered in a radially outward direction, but in that particular area, this feature didn't extend more than about 2, maybe 3 feet, from the skirt of the engine. Over.

CAPCOM
Roger. Understand that near the aft end up to the eve, that the rays did appear to be darker. I understand, Buzz, that these were - this was the appearance of the material which had been uncovered by the rays that appeared darker for 2 or 3 feet extending out. Is that correct?

TRANQUILITY
No, I wouldn't say it was necessarily material that had been uncovered. I think some of the material might have been baked or in some way covered to be more cohesive and perhaps go together or something - I don't know. Now, in other areas, before we started traveling around out front, why we could see that small erosion had taken place in a radially outward direction, but it had left no significant mark on the surface other than just having eroded it away. Now, it was different back in the - right under the skirt itself. It seems as though the surface had been baked in a streak fashion, and I think a couple of pictures on film will show that. But, that didn't extend very far. Over.

CAPCOM
Roger, Tranquility. And, this

CDT 03:03 GET 114:31 TAPE 385/3

CAPCOM
is great concern that you've described or at least suggested - your suggestion was that it was due to the heat of the engine at any rate. Next subject, did - -

TRANQUILITY
I believe so.

CAPCOM
Roger. Next subject, did either of the solar panels on the PSE touch the surface of the moon during deployment? Over.

TRANQUILITY
I think that two corners did touch just when it was deployed but both of them did come out at the same time. It unfolded a little unevenly and of course the crane that it was on was a little bit - not quite as level as it was - as I would like to have it. I think that two corners did touch to about 1 inch, 3/4 to 1/2 an inch deep and maybe along the bottom, it might have been maybe 3 inches leaving a small triangular coating on two of the corners, and I think these are on the western ones. Over.

CAPCOM
Roger. Understand the description and the next subject on the 2 core tubes which you collected, how did the driving force required to collect these two - -

END OF TAPE

CDT 03:14 GET 114:42 TAPE 386/1

CAPCOM
- the two core tubes which you collected, how did the driving force required to collect these tubes compare? Was there any difference? Over.

TRANQUILITY
Not significantly. I could get down to about the first 2 inches without much of a problem and then as I would pound it in about as hard as I could do it and the second one took 2 hands on the handle and I was putting pretty good dents in the top of the extension rod and it just wouldn't go much more than - I think the total depth might have been about 8 or 9 inches. But even there it didn't for some reason it didn't seem to want to stand up straight. In other words, I'd keep driving it in and it would dig some sort of a hole but it wouldn't - just penetrate in a way that it would support it and I'd keep it from falling over if that makes any sense at all. It didn't really to me. Over.

CAPCOM
Roger, Buzz. I think I've got the picture. You indicate that little difference between the two samples and that in each case you got down about 2 inches without any problems and then had to continuing hammering rather vigorously in order to continue driving it into a total depth of 8 or 9 inches and even at that point the rods did not want to stay vertical. That they'd tend to fall over on you even after pounding in that far. Is that correct?

TRANQUILITY
Yeah, that's about it. It wasn't a rapid change in resistive force. And also I noticed when I took the bit off that the material was quite well packed, a good bit darker, and it - the way it adhered to the cord tube gave me the distinct impression of being moist. Over.

CAPCOM
Roger. I understand the general impression of being moist as packed in the cord tube. Next question. We did copy your comments prior to the EVA of your general description of the area. We wonder if either of you would have anymore lengthy description or more detailed description of the general summary of the geology of the area. Over.

TRANQUILITY
We'll postpone our answer to that one until tomorrow, okay.

CAPCOM
Yes indeed. That will be fine. Just a couple more here and I think these may not be quite as lengthy as number 7 there. Can you estimate the stroke of the primary and secondary struts? Over.

TRANQUILITY
Well, I could do it like this. About all the struts are about equally stroked and the heighth from the ground to the first step is about 3 feet or maybe 3 and 1/2 feet.

CAPCOM
Roger. Understand, Neil. Next topic, just after landing you pointed out that there was a hill to the west along the plus Z axis from the left. Are there

CDT 03:14 GET 114:42 TAPE 386/2

CAPCOM
large rocks in that direction that might block the solar ray during the sunset - as sunset approaches in your locality - are there any large rocks that might tend to obscure the ray. Over.

TRANQUILITY
No, I don't believe so. I think that it's about as level as any other area is that we chose.

CAPCOM
Roger.

TRANQUILITY
There's nothing large anyway that's going to get in the way.

CAPCOM
Roger. Copy. That's also the way it appears from the television I think and now the final question. You commented, Neil, that on your flight to the landing spot you had passed over a football field size crater containing rather large blocks of solid rock perhaps 10 to 15 feet in size. Can you estimate the distance to this football size crater from your present position? Over.

TRANQUILITY
I thought we'd be close enough so that when we got outside we could see its rim back there but I couldn't. But I don't think that we're more than a half mile beyond it. That is a half mile west of it.

CAPCOM
Roger, so you estimate your present position less than a half mile approximately west of this large crater. Over.

TRANQUILITY
That's correct.

CAPCOM
Okay, you all. That takes care of the questions from our geologists for tonight and unless you have something else that will be all from us for the evening. Over.

TRANQUILITY
Okay, thank you.

PAO
The CAPCOM there was astronaut Owen Garrett, one of the group of five scientists astronauts selected in 1965.

CAPCOM
Tranquility Base, Houston. We've now collected all the ranging data that we can use and you can go back to caution and warning and able. Over.

TRANQUILITY
Roger, will do.

END OF TAPE

CDT 03:24 GET 114:52 TAPE 387/1

CAPCOM
Tranquility Base. Houston. Over.

TRANQUILITY
Go ahead, Houston.

CAPCOM
Roger. A few more verifications, here. Can you - will you verify that the disk with messages was placed on the surface as planned, and also that the items that are listed in the flight plan, all of those listed there were jettisoned. Over.

TRANQUILITY
All that's verified.

CAPCOM
Roger. Thank you and I hope this will be a final good night. Okay.

PAO
Tranquility Base has confirmed that they left on the lunar surface all the items they had planned to. We have said good night to Neil Armstrong and Buz Aldrin. We will continue to monitor throughout this rest period which is scheduled to end at about 122 hours elapsed time. We're now 114 hours 53 minutes. Should there be any further conversations with either Tranquility Base or Columbia, we will come back up and bring those to you. This is Mission Control, Houston.

END OF TAPE

CDT 04:22 GET 115:50 TAPE 388/1

PAO
This is Apollo Control at 115 hours 50 minutes. It's been almost an hour since we said good night to Tranquility Base. Dr. Kenneth Biers, the flight surgeon on this shift, reports that he does not believe that Neil Armstrong is asleep yet. From his heart-trate, he thinks he's resting and perhaps dozing from time to time, but he doesn't believe that he is asleep. Neil is the only one being monitored in Tranquility Base. There is no biomedical instrumentation for Buzz Aldrin. Dr. Biers reports that Mike Collins is sound asleep in Columbia as it orbits the moon. Columbia has just entered its 21st revolution of the moon. All systems on the Lunar Module are in good order, showing cabin pressure of 4.9 pounds per square inch, cabin temperature 62 degrees Fahrenheit. We have not heard from Tranquility Base since saying good night and we have not attempted to call them. This is Mission Control, Houston.

END OF TAPE

CDT 05:22 GET 116:50 TAPE 389/1

PAO
This is Apollo Control at 116 hours 50 minutes. All systems in both Columbia and Tranquility Base still operating very well. No problems. Dr. Kenneth Biers' report is the same as the one an hour ago. The data from Neil Armstrong indicates that he is resting, but he is not believed to be asleep, not following the pattern of sleep, but he is resting. Cabin pressure is holding steady at 4.9 pounds per square inch, temperature at 62 degrees Fahrenheit. The consumables in Tranquility Base are still in good shape, showing 45 and a half per cent of the descent water still remaining, the water very important for cooling on the lunar surface. Showing 63 per cent of the oxygen supply in the descent stage still remaining. Both of those consumables in the ascent stage very high - have not been used yet. Two water tanks in the ascent stage, each one showing 97.6 per cent; the other showing 98.4. Two oxygen tanks in the ascent stage, one reading 93 and a half per cent, the other 96.8 per cent. Mike Collins still asleep in Columbia. At 116 hours 52 minutes, all still going well with both spacecrafts. This is Mission Control, Houston.

END OF TAPE

CDT 06:26 GET 117:54 TAPE 390/1

PAO
This is Apollo Control at 117 hours 54 minutes. All continues to go well with both Columbia orbiting the moon, now in its 22nd revolution, and Tranquility Base on the surface of the moon. Flight surgeon Dr. Kenneth Biers says his data continues to indica-

te that Neil Armstrong may be dozing but he's sure that he is not sleeping soundly or well. Heart rates have been down in the 50's at times, but have not stayed there very long. He believes he may be sleeping fitfully and dozing, but stirring around quite a bit. Mike Collins still sleeping in Columbia and the Lunar Module Pilot Buzz Aldrin is not instrumented so the doctors cannot determine whether he's asleep or not. Cabin pressure in the Lunar Module still holding steady at 4.9 pounds per square inch. Temperature has dropped one degree since last report, now reading 61 degrees Fahrenheit. All consumables are still in good shape. This is Mission Control, Houston.

END OF TAPE

CDT 07:22 GET 118:50 TAPE 391/1

PAO
This is Apollo Control at 118 hours 50 minutes. Flight controllers here in Mission Control Center continue to monitor the systems of Eagle at Tranquility base consistently and of Columbia when that spacecraft is within acquisition on the front side of the moon. And they are in acquisition of Columbia telemetry now, it's in it's 22 revolution. Everything continuing to go very well. All systems normal. Mike Collins is still alseep, very well, in Columbia. Neil Armstrong sleeping fitfully, if indeed he is alseep at all at Tranquility base. Throughout this rest period the cabin pressure has held very steady at 4.9 in the lunar module. We're still showing a cabin temperature of 61. This is Mission Control, Houston.

END OF TAPE

CDT 08:23 GET 119:51 TAPE 392/1

PAO
This is Apollo Control at 119 hours, 51 minutes. The report is the same as it has been throughout the rest period. All systems in both Eagle and Columbia are operating very well, Mike Collins asleep, Neil Armstrong sleeping fitfully. The heart rate goes down into the sleep range but then comes up out of it indicating he is stirring around considerably. Columbia is in its 23rd revolution now in an orbit 62 by 57 nautical miles. Still holding 4.9 pounds per square inch, cabin pressure 61 degrees Fahrenheit temperature. The descent water quantity now shows 39 and one-half percent remaining. Descent oxygen quantity 63 percent remaining. This is Mission Control, Houston.

END OF TAPE

CDT 09:31 GET 120:59 TAPE 393/1

PAO
This is Apollo Control 120 hours 59 minutes ground elapsed time. We've called the spacecraft Columbia from Mission Control here to wake up Mike Collins. The network is configured so that the LM crew, the Eagle crew, will not be disturbed. Lets join the conversation in progress.

CAPCOM
Columbia, Columbia, good morning from Houston.

COLUMBIA
Good morning.

CAPCOM
Hey Mike, how's it going this morning?

COLUMBIA
How goes it?

CAPCOM
Real fine.

COLUMBIA
(garbled) How's it going with you?

CAPCOM
Real fine here. Columbia, request P00 in accept. We'll shove the state vector in for you right away.

CAPCOM
Okay, it's coming up now, Columbia. We're going to keep you a little busy here. As soon as we get the state vector in we'd like

you to go ahead and do a P52 option 3 on this night pass, and then when you come on around the other side there we'll give you some landmark tracking information on prime 130.

COLUMBIA
Very good.

CAPCOM
And for your information we're also going to have Tranquility Base do a P52 when you come around the other time, and I have the P22 information if you are ready to copy.

COLUMBIA
Go ahead.

CAPCOM
Okay, track landmark 135 using P22, and for information this will properly position your rendezvous radar transponder. T1 is 122 plus 16 plus 05 - okay, stand by.

CAPCOM
Columbia, Houston. The computer is yours.

COLUMBIA
Okay, and I'd like grid square of this crater 130 prime. Over.

CAPCOM
Columbia, Houston. Say again about 130 prime.

CAPCOM
Columbia, Houston.

COLUMBIA
Go ahead.

CAPCOM
Roger. I have a T1 and T2 times and also the longitude of the 130 prime. We're working on the grid squares and we'll get them shortly.

COLUMBIA
Ready to copy.

CAPCOM
Okay, T1: 122 plus 16 plus 05. Tango 2: 122 plus 21 plus 11 and 6 miles north of track. Do you want your NOUN 89 values?

COLUMBIA
Yes, please.

CAPCOM
Roger. Latitudes plus 01.243. Longitudes over 2, plus 11.844. Altitude minus 001.46. Over.

CDT 09:31 GET 120:59 TAPE 393/2

COLUMBIA
Copy T1: 122:16:05. T2: 112:21:11, 6 miles north, NOUN 89 is plus 01243 plus 11844 minus 00146.

CAPCOM
Columbia, affirmative, and at the T1 time put your rendezvous radar transponder switch to OPERATE.

COLUMBIA
All right.

CAPCOM
And this 130 prime is the same one that you tracked prior to descent. Over.

COLUMBIA
Okay. You've updated your information as to the LM's position and this is your best estimate of where the LM is. Is that correct?

CAPCOM
Columbia, that's negative. This 130 is the little bitty crater there that you tracked - John Young's crater - that you tracked prior to descent. And we want that -

COLUMBIA
Fine, okay. You've given up looking for the LM.

CAPCOM
Affirmative. We want this for one last fix on your plane.

COLUMBIA
All right, fine, Understand. Thank you.

CAPCOM
And when the LM does his P22 on your transponder, well then that will be our last shot at the LM's position.

COLUMBIA
Roger, understand. Do you care whether my transponder is on before T1?

CAPCOM
Roger, it'll be on WARMUP prior to that time and and you can go to OPERATE any where around that time.

COLUMBIA
Yes, I get it, it's on its 24 minute warmup now.

CAPCOM
Roger.

CAPCOM
And Houston, the computer is yours, you can go to BLOCK any time.

COLUMBIA
Roger, BLOCK going P52 option 3.

CAPCOM
Roger, and we'll see you coming around the other side. About 1 minute to go and all your systems are looking good.

COLUMBIA
Thank you.

END OF TAPE

CDT 09:42 GET 121:10 TAPE 394/1

PAO
This is Apollo Control. Spacecraft Columbia has gone behind the moon on the twenth third lunar revolution. Be acquired again at - well, let's see now, it looks like we don't have acquisition table up yet for next rev. During this pass and the short conversation toward the end of the front side pass with Columbia, the network transmitters have been arranged so that the transmissions would not disturb the crew of Eagle who at this time should be asleep. Not since Adam has any human known such solitude as Mike Collins is experiencing during this 47 minutes of each lunar revolution when he's behind the moon with no one to talk to except his tape recorder aboard Columbia. While he waits for his comrades to soar with Eagle from Tranquility Base and rejoin him for the trip back to earth, Collins, with the help of flight controllers here in Mission Control center has kept the command module's system going "pocketa-pocketapocketa". At 120 hours, 12 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

PAO
This is Apollo Control. Let's join the call to Tranquility Base.

CAPCOM
How is the resting stand up there, or did you get a chance to curl up on the engine camp?

EAGLE
Roger, Neil has rigged himself a really good hammock with a weight gutter, and he's been lying on the hatch and engine cover, and I curled up on the floor. Over.

CAPCOM
Roger. Copy, Buzz. We've got a couple of changes to your surface check-list here, and in general, what we're going to want you to do is P-22 tracking the command module for one last hack on your position there. This will be - in other words, P-57, P-22, and then press on (garble) with the check list, and the rest of them are a couple of minor changes in the check list. The main one being that we do not want the rendezvous radar on during the ascent, and we expect that this will take care of some of the overflow of program alarms that we're getting during descent.

EAGLE
Okay, we had the rendezvous radar in slew during descent though.

CAPCOM
Traquility Base, Houston. I missed that. Say again.

EAGLE
Roger, I say again. We had the rendezvous radar switch in the P00 position, not the LCG position.

CAPCOM
Roger, we copy that. But there's a greater duty cycle on - there's a good 15 percent duty cycle on the ascent program there, so just go ahead and leave it off. And I have the changes if you want to get out your surface check list and I can go ahead and start giving them to you.

EAGLE
Allright, go ahead. I've got it out.

CAPCOM
Okay, before we start here, request P00 and data and we'll give you some vectors.

EAGLE
You've got P00 and data.

CAPCOM
Okay, and on surface 50 will be the first change there.

EAGLE
Okay, and I understand you want us to do a P-57 option 3 and then a P-22. Is that the general idea? Over.

CAPCOM
That's affirmative, so on the surface 50 there, down at the bottom of the page, just after pro after 2 recycles, stick in a time of 1:22 plus 15, do P 22 as per ping 20 of G and N dictionary. Over.

EAGLE
Roger, understand that's 1:22 15 to P-22 as per pings 20 G and N dictionary.

CAPCOM
Roger. Okay let's skip on over to surface 59.

EAGLE
Okay.

CAPCOM
Okay, this is going to be for one last vent on the DPS tank, so at the top of the page just after

CDT 10:12 GET 121:40 TAPE 395/2

CAPCOM
EPS invertor 1 close, add - okay after EPS invertor 1 closed, add prop, descent helium red flash vent close, and then after stabilization control, AELD close, add prop displays flash engine overide flash logic close. Over.

EAGLE
Roger, copy. These are 2 circuit breakers, right?

CAPCOM
Tranquility Base, affirmative. Those are just the circuit breakers at that time.

CAPCOM
Tranquility Base, Houston. Did you get those 2 on the proportion circuit breakers?

EAGLE
Roger, I have those 2.

CAPCOM
Okay, let's go over to surface 60, and then down the middle of the page, after launch guidance system recommendation from MSFN, then add the switches -

EAGLE
Roger, go ahead then.

CAPCOM
Okay. After launch guidance system recommendation from MSFN add descent propulsion fuel vent open add descent propulsion oxidizer vent open add verify talkback gray. Over.

EAGLE
Roger. Descent propellant fuel vent open, descent propellant oxidizer vent open verify talkback gray.

CAPCOM
Roger, you've got that one, so that'll be the last vent and it will continue venting. Skip over to surface 61 down there at T minus 17.

EAGLE
Roger, I'm there. Go ahead.

CAPCOM
Okay, at t minus 17, delete CB 11, AC Bus A, rendezvous radar closed wait 30 seconds, delete PGNCS rendezvous radar close, and then add updated link switch to voice backup. Over.

EAGLE
Roger, I have that. Leave those 2 circuit breakers open, and have the updated link to voice backup, and we'll make the appropiate changes on the following circuit breaker status cards.

CAPCOM
Roger, and you might add a little note down there at the bottom of the page - NOTE: - this is the bottom of page 61 - NOTE: Do not use tapemeter in PGNCS, i.e., do not place mode select switch to ping. Over.

EAGLE
Okay. We'll put it in AGS.

CAPCOM
Roger, that's fair enough. That's some more of that computer load business.

END OF TAPE

CDT 10:22 GET 121:50 TAPE 396/1

CAPCOM
Okay, that's all the changes we have the checklist here, I've got some - just the general notes, I'll read to you on P22, and just for some information, over.

EAGLE
Okay, and then it looks to me like we ought to get hopping on this P57.

CAPCOM
Roger, we agree wholeheartedly. And while your starting on that, I'll read, just read these notes on P22. Call P22 possible program alarm 5.6, range greater than 400 nautical miles, and then use the P22 as describing on things 20. Take option 1 in NOUN 06, and use the no update mode. Rendezvous radar will lock on at about 25 degrees elevation above the horizon. If 503 alarm occurs, designate bail. Key A proceed and allow the rendezvous radar to search for the CSM. And place the Range Altitude Monitor Switch in altitude, altitude rate to prevent the tape meter from driving into the stops. And press on.

EAGLE
Roger, I think I have that.

PAO
This is Apollo Control. A little over 2 minutes until Columbia comes over the hill again on the 24th Lunar Revolution. In that wake up call to Eagle, the crew described how they slept in the spacecraft by lying on the floor and on the engine cover. Some of the preliminary times being generated now ascent show ignition about 1 minute 26 seconds earlier than the premission flight plan. Ignition time now showing 124 hours 22 minutes 0 seconds. Burn will have a magnitude of 6,068 feet per second. Quite a bit of that will be in vertical rise and actually starting from zero feet per second on the lunar surface. The CSI maneuver behind the moon, the Concentric Sequence Initiate, CSI the acronym being for that maneuver. 125 hours 19 minutes 34 seconds. Consistent Delta heighth CDH 126 hours 18 minutes 0 seconds. Terminal Phase initiation 126 hours 57 minutes 0 seconds, and Terminal Phase Finialization or the final breaking before docking 127 hours 39 minutes 39.2 seconds. These are Ground computations. And they will be computed by the crew from radar tracking, rendezvous radar. So actually these number computed on the Ground are somewhat academic in that they will be computed in real time by the crew. We're standing by here for CAPCOM to resume conversation. During this up coming pass here, more definite fix on the Eagle positions will be attempted by using the rendezvous radar from the Eagle in Program 22, rendezvous radar lunar surface navigation program. The transponder on Columbia in the meantime has been warmed up. During the last revolution, Mike Collins was advised to - have the - the transponder warmed up. As of now, the exact location is somewhat vague. And perhaps this rendezvous radar exercise will give a final, more pinpoint location of where Eagle does indeed nest on the moon. We'll continue to monitor the airground circuit. We've had acquisition of signal with Columbia, so likely the conversation will increase here as we get the

CDT 10:22 GET 121:50 TAPE 396/2

lock on, hopefully, with rendezvous radar as Columbia passes over the Eagle landing site. Still live on air-ground.

CAPCOM
Columbia, Columbia, Houston, over.

CAPCOM
Columbia, Columbia, Houston, over.

COLUMBIA
Houston, Columbia.

CAPCOM
Roger, Columbia. We'd like a cryo stir in all 4 tanks, and the standard 1 minute, over.

COLUMBIA
In works.

CAPCOM
Roger, and do you have any torquing angles from the P52?

COLUMBIA
Roger, stand by, over.

CAPCOM
Tranquility, Houston, request error reset at this time, over.

EAGLE
Roger, error reset, and would you tell me when you're satisfied with the LGC self test.

CAPCOM
Tranguility, LGC is a go.

EAGLE
Roger.

COLUMBIA
Torquing angles when you're ready.

CAPCOM
Columbia, Houston, go ahead.

END OF TAPE

CDT 10:32 GET 122:00 TAPE 397/1

CAPCOM
Columbia, Houston. Go ahead.

COLUMBIA
Under stars 25 and 42 manual difference 5 balls 993 plus 00165 plus 00186 minus 00039 time of torquing 121 15. Over.

CAPCOM
Columbia, Houston. We copy. Thank you.

COLUMBIA
(Garble) completed.

CAPCOM
Roger. Thank you.

TRANQUILITY
Houston, this is Tranquility. Would you like a recycle on the VERB 6 and so forth? Over.

CAPCOM
Tranquility, Houston. We copy. Stand by 1.

CAPCOM
Tranquility, Houston. Request recycle.

COLUMBIA
(Garble)

CAPCOM
Spacecraft calling Houston? Say again.

COLUMBIA
(Garble)

CAPCOM
Roger, copy, Columbia.

CAPCOM
Tranquility, Houston. Request rendezvous radar breakers in about now.

CAPCOM
Columbia, Houston. Request OMNI D - OMNI DELTA.

CAPCOM
Tranquility Base, Houston. Request you start the warmup on the rendezvous radar.

TRANQUILITY
Roger.

END OF TAPE

CDT 10:47 GET 122:15 TAPE 398/1

TRANQUILITY
Houston, you copying noun 93?

CAPCOM
Tranquility, affirmative. Go.

TRANQUILITY
Roger, we'll get a torque.

CAPCOM
Houston, roger.

CAPCOM
Tranquility Base, Houston. Columbia will be overhead at 122 plus 22 plus 51. His LOS will be 29:35. Over.

TRANQUILITY
Roger.

TRANQUILITY
Houston, we'd like to check this on the tape meter against the AGS. We'll go back to altitude - altitude rates as soon as the rate starts to build up. Over.

PAO
This is Apollo Control. We have confirmation of radar lock on.

TRANQUILITY
On second thought, since that will take the range rates I guess we'd better not do that. And for this range that the AGS are showing now 425 miles with a signal strength of 2.2. It looks like we ought to proceed on this. Over.

CAPCOM
Roger. Stand by one. Tranquility affirmative. Proceed.

TRANQUILITY
Are you getting the information on the downlink now?

CAPCOM
Tranquility affirmative, and we're sailing. We've got 4 point so far, and it's looking good.

TRANQUILITY
Okay, what do you people think about calling up a VERB 83?

CAPCOM
Tranquility, Houston. Stand by now. We're getting the data now. We're checking on the VERB 83.

TRANQUILITY
And we expect that we may lose lock when it passes overhead because of the max rate that the radar has.

CAPCOM
Tranquility, Houston. Negative on VERB 83.

TRANQUILITY
Understand.

TRANQUILITY
We just lost lock.

CAPCOM
Tranquility, Houston. Go.

COLUMBIA
They Just lost lock.

CAPCOM
Roger. We had about 20 some points before you said that, and for your information, the reason the AGS is a little different there - the reason the AGS is a little different is because the K factor is a little bit wrong.

TRANQUILITY
Has he already gone over - okay, has he already gone overhead, or do you want us to try and get in lockon again?

COLUMBIA
Houston, Columbia. You got NOUN 49. Five good marks.

CDT 10:47 GET 122:15 TAPE 398/2

CAPCOM
Tranquility, affirmative. Try to lock on again, and you'll lose him again at about 29 minutes and 35 seconds.

TRANQUILITY
Okay, you have a real quick procedure how to do that.

CAPCOM
Columbia, Houston. Say again about your NOUN 49.

COLUMBIA
I say I got 5 good marks. You got NOUN 49. When you get everything you need on the downlink let me know, over.

CAPCOM
Columbia, Houston. Stand by one.

END OF TAPE

CDT 10:57 GET 122:25 TAPE 399/1

TRANQUILITY
Ron, did you say on the 526 alarm to proceed or do a VERB 32?

CAPCOM
Roger. (garbled) Radar thinks the range is greater than 400 miles now.

CAPCOM
Tranquility Base, Houston. Recommend you terminate P22. Over.

TRANQUILITY
Roger, will do.

CAPCOM
And Columbia, Houston, same for you. You can terminate P22.

COLUMBIA
I have. I'm already passed it.

CAPCOM
Roger.

COLUMBIA
Up standing P22 here a second just to record the NOUN 89 amd then over VERB 34.

CAPCOM
Columbia, Houston. Roger, we copy, and that's good.

CAPCOM
Tranquility, Houston.

TRANQUILITY
Roger, go ahead.

CAPCOM
Roger. Request S-band function switch to RANGE. We're going to do some ranging on you. Also I have an updated AGS K factor when you are ready to copy. Over.

TRANQUILITY
Roger, go' ahead with the K factor.

CAPCOM
Roger. 119 plus 59 plus 59.92. Over.

TRANQUILITY
Roger, a little closer this time.

CAPCOM
That's (garbled)

TRANQUILITY
119 59 5992. Over.

CAPCOM
Tranquility, Houston. Readback correct.

CAPCOM
Columbia, Houston. (garbled) the K factor.

COLUMBIA
Roger.

COLUMBIA
This is Columbia. Go ahead. And I'd like to know about this P52 coming up. Is that the one I just completed or do you want a pair of them back to back?

CAPCOM
Columbia, Houston. You do not need to do another P52 unless you want to, break, and also Columbia, when you get a chance request bat C and a pyro readout. Over.

COLUMBIA
Bat C says 37 volts even. Pyro A, 37. Pyro B, 37.

CAPCOM
Columbia, Houston. Roger, we copy. Thank you.

COLUMBIA
That bus B is 37. Bat bus A is 36 or I'd think the gauge was stuck.

CAPCOM
Roger, and you're looking good to us, Columbia.

COLUMBIA
Yes, sir. Keep it that way.

COLUMBIA
Columbia is coming up on a VERB 45 enter to reset the surface flag.

CAPCOM
Columbia, Houston. Negative. Stand by on the VERB 45.

COLUMBIA
Roger that.

COLUMBIA
And a crew status report from Columbia. I figure I got about 5 hours good sleep although you guys probably know better than I do.

CDT 10:57 GET 122:25 TAPE 399/2

CAPCOM
Columbia, roger we copy.

CAPCOM
Columbia, Houston. We've got a couple more vectors to send up to you. They'll be coming up shortly and then you do the VERB 45 after you get those in. Over.

COLUMBIA
Okay, that's fine. Just wanted to make sure we're both in sync on the order.

CAPCOM
Roger.

CAPCOM
Columbia and Tranquility Base, this is Houston. In case you haven't noticed, the MSFN relay is not activated, so I can go ahead and relay anything if you want to talk directly.

COLUMBIA
Columbia, Roger.

TRANQUILITY
Houston, Tranquility. Be advised we've got -

COLUMBIA
(garbled)

TRANQUILITY
- - showing red right now. We just put a VERB 77 in. I believe that there's (garbled)

CAPCOM
Tranquility Base, Houston. We've got a lot of static down here. Could you say again?

TRANQUILITY
Roger. We have 4 pressure talkbacks indicating red. We still have the circuit breakers out as of right now. I believe at this moment we have just entered VERB 77 on Tape 5052 and are ready to proceed with the hot fire. Is it normal to have these 4 red flags? Over.

CAPCOM
Tranquility Base, Houston. We think that's okay. Go ahead and reset them and press on with the hot fire. Over.

CAPCOM
(garbled)

END OF TAPE

CDT 11:10 GET 122:38 TAPE 400/1

CAPCOM
Columbia, Columbia, Houston, request P00 in accept, and we'll send some state vectors up to you.

COLUMBIA
Very good, P00 in accept.

EAGLE
Houston, Tranquility. I used the Capella in the last siting, and it's a good ways near the edge. A good ways away from the center of the detent 4. I'm wondering if it would pay any to use Alpheratz at star number 1. It might be a little closer, however, it would delay things a little, since I'd have to designate the radar out of the way, over.

CAPCOM
Tranquility, roger, we copy, stand by 1. And break, break, Columbia. We're having a little trouble getting the stuff in there, request high gain, pitch minus 20 yaw plus 250, over.

CAPCOM
And Tranquility, Houston, we prefer to save the time press on with Capella, over.

EAGLE
Roger.

CAPCOM
And Tranquility, Houston, the RCS check looks mighty fine to us.

EAGLE
It looks good up here.

CAPCOM
Columbia, Columbia, Houston, over.

CAPCOM
Columbia, Houston, over.

CAPCOM
Columbia, Houston, in a blind high gain pitch minus 20 yaw plus 150.

EAGLE
Houston, Tranquility, could you give me the fixed portion of the ascent pad so I can load it in for P57, over.

CAPCOM
Tranquility, roger, stand by 1. We want to wait on that P57 until about TEC minus 50 minutes, over.

EAGLE
Roger.

CAPCOM
Columbia, Columbia, Houston, over.

END OF TAPE

CDT 11:20 GET 122:48 TAPE 401/1

CAPCOM
Columbia, Columbia, Houston. Over.

TRANQUILITY
Houston, Tranquility. It turned out detent 4 isn't useable anyway, with the yaw that we have because the earth appears in both detent 2 and detent 3.

CAPCOM
Tranquility Base, Houston. Roger.

CAPCOM
Columbia, Houston. Over.

CAPCOM
Tranquility, Houston. I have your LM ascent and CSI data pads when you are ready to copy.

TRANQUILITY
We're ready to copy.

CAPCOM
Roger. LM ascent pad. TIG 1242200 00 NOUN 76 5534900322 plus 0017 DEDA to 47 plus 37104 minus 70470 plus 58604 plus 56936. Your LM weight 10837. Your T-14 126 plus 20 plus 12. Over.

TRANQUILITY
What figures the cross range and NOUN 76?

CAPCOM
Roger. Your cross range for NOUN 76 - by the way we may update this later - but now it is plus 0017. Over.

TRANQUILITY
Roger. Readback follows. TIG 124 2200005534900322 plus 0017 plus 37103 minus 70470 plus 58604 Plus 56936. LM weight 10837. T-14 126 20 12. Go.

CAPCOM
Tranquility, Houston. Roger, your readback correct. Now I have your CSI data pad.

TRANQUILITY
Going to CSI pad.

CAPCOM
Roger. CSI pad. TIG to CSI 125193470 TIG TPI 126570000 NOUN 810532 plus 0000 FDAI NA DEDA 373 03196, DEDA 275 04170 NOUN 86 plus 0532 plus 0000 plus 0012. Tranquility readback.

TRANQUILITY
CSI pad follows. TIG 125193470 TIG TPI 126570000 NOUN 810532 plus 0000 35303196 27504170 NOUN 86 plus 0532 plus 0000 plus 0012. Go.

CAPCOM
Tranquility Base, Houston. Your readback is correct. And, Tranquility, no need for any gyro compensations. It's GO.

TRANQUILITY
Roger. Understand.

CAPCOM
Columbia, Houston. Over.

CAPCOM
Columbia, Houston. Request high gain. PITCH, minus 30. YAW, plus 170. Over.

END OF TAPE

CDT 11:30 GET 122:58 TAPE 402/1

CAPCOM
- zero. Over.

COLUMBIA
Houston,, Columbia on the high gain. Over.

CAPCOM
Roger, Columbia. We still need to finish your uplink there, and then I have your CSI and PTI times and also the liftoff.

COLUMBIA
Go ahead, ready to copy.

CAPCOM
Roger. LM ascent liftoff time 124 22 00 00. Your CSI tik say again CSI tik 125 19 34 70. Your tik of TPI 126 57 00 00. And the LM's NOUN 81 values for CSI 05 32 - that's 53.2 for DELTA V X, DELTA V Y all zeroes. Columbia, Houston. Over.

COLUMBIA
Roger, readback liftoff tik 12422 even, CSI 125 193470, TPI 126 57 even, LM 981 for CSI 53.2 DELTA V X. Over.

CAPCOM
Columbia, Houston. Roger, your readback correct.

CAPCOM
Columbia, Houston. We're coming up with your second load now.

CAPCOM
Columbia, Houston. The computer is yours, and you can do your VERB 45 enter now.

COLUMBIA
Roger. Going into BLOCK and VERB 45 enter.

CAPCOM
Roger.

COLUMBIA
How's the black team today? All prime and raring to go?

CAPCOM
You bet there Mike.

PAO
This is Apollo Control. Some 5 minutes 35 seconds away from loss of signal with the spacecraft Columbia before it goes on the far side of the moon on the 24th revolution. 1 hour, 18 minutes until ascent ignition and following that the rendezvous sequence completed with the docking at 128 hours approximately. We'll continue to monitor air to ground here as data is passed up to the crew for the upcoming day's activities. Apollo Control standing by at 123 hours and 3 minutes.

CAPCOM
Columbia, Houston. About 3 minutes LOS and I have your consumables update.

COLUMBIA
Ready to copy.

CAPCOM
Roger. At 123 plus 00, RCS total minus 7 percent, ALPHA minus 12 percent, BRAVO plus 4.5, Charlie minus 7, DELTA minus 6.5. Your hydrogen total minus 1.4 pounds, oxygen plus 1.7. Over.

COLUMBIA
Whoever figured those hydrogens and oxygens out a couple of days ago must have known what he was doing.

CAPCOM
Okay, I think I read that oxygen as a plus 17 pounds.

COLUMBIA
Roger, still close.

CDT 11:30 GET 122:58 TAPE 402/2

CAPCOM
Eagle and Columbia, this is the backup crew. Our congratulations to yesterday's performance, and our prayers are with you for the rendezvous. Over.

EAGLE
Thank you, Jim.

COLUMBIA
Thank you, Jim.

EAGLE
Glad to have all you beautiful people looking over his shoulder. We had a lot of help down there, Jim.

END OF TAPE

CDT 11:40 GET 123:08 TAPE 403/1

TRANQUILITY
(garbled) looking over his shoulder.

CAPCOM
We had alot of help down there, didn't we.

PAO
This is Apollo Control. We've had loss of signal with Columbia going behind the moon. Toward the end of that pass, Apollo 11 backup commander, Jim Lovell, who's had some experience in Lunar missions came up with his congratulations with his job-well-done. He mentioned that he would be here giving moral support during the rendezvous sequence to follow. There are likely to be further communications with Eagle until the command mmodule comes around the corner again some 44 minutes from now We'll bring the circuit back up as communications resume perhaps playing catch up with tape recordings, and at 123 hours, 10 minutes ground elapsed time, 1 hour, 11 minutes to ignition this is Apollo - stand by. We may be - let's listen in again.

TRANQUILITY
Going to give you a few comments with regards to the geology question of last night. We are landed in a relatively clear crater field of elongate secondary - circular secondary craters most of which have rims irrespective of their rays and irrespective of their size. That's not universally true. There are a few of the smaller craters around which do now have a discernable rim. The ground mass throughout the area is a very fine sand to a silt. I say the thing that would be most like it on earth is the powdered graphite. Immersed in this ground mass are a wide variety of rock shapes, sizes, textures, rounded and angular, many with varying inconsistencies as I said I've seen plain - what looked to be plain basalt and particular basalt. Others with no crystals, some with small white phenocrysts, maybe one to less than 5 percent, and the bould - we are in a boulder field where the boulders range generally up to 2 feet with a few larger than that. Now, some of the boulders are lying on top of the surface, some are partially exposed, and some are just barely exposed, and in our traverse around the surface and particularly working with the scoop we can run into boulders below the surface probably buried under several inches of the ground mass.

CAPCOM
Tranquility, Houston. Roger, very fine description.

TRANQUILITY
Now I suspect this boulder field may have some of its origin with this large sharp edge rocky rim crater that we passed over in final descent. Now yesterday I said that was about the size of a football field, and I have to admit it was a little - little hard to measure coming in, but I thought that it might just fit in the astrodome as we came by it, and it runs in the

CDT 11:40 GET 123:08 TAPE 403/2

TRANQUILITY
vacinity of the - this rocky rim crater are much larger than these in this area. Some are 10 feet or so and perhaps bigger, and they are very thickly poculated out to about one crater diameter beyond the crater rim. Beyond that there is some diminishing, and even out in this area the blocks seem to run out in rows and irregular patterns, and then there are spans between them where there are considerably less surface evidence of the hard rocks. Over.

CAPCOM
Tranquility Base, Houston. We copy. Thank you very much. And Tranquility Base, we're through with the ranging. Take your S-band function switch to off reset.

TRANQUILITY
Roger.

CAPCOM
And Tranquility, I have a LM consumables update for you.

TRANQUILITY
Roger, ready to copy.

CAPCOM
Okay, at 123 plus 00, RCS alpha 78 - 78 percent PQMD, BRAVO is 76 percent PQMD, descent O2 is 62 percent - 62 percent, descent ampere hours are 590, 590 remaining, ascent ampere hours are 574, 574 remaining. Over.

TRANQUILITY
Roger, copy. That's very good. Thank you.

CAPCOM
Roger.

END OF TAPE

CDT 11:50 GET 123:18 TAPE 404/1

CAPCOM
Tranquility base, Houston.

EAGLE
Go ahead Houston.

CAPCOM
Roger, for your P57 errors, we did a looking around, and it looks like Sirius and Rigel at a detent 6 would be real good on that. Sun angle on Sirius is about 43 degrees, and on Rigel it's about 55 degrees, over.

EAGLE
Roger, Houston, the only trouble is that the sun is in number 5, the closed one. And it appears to also be close enough to detent 6 to shine on the far side of the cone. And it completely obscures detent 6. I'm unable to use that at all.

CAPCOM
Okay, we understand, out, and thank you.

CAPCOM
Tranquility, Houston, for your information the circuitry looks real fine on that ascent engine arm circuit breaker.

EAGLE
Roger, I don't think I could get it out now if I wanted to.

CAPCOM
Roger, we copy.

EAGLE
And it looks like in detent 6 I can pick up Venus right at the fringe, but I can't get anything else.

CAPCOM
Roger.

EAGLE
And by the way, Houston, our EVA antenna did return.

CAPCOM
Roger, mighty fine, thank you.

CAPCOM
Tranquility, Houston.

EAGLE
Roger, go ahead.

CAPCOM
Roger, it looks like you're going to have to reposition the radar here. We suggest you may want to start your TIG minus 45 minutes, that point in the checklist at about TIG minus 50 over.

EAGLE
Roger. Why do you think I need to move the radar.

CAPCOM
Well, we thought that you probably wouldn't be able to get the star there.

EAGLE
On our detents, the radar can be pointing plus X, and I'll be using right rear, it's okay.

CAPCOM
Roger, that's fine then.

PAO
This is Apollo Control. Some 57 minutes 22 seconds away from ignition on the LM ascent back into lunar orbit. Some 30 minutes away from acquisition of the spacecraft Columbia, as it comes around again on the 25th revolution. And the latest information from the scientific experiment placed on the lunar surface last night by the Apollo 11 crew, our Science Support Room reports receiving continous data from the Passive Seismic Experiment. The Passive Seismic Experiment is part of the early Apollo science experiment package which has the acronym ASEP. Recorded the astronauts footsteps on the moon; also sent down signals when the crew climbed up the ladder back into the Eagle, and recorded a strong signal when they expended Portable Life Support

CDT 11:50 GET 123:18 TAPE 404/2

PAO
Backpacks and other pieces of equipment were jettisoned out Eagle's front hatch. Let's rejoin the conversation.

CAPCOM
One more late checklist change there on rendezvous radar position for lift-off, over. - from phase surface 57.

EAGLE
Roger, go ahead.

CAPCOM
Okay, on surface 57 there on your VERB 21 NOUN 73, trunnion leave it 180, shaft we'd like 335, over.

EAGLE
Roger, understand, shaft 335.

CAPCOM
Roger, and if the durable doesn't quite hack it on lift-off, looks like the forward OMNI is good for about 30 to 60 seconds after lift-off. And the aft OMNI antenna is good for the rest of the ascent, over.

EAGLE
Roger, copy.

EAGLE
Houston, we've got 2 angles here at 3 minutes in ascent, would you confirm those. Pitch 134 and YAW minus 32, over.

CAPCOM
Tranquility base, roger, we verify those are correct.

END OF TAPE

CDT 12 noon GET 123:28 TAPE 405/1

PAO
This is Apollo Control. Here in mission control center Flight Director Glen Lunney is polling the various positions here in the control room on their readiness to go ahead with the ascent from this next pass as the command module comes around the moon, and we're some 53 minutes now away from ascent. Meanwhile back at the scientific experiment situation, another attempt is scheduled today to shoot another laser beam up to the laser retroreflector, which is the other part of the experiment package left on the moon. The seismic experiment will continue to record and send back measurements to mission control and will probably receive it's strongest signal when the ascent engine ignites and starts Eagle on it's way into lunar orbit and rendezvous with Columbia. There's considerable amount of conversation going on with the crew even though command module Columbia is behind the moon at this time. Rather than disconnect the air-ground line and be in a tape play-back mode, we'll leave a circuit up

all the way through to loss of signal on the next rev when both spacecraft will go behind the moon. At 123 hours, 29 minutes, and standing by, this is Apollo Control.

CAPCOM
Tranquility Base, Houston.

TRANQUILITY
Go ahead.

CAPCOM
Roger. Eagle's looking real fine to us down here. We have a fairly high confidence that we know the position of the LM. However, it is possible that we may have a plans change, but in the worst case it would be up to 30 feet per second, and of course we don't expect that at all .

TRANQUILITY
Okay.

TRANQUILITY
Houston, Tranquility Base. Since we've still got plenty of time I think I'll go ahead and recycle on 604.

CAPCOM
Tranquility, Roger, that's okay with us, and we assume that the primary canister is still aboard. Is that correct?

TRANQUILITY
We have one primary canister on board and one secondary. The other primary is out in front of the Z plus B pad. Over.

CAPCOM
Roger, we copy. Thank you.

TRANQUILITY
The things looks consistant today.

CAPCOM
That's affirmative, by gosh. Looking great.

TRANQUILITY
Houston, did you copy 905 and are you looking at 93? Over?

CAPCOM
Tranquility Base, it's beautiful.

TRANQUILITY
Okay, we'll proceed.

CAPCOM
Roger.

TRANQUILITY
I know where to start, I'm not sure the PGNCS know where gravity is.

CDT 12 noon GET 123:28 TAPE 405/2

CAPCOM
Okay.

TRANQUILITY
Houston, these are your angles, not ours.

END OF TAPE

CDT 12:20 GET 123:48 TAPE 406/1

TRANQUILITY
Houston, these are your angles, not ours.

CAPCOM
Roger. I quoted -

TRANQUILITY
that'll change your modifications angles.

CAPCOM
Tranquility, Houston. Recommend 334 and that should just keep it out of the limit.

TRANQUILITY
Okay.

PAO
This is Apollo Control. We are some 3 minutes to acquisition time for Columbia as it comes around on the 25th lunar revolution. We have had acquisition with Columbia. Some 26 minutes away from ignition time on the ascent burn which will place Eagle back into lunar orbit. Here we go.

COLUMBIA
- DELTA. Over.

CAPCOM
Columbia, Houston. Roger. Loud and clear. If you would like to take it down, we have the latest position of Tranquility Base. Over.

COLUMBIA
Go ahead.

CAPCOM
Roger. A step west of West Crater, Juliet te .5/7.7. Over.

TRANQUILITY
I understand that it is just west of the crater which is at Juliette .5/7.7. Is that correct?

CAPCOM
Columbia, Houston. That is correct.

COLUMBIA
Thank you.

CAPCOM
Tranquility Base, Houston.

TRANQUILITY
Roger. Because of the lower load with the rendezvous off, we'd like to have Battery 5 and 6 on the line now, 1 and 3 off. Over.

TRANQUILITY
It worked.

CAPCOM
Roger. Thank you.

PAO
This is Apollo Control in Mission Control. The lunar orbit chart on the center plot board has disappeared. We now have the various scribing plotters projecting on the center plot board to show the ascent. All of these lines and the various colors that are scribed on by the three sources of primary guidance system, the abort guidance system and the manned space-wide network all mean something to Flight Dynamics Officer. Let's rejoin the conversation.

END OF TAPE

CDT 12:30 GET 123:58 TAPE 407/1

COLUMBIA
Columbia is rolling inertially at lift-off attitude, my DAP is configured as my procedures at a time of 124 02.

CAPCOM
Columbia, Houston, roger, we copy you.

COLUMBIA
I'm using B and D roll.

CAPCOM
Tranquility, Houston, say again.

EAGLE
Houston, we were not calling.

CAPCOM
Roger, Columbia, was that Bravo and Delta roll, over.

COLUMBIA
Columbia, affirmative.

CAPCOM
Roger.

CAPCOM
Columbia and Tranquility, I'll give you a mark at 20 minutes to go, and that's in about 20 seconds.

CAPCOM
Stand by. Mark 20 minutes.

COLUMBIA
Columbia, roger.

CAPCOM
Tranquility base, Houston.

EAGLE
Go ahead.

CAPCOM
Roger, just a reminder here, we want to make sure you leave the Rendezvous Radar Circuit Breakers pulled; however, we want the Rendezvous Radar Mode Switch in LGC just as it is on Surface 59.

EAGLE
Okay.

CAPCOM
Tranquility base, Houston.

EAGLE
Roger, go ahead.

CAPCOM
Roger, our guidance recommendation is PGNCS, and you're cleared for take off.

EAGLE
Roger, understand. We're number 1 on the (garbled).

CAPCOM
Roger.

PAO
This is Apollo Control. We have confirmation on the ground that the ascent propulsion system propellant tanks have been pressurized.

EAGLE
Houston, Tranquility. We're not sure that we got number 2 tank to fire. It's still showing the high pressure.

CAPCOM
Roger, we confirm that. Try it again.

EAGLE
Okay, we'll go to number 2 this time.

CAPCOM
Roger, we concur.

EAGLE
Roger. No problem.

PAO
This is Apollo Control. Network controller just informed the flight director that items called battle shorts have been installed around the network. These are mechanical shorts of critical power supplies and transmitters and the like, so that before they will go off-line, they'll actually burn up in critical phases of the mission. They want to get as much data as possible through the burn, so for that reason any circuit breaking funtion of the equipment is inhibited with these battle shorts. They're not a piece of apparel. In the upcoming ascent some 14 minutes from now, almost 5000 pounds of propellant will be run through the ascent engine to propel the lunar module upper stage or

CDT 12:30 GET 123:58 TAPE 407/2

PAO
ascent stage to velocity - total velocity of 6068 feet per second. Go through a vertical rise phase at about 50 seconds after liftover - liftoff will begin pitching over, and some 168 miles down range will be inserted into lunar orbit at about 60,000 feet above the surface. With an apolune of approximately forty -

END OF TAPE

CDT 12:40 GET 124:08 TAPE 408/1

PAO
- and about 60,000 feet above the surface. With an apolune of approximately 45 nautical miles half a revolution later on the far side of the moon. We will continue to monitor air-ground here. We are some 1 hour away from loss of signal with the lunar module after its insertion. Eagle now 13 minutes away from - 13 minutes, 23 seconds away from ascent ignition. 124 hours, 8 minutes ground elapsed time in the mission. Apollo Control standing by.

TRANQUILITY
Houston, there looks like there is very little difference between the two.

CAPCOM
Roger.

TRANQUILITY
We've got No. 2 reading 3050 and No. 1 is reading 3000 and it drops down to 2990. So I am not sure that it is really indicative that it did go. Over.

CAPCOM
Roger. We copy and we agree.

TRANQUILITY
Okay. I will assume that we will GO for liftoff and will proceed with the ascent B.

CAPCOM
Roger. That is correct, and we will go ahead and watch tank 2. If tank 2 doesn't decrease we will tell you to close the ascent feeds and open the shut off. Over.

TRANQUILITY
Okay. Ascent Beeville and shutoff for close.

CAPCOM
Roger.

TRANQUILITY
I've got the cross feed on.

CAPCOM
Tranquility Base, little less than 10 minutes here. Everything looks good and we assume the steerables in track mode auto.

TRANQUILITY
Roger, it is in track mode auto.

CAPCOM
Roger.

TRANQUILITY
And both ED batteries are GO.

CAPCOM
Tranquility, Houston, roger.

ALDRIN
Neil, I'm reading you on VHF. You sound good.

ARMSTRONG
Yes, sir. Couldn't be better. It is just purring along.

ARMSTRONG
Bait scale 25.

ALDRIN
25.

ARMSTRONG
Ascent translation 4 jets. Balance couple on.

ALDRIN
Balance couple on.

ARMSTRONG
BTCHS, button reset, board to board stage reset.

ALDRIN
Reset.

CDT 12:40 GET 124:08 TAPE 408/2

ALDRIN
Reset.

ARMSTRONG
Headband minimum, bat control, mode control, mode control auto,

ALDRIN
Auto, auto.

PA0
Crew of Eagle going through their preadmission checklist.

ARMSTRONG
Neil standing by for 2 minutes to - for the guidance steering in the AGS.

END OF TAPE

CDT 12:50 GET 124:18 TAPE 409/1

CAPCOM
Eagle, Houston, you're locking good to us.

TRANQUILITY
Roger.

PAO
The guidance computer aboard the LM, or aboard Eagle will be loaded with the program 12, powered ascent guidance. We'll continue to monitor now at 3 minutes 12 seconds away from ignition as the crew of Eagle goes through their prelaunch checklist.

TRANQUILITY
(garbled)

PAO
Coming up on 2 minutes, Mark T minus 2 minutes.

TRANQUILITY
Watch your guidance steering in the AGS.

TRANQUILITY
The master arm on.

PAO
Guidance reports both navigation systems on Eagle are looking good.

TRANQUILITY
50 blanks.

TRANQUILITY
(garbled)

TRANQUILITY
Forward 8, 7, 6, 5, abort stage, engine arm ascent, proceed, That was beautiful. 26, 36 feet per second up. Be advised of the pitch over. Very smooth. Aldrin's (garbled) logged. Very quiet ride. There's that one crater down there.

PAO
1000 feet high, 80 feet per second vertical rise.

CAPCOM
Eagle, Houston. Request manual start over right.

EAGLE
Roger.

PAO
2600 feet altitude.

EAGLE
(garbled)

CAPCOM
Eagle, Houston, 1 minute and you're looking good.

EAGLE
Roger.

PAO
130 feet vertical rise rate.

EAGLE
- a little bit of slow wobbling back and forth. Not very much thruster activity.

CAPCOM
Roger, mighty fine.

EAGLE
(garbled) 150 up, beautiful. (Garbled) down. And AGS agrees within a foot per second.

CAPCOM
Eagle, Houston, you're looking good at 2. AGS, PGNCS, and MSFN all agree.

EAGLE
We're at 3000, 170 up, beautiful. 14 (garbled) And a foot per second again AGS to PGNCS.

EAGLE
Dead band looks like it's holding good, Houston.

CAPCOM
Roger, we concur. It's great.

EAGLE
1500, 185.

PAO
Aldrin is reading the horizontal velocity first and then the verical velocity. It's now 1424 feet per

CDT 12:50 GET 124:18 TAPE 409/2

PAO
second vertical velocity, 187 vertical velocity.

CAPCOM
Eagle, Houston, you are GO at 3 minutes. Everything is looking good.

EAGLE
Roger.

EAGLE
We are coming up to a (garbled) state max now.

EAGLE
We're going right down U.S. 1.

CAPCOM
Roger.

PAO
Height now approaching 32,000 feet.

CAPCOM
Eagle, Houston, 4 minutes you're going right down the track, Everything's great.

PAO
Horizontal velocity approaching 2500 feet per second.

EAGLE
That's Sabine off to the right now.

CAPCOM
Roger.

PAO
Some 120 miles to go till insertion.

EAGLE
240 to go.

EAGLE
There's Ritter out there. (garbled) there it is right there. (garbled) Man, that's impressive. looking, isn't it?

CAPCOM
Eagle, Houston, you're looking good.
EAGLE
- 3, 9, 55.

PAO
All 3 data sources are agreeing quite closely here. The 3 color plot board in front of Mission Control here is almost superimposed as each of the 3 colors are scribed on this scribing plotter.

EAGLE
(garbled) off to the right.

CAPCOM
Eagle, Houston. You're still looking - -

END OF TAPE

CDT 13:00 GET 124:28 TAPE 410/1

CAPCOM
Eagle, Houston. You're still looking mighty fine.

EAGLE
Roger, good agreement in DELTA-V to go and both AGS and PNGCS.

CAPCOM
Roger.

PAO
One minute to go in the burn. 4482 feet per second, horizontal velocity.

EAGLE
About 800 to go. 700 to go. Okay, I'm opening up the main shutoffs. Ascent feed closed, pressure's holding good, crossfeed on, 350 to go. Stand by on the engine arm. 90, okay, off, 50, shutdown. We got 53,373, 32.8 feet per second, 60,666.

CAPCOM
Eagle, roger. We copy. It's great. Go.

EAGLE
And we got - got our residuals. Now take -

CAPCOM
Eagle, Houston. Trim residuals.

EAGLE
(garbled)

PAO
Showing a paraloon of 9.1 nautical miles, apaloon of 47.2 nautical miles on the PNGCS. All three systems are GO. Shutoff velocity showing about 5,537 feet per second plus or minus a foot or so on each of the three systems.

CAPCOM
Eagle, Houston. Trim looks good. That's good.

EAGLE
Eagle's monitor (garbled) 480 feet per second.

CAPCOM
Okay, that sounds a little - little on the high side.

EAGLE
(garbled) Okay. Okay, Houston. We show 47.3 by 9.5.

CAPCOM
Roger. 47.2 by 9.5.

EAGLE
AGS has 9.5, 46.6.

CAPCOM
Eagle, Houston. Copy. Eagle, Houston. Request the abort phase 3 test. You can stop to reset remote control to at hold when you get a chance to.

EAGLE
Roger.

PAO
Here in Mission Control the scribing plotter showing the velocity in height - here we go again.

CAPCOM
Let's proceed with P52 as per nominal.

EAGLE
Roger, Houston. Eagle is back in orbit and left Tranquility Base and leaving behind a - a replica from our Apollo 11 launch (garbled).

CAPCOM
Eagle, Houston. Roger, we copy. The whole world is proud of you.

EAGLE
We need a lot of help.

COLUMBIA
Eagle, Columbia. I got 470 now for (garbled) and I just broke lock. Could you hold silent

CDT 13:00 GET 124:28 TAPE 410/2

COLUMBIA
for a few seconds here while I reacquire. Columbia's reacquired you.

PAO
Here in Mission Control the scribing plotters have been replaced with the lunar orbit tracking chart showing the Eagle behind Spider some 20 degrees in longitude. Flight Operations Director, Chris Kraft, commented that he felt like some 500,000,000 people around the world are helping push Eagle off the moon and back into orbit. We're continuing to monitor transmissions between the ground and Eagle and Columbia. Apollo Control standing by.

CAPCOM
Columbia, Houston. Request P00 and accept, and we'll give you a good GO LM vector. Over.

CAPCOM
Eagle, Houston. You can go ahead and turn your update link switch off.

EAGLE
Roger, it's off.

CAPCOM
Roger.

END OF TAPE

CDT 13:10 GET 124:38 TAPE 411/1

PAO
This is Apollo Control. During the ascent phase, the heart rates on the Eagle crew reached 90 for Neil Armstrong, 120 for Buzz Aldrin. They're now back down in the 80's. For some 28 minutes 15 seconds from loss of signal with Columbia, 29'minutes 52 seconds away from loss of signal on Eagle.

EAGLE
Houston, the AGS has a DELTA H of 15.5.

CAPCOM
Eagle, Houston, roger. 15.5

EAGLE
And a maneuver of 51.3.

CAPCOM
Roger, we copy. And Eagle I have OMNI. Over.

EAGLE
Roger, last OMNI.

CAPCOM
Columbia, Houston.

EAGLE
(Garble) And I can see it reflecting out my window.

CAPCOM
Eagle, Houston. In a blind tri-low bit rate. Over.

EAGLE
Roger, low bit rate. I've got a 3.8 signal strength. Over.

CAPCOM
Eagle, Houston. Roger. We copy your signal strength 3.8.

CAPCOM
Eagle, Houston.

EAGLE
Roger, go ahead.

CAPCOM
Roger. We saw a very slight jump in cabin and suit pressure there. Could you verify cabin, repress valve is closed?

EAGLE
Okay, it's closed.

CAPCOM
Roger, and we've got about 1 minute to before where you ought to be radar tracking, and we've lost data with you.

EAGLE
Okay. (Garble)

CAPCOM
Okay, good pass. (Garble)

CAPCOM
Columbia, Houston. Say again.

EAGLE
Is that enough?

EAGLE
Beautiful. Okay let's talk 'em, I'll write them down. Minus 06 plus 64 plus 127. Torque (garble).

CAPCOM
Radar circuit breakers in?

EAGLE
Yes, we're pointed down pretty much. We're going to be up -

CAPCOM
Columbia, Houston. Did you call?

END OF TAPE

CDT 13:25 GET 124:53 TAPE 412/1

COLUMBIA
That's affirmative. I called you before about the VHF ranging. It's not working.

EAGLE
Houston, Eagle. Did you copy our star angle difference and torquing angles.

CAPCOM
Eagle, Houston. We didn't have them on the downlink but we copied them on the VOX.

EAGLE
Okay. It was zero for star angle difference, minus 06, plus 64, and plus 1.37. Over.

CAPCOM
Eagle, Houston. Roger. We have that.

EAGLE
That's it. Got a good lockon, Houston.

EAGLE
... take that.

EAGLE
How about that?

EAGLE
Your really think its apogee is 125 21, huh? 25 ... That circuit breaker is in.

EAGLE
Engine arm circuit breaker.

EAGLE
Okay. There's a mark. Buy that?

CAPCOM
Eagle, Houston. If you have time, pitch 162, yaw minus 16.

EAGLE
You load the REFSMMAT? Okay.

COLUMBIA
Eagle, Columbia. Your Y-dot is minus 1.0. Over.

EAGLE
Mike, you're ...

COLUMBIA
Eagle, do you read Columbia? Over.

COLUMBIA
Eagle, this is Columbia. Over.

COLUMBIA
Houston, Columbia. Over.

CAPCOM
Roger, Columbia. Loud and clear now. This is Houston.

COLUMBIA
Roger. Would you tell Eagle his Y-dot is minus 1.0. Over.

CAPCOM
Roger. Eagle, Columbia says your Y-dot is minus 1.0. Over.

EAGLE
Roger, Houston. We got that. Thank you.

CAPCOM
Roger. And you can go high bit rate now. Eagle can.

COLUMBIA
Eagle, Columbia. How do you read?

EAGLE
AGS agrees very closely, and pointing ...

COLUMBIA
Houston, Columbia is unable to read Eagle on either antenna or on VHF duplex Bravo. You got any suggestions?

CAPCOM
Roger. Columbia, we understand. You are unable to read Eagle. Stand by.

EAGLE
Houston, tell Columbia that we read him about strength 2.

EAGLE
Okay. Wide deadband on.

COLUMBIA
Houston, Columbia. Also my VHF ranging is not working now, and I'd like to know whether you'd like

CDT 13:25 GET 124:53 TAPE 412/2

COLUMBIA
me to continue making sextant marks or do nothing. I'm supposed to be doing VHF marks only, and it's for the next 6 or 7 minutes.

CAPCOM
Columbia, Houston, roger, we copy. And Eagle, looks like the best antenna would be forward for the LM. And break, Eagle, we'll omit you're loading of the TPI tig and P32, could you confirm you've done that.

CAPCOM
Columbia, Houston, recommend you take sextant marks, and do not reinitialize, over.

COLUMBIA
Roger, Houston, Columbia, got the VHF ranging back now, I'll stick with the nominal, thank you.

CAPCOM
Roger, mighty fine.

EAGLE
Columbia, reading you loud and clear now, Eagle.

CAPCOM
Columbia, Houston.

COLUMBIA
Go ahead, Houston.

CAPCOM
Roger, Mike, you can go ahead and get as many VHF and sextant marks as you can here in this period of time.

COLUMBIA
Roger, out. I've just got time for maybe 2 sextant marks, then get on with the final count.

CAPCOM
Eagle and Columbia, about 1 minute till LOS there on Columbia. It looks like we have about 51.5 for CSI and we tend to confirm you're Y dock. And break, for Eagle verify VHF Bravo transmitter is OFF.

EAGLE
Roger, VHF Bravo is OFF.

CAPCOM
Eagle, Houston. Recommend aft OMNI and are you go for CSI, so we can let Columbia know, over?

EAGLE
Roger, we're GO for CSI.

CAPCOM
Columbia, Houston, did you copy, Eagle is GO for TSI.

COLUMBIA
No, I did not copy. I'm afraid they're only intermittent but thank you.

CAPCOM
Roger.

PAO
This is Apollo Control. Columbia has gone behind the moon. Still a little over a minute left until Eagle goes behind the moon. We'll catch these last few minutes of tracking and any possible conversation.

CAPCOM
Eagle, Houston. We'll see you coming around the other side. Your AOS time -

END OF TAPE

CDT 13:40 GET 125:08 TAPE 413/1

CAPCOM
Eagle, Houston, we'll see you coming around the other side. Your AOS time is 1 minute ahead of the flight plan.

EAGLE
Okay, thank you.

PAO
This is Apollo Control. We have had loss of signal with Eagle. Quite scratchy as Eagle went over the hill to complete the 25th lunar revolution as it gets to the midpoint on the lunar far side. Ascent burn just completed went quite well on time at 124 hours 22 minutes 0 seconds ground elapsed time. Coming up on this rev, approximately 10 minutes from now as a matter of fact, will be the concentric sequence initiate maneuver, CSI, which will raise the Eagle's perilune to some 45 nautical miles. Eagle now is in an orbit measuring 9.4 nautical miles at insertion or perilune, and 46.7 at apolune, This CSI maneuver will be made approximately at apolune. Therefore, the effect takes place 180 degrees later and has the effect of raising perilune to the desired 45 nautical miles. This maneuver will take place at 125 hours 19 minutes 34.7 seconds. He will have a DELTA-V or velocity change of 51.5 feet per second. All of these maneuvers, incidentally, in the rendezvous sequence by Eagle will be made by using the reaction control system of Eagle. Following the CSI at 126 hours 18 minutes 0 seconds a 9.2 foot per second burn, probably mostly a radial burn, at 126 hours 18 minutes will twist the Eagle's orbit to equal distance from the orbit of Columbia, what they call a constant DELTA height, or CDH maneuver. At 126 hours 57 minutes 00 seconds, terminal phase initiation, TPI. In this maneuver the crew visually thrusts along the line of sight toward Columbia when the line of sight is some 27 degrees above the local horizontal. This maneuver will have a magnitude of about 24.9 feet per second, and, in turn, it raises the apolune to 60.5 nautical miles, which is approximately the altitude Columbia's orbiting. Terminal phase finalization. TPF 127 hours 39 minutes 39.2 seconds. This is the start time for a series of small burns which are a combination of midcourse correction and velocity match maneuvers to bring Eagle inwith Columbia and match the velocity so that they stationkeep for a short period for photography, etc., and move on in to docking at approximately 128 hours ground elapsed time. In all of these maneuvers Mike Collins aboard Columbia is spring loaded to do what is called a mirror image maneuver approximately a minute after the Eagle is scheduled to make its maneuver, and if for some reason Eagle can not make the maneuver, Collins would do the exact same maneuver only in reverse so that Columbia would in effect begin a CSM active rendezvous with Eagle. As Eagle went over the hill on the 25th revolution, a velocity was being measured at 5410 feet per second. Eagle's weight somewhat lighter than when it started out in excess of

CDT 13:40 GET 125:08 TAPE 413/2

PAO
32,000 pounds, it's now shrunk to some 5885 pounds. Some 39 minutes 20 seconds away from acquisition of Columbia. 41 minutes 45 seconds from acquisition of Eagle as the 2 vehicles come around on the 26th revolution. The crew will likely describe how the CSI burn went, which is some 5 minutes away from this point, and at 125 hours 14 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 14:24 GET 125:52 TAPE 414/1

PAO
This is Apollo Control. 125 hours, 52 minutes ground elapsed time. Less than 1 minute away from the acquisition of the spacecraft Columbia coming around on the near side of the moon on the twenty sixth revolution. Some 3 minutes, 11 seconds away from Eagle's appearance on on the lunar front side. Stand by here for word. We have acquired data and voice link. Spacecraft Communicator, Ron Evans, is standing by for AOS so that he can pass some information to the crew of the two spacecraft. We have AOS of the spacecraft, Columbia.

CAPCOM
Comm, AOS, data.

CAPCOM
Columbia, Houston. Have you talked to Eagle? Do you have comm with Eagle now?

COLUMBIA
Houston, Columbia. Over. Houston, (garbled) Columbia. Over. Houston, Columbia. Over.

CAPCOM
Columbia, Houston. You're very weak. Say again.

COLUMBIA
Roger. Houston. Columbia PSI nominal no plane change. Everything's going beautifully, and the LM seems to be (garbled).

CAPCOM
Roger. Columbia, Houston. You're about 1 by I couldn't make you out. I can't understand.

COLUMBIA
Houston, Columbia. How now? (garbled). Houston, Columbia. Over. Houston, Columbia. Over.

EAGLE
Houston, this is Eagle. Over.

CAPCOM
Hey, Eagle. Houston loud and clear. Columbia was very weak. We were unable to read him.

EAGLE
Roger. We saw you come up over the horizon and it looks like you had a laser operating. Could you confirm that?

CAPCOM
Eagle, Houston. Stand by. We'll check it. And Eagle, Houston. Can you give us a burn report?

EAGLE
Roger. Stand by. Okay, the CSI burn was on scheduled time of 125193470, 51.5 feet per second was our solution. After changing residuals a little bit, we ended up with a minus .2 plus .7 and minus .1. And in the AGS at that time we had plus .4 plus .9 plus .3.

CAPCOM
Eagle, Houston. We copy. Any plane change? Over.

EAGLE
No, there's no plane change on PSI, and CSM had 2.3 foot per second burn. We had a 2.9 and we elected to postpone that. Over.

CAPCOM
Roger. We copy, Eagle. Over.

COLUMBIA
Houston, are you reading Columbia now? Eagle, how about making a connection for me. Will you please?

CDT 14:24 GET 125:52 TAPE 414/2

EAGLE
Roger. Houston, do you have some high gain angles for Columbia? Over.

CAPCOM
Roger, Eagle. And Columbia stand by. We'll have them for you shortly. Eagle, Houston. Would you verify you switched lithium hydroxide canisters? Over.

EAGLE
That's affirmative. We started getting an erratic indication on the primary so we switched to secondary, and it was a again erratic and I thought it might have been a sensor, but it's settled down now, and we're on the secondary. Over.

CAPCOM
Roger. We copy. Mighty fine. Columbia and Eagle. Request omni Delta for Columbia.

COLUMBIA
Roger, Houston. (Garbled).

EAGLE
Houston. Columbia's been on DELTA, but he hasn't had much luck with you.

CAPCOM
Eagle, Houston. Roger, we copy.

COLUMBIA
Houston, you ready to copy our (garbled)? Okay, (garbled).

PAO
This is Apollo Control. Columbia is now in an orbit measuring 56.6 nautical miles by 62.5 nautical miles, and the display here in mission control shows that the range from Eagle to Columbia of a tad over 100 miles. And about 99 feet per second closure rate.

CAPCOM
We'd like to go ahead and try your lithium hyoroxide on the primary and let us take a look at it down here. Columbia, Houston. Over.

CAPCOM
Columbia, Houston. Over.

COLUMBIA
(garbled).

EAGLE
Houston, Eagle. Columbia's been reading you loud and clear on his omnis but he hasn't had any luck in transmitting to you.

CAPCOM
Roger, Eagle. Mighty fine. We don't hear Columbia though.

EAGLE
Okay.

END OF TAPE

CDT 14:40 GET 126:08 TAPE 415/1

EAGLE
We're burning ours, Mike. Tainus 1.8.

CAPCOM
Eagle, Houston. (static).

CAPCOM
Columbia, Houston. Over.

CAPCOM
Columbia, Houston. You can go ahead and go to reacq in the high gain. We could get you then.

COLUMBIA
Do you have some angles for us, Houston?

CAPCOM
Roger, PITCH minus 30, YAW 180, for Columbia.

EAGLE
Okay, and what was your CDH solution, Mike?

CAPCOM
Roger, copy. Thank you.

EAGLE
And Houston, Eagle. Got an ECS flight a CO2 flight, pressure's reading about one half millimeter.

CAPCOM
Eagle and Columbia, Houston, roger. We copy.

CAPCOM
Columbia, Houston. Go.

CAPCOM
Eagle, Houston. We're sure that's a sensor problem. You can leave it on primary.

EAGLE
Okay.

EAGLE
Roger, we pulled the circuit breaker.

CAPCOM
Roger, Eagle.

EAGLE
And our water separator apparently isn't working too well. We're getting a lot of water through the suit limb and we've changed water separators but it doesn't seem to have improved the situation any.

CAPCOM
Eagle, Houston. Roger, we copy.

COLUMBIA
Eagle, Columbia standing by to back you up on the burn. Just let me know how it's going.

EAGLE
Okay. You want to know what our 981 is?

COLUMBIA
Ready to copy.

EAGLE
Okay, I think you already got the burn time, minus 8.1, minus 1.8, minus 18.2.

COLUMBIA
Okay, that's pretty close agreement. For burn time, I still have 126 17 46.

EAGLE
Roger.

CAPCOM
Eagle, Houston. For warm fueling, we are agreeing with your CDH.

EAGLE
Congratulations.

EAGLE
Unfortunately, the chart doesn't agree with us, because the range rate is 36 minutes off the chart.

PAO
Apollo Control here. Less than a minute remaining until the constant DELTA height or CDH maneuver. We'll continue to monitor the air-ground. This small magnitude radial burn to put Eagle in a orbit that's concentric with -

END OF TAPE

CDT 14:50 GET 126:18 TAPE 416/1

PAO
- the Eagle in an orbit that's concentric with. Here we go. 30 seconds.

COLUMBIA
Yes, I'm ready. Go ahead.

COLUMBIA
Burn complete.

CAPCOM
Burn complete.

COLUMBIA
Thank you.

CAPCOM
Eagle, Houston, when you get a chance are your LCG hooked up, and if so what does the LCG accumulator show?

PAO
This is Apollo Control. Range now showing 91.3 nautical miles, range rate, rate of closeure 119 feet per second.

COLUMBIA
It sure is great to look down there and not see you.

EAGLE
we think so

CAPCOM
Eagle, Houston.

EAGLE
Go ahead.

CAPCOM
Roger. Did you copy on the LCG there and reading on the water accumulator?

EAGLE
Yes.

EAGLE
Roger, it is I'm just getting out a burn pad.

EAGLE
Houston, the water accumulator is right on the line between the red and the green. Over.

CAPCOM
Eagle, Houston. Roger, we copy.

CAPCOM
Eagle, Houston.

EAGLE
Houston , Eagle.

CAPCOM
Roger. On the water problem, we can't add any thing more to it except the fact that it looks like the water accumulators are up to up to speed down here.

EAGLE
Okay, it's not going to be too much trouble.

CAPCOM
Roger.

EAGLE
It's in one suit, too, for some reason.

CAPCOM
Columbia, Houston. Our COMM problem was accredited to the ground station here.

COLUMBIA
Good. Glad to hear it.

CAPCOM
Roger. You're mighty fine now.

PAO
This is Apollo Control. Range between Eagle and Columbia now showing 67.5 nautical miles. Range rate, closure rate, 121 feet per second.

EAGLE
Range rate at 30.

COLUMBIA
I have a TPI check when you guys want to compare them.

EAGLE
Stand by.

EAGLE
(garble) 198.

EAGLE
Go ahead, Mike. What have you got?

COLUMBIA
127023450.

EAGLE
You're about 32 seconds greater than we are.

CDT 14:50 GET 126:18 TAPE 416/2

COLUMBIA
Okay, fine.

PAO
This is Apollo Control, some 25 minutes now until the TPI, terminal phase initiation burn, just before loss of signal as both spacecraft go over the hill.

PAO
This is Apollo Control the black team of flight controllors here in Mission Control are more or less in an advisory capacity during this rendezvous sequence. They're actively computing maneuver times, but in the final analysis it's onboard computations by the crew of Columbia and Eagle which really bring about the rendezvous. Standing by.

END OF TAPE

CDT 15:09 GET:126:37 TAPE 417/1

PAO
which nearly bring about to rendezvous. Standing by at 126 hours 37 minutes ground elapse times. Some 24 minutes away from ignition on the thrust along the line of sight for Terminal Phase Initiate.

EAGLE
(garbled)

EAGLE
(garbled) you want to get another - get an update (garbled).

EAGLE
(garbled).

EAGLE
Okay, range.

EAGLE
(garbled).

EAGLE
It is.

EAGLE
The range is at 40.

COLUMBIA
Buzz, I would like to confirm that your TPI keg is 1270202, over.

EAGLE
We haven't settled on a final one yet. The last one was - standby -

COLUMBIA
(garbled).

COLUMBIA
Just as soon as you know what TPI 06 is going to be, I would appreciate a call.

EAGLE
Okay.

COLUMBIA
Last I got was - 32 seconds earlier than mine which would make it 1270202.

COLUMBIA
(garbled). Are you going to be revising that one?

EAGLE
I think probably so. How late - how late can you take a reading?

COLUMBIA
Well, to stay on my timeline, I should have it in the next couple of minutes.

END OF TAPE

CDT 15:20 GET 126:48 TAPE 418/1

EAGLE
Okay. Latest estimate 127 03 39.

COLUMBIA
Thank you kindly.

CAPCOM
Eagle, Houston.

EAGLE
Roge. Go ahead.

CAPCOM
Roger. In the event of a possibility that we may have had some water channeling in those hydroxide canisters, we recommend you stay in the cabin mode from now on. Over.

EAGLE
Roger.

CAPCOM
Eagle, Houston.

EAGLE
Go ahead.

CAPCOM
Roger. I better clarify that. Cut cabin mode a little bit there. What we mean is you go and stay in the cabin mode. Helmet and gloves on are your option and we really have no concern with the CO2. Over.

EAGLE
Roger. Understand.

EAGLE
Mike. You already loaded that time? We've got a final one here.

COLUMBIA
I've already loaded it. I don't think it'll make much difference.

EAGLE
Tell me - 9 seconds difference.

EAGLE
MARKS next.

CAPCOM
Columbia, Houston.

COLUMBIA
Columbia, go ahead.

CAPCOM
Roger Mike. You can go ahead and arm your logic anytime you want to and we'll give you a GO so you can hit your power alarm at your convenience.

COLUMBIA
That's a good idea babe. You see anybody watch logic.

CAPCOM
That's how it is. I'll get it from mark.

COLUMBIA
Mark Logic 1, Mark Logic 2.

CAPCOM
Columbia, Houston. One of the sec arm circuit breaker's CLOSED.

COLUMBIA
Okay. Going in touch on batteries FFE.

CAPCOM
Columbia, Houston. Logic looks good. You can arm your CYRO's at your convenience.

COLUMBIA
Thank you.

COLUMBIA
You can find your start to maneuver to CSI sir.

EAGLE
Okay.

PAO
This is Apollo Control about 6 and 1/2 minutes to ignition on the thermal phase maneuver in which the crew Eagle will thrust along the line of sight toward Columbia. Distance now between the two spacecraft

CDT 15:20 GET 126:48 TAPE 418/2

PAO
some 38.6 nautical miles closing at a rate of 110 feet per second.

CAPCOM
All your selections looks good to us. Out.

END OF TAPE

CDT 15:31 GET 126:59 TAPE 419/1

EAGLE
And Mike if you want our target Delta-v, I'll give it to you.

COLUMBIA
Ready to copy.

EAGLE
127 03 3082 +20 2.7 +1.7 -10.6, over.

COLUMBIA
127 03 3082 +20 2.7 +1.7 -10.6, thank you.

EAGLE
I'm showing a good bit of out of plane velocity on my cross pointers. Mike.

COLUMBIA
Rog, I have no indication of it.

COLUMBIA
Coming up on 1 minute to Tig, Neil. How's it looking?

EAGLE
Pretty good.

COLUMBIA
Good.

EAGLE
That out of plane was in the AGS, not in the radar.

COLUMBIA
Roger.

EAGLE
We're burning.

COLUMBIA
That a boy.

COLUMBIA
Burn complete.

EAGLE
Read, burn complete.

COLUMBIA
Roger, thank you.

CAPCOM
Eagle, Houston, AFT omni, low bit rate and we'll see you at 1 27 +51.

PAO
This is Apollo Control. We've apparently had loss of signal with Columbia and Eagle as they went behind the moon on the 26th revolution. Next maneuver scheduled for about 33 minutes from now. While both vehicles are behind this will be the breaking series of maneuvers coming down to docking, or station keeping first and then docking at about 128 hours ground elapsed time. And at 127 hours 6 minutes ground elapsed time in the flight of Apollo 11, this is Mission Control.

END OF TAPE

CDT 16:22 GET 127:50 TAPE 420/1 (REVISED)

PAO
This is Apollo Control. 127 hours 50 minutes ground elapsed time. We're less than a minute now away from acquisition of the spacecraft, Columbia. Hopefully, we find within a few feet of it, will be Eagle. Docking should take place about 10 minutes from now, according to the flight plan. However, this is a crew option matter. We're standing by for word that data is coming in from the two spacecraft. This is lunar revolution number 27 for Columbia. We have LM AOS

SC
Roger.

EAGLE
Okay Mike. I'll get - try to get in position here, then you got it. How does the roll attitude look? I'll stop. Matter of fact, I can stop right here is you like that.

CAPCOM
Eagle, Houston. Middle gimbal. And you might put out to Columbia, we don't have him yet.

EAGLE
They're tight.

EAGLE
I'm not going to do a thing, Mike. I'm just letting her hold in attitude hold.

COLUMBIA
Okay.

EAGLE
You (garbled)

COLUMBIA
Okay.

EAGLE
Okay, we're all yours. Roger.

COLUMBIA
Okay. Okay, I have thrusters D3 and D4 safeied.

EAGLE
Okay.

COLUMBIA
I'm pumping up cabin pressures,

COLUMBIA
That was a funny one. You know, I didn't feel it strike and then I thought things were pretty steady. I went to retract there, and that's when all hell broke loose. For you guys, did it appear to you to be that you were jerking around quite a bit during the retrack cycle?

EAGLE
Yeah. It seemed to happen at the time I put the contact thrust to it, and apparently it wasn't centered because somehow or other I accidentally got off in attitude and then the attitude hold system started firing.

COLUMBIA
Yeah, I was sure busy there for a couple of seconds. Are you hearing me alright, I

END OF TAPE

CDT 16:37 GET 128:05 TAPE 421/1

COLUMBIA
Are you hearing me all right? I've got a horrible squeal.

EAGLE
Yes, I agree with that, but we hear you okay.

COLUMBIA
Houston, Apollo 11. Over.

CAPCOM
Apollo 11, Houston. Go.

COLUMBIA
Roger. I'm supposed to adjust the oxygen flow in this thing at six tenths of a pound per hour, but being as how this transducer is not working right, could you give me an updated number?

CAPCOM
Affirmative. You want to go ahead and adjust your O2 flow until it just goes off the peg, and then crank the direct O2 valve back down about 5 degrees. Over.

COLUMBIA
Boy, you were really waiting for that one, weren't you? Okay, thank you.

COLUMBIA
Houston, I did that, and I believe we are flowing oxygen but the gage is sure not staying close to your low.

CAPCOM
Roger, that's fine. That's what we expect.

COLUMBIA
Okay.

COLUMBIA
Okay, I'm going to go ahead with the tunnel leak check.

CAPCOM
Columbia, Houston. I have a new LM weight for you whenever you're ready to copy.

COLUMBIA
Not right now, Ron. Remind me of it later, would you please?

CAPCOM
Roger. We'll stand by.

COLUMBIA
Houston, Apollo 11. I let P47 run longer than I should. I may have deteriorated our state vector by that.

CAPCOM
Roger, Apollo 11. That's okay. We'll see later.

PAO
This is Apollo Control. Communications are somewhat scratchy with Apollo 11. Columbia and Eagle now reunited to become Apollo 11 again. Our best estimate on the time of docking is some 3 minutes after the preimission time of 128 hours. Continuing to monitor this 27th lunar orbit for the two-way communications between the two spacecraft.

COLUMBIA
Go ahead with your DAP, please.

CAPCOM
Roger. Your LM weight, 5785. For R1 we'd like to have 61102. R2 01111. Use BD roll. Over.

COLUMBIA
Roger. I'm configured now at downlink for BD roll, and I have thrusters C4 and B3, turned off and I copy register 1, 61102 01111, and LM weight 5785. Thank you.

CAPCOM
Roger. Copy.

COLUMBIA
Houston, Columbia has completed the leak check, and proceeding with opening the hatch dump valve.

CDT 16:37 GET 128:05 TAPE 421/2

CAPCOM
Roger, Columbia. Understand you're doing the leak check. I missed anything after that.

COLUMBIA
The leak check is complete, and I'm proceeding with opening the hatch up now.

CAPCOM
Eagle - Columbia, Roger.

END OF TAPE

CDT 16:47 GET 128:15 TAPE 422/1

COLUMBIA
Eagle, Columbia.

EAGLE
Go ahead.

COLUMBIA
My hatch is removed. You can open yours and I'll start a shaft uplink.

EAGLE
Okay.

COLUMBIA
Standby one first.

EAGLE
Okay .

PAO
This is Apollo Control still rather noisy communications here on the 27th lunar revolution. 39 minutes remaining until Apollo 11 goes behind the Moon. We'll leave the circuit up and try to monitor the conversation between the two spacecraft or between the Apollo 11 and the ground for the remainder of this pass - try to ascertain the status onboard as far as transferring the crew and other items back into the command module. The cleanup in the LM getting all the items dusted off prior to bringing them back in the command module. At 128 hours 25 minutes Ground Elasped Time, standing by, this is Apollo Control.

EAGLE
How are you doing.

COLUMBIA
Yeah, everything is going fine. Be with you in just a second.

CAPCOM
Eagle, Houston, over.

EAGLE
Go ahead, Houston. Eagle here.

CAPCOM
Roger. Anytime prior to jettisoning there, we'd like an AGGS the things align 400 plus 30,000, over.

EAGLE
Okay. Any particular attitude you would like for us to get at?

EAGLE
We're not getting any. Could you give us some coordinate gimbal angles to move the temperature and then we will align the things with the AGGS, over.

CAPCOM
Roger, Eagle, we concur, standby on the gimbal angles and also Eagle while we got the command module directo two on there, there's a possibility that your cabin relieve - might relieve if we get up on around cabin pressure of about 5.4 or 5.5.

EAGLE
Roger.

CAPCOM
Eagle, Houston.

EAGLE
Roger, go ahead.

CAPCOM
Roger. All we are trying to do is get things and AGGS aligned together. Doesn't make any difference on the gimbal angle.

EAGLE
Hoping you know.

EAGLE
We are pretty close to 000. Is that all right?

CAPCOM
Eagle, that's beautiful.

EAGLE
You might want to take into account what will happen if we will have to maneuver to jetter censors.

CAPCOM
Eagle, Houston. We don't care what - all we are trying to do is to get a drip later. See how long it takes to drift the part on the thing after you jettison.

CDT 16:47 GET 128:15 TAPE 422/2

EAGLE
Okay, will we be jettisoning at about this attitude? That's okay. I'll align the AGGS with the things. You can tell me a little later if you need some help.

CAPCOM
Eagle, Houston. That's fine.

END OF TAPE

CDT 17:07 GET 128:35 TAPE 423/1

COLUMBIA
Houston, Columbia. You want me to realine my react angle yet?

CAPCOM
Columbia, Houston. I can give you some react angles for the high gain on the LM jettison attitude. And then you can go there whenever you want to. The angles are Pitch minus 50 and yaw O.

COLUMBIA
Okay.

COLUMBIA
Houston, Columbia. Say the jettison Roll, Pitch and Yaw, please.

CAPCOM
Columbia, Houston. Roll 0, Pitch 025 and Yaw 0. Over.

COLUMBIA
Roger. Understand Roll 0, Pitch 025 , Yaw 0.

CAPCOM
That's affirmative.

EAGLE
Houston, Eagle. Over.

CAPCOM
Eagle, Houston. Go.

COLUMBIA
Roger. That appears on the red arrows is going to be much of a competitor to the leading Midas leader brands. Over.

CAPCOM
There's a little noise there Buzz, say again.

CAPCOM
Eagle, Houston.

EAGLE
Roger. Go ahead.

CAPCOM
Roger. Just a reminder to be sure to zero the AGS errors before you enable the AGS attitude HOLD there after your get in BURN attitude.

EAGLE
Roger. You mean SEP attitude?

COLUMBIA
Houston, how do you read Columbia high gain now?

CAPCOM
Hey Columbia, Houston. Mighty fine. Loud and clear.

COLUMBIA
I read the same thing.

CAPCOM
And Eagle, Houston. Your steerable antenna angles for jettison attitude are. Over..

EAGLE
Roger. Go ahead.

CAPCOM
Roger. Pitch 165, Yaw 68. Over

EAGLE
Roger. Pitch 165, Yaw 68.

CAPCOM
Eagle, Houston. Correct.

CAPCOM
Columbia, Houston.

COLUMBIA
Columbia, go ahead.

CAPCOM
Roger Mike. You want to trig the O2 flow up, just a bit there?

COLUMBIA
Okay. Coming up.

COLUMBIA
Houston. Do you have any preferances as to what you want us to do with the probe. Over.

CAPCOM
Columbia, Houston. Stand by 1.

COLUMBIA
Okay. Eagle says they've got a place for it inside there, so no problem.

CDT 17:07 GET 128:35 TAPE 423/2

CAPCOM
Roger. That's all we were interested in.

END OF TAPE

CDT 17:18 GET 128:46 TAPE 424/1

CAPCOM
Eagle, Houston.

EAGLE
Eagle, go ahead.

CAPCOM
Roger, Neil it looks like your steerable's good. You can compute your cockmode to slough and, the high bit rate please, over.

EAGLE
Cockmode to slough and high bit rate.

COLUMBIA
Okay stand by just one please.

COLUMBIA
Okay shoot them on down.

CAPCOM
Eagle, Houston.

EAGLE
Go ahead, Houston.

CAPCOM
Roger, Neil, just a reminder again, the ACA out of detent to zero the AGS out of there just in case you go to attitude hold, shortly.

EAGLE
Okay.

COLUMBIA
You say you wanted the probe now.

CAPCOM
Eagle, Houston.

EAGLE
Houston, Eagle go ahead.

CAPCOM
Roger, that ACA out of detent didn't quite do it because the mode control switches were off. Request guidance control to PNGCS and then back to AGS, and that will zero the AGS there, over.

EAGLE
Say again please.

CAPCOM
Roger, request guidance control switch to PNGCS and then back to AGS, over.

EAGLE
Okay,'we still have both control switches off, over.

CAPCOM
That's okay, that's good.

EAGLE
And I thought I'd just take about 5 seconds here and see if I could get 000 gone, since we're fairly close to gimball ON right now.

CAPCOM
Eagle, Houston, that's fine.

END OF TAPE

CDT 17:28 GET 128:56 TAPE 425/1

PAO
This is Apollo Control. Some 6 minutes 40 seconds remaining until Apollo 11 goes behind the moon on the 27th revolution. The signal from the passive seismometer, which was left on the moon by the crew of Eagle, was lost for 30 minutes beginning about 5 minutes before Eagle took off this morning. The signal was lost because of a equipment problem that the Canary Island tracking station. The Seismic equipment is back on line now, and is beginning to record lunar day surface temperatures. The dust detector recorded zero dust after Eagle lift off. The laser ground station have not yet acquired a return signal from the Laser Ranging Retro Reflector. Five minutes away from loss of signal with Apollo 11. We will continue to monitor the air-to-ground as the spacecraft goes over the hill. The crew now is engaged in the decontamination procedures inside the lunar module prior to transferring back into the command
module.

CAPCOM
about 5 minutes to LOS. Your LM jet time will be 131 plus 52 and I have the rest of the maneuver pad if you want it now, or I can give it to you on the next time around.

COLUMBIA
Stand by 1.

COLUMBIA
Could you read around the next time around, please.

CAPCOM
Sure. That's fine. We'll give it to you then.

CAPCOM
Apollo 11, Houston. About a minute and a half to LOS. You're looking great. It's been a mighty fine day.

COLUMBIA
Boy, you're not kidding.

PAO
This is Apollo Control. We've had loss of signal as Apollo 11 went around the back side of the moon on the 27th rev. We'll have acquisition with Apollo 11 approximately 45 minutes from now. At - Let's see - Would you believe they don't have the next tables up for the next rev. At any rate, 45 minutes from now, and at 129 hours 4 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 17:45 GET 129:13 TAPE 426/1

PAO
This is Apollo Control at 129 hours, 13 minutes. Apollo 11 is now 36 minutes 40 seconds from coming around the other side of the moon for reacquisition on the 28th revolution. We're nearing the end of the 27th revolution at this time. On the backside of the moon, Armstrong and Aldrin should be involved in preparing for transferring back to the command module with Mike Collins, and they'll be cleaning up equipment and vacuuming off any particles of dust that remain before transferring to the command module. About 15 minutes after we reacquire we would expect Neil Armstrong to be ready for the transfer to the command module. Buzz Aldrin to follow along behind about 30 or 40 minutes later. Here in Mission Control we're presently completing the shift change. Flight Director, Gene Kranz is replacing Glenn Lunney, and the Capsule Communicator on this shift will be Astronaut Charlie Duke. The change of shift briefing is scheduled to occur in the news center at 6 p.m. Central Daylight Time. At 129 hours, 14 minutes, this is Apollo Control, Houston.

END OF TAPE

CDT 18:48 GET 130:16 TAPE 427/1

PAO
This is Apollo Control at 130 hours 16 minutes. We reacquired Apollo 11 about 25 minutes ago, at 129 51. At that time Mike Collins reported that all 3 crewmen were in the command module. The transfer occuring while the spacecraft were on the back side of the moon. They had closed out the LM early and had transferred to the second coolant loop. That decision was made in mission control because the secondary loop was on, the primary loop disabled in the close out process. We did not want to have the LM docked to the CSM for an undue length of time, because the primary guidance system is not cooled. The decision was initially made to jettison the LM at 130 hours 30 minutes, however the crew continued ahead of schedule. They were ready to jettison ahead of that time, and Collins reported at 130 10 about, 17 minutes ago, that they were, had jettisoned the LM and said it had departed at several feet per second, and we heard a comment from Buzz Aldrin, that he noticed some cracks in the thermo covering around the LM tunnel, docking area, however he said it did not appear to be a structural crack but merely some cracks in the thermal covering. We are currently scheduled to perform the small reaction control system maneuver with the command and service module for seperation from the LM at 130 hours 30 minutes, or about 12 minutes from now. We'll pick up this pass as it began on tape and when we've caught up, we'll continue to follow the activity live.

CAPCOM
Hello Eagle, Houston. Do you read, over.

COLUMBIA
Houston, this is Columbia, reading you loud and clear. We're all three back inside, the hatch is installed. We're running a pressure check leak check. Everything's going well.

CAPCOM
Roger, Eagle, correction, roger Columbia, we copy. You guys are speedy. You beat us to the punch. We had a couple of things for you.

COLUMBIA
What are they.

CAPCOM
Oh it was just, we wanted you to close the CO2 sensor breaker and give us an RCS on board read out out of Eagle, but that's all.

CAPCOM
Columbia, Houston. We've got a state vector for you. If you give us P00 and accept, over.

COLUMBIA
Buzz says the CO2 sensor circuit breaker is in.

CAPCOM
Rog, thank you very much.

COLUMBIA
The RCS quantity was approximately 68 at A and 45 percent at B.

CAPCOM
Roger.

COLUMBIA
And we're going P00 and accept.

CDT 18:48 GET 130:16 TAPE 427/2

CAPCOM
Roger, thank you.

CAPCOM
Columbia, Houston, your friendly white team's going to be on till we get you on the way home and we'd like to congratulate everybody on a successful rendezvous and a beautiful EVA. It was a great show for everybody, over.

COLUMBIA
Thank you Sir, I'll tell Neil and Buzz. Houston, the hatch pad was a negative check. I'm going to go to LM tunnel again now and leave it there.

CAPCOM
Roger, Columbia, we copy, that's good and we'd like a readout on the TEP of about the time you, that Eagle selected the secondary loop, over.

COLUMBIA
Stand by.

CAPCOM
Hello, Columbia, Houston, we got the load in. You can do the verb 66 and the computer is yours, over.

COLUMBIA
Roger.

COLUMBIA
Houston, Apollo 11, I'd say that the secondary loop was situated about 15 to 20 minutes ago.

CAPCOM
Roger, copy, Columbia, thank you very much.

CAPCOM
Columbia, Houston, it looks like you guys are so speedy on us that we're thinking about moving up jettison time to about a GET of 130 +30 if that's okay with you all, over.

COLUMBIA
That's fine. I've still got to get a P30 pad from you

CAPCOM
Rog, we want to talk to you about that. Mike, we can, for your druthers, we can do it either way. We can either let you do it in the jettison in P30, correction P47 or we can send you a P30 target load up and then you - let you call P41, which ever you want to do, over.

COLUMBIA
Yea, I see Ron was going to give me a P30 pad and the flight plan says P47. Out of the two, I prefer to go to P30, P41 route.

CAPCOM
Rog, beautiful. We've got the load if you'll give us P00 and ACCEPT, we'll send you a load up, stand by. Columbia, Houston, we'd like you to terminate direct O2 flow and stand by on your P00 and ACCEPT. We'll have to generate a new load due to the move up on time, over.

COLUMBIA
Roger.

CAPCOM
Columbia, Houston, over.

CAPCOM
Roger, Mike. It looks like if we move up this jettison time and give you a new load it would require a new attitude, and we can't do that due to the LM already closed out and it would fight us all the way around and we'd loose comm with it. We're thinking separating at

CDT 18:48 GET 130:16 TAPE 427/3

CAPCOM
P47 in about 10 minutes. We're looking at trajectory and we'll be with you momentarily, over.

COLUMBIA
Okay, it's no big thing with me either way.

CAPCOM
Rog.

CAPCOM
Hello Columbia, Houston. We'd like you to start down your jettison check list. We recommend picking up page F11-12 and we'd like to jettison in 10 minutes. That'll be 130 1445, over.

COLUMBIA
Okay.

CAPCOM
Columbia, Houston, if that's not satisfactory, let us know, over.

COLUMBIA
Houston, Columbia how about a go for logic buss arm.

CAPCOM
Stand by.

CAPCOM
Columbia, Houston you've got a go.

COLUMBIA
Thank you.

CAPCOM
Columbia, Houston. You can undock at your convenience, correction, jettison at your convenience. We would like you to jettison Eagle and station keep, in P47 and station keep and we'll have another attitude and a maneuver for you so we'll be okay for TEI, over.

COLUMBIA
Roger that. And I'm standing by to go to P47 just as soon as you give me a go for pyro arm.

CAPCOM
Rog, I thought we gave you that. Mike you're go for pyro arm and your go for jettison.

COLUMBIA
Okay. Okay let her go in 2 seconds.

CAPCOM
Copy, out.

COLUMBIA
983 reading-4ball -3ball3, or correction - both register 1 and register 2 are reading -4ball 3, register 3 is zeros, the EMS remained on 100.0. A fairly loud noise and it appears to be departing, oh I would guess several feet per second.

CAPCOM
Roger, can you kindof station keep with it, Mike? Just stand by now.
COLUMBIA
Will do.

CAPCOM
Columbia, Houston, don't try to chase it, just hold what you've got.

COLUMBIA
Charlie, did it hold cabin pressure this time.

END OF TAPE

CDT 18:58 GET 130:26 TAPE 428/1

CAPCOM
Columbia, Houston. Don't try to chase it, just hold what you got.

COLUMBIA
Dilate at all cap pressure this time.

CAPCOM
Say again, Buzz. over.

COLUMBIA
Okay, I thrust it back - I thrust it back toward it a little bit, Charlie, and I'm now reading Noun 83 plus 4 balls 4 minus 4 balls 8 and you want me to fuel average D. Right?

CAPCOM
Stand by. That's affirmative. You can exit P47.

COLUMBIA
There she goes. It was a good one.

CAPCOM
Roger, got you. We got Eagle looking good. It's holding cabin pressure and you picked up about 2 feet per second from that jettison.

COLUMBIA
I believe that. I can see some cracks on the outer - stroking around the tunnel. Except the tunnel's protective covering - I don't think it has anything to do with suction.

CAPCOM
Roger.

CAPCOM
Hello, Columbia, Houston. We'll have an attitude and a little tweak burn for you in about 13030 so we can separate from Eagle. Over.

COLUMBIA
That's fine.

CAPCOM
Columbia, Houston. Would you start a maneuver to a pitch of 230 for this little tweak burn? Over.

COLUMBIA
Roger. Pitch 230.

CAPCOM
Roger, Mike, and verify track mode in AUTO for the high gain.

COLUMBIA
We're in REACQ. Is that all right?

CAPCOM
Say again.

CAPCOM
We need AUTO.

COLUMBIA
Say again. We're in REACQ - AUTO REACQ.

CAPCOM
Roger. We need AUTO, please, sir.

COLUMBIA
There you got it.

COLUMBIA
Roll 0, pitch 320. Yaw 0?

CAPCOM
Right now that's what we're looking at. Stand by. We might have you roll so we can keep the high gain. Stand by.

COLUMBIA
Roger.

CAPCOM
Columbia, Houston. Over.

COLUMBIA
Go ahead.

CAPCOM
Roger, Mike -

COLUMBIA
Apollo 11, these days.

CAPCOM
Oh, Roger, Apollo 11. We got you going to a posigrade attitude and we want you this burn on B - even minus X thrusters at about 2 or 3 feet per second and we got a load for you and we'll set it up momentarily. Over.

SC
Okay.

CAPCOM
Apollo ll,,Houston. Would you give us to

CDT 18:58 GET 130:26 TAPE 428/2

CAPCOM
an ACCEPT? We have a load for you. Over.

SC
You got it.

CAPCOM
Roger, Mike. And our pitch attitude's a little long here. If you're ready to copy, I'll give you the SEP pad. Over.
SC
Go ahead. Ready to copy.

CAPCOM
Roger. Starting with Noun 33, 130300000 plus 00020 plus all zeros plus all zeros. Roll, all zeros, pitch 230, yaw zero. Noun 44 is NA. Delta-VP, 00020. Burn time, 007. Delta-VC, 00020. We have - the rest of the pad is NA.

SC
Roger. GET 130 hours 30 minutes. Delta-VX, 2.0, roll 0, pitch 230, yaw 0, Delta-VC, 2.0.

CAPCOM
That's affirmative, Apollo 11. And, Mike, it's similar to the SEP burn prior to that last undocking here. And the P41 you should see on register 1 - 2, and then you confirmed minus XC. Read 4. Over.

CAPCOM
Apollo 11, Houston. Computer's yours. Over.

SC
Roger, Charlie. We switched our OMNI-B DELTA, and I lost that last transmission. Would you say it again, please? The thing I'm wondering about specifically is that earlier you said it would be minus X-thrusters and the fan indicates plus X. Do you want me to no that to zero or do you want half two and leave it as a fourth?

CAPCOM
Roger, Apollo 11. The way we gave it to you in the attitude we're in. It'll be just like the SEP burn that you had yesterday. You'll PVL Noun 85 will give you a plus 2 and then you just burn minus X until you read 4. Over.

SC
Understand.

CAPCOM
Apollo 11, Houston. We see you in P41 now. It might take you a couple of minutes to integrate these vectors that we gave you and if you don't make TIG, it's pretty insistent if you can just let P41 bring you up to TIG, and when you get to zero, you can burn on that. Over.

SC
Okay. Burns complete residuals plus 3 balls 40 plus 4 balls 7 plus 4 balls 2, Delta-V counter 102.1. Over.

CAPCOM
Copy, Apollo 11. Looks good to us. Over.

SC
Okay.

SC
Houston, Apollo 11. How about coming up with a good communications attitude for us to go to between now and the time we've maneuvered at TEI attitude.

CAPCOM
Roger. Sir stand by

CAPCOM
Hello, Apollo 11, Houston. A couple of things for you. Over.

SC
Go ahead.

CAPCOM
Okay, Mike, you can maneuver to your preliminary TEI attitude as shown on page 398 of the flight plan, and the high gain angles are good as shown in the flight

CDT 18:58 GET 130:26 TAPE 428/3

CAPCOM
plan, and we'd like you to dump the waste water at 131:05 down to 10 percent. Over.

SC
Okay; understand. I'm going to go to roll, 1.1, pitch, 52.6, and yaw, 13.8, and you want a waste water dump 10 percent starting at 131:05.

CAPCOM
That's affirmative. Right out the LOS.

END OF TAPE

CDT 19:08 GET 130:36 TAPE 429/1

CAPCOM
That's affirmative. Right out to LOS.

COLUMBIA
We're now losing progress, Houston.

CAPCOM
Copy, 11. Out.

CAPCOM
Apollo 11, Houston. Over.

PAO
This is Apollo Control at 130 hours 46 minutes. That command module separation, maneuver, which occurred at 130 hours 30 minutes, was a 2 foot per second retrograde burn. Burn duration was 7 seconds. The Flight Dynamics Officer reports that at transearth injection, which is scheduled to occur as per the flight plan, at about 135 hours 25 minutes, and at that time, the CSM will be about 20 miles ahead of the LM and about I mile below.

COLUMBIA
Apollo 11 under high gain. How do you read?

CAPCOM
5 by, 11. How me? Over.

COLUMBIA
You're loud and clear, Charlie. What numbers are you looking at for TEI Tig preliminary. 135 hours 23 minutes. Something like that?

CAPCOM
That's affirmative, Mike. We're looking at about nominal time. We've considered kicking it up a rev, but we don't think this rev track is going to be any good since we had the RCS burn and we need some more tracking to get you a good TEI. Over.

COLUMBIA
That's what we're looking for.

CAPCOM
Roger.

CAPCOM
11, Houston. Looks like it's going to be pretty relaxed time here for the next couple of hours. We'll have you a pad, of course, the next rev or so and we'll keep you posted on TEI. Looks like nominal time. Over.

COLUMBIA
Thank you.

CAPCOM
And your little maneuver back here a moment ago, will put you about 20 miles ahead of the LM at TEI.

COLUMBIA
Okay.

COLUMBIA
Imagine that place has cleared out a little bit after that rendezvous. You can find a place to sit down almost. Huh?

CAPCOM
Rog. Our MOCR's about empty right now. We're taking it a little easy. How does it feel up there to have some company?

COLUMBIA
Damn good. I'll tell you.

CAPCOM
I'll bet. I think you'd almost be talking to yourself up there after 10 revs or so.

COLUMBIA
No, no. It's a happy home here. It'd be nice to have company. As a matter of fact, I'd be nice to have a couple of hundred million Americans up here.

CDT 19:08 GET 130:36 TAPE 429/2

CAPCOM
Roger. Well, they were with you in spirit.

COLUMBIA
Let them see what they're getting for their money.

CAPCOM
Rog. Well, they were with you in spirit anyway. At least that many. We heard on the news today, 11, that last night - yesterday when you made your landing, New York Times came out with a - headlines, the largest headlines they've ever used in the history of the newspaper.

COLUMBIA
Copied. I'm glad to hear it was fit to print.

CAPCOM
It was great.

CAPCOM
That's why we didn't read you up any newscast. There really wasn't anything to talk about.

COLUMBIA
Hi there Buzz.

END OF TAPE

CDT 19:23 GET 130:51 TAPE 430/1

CAPCOM
Apollo 11 Houston. We've got 10 minutes to LOS, see you over the hill at 131:48, over.

SC
Okay, Charlie, I'll dump the water as soon as we go around the moon.

CAPCOM
Everything's looking real good now.

SC
Yea, same here.

CAPCOM
Hello Apollo 11, Houston. Coming up about 4:30 LOS. You're looking great on all your systems. Eagle purring right along. After an hour 30 without any cooling, the PNGCS is still looking good, over.

SC
Roger.

CAPCOM
Apollo 11, Houston, will you verify that your rendezvous radar transponder is off, over.

SC
It's not but I'll get it off.

CAPCOM
Rog, we were seeing, believe it or not, we were seeing some funnies on the Eagles rendezvous radar and that was the only theory that we had. It looked like it was a good one.

SC
Good theory.

PAO
This is Apollo Control. We've had loss of signal now. At the present time we show Apollo 11 in an orbit with a high point of 62.6 nautical miles and a low point or pericenthian of 54.9. The spacecraft is traveling at a speed of 5 thousand 3 hundred 55 feet per second. We will reacquire the spacecraft in a little over 45 minutes on the 21st revolution. At 131 hours 3 minutes this is Apollo Control, Houston.

END OF TAPE

CDT 20:20 GET 131:48 TAPE 431/1

PAO
This is Apollo Control at 131 hours 48 minutes. We're standing by to reacquire Apollo - Apollo 11. Acquisition should come in about 5 seconds. This revolution should be relatively quiet. We don't have a great deal of activity scheduled. The crew may have time to get something to eat, and here on the ground we will be computing the information needed for their transearth injection burn. We do have data now from the spacecraft. We'll standby for a call to the crew.

CAPCOM
Hello, Apollo 11, Houston. We are standing by. Everything is looking great here, over.

SC
11. Roger.

PAO
This is Apollo Control. We suspect the crew is having something to eat at this time which probably accounts for the relatively quiet period. One of the things that we are watching with interest here in Mission Control is the lunar module. At the time Aldrin and Armstrong left the LM and came back into the service module, they switched over to the secondary cooling loop as part of a test that we are running to determine just how long the primary guidance and navigation system will last without cooling. The primary guidance system is not cooled on the secondary loop which provides backup cooling for the secondary guidance system and it has always been a point of interest as to just how long the primary guidance system will survive without cooling - estimates range up to several hours. The LM TEL COMM Controller reports that at this time we are seeing some rise in the PIPAS. These are the Pulse Integrating Pendulium - Pendulous Accelerometers which - the primary guidance system uses to detect changes in motion and attitude and of course they are an essential item in the - the primary guidance system. We are seeing a gradual rise in temperature but the TEL COMM engineer reports that the primary guidance system still looks very good. At the time the crew reported they were back that Armstrong and Aldrin reported that they were back in the command module, we asked them what time they did switch over to the secondary loop. Armstrong estimated that that occurred about 129 hours 40 minutes which was a little over 2 hours ago. We will continue to monitor the LM and to observe the performance of the pri-

mary guidance system. All systems on the command service module continue to function very well at this time and the same can be said for the lunar module. At the present time we show Apollo 11 in a orbit 62.5 nautical miles by 54.2. The spacecraft travelling at a speed of 5349 feet per second.

END OF TAPE

CDT 20:31 GET 131:59 TAPE 432/1

PAO
This is Apollo Control at 132 hours, 15 minutes. We have some preliminary figures on the transearth injection maneuver scheduled to occur about 3 hours, 8 minutes from now. The time of ignition is - stand by just a moment. The time of ignition would be 135 hours, 23 minutes 41 seconds.

CAPCOM
Here we can read up. Over.

SC
Your free as the heavens.

CAPCOM
Roger Neil. Starting off, congratulatory messages on the Apollo 11 mission have been pouring into the White House from world leaders in a steady stream all day. Among the latest are telegrams from Prime Minister Harold Wilson of Great Britian and the King of Belgium. The world's press has been dominated by news of Apollo 11. Some newsmen estimate that more than sixty percent of the news used across the country today concerned your mission. The New York Times which we mentioned before has had such a demand for its edition of the paper today, even though it ran 950 000 copies, that it will reprint the whole thing on Thursday as a souvenir. And Premier Alexei Kosygin has sent congratulations to you and President Nixon through former Vice President Humphrey who is visiting Russia. The cosmonauts has also issued a statement of congratulations. Humphrey quoted Kosygin as saying "I want you to tell the President and the American people that the Soviet Union desires to work with the United States in the cause of peace." And Mrs. Robert Goddard said today that her husband would have been so happy. "He wouldn't have shouted or anything. He would just have glowed." She added, "That was his dream, sending a rocket to the moon." People around the world had many reasons to be happy about the Apollo 11 mission. The Italian police reported that Sunday night was the most crime-free night of the year. And in London a boy who had the faith to bet $5 with a bookie that a man would reach the moon Before 1970 collected $24 000. That's pretty good odds. You're probably interested in the comments your wive's have made. Neil's Ann had said about yesterday's activities, "The evening was unbelievably perfect. It is an honor and a privilege to share with my husband, the crew, the Manned Spacecraft Center, the American public and all mankind, the magnificent experience of the beginning of lunar exploration." She was then asked if she considered the moon landing the greatest moment in her life. She said "No, that was the day we were married." And Mike,

CDT 20:31 GET 131:59 TAPE 432/2

CAPCOM
Pat said simply, "It was fantastically marvelous." Buzz' Joan said, "Apparently couldn't quite believe the EVA on the moon. She said, "It was hard to think it was real until the men actually moved, After the moon touchdown, I wept because I was so happy." But she added, "The best part of the mission will be the splashdown." In other news, and there was a little bit, another explorer Thor Heyerdahl had to give up his attempt to sail a papyrus boat across the Atlantic. The storm-damaged boat was abandoned about 650 miles from Bermuda. The speed of the craft had been reduced to about 25 miles a day and Heyerdahl said the object of the voyage had not been to provide an endurance test for the crew. Looking at the world of sports, let's see here. While you were busy the other day, Joe Namath and Football Commissioner Pete Rozelle made the announcement that Broadway Joe had agreed to sell his interest in the Bachelors III restaurant and report to the New York Jets. Joe arrived at the Jet's training camp today and had his first workout. Several other Jet players who had held out along with Joe also reported. And Davy Hill, from Jackson, Michigan, won his third major golf in as many starts in the past week. He won the Philadelphia Classic. Hill has won four tournaments so far this year and is the leading money winner this year with a cool $129 000. And in baseball, the west division of the National League remains a tight race. LA and San Francisco are one game behind league-leading Atlanta. The Astros have a record of 48 wins and 48 losses and are now in fifth place, seven games out. A twinbill between the Astros and Cincinnati last night was postponed because of rain. The Chicago Cubs are still in first place in the East Division. They lead the New York Mets by 4 and 1/2 games. And in the American League, Baltimore is breezing toward the Eastern Division title. They lead second place Boston by 11 games. Looking ahead, the All-Star baseball game is scheduled for tomorrow. And President Nixon was scheduled to see the game and then leave immediately after the game for the Pacific splashdown area, before going on his tour of Europe. And that about covers the news this day. You guys have been making most of it and I'm sure we couldn't fill you in on any of the details that you already know. Out.

SC
Thank you much, Charlie.

CAPCOM
Your welcome.

CAPCOM
11, Houston. We've got a preliminary PEI 30 pad if you're ready to copy?

CDT 20:31 GET 131:59 TAPE 432/3

SC
Ready to copy.

CAPCOM
Roger. Coming at you. TEI 30 SPS G&N 36691 minus 061 plus 067 135 23 41 49. NOUN 81 plus 32020 plus 06713 minus 02773 181 054 013. NOUN 44 HA is NA plus 00230 32833 228 DELTA-VC 32625 24 1510 355. Next 3 lines are NA. NOUN 61 plus 1103 minus minus

END OF TAPE

CDT 20:56 GET 132:24 TAPE 433/1

CAPCOM
plus 1103 minus minus 17237 11806 36275 1950452. You set stars - or Deneb and Vega, 242172012. We like 2 jet ullage to 16 seconds. The horizon will be on the 11 degree mark at TIGN minus 2 minutes. And the other comments, your sextant star is visible after GET of 134:50. Ready for your readback. Over.

SC
Roger. We have a TEI 30 SDS G&N 36691 minus 061 plus 067 135234149 plus 32020 plus 06713 minus 02773 181 054 013 NA plus 00230 plus 32833 228 32625 241510 355 NA 3 times plus 1103 minus 17237 11806 36275 1950452 Deneb and Vega 242172012 2 jet ullage 16 seconds. Horizon 11 degree line at TIGN minus 2 minutes. Sextant star visible after 134:50. Over.

CAPCOM
Roger, Mike. Good readback. Out.

PAO
This is Apollo Control at 132 hours, 29 minutes. That last string of numbers read up to the spacecraft included the information the crew will need to start them on their way back to Earth in about 2 hours, 54 minutes. The time of ignition for the transearth injection burn again is 135 hours, 23 minutes, 42 seconds. They will burn their 20,500 pound thrust service propulsion system engine for 2 minutes, 28 seconds and increasing their speed by 3283 feet per second. And our preliminary estimate is that that will put them into the Pacific Ocean at the primary landing site at 195 hours, 18 minutes, 47 seconds, ground elapsed time, or almost precisely on the flight plan. The spacecraft weight at the time they do the transearth injection burn will be 36,691 pounds. We'll continue to stand by for any communication from the spacecraft. We now have about 29 minutes, 30 seconds until the Apollo 11 goes around the corner and behind the moon out of radio contact.

END OF TAPE

CDT 21:11 GET 132:39 TAPE 434/1

CAPCOM
Hello Apollo 11, Houston. 7 minutes to LOS. Next A0S 133:46. You're looking good going over the hill. 0ut.

PAO
This is Apollo Control. We're now about 30 seconds from loss of signal with Apollo 11 on the 29th revolution. We'll be reacquiring in about 46 minutes. As the spacecraft comes around on its 30th revolution, that will be the next to the last full revolution in lunar orbit. The transearth injection maneuver will be performed at the end of the 30th revolution, just after - actually, just after beginning the 31st revolution of the moon. Apollo 11 is now in an orbit with a high point of 62.6 nautical miles and a low point of 54.2. The current spacecraft velocity is 5,356 feet per second, and we show an orbital weight of 36,691 pounds. We have loss of signal now. We'll be coming back up when we reacquire in about 45 minutes. At 133 hours, this is Apollo Control, Houston.

END OF TAPE

CDT 22:17 GET 133:45 TAPE 435/1

PAO
This is Apollo Control at 133 hours 45 minutes. We're now 50 seconds from reacquiring Apollo 11 on the 30th revolution of the moon. This will be our last front side pass before transearth injection. On this revolution we'll be passing up to the crew the final

computations for their transearth injection maneuver, which is scheduled to occurr at 135 hours 23 minutes 42 seconds, or about 1 hour 38 minutes from now. We should have acquisition of signal now in about 10 seconds. We'll stand by.

PAO
We have acquired the signal from the spacecraft now. We're standing by at this time for a call from the crew or for Capcom Charlie Duke to put in a call to the crew from the ground. We presently show the lunar module in an orbit 63.3 by 56 nautical miles, the command service module is in an orbit 63.2 by 53.9. At the time of the transearth injection burn we expect that the command module will be about 1 mile below the LM and about 20 miles in front of it.

CAPCOM
Hello Apollo 11, Houston. We're standing by.

SC
Roger.

CAPCOM
We'd like you, sometime at your convenience, to stir up the cryos on this pass and we're wondering if you got the fuel cell purge, over.

SC
Roger the O2 fuel cell purge.

CAPCOM
Say again, you're breaking up.

SC
Roger, the O2 fuel cell purge is complete.

CAPCOM
Rog, copy.

CAPCOM
Hello Apollo 11, Houston. We've got a load for you if you give us P00 and ACCEPT. The load consist of a CSM pre PEI state vector, it's going in the CSM slot and a post TEI state vector that'll go into the LM slot, if that's okay, and also a TEI target load, any comments, over.

SC
Very good, thank you very much.

CAPCOM
Yes sir.

SC
P00 and ACCEPT, you got it.

CAPCOM
Thank you.

CAPCOM
And 11 Houston, a reminder, you can scratch the verb 66 at 134 30.

SC
Understand.

CAPCOM
And 11, Houston for your information, Eagle, we had an ISS fail light came on at about 3 19 due to a CDU over heating and at about this time at AOS it looks like we're about to loose the platform.

SC
Roger.

END OF TAPE

CDT 22:27 GET 133:55 TAPE 436/1

PAO
This is Apollo Control. At this time the crew should be involved in their pre-ransearth injection status checks. They will also be aligning the platform on their spacecraft guidance system and will be passing up the final information for the transearth injection burn computed on the ground. A few minutes ago you heard Charlie Duke advise the crew that we show the LM platform is about to go. We've mentioned that prior to leaving the lunar module the crew had deactivated the primary cooling loop placing the secondary cooling loop in operation aboard the LM. This means that the primary guidance system does not get cooling. This is part of a preplanned test to find out just how long the primary guidance system would continue to function without cooling. We had predicted in advance that it would - may not - possibly not last much longer than a hour or so, but at the time Charlie Duke reported the platform had just gone down on the LM, it had been in operation without cooling a little more than four hours. We had an approximate time from the crew of transferring to the secondary cooling loop of about 129 hours 40 minutes and we got the report from Duke that the LM guidance platform was no longer usuable at 133 hours 55 minutes. We'll continue to standby for any further conversation from the crew. We're now one hour twenty minutes ten seconds away from transearth injection which will occur on the backside of the Moon at the beginning of the thirtyfirst revolution.

CAPCOM
Apollo 11, Houston. We got the load in. You can have your computer.

SC
11. Are you through with the computer?

CAPCOM
That's affirmative Buzz.

SC
All right. That's timing for you.

CAPCOM
Apollo 11, Houston. Your friendly white team has your coming home information if you are ready to copy, over.

SC
Standby.

SC
All right, ready to copy.

CAPCOM
Rog, 11. Got two pads for you. TEI 30 and then a TEI 31. TEI 30 SPS G & N 36 691 minus 061 plus 066 135 23 41 56 NOUN 81 32 correction plus 32 0 11 plus 06 818 minus 02 650 181 054 014. Apogee is NA. Perigee plus 00 230 32 86 correction 32 836. Burntime 2 28 32 628 24 151 1 35 7. Next three lines are NA. NOUN 61 plus 11 03 minus 17 237 11 806 36 275 195 04 52. Set stars are Deneb and Vega 242 172 012. We'd like ullage of two jets per 16 seconds and the horizon is on the 10 degree line at TIG minus 2 miminutes and your sextant star is visible after 134 plus 50. Standby on your readback. I have a TEI 31 if you are ready to copy, over.

SC
Roger, TEI 30 SPS G & N 36 691 minus 061 plus 066 135 23 41 56 plus 32 0 11 plus 06 818 minus 02 650 181 054 014. Apogee is NA plus 00 230 -

END OF TAPE

CDT 22:37 GET 134:05 TAPE 437/1

SC
Yaw 14, up 10 A, plus 00230 32836 228 32628 41511 357, NA plus 1103 minus 17237 11806, 86275, 1950452 Deneb and Vega 4217201, 3 jet ullage, seconds, horizon out of the window 10 degrees TIG minus 2 minutes. Sextant star at 134:50. Over.

CAPCOM
Roger, Buzz. Good readback. You're very weak. If you're ready to copy, I've got a TEI 31 for you. Over.

SC
Alright. Go ahead.

CAPCOM
Apollo 11, Houston. You were cut out. Say again.

SC
Roger. Stand by one.

CAPCOM
Roger.

SC
Alright. Go ahead. I'm ready to copy.

CAPCOM
Roger, 11. TEI 31, SPS G&N 36691 minus 061 plus 066 137 223985 plus 32838 plus 06845 minus 02487 NA pitch 052, the rest of the pad is NA. Ready for your readback. Over.

SC
Roger. TEI 31, SPS G&N 36691 minus 061 plus 066 137 223985 plus 32838 plus 06845 minus 02487 NA pitch 052, the rest is NA. Over.

CAPCOM
Roger. Good readback. And Buzz, did you say sextant star is visible after 134:50?

SC
No, I wrote down 134:10. I wasn't real sure about that one.

CAPCOM
Roger. It went by me there. Retro caught it. It's 134:50. Over.

SC
Okay. 134:50. Thank you.

CAPCOM
Yes, sir.

PAO
This is Apollo Control at 134 hours, 10 minutes. We have about 47 minutes, 30 seconds before losing contact with Apollo 11 as it goes behind the moon in preparation for the transearth injection burn. With the burn we would reacquire the spacecraft at 135 hours, 34 minutes, 11 seconds. Without the transearth injection burn on the upcoming revolution we would reacquire at 135 hours, 43 minutes, 50 seconds. The final figures on that burn as passed up to the crew a few minutes ago are as follows: ignition will occur at 135 hours, 23 minutes, 42 seconds. The burn duration will be 2 minutes, 28 seconds. That will add 3284 feet per second to the spacecraft velocity starting it on its path back to Earth. And we would consume about 10,000 pounds of propellant with that burn. Splash would occur according to our preliminary figures, just about precisely as predicted in the flight plan. We'll continue to monitor now for any further conversation from the spacecraft.

END OF TAPE

CDT 22:47 GET 134:15 TAPE 438/1

CAPCOM
Hello Apollo 11, Houston, after the burn we'd like you to trim X&Z, over.

SC
Okay, Charlie.

CAPCOM
Rog, and that's 2 tenths of a foot per second, as shown in the flight plan.

CAPCOM
Sounds like there's a story behind that one, too.

SC
We'll tell you when you get back.

CAPCOM
Hello Apollo 11, Houston will you verify that you've still got the cryos, over.

SC
Roger, we've still got them.

CAPCOM
Thank you sir.

END OF TAPE

CDT 22:57 GET 134:25 TAPE 439/1

PAO
This is Apollo control at 134 hours, 32 minutes. Flight director Gene Kranz just requested his flight controllers to view all of their data, take a good look at the spacecraft, and be prepared to make go, no go recommendations shortly for the transearth injection burn. That maneuver now 51 minutes, 27 seconds away. All systems on the spacecraft looking good at this point. The cabin temperature has been running about 72 degrees. At this time, the crew is aligning the platform on their guidance system. The stable platform used as a attitude reference for the upcoming burn. We've had very little conversation both here in the control center and from the spacecraft on this pass. We'll continue to stand by and monitor.

END OF TAPE

CDT 23:07 GET 134:35 TAPE 440/1

CAPCOM
Apollo 11, Houston. You are go for TEI. Over.

SC
Apollo 11, thank you.

END OF TAPE

CDT 23:17 GET 134:45 TAPE 441/1

PAO
This is Apollo Control at 134 hours 48 minutes. It continues very quiet out here in mission control. The flight controllers have been observing the crew inputs through their computer and monitoring as the crew prepares for the trans earth injection burn, scheduled to occur in about 35 minutes from now. We have now 9 minutes 20 seconds until loss of signal. The spacecraft currently traveling at a speed of 5,329 feet per second and the altitude is 62.5 nautical miles. At the time of the trans earth injection burn, the lunar module, Eagle, should be about 20 miles behind the command module.

CAPCOM
Hello Apollo 11. Houston. You've got about 8 minutes till LOS your AOS with the burn 135:34:05. No burn 135:44. Over.

COLLINS
Okay, thank you.

PAO
The crew has a go for the trans earth injection at the beginning of the 31 revolution. All systems on the spacecraft are looking very good at this point. You heard Capcom Charlie Duke advise Mike Collins that we will reacquire the spacecraft on the other side of the moon. Now with the burn the ground elapsed time of 135 hours 34 minutes and 5 seconds. Without the burn we reacquire at 135 hours 44 minutes 3 seconds. We now have 6 minutes 50 seconds until loss of signal. We will continue to monitor.

CAPCOM
Apollo 11. Houston. One minute to LOS. Go sic'em.

COLLINS
Thank you sir. We'll do it.

PAO
Thirty seconds now until loss of signal. We've had a last status check from the flight director and all around the room the word is go. We're now 26 minutes 23 seconds from the trans earth injection maneuver - 20 seconds until loss of signal.

PAO
And we have loss of signal now. We should next reacquire Apollo 11 at 135 hours 34 minutes 5 seconds. We are now 25 minutes 38 seconds from trans earth injection.

END OF TAPE

CDT 23:31 GET 134:59 TAPE 442/1

All dead air.

END OF TAPE

CDT 23:51 GET 135:19 TAPE 443/1

PAO
This is Apollo Control. We're now less than 30 seconds from the time in which trans-Earth injection is scheduled, the burn to start Apollo 11 on its trajectory back to Earth. We're now 15 seconds from the scheduled ignition time. That burn will last about 2 minutes 28 seconds and consume 10,000 pounds of propellant. The crew should be burning at this time. Of course, that maneuver is performed on the back side of the moon. We have no data from the spacecraft here in Mission Control at this time. We won't know how the burn went for about another ten minutes, which is the time of which we're scheduled to reacquire Apollo 11. During the course of this burn the spacecraft will increase its speed by about 3280 feet per second, or about 2240 miles per hour.

HOUSTON
Track Houston contact now on.

HONEYSUCKLE
Honeysuckle.

GUAM
Guam.

HOUSTON
Roger. Stand by for a (garble) check. Houston contact checking. 1 - 2 - 3 - 4 - 5 - 5 - 4 - 3 - 2 - 1. 1,2,3,4,5,5,4,3,2,1. Test out.

HONEYSUCKLE
Houston contact, Honeysuckle (garble).

HOUSTON
Go ahead.

HONEYSUCKLE
I'm going to put that on (garble).

HOUSTON
Roger.

GUAM
This is Guam contact. 100 per cent good modulation. How would you like the (garble) to figure.

HOUSTON
Honeysuckle and Guam, we will have a (garble) in the CSM downlink.

HONEYSUCKLE
Honeysuckle (garble).

GUAM
Guam roger.

HOUSTON
Honeysuckle and Guam, this is Houston contact. (Garble).

HONEYSUCKLE
Honeysuckle, roger.

GUAM
Guam, roger.

PAO
Trans-Earth injection should be completed in about 10 seconds from now. And we should have shut-down at this time. At this point Apollo 11 should be traveling at a speed of about 8660 feet per second, or about 5900 miles per hour. It should be on its way back to Earth, headed for Splashdown in the Pacific Ocean at 195 hours 18 minutes. With a successful burn we should reacquire Apollo 11 in 7 minutes 20 seconds from now.

END OF TAPE

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PAO
This is Apollo Control. We're now less than 1 minute from reacquiring Apollo 11. When last we heard from the spacecraft all systems were looking very good and we were in very good shape for the transearth injection maneuver. At this point Apollo 11 should be about 10,000 pounds lighter and on its way back to Earth. We're now 32 seconds from reacquiring. We'll stand by for communications with the spacecraft.

CAPCOM
AOS.

PAO
And there's the cue, we have acquisition of signal. And we have data right on schedule. Rog. Zero minus 0.7 minus 0.2.

CAPCOM
Hello Apollo 11, Houston. How did it go? Over.

SC
Time to open up the LRL doors, Charlie.

CAPCOM
Roger. We got you coming home. It's well stocked.

SC
Okay. Burn status, LP20. Burn time was 2 plus 30. Pads angles delt EPX after trim was .1, ZGY .9, BGZ .1. Delta VC minus 17.9 010.6 OCS 10.4. Unbalance minus 50.

CAPCOM
Roger. Copy, Neil. Sounds good to us. And Apollo 11, Houston. All your systems look real good to us. We'll keep you posted.

SC
Roger. Hey Charlie boy looking good here. That was a beautiful burn. They don't come any finer.

CAPCOM
Rog. Apollo 11, Houston. I wondered if you compared your state vector accuracy with the one in the LM flights. Over.

SC
Yes sir and it looked very nice. Verb 83 was plus 00070 and minus 00008.

CAPCOM
Rog. 11, Houston. I was looking at your bank Bravo nitrogen tank, it didn't leak a bit - correction - didn't leak a bit this time. Over.

SC
Roger, looked good here. Cabin pressure was hanging in there around 100 the latter part of the burn. It started oscillating a little bit and got down a little bit below 100.

CAPCOM
Roger.

SC
96 or so.

CAPCOM
Roger.

PAO
Most of the conversations so far has been from Neil Armstrong and Mike Collins. That last comment came from Collins. Our first report after acquisition was from Neil Armstrong. That transearth injection burn was very close to nominal. At this time we show the spacecraft traveling at a speed of 7,603 feet per second. The velocity already beginning to drop off and we're at an altitude of 445 nautical miles now from the moon. This is Apollo Control. We now show the spacecraft traveling at 7,378 feet per second. Altitude 568 nautical miles. The next order of business will

CDT 00:06 GET 135:34 TAPE 444/2

PAO
be to get the crew to sleep. Flight Director, Gene Kranz, requested his flight controllers, prior to acquisition of signal to review their procedures and to take as many steps as possible to get the crew to sleep as soon as possible. There will be a press conference in the building 1 auditorium. We estimate the time on that at about 12:300 Central Daylight Time. And our LM telecommunications engineer reports that we've just had acquisition of signal from Eagle which is still in lunar orbit. The last fix that we had on Eagle's orbit showed an apogee of 64. 1 and a para - apocynthion rather of 64. 1 and a paracynthion of 64.4 nautical miles. The spacecraft altitude is now climbed to almost 700 nautical miles from the moon. We show a weight of 26,510 pounds. About 10,000 pounds less than what we had actually about 1100 or 11,000 pounds - lets correct that - about 10,100 pounds less than what we had prior to the transearth injection burn.

END OF TAPE

CDT 00:18 GET 135:46 TAPE 445/1

CAPCOM
Apollo 11, Houston. Would you give us PU and accept. We've got a REFSMMAT for you. Over.

SC
Okay.

CAPCOM
Thank you.

CAPCOM
Hello Apollo 11, Houston. We've got the load in. You can go back to block. Over.

SC
We're there.

CAPCOM
Roger.

SC
Your command module sound seems to be working out pretty well, Charlie, the amount we carried. Looks like we carried just about what we needed.
CAPCOM
Wonderful.

SC
We have one 16 millimeter roll on the ASA 1000 color interior film. We were thinking of shooting that during entry window number 4 on bracket and try and get the camera guide sometime in the last couple of days. Give us all a good time for that.

CAPCOM
Roger.

PAO
This is Apollo control. The flight dynamics officer reports that the burn very nominal. Almost precisely as planned, the burn duration was about 3 seconds long, but the velocity change was almost precisely what we had been expecting. At the present time, Apollo 11 is 1076 nautical miles from the moon. The velocity continuing to drop off, down now to 6698 feet per second.

END OF TAPE

CDT 01:16 GET 136:44 TAPE 446/1

PAO
This is Apollo Control at 136 hours, 44 minutes. Apollo 11 is now 3,720 nautical miles from the moon and traveling at a speed of 5,367 feet per second. During the press conference we accumulated about 4 minutes of taped conversation with the crew. The crew reports at this time that they are completing taking pictures and they are getting ready to realign their guidance system platform. We'll pick up the tape conversation and then stand by for any following live communications with the crew. We anticipate that they will be shortly beginning their presleep checklist in preparation for a well deserved rest period.

CAPCOM
Hello Apollo 11, Houston. I wondered if during the TEl burn you utilized the oxidizer flow valve on the valve on the PUGS. Over.

SC
Yes we did. Based on your very excellent briefing I was expecting the thing to continue desiring increase for the whole time since we started out with it in increase. I saw that we pretty quickly crossed the line and started falling about 6 or 7 percent behind. We're still expecting it to move up and then I went down to full decrease and brought it back down to a difference of 2 percent. Over.

CAPCOM
Roger. Thank you very much, Buzz.

SC
2 tenths of a percent, I'm sorry.

CAPCOM
Roger. Thank you. Apollo 11, Houston. You can go to PTC attitude and torque at your - and do the P52 and torque at your convenience. Over.

SC
Hey, we got to take some more pictures, Chariie. Is their any constraint normally in staying here for awhile?

CAPCOM
No sir.

SC
Thank you.

CAPCOM
Go ahead 11. Over.

SC
How does that tracking look or is it too early to tell?

CAPCOM
Stand by, Mike. Apollo 11, Houston. FIDO's are looking at the data. It's too early to tell yet exactly. It's looking real good so far. We'll have you some answers shortly on trajectory. Over.

SC
Yeah. What FIDO is it?

CAPCOM
Jay Green.

SC
Howdy Jay.

CAPCOM
11, Houston. We have a DAP CSM update for you.

SC
Go ahead.

CAPCOM
Rog. That CSM weight, Mike, 26370. Over.

SC
Thank you sir.

CAPCOM
You're welcome. Apollo 11, Houston. We've taken your onboard vector and propogated it for you

CDT 01:16 GET 136:44 TAPE 446/2

CAPCOM
and it's looking real good. We only got about 24 minutes tracking now. Really too early to tell on the radar. Over.

SC
Roger, I understand.

CAPCOM
Hello Apollo 11, Houston. Mike, did you notice any transients at ignition on TEI? Over.

SC
Yeah. The transients are more noticeable than on previous burn, Charlie. I just wrote it off on the fact that we had a light command module but there was considerable roll activity which dampened down after the first 20 seconds I would guess after the burn but then there was also some pitch and yaw activity. I don't believe it was abnormal and seemed to be deadbanding fatherly crisply in roll plus or minus about 8 degrees inside the center line and after the first couple of - of after the first 20 seconds or so the gimbals were quiet and pitch and yaw were relatively quiet. Before that there was some oscillation but mostly just in rates-total attitude hung in there pretty well.

CAPCOM
Roger. Thank you very much. We were looking at the playback and we saw some things that rather stood up. We'll be back with you later on that.

SC
Okay.

CAPCOM
Apollo 11, Houston. Have you finished taking pictures? Over.

SC
We're just finishing up, Charlie.

CAPCOM
Rog.

SC
We'll get started on the P52 here pretty soon.

CAPCOM
Copy.

SC
Garble.

PAO
This is Apollo Control. That brings us up to date with the taped conversation. We'll stand by for any further live communication from the crew before they begin their sleep period. We've gotten some preliminary figures from the Flight Dynamics Officer on that transearth injection burn after a reveiw of the telemetry data and it shows that our change in velocity was nominal 3,283.5 feet per second. We also show a nominal burn time of 2 minutes, 28 seconds. The crew reported the burn time about 2 to 3 seconds long based on their onboard data. The ground data shows the burn to have been just about nominal. Based on the preliminary tracking it would appear that the splash down would occur almost precisely as predicted or planned in the flight plan. That would be at 195 hours and 18 minutes, 40 seconds ground elapse time. And we would expect that splash down time to change some what during the transearth coast particularly as the need or lack of need for midcourse correction becomes more apparent with additional tracking. At this time Apollo 11 is 4,086 nautical miles from the moon

CDT 01:16 GET 136:44 TAPE 446/3

PAO
traveling at almost precisely 1 mile per second, 5,283 feet per second and that's just updated 5,280 feet per second.

CAPCOM
Hello Apollo 11, Houston. You can crank up on the PTC at any time. Over.

SC
Thank you.

CAPCOM
Apollo 11, Houston.

SC
Go ahead, Houston.

CAPCOM
Rog, 11. This is the regional CAPCOM. Congradualtions on an outstanding job. You guys have really put on a great show up there. I think it's about time you power down and got a little rest though you've had a mighty long day here. Hope you're all going to get a good sleep on the way back. I look forward to seeing you when you get back here. Don't fraternize with any of those bugs in route except for the hornet.

SC
Okay. Thank you boss. We're looking forward to a little rest and a restful trip back and see you when we get there.

CAPCOM
Rog. You've earned it.
PAO
That exchange was between Donald K, Deke, Slayton, Director of Flight Crew Operations at the Manned Spacecraft Center and astronaut Neil Armstrong.

END OF TAPE

CDT 01:26 GET 136:54 TAPE 447/1

CAPCOM
Hello, Apollo 11, Houston. We'd like you to turn off O2 tank number 1 heaters. Over.

SC
It's off. Thank you.

CAPCOM
Roger.

CAPCOM
Hello, Apollo 11, Rouston. For your information, the LGC in Eagle just went sailing up about 7 hours. Over.

SC
Okay. It's very good, then (garble) a real winner there. Charlie, we're going to rotate about pitch 270 degrees on the way home vice 1 - or 090 on the way out. Right?

CAPCOM
Right there.

SC
Okay, We're reporting in a maneuver to that attitude is in progress.

CAPCOM
Roger.

SC
Houston, this status report ready to shut the CDR 11017, CMP 10019, LMP 09020. No medication.

CAPCOM
Say again, please, Neil. You were breaking up. We missed that. Over.

SC
Okay. This is crew status report radiation CDR. 11017, CMP 10019, LMP 09020. No medication.

CAPCOM
Roger. Thank you.

CAPCOM
And we didn't get any crew status report from you this morning. Wondered if you could give us an estimate of sleep last night. Over.

SC
(Garble.) Okay. I'll take a guess, Charlie, and try to give a conservative amount. CDR 3 and LMP 4.

CAPCOM
Roger. Thank you very much.

SC
And Com, you want the (garble), right?

CAPCOM
That's affirmative and we'd like you to disable on quad Charlie and Delta. Over.

CAPCOM
Apollo 11, Houston. If it's convenient, we'd like to go through your onboard readout. Over.

SC
Of what?

CAPCOM
Oh, excuse me. It's on the flight plan 3102. We'd like to have (garble) and RCS. Over.

SC
Stand by. Ready to copy, yet?

CAPCOM
Roger. Go ahead.

SC
That's Charlie 370, pyro mat A 370, mat B 370, RCS 55, 65, 64, and 62. Over.

CAPCOM
Roger. We copy all that. Thank you much.

END OF TAPE

CDT 01:36 GET 137:04 TAPE 448/1

All dead air.

END OF TAPE

CDT 01:46 GET 137:14 TAPE 449/1

CAPCOM
Apollo 11, Houston. A couple of questions for the moon walkers, if you got a second. Over.

ARMSTRONG
Go ahead.

CAPCOM
Roger, Neil. We're seeing some temperature rises on the passive seismic experiment that are a little higher than normal and were wondering if you could verify the deployed position. We understand it is about 40 feet from the LM in the 11 o'clock position. Over.

ARMSTRONG
no, it's about in the 9 or 9:30 position and I'd say it's about 50 or 60 feet.

CAPCOM
Roger. Copy. Also did you notice - was there any indication of any dust cloud as you lifted off? Over.

ARMSTRONG
Not very much. There was quite a bit of Kapton and parts of the LM went out in all directions and usually in the same distance as far as I can tell, but I don't remember seeing anything of a dust cloud.

CAPCOM
Roger. I understand all you could see were parts of the LM going out. What was your first comment on it?

ARMSTRONG
It was Kapton and other parts of the LM of staging scattering all around the area at great distances but I didn't see a dust cloud.

CAPCOM
Thank you very much.

COLLINS
Houston. Apollo 11. Did you keep me honest on the lithium hydroxide changes. When do you have the next one scheduled for?

CAPCOM
Standby.

CAPCOM
Apollo 11, Houston. Michael on that canister, we had you due to change one at 1:33 before TEI and it's on page 399. The next one we got is at 1:47. Over.

COLLINS
Okay.

END OF TAPE

CDT 01:56 GET 137:24 TAPE 450/1

CAPCOM
Hello, Apollo 11, Houston. We'd like to extend our damping period for another 5 minutes, let the rates get way down. Over.

SC
11. Roger.

PAO
This is Apollo control at 137 hours, 27 minutes. At this time, Apollo 11 is traveling at a speed of about 4982 feet per second. At about 5900 nautical miles from the moon, and about 198,900 nautical miles from earth. A short while ago, you heard Neil Armstrong make a few descriptive comments of the scene on the lunar surface at the time the planned ascent stage lifted off. Armstrong reported seeing very little dust, but quite a bit of debris from the LM. He referred to the Kapton, which is a plastic-like insulation material generally silver or gold in color which is found on the outside surface of the LM. And, we also had a report at 136 hours, 54 minutes, about 40 minutes or so ago that the LM guidance computer had finally stopped putting out any data, and that was about 7 hours, 13 minutes after the primary guidance system was deprived of the coolant, a test of how the system would continue to operate without coolant. The platform apparently begin to become unuseable after about 4 hours, and the computer itself finally gave up after about 7 hours, 13 minutes. Both items going considerably longer than had previously been predicted. The lunar module ascent stage still in lunar orbit. We are continuing to get data from it. All other systems appear to be functioning well at this time. The LM orbit we show as currently 64.4 nautical miles for height of apocynthion, 54.4 nautical miles for pericynthion. And, the LM is in its 23rd revolution, and here's a call to the crew.

CAPCOM
Over.

SC
Thank you, Charlie, and I think we'll bring you up to date on our chlorination status. In compartment B4, we have 1, 2, 3, 4, 5, 6, 7 - correction - we have 8 pockets for chlorine and buffer ampules of which - let me correct that. We have 7 pockets of which one is empty and always has been empty, leaving 6 remaining. And, the other side, over there in the BT, we have another container with 7 pockets, so we have a total of 7 plus 6 and those are filled with 6 chlorines and 7 buffers. Now, I've been using one chlorine and one buffer per day which, at this point and time, prior to this chlorination I'm about to do, leaves me one chlorine

and two buffers. Seems to me I'm one chlorine short, and that being the case, I'd like to (garbled) you right on postponing this chlorination using the last container until some later date like maybe tomorrow. Over.

CAPCOM
Roger. We copy, Mike. Standby.

CDT 01:56 GET 137:24 TAPE 450/2

SC
Okay.

END OF TAPE

CDT 02:06 GET 137:34 TAPE 451/1

CAPCOM
Hello Apollo 11, Houston. Check in A1 Mike and see what you can find in there. Over. We think you might have somemore chlorine up in A1. Over. Hello Apollo 11, Houston. Apollo 11, Houston. Do you read? You're breaking up. Over.

SC
Roger. We hear.

CAPCOM
Roger, 11. You're breaking up. Mike, please look in component A1. We think there might be somemore chlorine up there. Over.

SC
Eureka.

CAPCOM
11, Houston. Reading you about 1 by. Over. Apollo 11, Houston. We're having a down link problem. That's the reason we can't read you. We're switching sides. Stand by. Hello Apollo 11, Houston. How do you read now? Over.

SC
Fine.

CAPCOM
Rog. You're 5 by on that too, Mike. Thank you much. Did you copy that about A1 on that chlorine?

SC
Eureka.

CAPCOM
How about that sports fans.

END OF TAPE

CDT 02:16 GET 137:44 TAPE 452/1

CAPCOM
Apollo 11, Houston. We're having a little trouble getting the yaw rate damped out to the appropriate value. We'd like you all to be quite like mice for a couple of minutes and let's see if that will help it out. Over.

CAPCOM
11, Houston. You did great work there. We're ready to spin it up. Over.

CAPCOM
11, Houston. Did you copy? Over.

SC
Yes. We read you, Charlie? Would you stand by a minute?

CAPCOM
Roger. No hurry.

CAPCOM
11, Houston. Shift change time here. White team bids you good night. We'll see you tomorrow. Over.

SC
Okay, Charlie. Thank you.

SC
Right, Charlie. Thank you.

SC
Adios.

CAPCOM
Adios. Thanks again, for a great show, you guys.

SC
Thanks for a great show down there.

PAO
This is Apollo Control at 137 hours, 52 minutes. Apollo 11 crew has signed off for the night, starting a well deserved rest period. Duration of the rest period is programmed for 10 hours, however, the wake up time is not critical. It's very likely that we'll let them sleep until they wake up of their own accord. At this time Columbia is 7,045 nautical miles away from the moon, headed toward home at a velocity of 4,868 feet per second.

END OF TAPE

CDT 02:34 GET 138:02 TAPE 453/1

PAO
This is Apollo Control at 138 hours 02 minutes. CAPCOM Owen Garriott has just put in a call to the crew and is passing up some antenna information to them. Here's that conversation.

CAPCOM
Howdy there, Mike. We're ready to go ahead and have you put your OMNI position for your sleep period, and we would like the following high gain put positions: your high gain antenna in MANUAL, beam was WIDE, pitch is minus 50, and yaw is a plus 270, and just follow the flight plan for remaining comm configuration. Over.

SC
Roger and out. It's liable to be (garble) pretty hard.

CAPCOM
Your comm is pretty weak at this point, Mike. Please say again.

SC
Roger. (Garble).

PAO
This is Apollo Control. Ten minutes ago we logged what we expect to be our last contact with Eagle in lunar orbit. That coming at 137 hours 55 minutes Elapsed Time. At that time the battery power fell below the level where the secondary guidance system could hold the attitude of the vehicle within the sphere of antenna limits. We do not expect to establish contact with Eagle again. We'll continue to stand by here live. There may be a little more conversation before the crew turns in for the night.

CAPCOM
Apollo 11, Houston. We'd like for you to go ahead and put on S-Band antenna OMNI to OMNI and OMNI B. Over.

CAPCOM
Apollo 11, Houston. How do you read me through Honeysuckle now. Over.

SC
You're loud and clear. Over.

CAPCOM
Very good. Reading you better now, and did you copy we'd appreciate going S Band OMNI and OMNI B at this time. Over.

SC
Roger. (Garble).

CAPCOM
Okay, thank you.

SC
(Garble).

PAO
This is Apollo Control at 138 hours 11 minutes. We do not intend to contact the crew during this rest period again. We will take this lying down now and come back up if there is further conversation. This is Mission Control, Houston.

END OF TAPE

CDT 03:32 GET 139:00 TAPE 454/1

PAO
This is Apollo control at 139 hours. The crew of Apollo 11 is in the rest period. We have not contacted them within the last hour, and have not heard from them. All systems aboard the spacecraft performing well. Apollo 11 is now 10,149 nautical miles from the moon approaching the earth at a velocity of 4659 feet per second. Spacecraft weight is 26,510 pounds. This is mission control, Houston.

END OF TAPE

CDT 04:32 GET 140:00 TAPE 455/1

PAO
This is Apollo Control at 140 hours. Apollo 11 is now 12,835 nautical miles from the moon. Velocity 4552 feet per second. All systems still performing well. Dr. Kenneth Biers, the flight surgeon, reports his data indicates all three of the crewmen are asleep. This is Mission Control, Houston.

END OF TAPE

CDT 05:32 GET 141:00 TAPE 456/1

PAO
This is Apollo Control at 141 hours. Apollo 11 is 15,488 nautical miles from the moon. Velocity 4,480 feet per second. The crew is still asleep. All systems continuing to perform very well. This is Mission Control, Houston.

END OF TAPE

CDT 06:35 GET 142:03 TAPE 457/1

PAO
This is Apollo Control at 142 hours 03 minutes. Apollo 11 is 18,243 nautical miles from the moon. Velocity 4426 feet per second. Apollo 11 is in the passive thermal control mode, the performance of all systems nominal, and the crew is asleep. This is Mission Control, Houston.

END OF TAPE

CDT 07:32 GET 143:00 TAPE 458/1

PAO
This is Apollo Control at 143 hours. Apollo 11 is 20,704 nautical miles from the Moon, velocity 4390 feet per second. The crew is still is the rest period. The weather bureau's space flight meteorology group reported this morning that weather conditions in the primary landing area are expected to the acceptable, the sky partly cloudly, the winds easterly at 10 knots, and seas of 3 feet are predicted. Tropical storm Claudia is now located 2300 miles east of the landing area and will not affect the weather in the landing area Thursday. This is Mission Control Houston.

END OF TAPE

CDT 08:32 GET 144:00 TAPE 459/1

PAO

This is Apollo Control at 144 hours. Apollo 11 is 23,289 nautical miles from the moon approaching the earth at a velocity of 4,361 feet per second. All systems performing well, and the crew still in their rest period. It does not appear likely that we will perform midcourse correction number 5 scheduled for approximately 150 1/2 hours elapsed time. However, a firm decision on this mideourse will not be made for approximately 3 1/2 hours. This is Mission Control, Houston.

END OF TAPE

CDT 09:32 GET 145:00 TAPE 460/1

PAO

This is Apollo Control at 145 hours. Apollo 11 is 25,857 nautical miles from the moon. Heading toward home at 4338 feet per second. Apollo 11 will leave the moon's sphere of influence at an elapse time of 148 hours 7 minutes 23 seconds. This is Mission Control, Houston.

END OF TAPE

CDT 10:32 GET 146:00 TAPE 461/1

PAO

This is Apollo Control at 146 hours. We have heard nothing from the crew. We assume they are still asleep, and that sleep period began at about 137 hours, 47 minutes. At this time, Apollo 11 is 28,421 nautical miles from the Moon, and traveling at a speed of 4322 feet per second. The decision on midcourse correction number 5 is still tending toward not doing that midcourse, however the decision hasn't been made final, and there will be some additional tracking prior to firming up that decision. At this point it appears that the midcourse path number 5 opportunity would require about 4 to 5 feet per second. By waiting until the opportunity of midcourse correction 6, about 7 feet per second would be required. We do not plan to awaken the crew, at least immediately. Let them continue sleeping. All spacecraft systems continue to look very good to us from the ground. We've completed the change of shift here in mission control. Flight Director, Clifford Charlesworth, has relieved Milton Windler, and our capsule communicator is Astronaut Bruce McCandless. At 146 hours, 2 minutes, this is Apollo Control, Houston.

END OF TAPE

CDT 11:32 GET 147:00 TAPE 462/1

PAO

This is Apollo Control at 147 hours. The flight surgeon reported a short while ago that the crew appeared still to be sleeping, however, we have seen some signs of activity aboard the spacecraft. We suspect they may be awakening shortly. At the present time Apollo 11 is 30,980 nautical miles from the moon and the speed is 4308 feet per second. The flight plan for today is relatively quiet and we are continuing to await the crew's own awakening - we don't plan to awaken them from the ground at this time. At 147 hours, 1 minute, this is Mission Control, Houston.

END OF TAPE

CDT 12:02 GET 147:30 TAPE 463/1

PAO

This is Apollo Control at 147 hours 30 minutes. The flight surgeon reported a short while ago that the lunar module pilot, Buzz Aldrin, appears to be up at this time. Both Armstrong and Collins appear still to be sleeping. At the present time Apollo 11 is 32,253 nautical miles from the Moon and traveling at a speed of 4303 feet per second. Flight Director Clifford Charlesworth has elected to perform the midcourse correction maneuver scheduled at transearth injection plus 15 hours. That would be at about 150 hours 25 minutes ground elapsed time. The exact time of that midcourse correction is not critical and it could move around somewhat. We expect that it would be a velocity change of about 5 feet per second. We expect there will be some conversation with the crew before too much longer. We'll come back up when we hear from the spacecraft. This is Apollo Control at 147 hours 32 minutes.

END OF TAPE

CDT 12:11 GET 147:39 TAPE 464/1

PAO

This is Apollo Control at 147 hours, 39 minutes. The flight surgeon reports that all 3 crew are now awake. We expect to be hearing a Good Morning from the spacecraft before too much longer so we'll stand by for that. We said Good Night to the crew last night at about 137 hours, and 47 minutes so they have apparently had a good 10-hour rest period and we'll probably be getting a crew status report indicating just how much sleep each of the crewmen got. We'll stand by for any conversation with the spacecraft.

SC
Good afternoon, Houston. Apollo 11. Over.

CAPCOM
Good morning, 11, this is Houston. Over.

SC
Okay. New status report, 88 and 8.5.

CAPCOM
Roger. 88 and 8.5. When you are ready we've got a small flight plan update for you.

SC
Houston, we are ready to copy.

CAPCOM
Roger. At about 148 hours, if you have not already done so, a CO2 filter change and the H2 purge line heater-on 20 minutes before the O2 and H2 purge. At 148 hours we'd like you to initiate a charge on Battery Alpha instead of at 151 hours and leave the charge on until we notify you further. At 150 hours GET waste water dump to 10 percent. We do plan to burn the midcourse correction 5. It will be an RCS burn about 5 feet per second at about the nominal time and place. Over.

SC
Roger. Understand. We will be accomplishing the filter change shortly, the purge line heater-on, O2 and H2 purge shortly, and at 148 will initiate a charge on Battery A until you advise further. At 150 hours waste water dump to 10 percent. We are looking forward to midcourse correction 5 at about 5 feet per second nominal time. Over.

CAPCOM
Roger. I've got your consumables updated. Are you ready to copy?

SC
Copy.

CAPCOM
Okay. At GET 147.00 RCS total - minus 2.0 percent which is about minus 14 pounds, Alpha, minus 12.0, Bravo plus 10.0 minus 3.0 minus 1.0. Hydrogen total minus 1.5 pounds, O2 total plus 20 pounds. Over.

END OF TAPE

CDT 12:23 GET 147:51 TAPE 465/1

SC
Roger. I'll give you our onboard readouts. Alpha, 52 percent; bravo, 54 percent; coco, 54 percent; delta, 61 percent.

CAPCOM
Roger, 11. Would you read that quad alpha again, please. Buzz, you're cutting out. It may be Neil operating on VOX. Over.

SPACECRAFT
Negative. Alpha is 53 percent. Over.

CAPCOM
Roger, we copy. 11, from down here. On telemetry, all your systems look to be in good shape.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead.

CAPCOM
Roger, would you have Buzz to check his biomedical PM sensors for a loose or dryed out sensor. We're getting an erratic electrocartiogram reading. That would be one of the three sternal leads. Over.

SC
Okay.

SC
(garbled)

END OF TAPE

CDT 12:35 GET 148:03 TAPE 466/1

CAPCOM
Apollo 11, this is Houston. Say again your last, please.

SC
Disregard.

CAPCOM
Roger, out.

PAO
This is Apollo Control at 148 hours 7 minutes. In about 24 seconds from now, the spacecraft will pass the imaginary line into the Earth's sphere of influence.

CAPCOM
Stand by for a mark leaving the lunar's sphere of influence. Mark you leaving the lunar's sphere of influence, over.

SC
Roger. Is Bill Shaffer down there.

CAPCOM
Negative. We've got a highly qualified team on instead.

SC
Roger. I wanted to hear him explain it again at the Press Conference.

CAPCOM
Okay.

SC
That's old Apollo 8, but tell him the Spacecraft gave a little jump as it went through the sphere.

CAPCOM
Okay, I'll pass it on to him. Thanks a lot, Dave Reed is here burying his head in his arms right now.

SC
Roger, out.

SC
Those guys down there in the press room did a pretty good job this month.

CAPCOM
Yes, they have.

SC
Are we - have to give up yet?

CAPCOM
No, you'll hang in there for about another 47 hours or so.

SC
That's good.

END OF TAPE

CDT 12:45 GET 148:13 TAPE 467/1

PAO
This is Apollo Control at 148 hours, 21 minutes. At the time the spacecraft crossed from the moon's sphere of influence to the Earth's sphere of influence, that point at which the Earth is computed as having the dominant influence on the spacecraft trajectory, Apollo 11 was about 33,800 nautical miles from the moon, and about 174,000 nautical miles from Earth. At the present time, the spacecraft is traveling at a speed of 3994 feet per second with respect to the Earth. After awakening this morning, Neil Armstrong reported all 3 crewmen getting at least 8 hours of sleep. The commander received about - got about 8 hours, the command module pilot, Mike Collins, about 8 hours, and Armstrong reported that lunar module pilot, Buzz Aldrin, got about 8 and a half hours of sleep.

CAPCOM
Apollo 11, this is Houston. If your not busy now, I can read you up the morning news.

SC
Okay, we're all listening.

CAPCOM
Say again -

END OF TAPE

CDT 12:55 GET 148:23 TAPE 468/1

CAPCOM
Say again, 11.

SC
Roger, we're all listening. Go ahead.

CAPCOM
Roger. From the hot wires of the Public Affairs Office: Apollo 11 still dominates the news around the world. Only 4 nations, Communist China, North Korea, North Viet Nam, and Albania, have not yet informed their citizens of your flight and landing on the moon. One newsman said that he has run out of ways to describe your success. Tonight President Nixon is scheduled to watch the All-Star basball game in Washington. After the game he will depart for the Pacific recovery area. Wednesday evening he will fly from Johnston Island by helicopter to the Navy Communications ship Arlington. Then on Thursday morning he will reboard the helicopter and fly to the Hornet in time to witness your splashdown. Accompanying the President will be Secretary of State William Rogers and Frank Borman. They will watch the splashdown from the bridge of the recovery ship with Admiral John Sidney McCain, Jr., Commander of the Pacific Forces. Following the President's stay aboard the Hornet he will depart for his tour of Asia and scheduled visit to Romania. Luna 15 is believed to have crashed into the Sea of Crises yesterday after orbiting the Moon 52 times. The Soviet News Agency Tass reported that "scientific research in near-moon space was carried out." Sir Bernard Lovell at Jodrell Bank Observatory said that Luna 15 hit the surface of the Moon at a speed of about 300 miles per hour. Things have been relatively quiet recently in Viet Nam. G.I.'s on patrol were observed carrying transistor radios tuned into your flight. The Armed Forces Network radio and TV network in Vietnam gave the mission full coverage. Skirmishes still continue between the Egyptians and Isreali's along the Suez Canal. U.N. observers there are trying to halt the action. In Washington, the House Ways and Means Committee has voted to reduce the 27.5 percent oil depletion allowance to 20 percent. We've had rain several times here in the Houston area. Today it is cloudy and more showers are expected. On the sports front, as we mentioned earlier, the All-Star game is tonight. There were no games played yesterday. Last night, in New York, the Baseball Writers Association of America named Babe Ruth the greatest ball player of all time. Joe DiMaggio was named the greatest living ball player. Frank Borman made the announcements at a dinner honoring the players. Joe Namath put in a full day at the New York Jets training camp. Five policemen had a hard time restraining about 500 kids who wanted to touch Broadway Joe. He said he feels fine and says he will play in the All-Star game August 1, if Coach Weeb Eubank lets him. The Oilers camp at Kerrville got wet yesterday, but the workouts continued. There have been some minor injuries, but nothing too serious. Coach Wally Lemm is satisfied so far with the workouts.

CDT 12:55 GET 148:23 TAPE 468/2

CAPCOM
The Oilers are expecting attendance of over 30,000 for the preseason game with Buffalo. Apparently Don Meredith's announced retirement isn't expected to dampen enthusiasm, especially around here in Houston. Mario Andretti won the 200 mile Trenton Auto Race Sunday and is now the leading race driver in the U.S Auto Club's point standings. And that's about the summary of the morning news this afternoon in Houston. Over.

SC
Marvelous. Look up the Dow Jones Industrials for us.

CAPCOM
Roger, stand by a minute, please.

CAPCOM
Apollo 11, this is Houston. We see you in P00. When you can give us ACCEPT we have a state vector and target load uplink ready for you.

SC
Roger, Houston. I'm going to go ahead and start the computer.

CAPCOM
Roger, thank you.

END OF TAPE

CDT 13:10 GET 148:38 TAPE 469/1

CAPCOM
Apollo 11, we have completed the uplink. The computers is yours.

SC
Thank you.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead.

CAPCOM
Roger. With respect to the Dow Jones Industrials since closing on Tuesday afternoon the 15th, up to about 1:05 P.M. Houston time this afternoon, the effective net drop, that is minus 6 points on the industrial average. So far today since opening the Dow Jones Industrial Average has gone down by 11.05 points after rising 1 and one-half shortly after opening. Today's performance on the utilities is a drop of 1.63 and railroads a drop of 1.58. Over.

SC
Every flight has to have some disadvantage, I guess.

CAPCOM
Roger. There is some speculation that you all are responsible for that 1 and one-half point rise right after opening.

SC
Well, I don't believe they'll put that drop on us anyway.

CAPCOM
Roger.

CAPCOM
Apollo 11, this is Houston. If you have a minute or so free, I wonder if we could get Mike to give us a little bit of clarification on what happened around about the time of docking. We copied him as mentioning contact was very smooth, almost imperceptable and we're a little bit inquisitive or curious about his remarks as to what happened after probe retraction. Over.

SC
Roger. I docked in CMC auto and as I said I wasn't really sure at the moment of contact and I kept checking the docking probe indicators. I got two barber's poles indicating that the three capture latches, er, not capture latches, but the three gizmotches had made and we were soft docked; and at that time the situation looked very stable so I went to CMC's free, glanced back out the window and it still looked stable and I fired primary 2 bottle. And at that time a gyration began between the two vehicles due - I am not sure to what, perhaps the LM dropping or perhaps it was building up prior and I had not noticed it. But anyway, during the retract of the probe, there were yaw-my-yaw excursions of, I would guess, around 15 degrees and I had to come back on take the free switch and throw it back to auto and try to damp them out and I guess Neil was doing the same in the LM. I will let him tell you about his side of it. And I thought that we were

CDT 13:10 GET 148:38 TAPE 469/2

SC
not going to get a successful retraction and hard dock, However, in about I guess 6 or 8 seconds, I could see the situation damping out and we heard the noise indicating the docking latches had fired and later on when I got into the tunnel, all 12 of them had properly engaged.

CAPCOM
Roger.

SC
And on the LM side, we were in AGS MIN deadband holds and at contact I thrusted plus X and shortly after that we had sizeable attitude oscillation and thruster bearing so we opened up the deadband to max and manually flew the vehicle into stable attitude during the retraction. It went off after (garble) retraction.

CAPCOM
Roger. Thank you very much. Out.

END OF TAPE

CDT 13:21 GET 148:49 TAPE 470/1

CAPCOM
Apollo 11, this is Houston. I have your midcourse correction 5 pad available when you're ready to copy.

SC
Stand by.

SC
Houston, Apollo 11, ready to copy.

CAPCOM
11, this is Houston. Midcourse correction number 5. RCS G&N 26025, pitch and yaw trim NA, tig 150 29 54 53 minus 000 48 plus all balls plus 00001 075 159 328 HA is NA, HP plus 00 230 00048 011 00048, sextant an star 03 09 08 382. For site star nblock not available. Latitude plus 11 02 minus 172 04 11 803 36 275 195 03 33 GDC align Deneb and Vega. 007 144 068, no ullage, of course, 4 quad thrusting, over, read back.

SC
Roger, midcourse number 5, RCS G&N 26025, pitch and yaw NA, 150 29 54 53 minus 000 48 plus all zeros plus 00001 075 159 328 NA plus 00 230 00048 011 00048 03 09 08 382 NA three times, plus 11 02 minus 172 04 11 803 36 275 195 03 33 Deneb and Vega 007 144 068 4 quad for the burn, over.

CAPCOM
Apollo 11, this is Houston, read back correct, out.

PAO
This is Apollo Control at 148 hours 58 minutes. The series of numbers passed up to the crew a few minutes ago was for the midcourse correction number 5. That is scheduled to occur 150 hours 29 minutes 54 seconds. It will be a Reaction Control System burn using the spacecraft reaction control system thrusters. With a velocity change of 4.8 feet per second, and that will be retrograde. Primary purpose of the maneuver will be to adjust the entry conditions which is - would primarily be for corridor control, controlling the flight path angle at entry. And the current predicted splash time in the Pacific is 195 hours 17 minutes 25 seconds. At the present time Apollo 11 is 172,654 nautical miles from the Earth, traveling at a speed of 4017 feet per second. We estimate that the spacecraft will be half way home at a ground elapse time of 159 hours 53 minutes 43 seconds. At that point the spacecraft will 145,583 nautical miles from the Earth's surface, and we will have completed half of the return trip measured from lunar orbit insertion to splashdown. Now we also have another figure that - before the time of which the spacecraft velocity is equal with respect to both the Earth and the moon. At that point the velocity will be 4300 feet per second with respect to both bodies. And we would define this as the equal potential point. That will occur at 155 hours 30 minutes. And at that time the spacecraft will 156,874 nautical miles from the Earth, 52,543 nautical miles from the moon. We're now 1 hour 28 minutes 26 seconds from ignition for the midcourse correction 5 maneuver.

CAPCOM
Apollo 11, this is Houston, over.

SC
Roger, go ahead Houston.

CDT 13:21 GET 148:49 TAPE 470/2

CAPCOM
Roger, if Neil has a free minute, we've got a question or two regarding the CO2 partial pressure and water in the suit loop discrepancy noted yesterday, over.

SC
Go ahead.

CAPCOM
Roger, 11. Was water noted in both suits or only in yours, Neil?

SC
I think only in my suit.

CAPCOM
Okay, can you locate that occurrence for us in time when you first noticed water in the suit either by mission time or relation to any particular event.

END OF TAPE

CDT 13:36 GET 149:04 TAPE 471/1

SC
I think it was after insertion sometime, Bruce. I don't remember exactly when. It was when we were in orbit and had - after we took our helmets off.

CAPCOM
Roger, did you call it to us when you first noticed it, or was it sometime after when you called us?

SC
It just might have been probably 20 minutes after I noticed it that I mentioned it to you.

CAPCOM
Roger. Was this noticing the water accompanied by your erratic CO2 partial pressure readings, or was that a separate problem? Over.

SC
Well, the water problem evidenced itself before we noted any erratic motion the PCO2 gage.

CAPCOM
Roger. What was the relative sequence on selecting water separator number 2 and the secondary CO2 canister - that is, did you go to the secondary water separator first and then the secondary CO2? Over.

SC
I believe we went to secondary CO2 first.

CAPCOM
Roger, we copy. Was there any change in your suit loop count? Go ahead.

SC
I should mention Bruce that when I went to water secondary - water separator to secondary. I didn't notice any change, but about after 15 minutes or 20 minutes the water stopped coming out. So, maybe that was just water that was already in the loop that was still blowing out, but the secondary water separator was operating properly.

CAPCOM
Roger, did you make any changes in, the suit loop configuration after you went from the egress mode to the cabin mode after insertion - that is, in particular, they're interested in knowing if you recall changing the divertor valve position to egress any time while you were on the secondary canister? Over.

SC
No, I don't believe we did that at all Bruce.

CAPCOM
Okay, 11. Thank you. That sums up our questions for now, and we'll crank these back into the engineering pipeline and see what we can come up with.

SC
Okay. Are you satisfied that the CO2 circuit breaker was in (garble)? Over.

CAPCOM
Say again, please.

SC
Roger. In that jettison, are you satisfied that the C02 circuit breaker was in? Over.

CAPCOM
Yes, it was in.

SC
Roger, could you confirm that? I thought there was some question after we got into the command module as to whether that had been left in or not. Over.

CAPCOM
Roger, 11. It was in and confirmed in, and the readings after jettison say about .1 to .2.

END OF TAPE

CDT 13:51 GET 149:19 TAPE 472/1

CAPCOM
Apollo 11, this is Houston. We have not noted any change in the signal coming through on the LMP's EKG. When he has a little free time, we'd like him to check into it again. Over.

SC
Roger, I looked at all three of the upper chest Pendulums, and they appear to be fairly tight. I'll press them back in again. Over.

CAPCOM
Roger. On the TM here we noticed some fluxuations that may have been attributed to your moving the sensors around and pushing on them, but the erratic problem seems to be persisting.

PAO
This is Apollo Control at 149 hours, 41 minutes. We're now about 49 minutes away from the first midcourse correction of this transearth leg of the Apollo 11 flight. That maneuver will be a 4.8 foot per second burn of the spacecraft reaction control system thrusters and is scheduled to occur at a ground elapsed time of 150 hours, 29 minutes, 54 seconds. At this time Apollo 11 is 171,017 nautical miles from the earth, and the spacecraft velocity is 4,043 feet per second.

SC
Houston, Apollo 11. Over.

CAPCOM
11, this is Houston. Over.

SC
Roger. I wonder if you have noticed any change in the biomedic sign you're getting. Over.

CAPCOM
Negative, Buzz. Still looks kind of bad. Apparently when you move around, it's cutting in and out. Have you checked the little electrical connector where it goes into the signal conditioner? Over.

SC
I did. They're all about as tight as can be. I tell you what I'll - I'll take them out and put them back on again to see if that makes any difference.

CAPCOM
Okay, if you would at your convience. We'll be watching it down here.

END OF TAPE

CDT 14:17 GET 149:45 TAPE 473/1

PAO
This is Apollo Control at 150 hours 4 minutes. Telemetry data at this time shows the spacecraft in the proper attitude for the upcoming midcourse correction maneuver. The crew will soon be verifying their attitude by taking a sighting on a star through the sextant and will be running some tests on the guidance control system and, the reaction control system before the maneuver takes place. That burn now scheduled to come a little over 25 minutes. Apollo 11 is now 170,102 nautical miles from the Earth and the spacecraft velocity is 4058 feet per second.

END OF TAPE

CDT 14:42 GET 150:10 TAPE 474/1

CAPCOM
Apollo 11, this is Houston. We'd like you to try acquisition on the high gain antenna for us at PITCH minus 90, YAW 270. Over.

SC
Roger. Got us some work.

CAPCOM
Roger, out.

CAPCOM
11, this is Houston. We're showing about 6.8 percent on waste water on our telemetry now. Over.

SC
Okay, we've got about 9 up here. Over.

CAPCOM
Roger, out.

CAPCOM
11, Houston. We're standing by for your burn. Everything's looking good from down here.

SC
Thank you Bruce. You've got about a minute and 20 seconds.

CAPCOM
Roger, we concur.

PAO
One minute until midcourse correction number 5. It will be a 10.9 second burn of the spacecraft reaction control system thrusters giving a change of velocity retrograde of 4.8 feet per second. The primary purpose of this maneuver will be to control the spacecraft flight path angle at entry interphase. We're now less that 30 seconds from the initiation of the burn.

PAO
They should be burning at this time. And we show the burn off.

SC
Houston, do you copy our residuals?

CAPCOM
Roger, we've got your residual fuel count reading for us.

SC
DELTA VC is plus .2.

CAPCOM
Roger. Plus .2.

SC
That was actually plus 100.2. Okay?

CAPCOM
Okay.

PAO
That mideourse correction was performed at a distance of about 169,000 nautical miles from the Earth at a spacecraft velocity of 4075.6 feet per second.

END OF TAPE

CDT 15:07 GET 150:35 TAPE 475/1

PAO
This is Apollo Control at 150 hours, 35 minutes. Our telemetry data here on the ground shows that a midcourse correction maneuver just about nominal, burn duration 10.5 seconds. Prior to the maneuver, we were predicting a splashdown time of 195 hours, 17 minutes, 25 seconds. And we expect there will be some modification to that after we've had a chance to do some trak-king following this midcourse correction maneuver. Apollo 11 is now 168,843 nautical miles from the earth traveling at a speed of 4078 feet per second and we're continuing to see a very slow buildup in the Velocity.

SC
Houston, Apollo 11.

CAPCOM
Go ahead, 11.

SC
Roger. We're in PTC attitude and would you please give us a call when our thruster activity has subsided sufficiently.

CAPCOM
Roger stand by.

CAPCOM
Apollo 11, this is Houston. we're going to hand over from Madrid to Goldstone at 151 hours even. If you shauld lose lock on the high gain at this time, you may reaquire at PITCH minus 45 yaw 270. Break We're still watching your rates. Over.

SC
Okay. Thank you.

END OF TAPE

CDT 15:32 GET 151:00 TAPE 476/1

CAPCOM
Apollo 11, this is Houston, over.

SC
Apollo 11, Houston.

CAPCOM
Apollo 11, this is Houston, over.

SC
Go ahead, Houston.

CAPCOM
11, we're still seeing rates on your spacecraft above those we would like for and the continuation of the PTC mode which we are still monitoring it and we'll advise you when it has settled down, over.

SC
Okay.

PAO
This is Apollo Control at 151 hours 11 minutes. The crew is presently setting up the spacecraft for passive thermal control. Once it stabilizes out it will begin a slow roll rate of three revolutions per hour to maintain temperature control. At the present time Apollo 11 is 167,448 nautical miles from the Earth and the velocity is 4,101 feet per second.

CAPCOM
Apollo 11, this is Houston. You are go - you are set up on PTC, over.

SC
Thank you.

SC
Houston, Apollo 11, over.

CAPCOM
Go ahead 11.

SC
It didn't like it that time. When I 'got down to the entry 27303 enter, it took off in roll at a high rate and in excess of one degree per second. We are going to stop it now and we are going to have to go back and do,it over again. I would like to try find out the reason it did that.

CAPCOM
Roger, it might as well start setting up for it and we will be working the problem here.

SC
Okay. You do have us on high bit rate here now?

CAPCOM
That's affirmative.

SC
Okay, good. I'll maneuver back to PTC Ignition Attitude while'you guys look at the data and see what you think.

CAPCOM
Roger.

END OF TAPE

CDT 15:57 GET 151:25 TAPE 477/1

CAPCOM
Apollo 11, this is Houston. While you're waiting for the CSM to settle down and for us to look at the tapes on your latest maneuver, would you feel like answering some more questions with relation to the lunar surface? Over.
SC
Go ahead.

SC
Go ahead, Houston.

CAPCOM
Roger. For 64,000 dollars we're still trying to work out the location of your landing site, Tranquility Base. We think it is located on LAM2 Chart at Julia .5 and 7.8. Do you still have those charts onboard? Over.

SC
Stand by one. They're packed.

CAPCOM
Roger. You may not have to unpack it. The position which I just gave you is slightly west of west crater. I guess it's about two tenths of a kilometer west of it, and we were wondering if Neil or Buzz had observed any additional landmarks during descent lunar state or ascent which would confirm or disprove this. One thing we're wondering about is that if you were at this position you would have seen the Cat's Paw during the ascent just up to the north of your track. Over.

SC
We were looking for the Cat's Paw too, thinking we were probably downrange, beyond the Big Z. But I think that it's likely that that might have been West crater that we went across in landing, but - Stand by.

SC
We're hoping, Bruce, that our 16 millimeter film was working at that point in descent and we'll be able to confirm our touch-down position. We thought that during ascent we might be able to pick up some recognizable objects close to the landing site, and we did see a number of small craters and crater rows and things like that, which we may be able to pick out after the fact, but we haven't been able to yet.

CAPCOM
Roger. And the next question from our panel is for Buzz. We recall that he reported seeing a laser upon AOS of the Earth the first time after - the first REV after ascent, and we're wondering what color the beam was and if he could determine at the approximate location with respect to the Earth. Over.

SC
It was mostly white - perhaps a tinge of yellowish color to it, and it seemed to be, as I recall it, the terminator of the Earth was toward the horizon and seemed to be about a quarter to a third of the way down from - down towards the terminator of the Earth from the opposite horizon. That's a third to a quarter of the Earth's radii. Over.

CAPCOM
Roger, and that puts it in the light side. Over.

SC
Roger. Yes, it was in the light side. The Earth was about two thirds lit - Earth, with the terminator down toward the horizon. And now coming from the opposite

CDT 15:57 GET 151:25 TAPE 477/2

SC
LM of the Earth, the sunlight LM, coming down about one quarter to one third of a radius in from the LM. Generally, pensively located with respect to a line drawn perpendicular to the terminator that goes through the center. Over.

CAPCOM
Roger, Buzz; we copy.

SC
And I got pictures of that. I'm sure that will show up.

SC
And I saw that too. It was a very bright - spot of light and I confirm Buzz's observation of its position.

CAPCOM
Okay, 11, very good. Now with respect to the documented sample container on television it appeared to us as though the samples for that container were in fact being - given - being selected in accordance with some thought or consideration being given to the rocks themselves, and we were wondering if you could give any further details from memory about any of these samples, and the context of the material or the surface from which they were taken. Over.

SC
Yes, you remember I initially started on the cut side of the LM that the TV camera was on, and I took a number of samples of rocks off the surface and several that were just subsurface, and about 20 - 15 to 20 feet north of the LM and then I recalled that that area had been probably swept pretty well by the exhaust of the descent engine, so I crossed over to the southern side of the LM and took a number of samples from the area around the elongate double crater that we commented on and several beyond that and tried to take as many different types - of rock types as I could see by eye as I could in the short time we had available.

There were a number of other samples that I had seen earlier in our stroll around the LM that I had hoped to get back and pick up and put in the documented sample, but I didn't get those and I'll be able to comment in detail when we get in the debriefing session.

CAPCOM
Roger. Did you observe any small craters with conspicuously blocking rims? Over.

END OF TAPE

CDT 16:13 GET 151:41 TAPE 478/1

SC
- well except for the one big one that we went over, I guess they're were none in our area. I took a stroll back after putting up the PSEP and all. Buzz was starting to unpack the documented samples. Took a stroll back to a crater behind us that was maybe seventy or eighty feet in diameter and fifteen or twenty feet deep. We took some pictures of it. It had rocks in the bottom. We were essentially showing no bedrock, at least in the walls of the crater at that depth. Over.

CAPCOM
Roger. We copy. Okay, thank you Neil. That about wraps up the questions we have on hand for now.

SC
My compliments to the chef. It's very outstanding. This cream of chicken soup, I get at least 3 spoons.

CAPCOM
Okay. Cream of chicken, 3 spoons.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead.

CAPCOM
11, we concur that having worked 16 NOUN 20 up on the DSKY may well have had some effect, on your PTC initiation. It works like this with - give what the computer work with the noise of the axle, PDU angles. What we'd like you to do is do a CDU 0 which is VERB 4 0's NOUN 2 0 ENTER and then start the PTC procedure again at step 2 with loading VERB 6922 desired attitude in the AUTO maneuver and all that. OVER.

SC
Okay. The only I understand about that is why it took off at the rate it did. What rate should it had taken off at under that theory.

CAPCOM
Stand by a minute, Mike.

CAPCOM
11, CMP, this is Houston. Over.

SC
Go ahead, Houston.

CAPCOM
Mike, over here on page 9-7 of your checklist where we're setting up PTC, there's been a note penciled in after wait 20 minutes for rate to damp. Do not mark a VERB 16 NOUN 20. It turns out that the significance of that is that if you are monitoring 16 NOUN 20 then when you get down here in step 7, the second time you do a VERB 24 you've got to reload the NOUN 01 to make it VERB 24 and NOUN 01 ENTER before you load the three registers. Over.

SC
Roger. I was just questioning the rate at which the maneuver would begin if that were not done.

CAPCOM
Roger. We're still working on computing the rates for you.

CAPCOM
Apollo 11, this is Houston. We'd

CDT 16:13 GET 151:41 TAPE 478/2

CAPCOM
like you to select reacq mode in the high gain antenna. Looks like we're about to lose you. Over.

END OF TAPE

CDT 16:28 GET 151:56 TAPE 479/1

SC
And I'll be able to comm out in detail what we can in the debriefing session.

CAPCOM
Roger. Did you observe any small craters with conspicuously blocky rims? Over.

PAO
This is Apollo Control at 152 hours 9 minutes. At this time, the crew is getting the spacecraft set up to reinitiate the passive thermal control. Apollo 11 currently 165,143 nautical miles from the earth and traveling at a speed of 4,142 feet per second. The flight plan has relatively few activities scheduled for now through the beginning of the crew sleep period tonight. We do have a television transmission scheduled. I believe, the time on that is a little after 8:00 PM Central Daylight Time. And we show the sleep period to begin at about 160 hours ground elapsed time, or a little less than 8 hours from now. We'll continue to stand by for any conversation with the crew. It has been relatively quiet for a good part of today. We'll stand by for a call from the capcom or from the spacecraft down to the ground.

END OF TAPE

CDT 16:43 GET 152:11 TAPE 480/1

CAPCOM
Apollo 11, Apollo 11, this is Houston broadcasting in the blind. If you read us attempt to acquire on omni antennas, attempt to acquire on omni antennas, if you read. This is Houston, out.

CAPCOM
Apollo 11, Apollo 11, this is Houston broadcasting in the blind, do you read? Our contact position on an omni antenna, our contact position using an omni antenna, over.

CAPCOM
Apollo 11, Apollo 11, this is Houston broadcasting in the blind. If you read attempt to contact using an omni antenna, this is Houston, out.

PAO
This is Apollo Control at 152 hours 29 minutes. In the process of reestablishing the passive thermal control with the spacecraft in a slow rotation, we have apparently lost high gain lock on and we expect that the crew will reacquire lock with the antenna once the passive thermol control is reestablished. At the present time Apollo 11 is 164 thousand 320 nautical miles from the earth and the velocity is up now to 4 thousand 156 feet per second. We'll continue to stand by here for reacquisiton of the spacecraft, for reestablishment of high gain lock on.

END OF TAPE

CDT 17:03 GET 152:31 TAPE 481/1

CAPCOM
Apollo 11, Apollo 11, this is Houston broadcasting in the blind. If you read us, attempt acquisition using an OMNI antenna - attempt acquisition using an OMNI antenna. This is Houston, out.

SC
Hey, Goldstone.
CAPCOM
Apollo 11, Apollo 11, this is Houston. Radio check, over.

(?)
(garbled).

CAPCOM
Apollo 11, this is Houston. How do you read, over?

SC
Loud and clear, Bruce.

CAPCOM
Roger, what antenna are you using?

SC
Houston, Apollo 11 has gone into high gain. How do you read, over?

CAPCOM
Well, you are loud and clear on the high gain.

SC
So what's new?

CAPCOM
Oh, we were wondering what was new with you up there.

SC
Oh, very quiet. We're just sitting here letting the thruster firing damp down when they - Houston let us know and we will start this PTC.

CAPCOM
Roger.

SC
Nice to sit here and watch the Earth getting larger and larger and the Moon smaller and smaller.

CAPCOM
Roger. We'll give you a call when your rates have damped down sufficiently and we are unable at the present time to predict what what you should have seen at your last attempt in ignite. PTC we saw about 2 1/2 degrees per second, over.

SC
Yeah, I believe that.

SC
Buzz thinks we should have a PTC program built in the computer. He could very well be right.

END OF TAPE

CDT 17:23 GET 152:51 TAPE 482/1

COMTECH
(Garble) 2 3 4 5. 5 4 3 2 1.

COMTECH
1 2 3 4 5. 5 4 3 2 1. Garble

PAO
This is Apollo Control at 153 hours, 7 minutes. At the present time, we are changing shifts here in Mission Control. Flight Director Gene Kranz will be coming on to relieve Flight Director Clifford Charlesworth. The Capsule Communicator on this shift will be astronaut Charlie Duke. There will be a change of shift briefing in the news center, in the building 1 auditorium in about 10 minutes. At the present time, Apollo 11 is traveling at a speed of 4,185 feet per second. The spacecraft is about 162,700 nautical miles from the earth. During the change of shift briefing, we will take the circuit down. Record any conversation that develops with the spacecraft and play it back following the change of shift briefing. At 153 hours, 9 minutes this is Apollo Control, Houston.

END OF TAPE

CDT 18:21 GET 153:49 TAPE 483/1

PAO
This is Apollo Control. 153 hours 49 minutes Ground Elasped Time. Apollo 11, homeward bound, is now 161,015 nautical miles out from Earth. Velocity now 4,216 feet per second. Some 3 1/2 minutes of recorded air to ground transmissions have accumulated during the recent Change of Shift Press Conference here in Apollo News Center. Let's play that tape back now.

SC
Houston, Apollo 11.

CAPCOM
Go ahead, 11.

SC
Rog. I was just checking the radios and how is the thruster activity coming?

CAPCOM
11, Houston. The radios are still in good shape and we are still waiting for your rates to decay. We got .03 degrees per second in pitch now.

SC
Okay. We're - we're in no rush. This is a very pleasant attitude as a matter of fact, the sun is down in the LEB so it is not shinning through the windows and heating the place up. We got the Earth steady out window 01. We have the Moon steadily out window 03 and of course we are locked up on the high gain, so as long as the thermal people are happy, we are happy.

CAPCOM
Roger, we copy.

CAPCOM
Apollo 11, this is Houston, over.

SC
Go ahead, Houston.

CAPCOM
Okay, 11. We are about ready to start PTC. I would like to give you some high gain antenna angles though. We would like to operate in the react mode and if you plan on spinning up in the positive or negative direction, over?

SC
We can do it either way. I had planned the positive.

CAPCOM
Okay, for positive the high gain antenna setting should be pitch plus 30, yaw 270, and in react, over.

SC
Understand. React pitch plus 30, yaw 270. Thank you.

CAPCOM
Roger, and if - would when you are making your DSKY entries to set up for PTC, go a little slower and we will try to follow each entry from down here.

SC
Roger, out.

SC
Houston, 11. PTC established.

CAPCOM
Roger, 11.

CAPCOM
11, Houston. We observed that PTC is varily well established here and we'll keep you posted on how it's going and your friendly white team commentator is taking over now.

SC
Okay, thank all your black team.

CAPCOM
That was the green team.

SC
Correction, all your green team - correction green team excuse me.

CAPCOM
Roger, out.

SC
How could I forget. I used to be a green one.

CDT 18:21 GET 153:49 TAPE 483/2

CAPCOM
Hello Apollo 11, Houston. Your white team is now on. We're standing by for an exciting evening of TV and a presleep report, over.

CAPCOM
Apollo 11, Houston. Are you sure you don't have anybody else in there with you?

SC
Houston, Apollo 11. Say again, please.

CAPCOM
We had some strange noises coming down on the downlink and it sound like you had some friends up there.

SC
Where - where do the white team go during their off hours anyway?

CAPCOM
Say again.

END OF TAPE

CDT 18:31 GET 153:59 TAPE 484/1

PAO
This is Apollo Control. Still no explanation, the weird noises emanating from Apollo 11, if indeed it is from Apollo 11 and it's reported from network that it's being received on the downlink at two different stations in the Manned Space Flight Network. Perhaps it will all shake out later in the mission as to what these strange noises are. We'll come back up again as conversation is resumed with Apollo 11 now 160,410 nautical miles out from earth traveling at 4228 feet per second. At 154 hours, 5 minutes ground elapsed time this is Apollo Control.

END OF TAPE

CDT 19:25 GET 154:53 TAPE 485/1

PAO
This is Apollo Control 154 hours, 53 minutes ground elapsed time. 40 hours, 9 minutes to entry. Apollo 11 homeward bound 158,378 nautical miles out from earth velocity now 4267 feet per second. We have some 3 minutes of tape accumulated over the past half hour of minor conversations with the crew of Apollo 11. We'll roll these tapes now.

CAPCOM
Apollo 11, Houston. Over.

SC
Roger.

CAPCOM
Roger. Would you veriy - We've lost comm with you for about the last ten minutes. Would you verify that the S-band track switch is in reacq? Over.

SC
Negative. It's not. The last time we broke lock, we went to AUTO and I left it there.

CAPCOM
Roger. We'd like you to put it in REACQ then monitor in about two minutes we'll be coming up on the high gain, would you monitor the REACQ if it doesn't take acquire manually. Over.

SC
Okay. Say again the angles you'd like?

CAPCOM
We'll try to switch it ourselves. Stand by on the angles.

CAPCOM
Buzz, it's Pitch plus 30 yaw 270. Over.

SC
Roger, I've got them.

CAPCOM
Thank you.

CAPCOM
Hello Apollo 11, Houston. Would, you please terminate battery charge now. Over.

SC
Roger. Terminating battery chargers.

CAPCOM
Roger.

CAPCOM
Hello Apollo 11, Houston. Any special attitude you'd like us to look at for the TV? Over.

SC
I don't guess we have a requirement to (garble).

CAPCOM
Roger. We have an attitude that we can get the earth out of orbit, the moon would kind of look at - I wonder if we can get both if that's what you'd like. Over.

SC
A 50 degree roll attitude would probably give us that Joe.

CAPCOM
Roger.

SC
That's a good one because it puts the earth out window 1 and the moon out window 3 and puts the sun down the LEB so the lighting in here remains rather reconstant.

CAPCOM
Roger. Well we'll just stop on

CDT 19:25 GET 154:53 TAPE 485/2

CAPCOM
the 50 roll then and we'll give you the word when to do that. Over.

SC
Okay.

PAO
This is Apollo Control. That completes, the accumulation of air to ground communications by means of tape recordings on the last half hour or so. It's quiet right now. No conversation going on between Spacecraft Communicator Charlie Duke and the crew of Apollo 11. And at 154 hours, 57 minutes ground lapsed time this is Apollo Control.

END OF TAPE

CDT 19:59 GET 155:27 TAPE 486/1

PAO
This is Apollo Control, 155 hours, 27 minutes ground elapsed time. Coming up now about 3 minutes away from tonight's television pass. It'll be through the 85-foot antenna at the Goldstone tracking station. The 210 foot dish out there is tied up tracking one of the Mars fly-by missions. We have some 20 seconds of tape accumulated. We'll play that back and rejoin the conversation line.

CAPCOM
Apollo 11, Houston. We'll have high gain antennas out 155:30. At that time, you can turn on the TV if you desire and continue your roll around until you get 50 degrees roll. Over.

CAPCOM
Apollo 11, Houston. We were going to give you the all-star game tonight, but it was rained out. Over.

SC
(garble)

CAPCOM
11, Houston. We're on the high gain. You can warm up the antenna now if you like. Over.

PAO
This is Apollo Control still standing by for the incoming television signal from Columbia. Still nothing but the color bar test pattern as of now. Continuing to stand by on air to ground and television links.

CAPCOM
Apollo 11, Houston. We see you coming up on 50 roll. How does that attitude look? Over.

CAPCOM
Apollo 11, Houston. We're ready for the TV. We're all configured. At your convenience. Over.

PAO
This is Apollo Control. While we're waiting for the television pictures to come in, we have in the control room here a vase full of long-stemmed red roses, the card saying, "To one and all concerned. Job superbly done. From a moonstruck Canadian." Continuing to stand by as we wait for the pictures to come from Columbia. Here they come.

SC
Houston, Apollo 11. Over.

CAPCOM
Roger; go ahead, 11. Over.

SC
Are you picking up our TV signals?

CAPCOM
That's affirmative. We have it up on the eidophor now. The focus is a little bit out. We see Earth in the center of the screen, and still have a little white dot in the bottom of the camera apparently, and we see some land masses in the center. At least, I guess that's what it is. It's very hazy at this time on our eidophor. Over.

SC
Let me change, believe that's where we just came from.

CAPCOM
It is, huh? Well, I'm really looking at the bad - at a bad screen here. Stand by one. Hey, you're right.

SC
It's not bad enough (garble)

CAPCOM
What?

SC
I said it's not bad enough about finding the right landing spot, were you going to be at the right planet?

CDT 19:59 GET 155:27 TAPE 486/2

CAPCOM
I'll never live that one down.

END OF TAPE

CDT 20:09 GET 155:37 TAPE 487/1

SC
It's not bad enough not finding the right landing spot but when you haven't got the right planet

CAPCOM
I'll never live that one down.

SC
We're making it get smaller and smaller here to make sure that it really is the one leaving.

CAPCOM
That's enough you guys.

CAPCOM
Eleven, that was a good picture there.

SC
Okay, that's enough of the moon.

SC
Okay, that's enough of the moon Charlie. We're getting set up for some inside pictures.

CAPCOM
Right.

SC
We've got a lot of scientists from a number of countries standing by to see the lunar samples and we thought you'd be interested to see them as they really are here. These two boxes are the sample return containers. They're vacuum packed containers that were closed in a vacuum on the lunar surface, sealed and then brought inside the LM and then put inside these fiberglass bags zippered and resealed around the outside and placed in these receptacles in the side of the command module. These are the two boxes and as soon as we get onto the ship I'm sure these boxes will immediately be transferred and delivery started to the lunar receiving laboratory. These boxes include the samples of the various types of rock. The ground mass is the soil, the sand and silt and the particle collector for the solar wind experiment and the core tubes that took depth samples of the lunar surface.

CAPCOM
Roger Neil thank you much for that description. We've got a pretty dark picture down here could you set your F-stop. We'd like to have it, see if you can open it up a little bit, over.

SC
Okay our moniter showed that to be very bright.

SC
We're down here between, well around F4 which we thought would be plenty right, we'll wind it up some more.

CAPCOM
Well we'd appreciate it. It's pretty dark on all our minitors here.

SC
Okay, fine.

CAPCOM
It's looking a lot better now, Neil.

CAPCOM
There's Buzz.

CAPCOM
11 Houston, we have an excellent picture now, over.

SC
Okay how do you read me, Charlie.

CAPCOM
5 by now, Buzz, over.

SC
Okay. The more mundane affairs, now that we've touched the moon, I'd like to trace through a little bit for you the developments that have taken place in the

CDT 20:09 GET 155:37 TAPE 487/2

SC
food department. I'm sure you've already seen the drink container. A little later Mike will show you how the water gun operates with its new filter to take out hydrogen. Essentially this water gun is put in this hand and filled up this bag with water and the tang then disolves in the water and this end of the - out feeding. Likewise we have other foods that are more solid nature. You can probably see this shrimp cocktail meal. This afternocn while the two of us had salmon salad. Another early development was the use of bite size food.

CAPCOM
Eleven, Houston, Buzz, you're breaking up badly, will you check your vox, over.

SC
Roger, how am I coming through now, Charlie.

CAPCOM
You're very clear when you come through. It's just that your vox is not keying at every word, over.
SC
Okay.

SC
These bite size objects were designed to remove the problem of having so many crumbs floating around in the cabin so they designed a particular size that would be able to go all into the mouth at once. I think since all of our experience we've discovered that we could progress a good bit further than that back to some of the type meals that we have on earth. As a matter of fact on this flight we've carried along pieces of bread and along with the bread we have a ham spread, and I'll show you, I hope, how easy it is to spread some ham - while I'm in zero "G". I think we've discovered that it is quite easy to - - you're all very familiar with.

CAPCOM
Apollo 11, Houston. We notice your roll rate increasing. Will you please see if you can bring that down to about 04 so we'll be loosing a high gain shortly, over.

SC
You can also use zero gravity to demonstrate many things that we've all learned in school. I'd like to demonstrate briefly how easy it is to explain the action of the gyroscope. We know that according to the equations of motion that we would expect that once this is given a spin, and has a spin axis in this direction, if we give it a particular torque, I'll do this by pushing my hand against it in this fashion once its spinning, by the equations we can predict, if as I put this torque on it, it will in fact -

END OF TAPE

CDT 20:19 GET 155:47 TAPE 488/1

SC
and begins to in this fashion onceits spinning. By the equations, we can predict that if I put this torque on it, it will in fact rotate this direction. Let's see how well this works out. See even if I apply the torque this way, its rotated this way.

SC
Too close isn't it?

CAPCOM
11, Houston. It's a pretty good demonstration.

SC
Houston this next is a little demonstration for the kids at home, all kids everywhere for that matter. I was going to show you how you drink water out of a spoon but I'm afraid I filled the spoon too full and if I'm not careful, I'm going to spill water right over the sides. Can you see the water slopping around on the top of the spoon kids?

CAPCOM
That's affirmative 11.

SC
Okay, well as I said, I was going to tell you but I'm afraid I filled it too far and its going to spill over the sides. I'll tell you what. I'll just turn this one over and give me the water and start all over again. Okay?

CAPCOM
Okay.

SC
And you can see, up here we don't know where over is. One up is as good as another and that really is water, I tell you.

SC
That's really not the way we drink. We really have a water gun which I'll show you. Here's the water gun, this cylindrical thing on the end of it is a filter with several membranes. One allows water to pass but not any gas; the other allows gas to pass but not any water so by routing the gaseous water which comes from our tank through the filter we're able to drink purified water without the gas in it, filtered water. And of course all we do to get it started is pull the trigger. It's sort of massy. I haven't been at this very long. It's the same system that the Spaniards used to drink at a winestand at the bull fights, only I think it'd be more fun.

SC
We'll be seeing you kid.

CAPCOM
Thank you from all us kids in the world, here in the MOCR, who can't tell the earth from the moon.

SC
Roger. Stand by. We'll get you that (garble).

CAPCOM
Looks like you need a wine skin up there, Mike?

CDT 20:19 GET 155:47 TAPE 488/2

SC
That'd be nice.

SC
Okay.

CAPCOM
11, Houston. -

SC
You want a picture now, Houston?

CAPCOM
That's affirmative. I refuse to bite on this one though. You tell us.

SC
Okay. This should be getting larger and if it is the place we're coming up to.

CAPCOM
Roger.

SC
No matter where you travel, it's always nice to get home.

CAPCOM
We concur 11. We'll be happy to have you back.

PAO
This is Apollo Control. Still up live with the air to ground circuit to Apollo 11 homeward bound. Now in the passive thermal control mode, or barbecue mode, Charlie Duke is going to make another call to the crew. Let's listen in, in a moment. He's discussing with Flight Director Deke Frank, who tonight is spelling Gene Kranz on this shift, although Gene is here. They're discussing some adjustments to the passive thermal control mode. Apollo 11 has left the moon some 53,666 miles behind it. And relative to the moon, Apollo 11 is traveling now at 4306 feet per second. Continue to monitor air to ground here till the crew settles down. They're not scheduled to go into their rest period until about another 4 hours from now.

CAPCOM
Apollo 11, Houston. We were curious to see if there was any excess moisture up around the tunnel hatch area as we saw on 10. Over.

SC
It just so happens that's what we were talking about now. There is a little bit of dampness around the outside edge of the hatch but very, very slight amount. We've got a hose up there that - -

END OF TAPE

CDT 20:29 GET 155:57 TAPE 489/1

SC
outside edge of the hatch, but very, very slight amount. We've got a hose up there that we're hoping will sort of help keep it a little bit dry.

CAPCOM
Roger, Mike. Thank you much. Have you seen any more water collecting on the AFT bulkhead? Over.

SC
No, we haven't, as a matter of fact. It's been dry in that area since we got rid of that last time.

CAPCOM
Rog. Thank you.

SC
Apollo 11 is back in PTC attitude. Standing by for thruster quieting.

CAPCOM
Rog, we see that. Thank you much, Mike.

PAO
This is Delta Launch Control. We have postponed the launch of the Delta vehicle tonight. The launch of INTELSAT 3, 24 hours. The reason for this postponement is to examine the second stage propellant ground equipment. There is a slight chance that the acid used in the second stage for an oxidizer inhibited red fuming nitric acid, could have contained an excessive level of contaminants. This possibility is the most that there is a desire to make the examination. During fueling today, it was noticed that the transfer of the inhibited red fuming nitric acid took longer than expected, or longer than normal. In examining the ground equipment, it was found that a filter element had dislodged and had traveled approximately 2 feet into the line. There is need now to insure, that in fact, the displacement of this filter was what caused the slowdown and also a need now to analyze the

IRFNA, or inhibited red fuming nitric acid to insure that no contamination is evident. The launch has been rescheduled for 24 hours from now, or 24 hours from 10:00 PM tonight. This has been cleared with the range. We have the same launch window tomorrow night. 10:00 PM to 11:10 PM. This is Delta Launch Control.

PAO
This is Apollo Control. Apparently, there will be little conversation in the next half hour or so. Apollo 11 now 155,000 as you were - Yes, 155,906 nautical miles out from earth. Approaching at a velocity of 4,316 feet per second. And at 156 hours 6 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 20:41 GET 156:09 TAPE 490/1

PAO
This is Apollo Control. After first saying that there would be very little conversation, it seems there's quite a flurry of conversation between the ground and Apollo 11. Let's play back tapes and catch up and go live.

SC
Houston, Apollo 11. Could you get a little summary of the evening news for us?

CAPCOM
Yes, sir. We'll have it for you momentarily. Also, a little flight plan update, Mike. On page 3-113, you can delete the O2 fuel cell purge. Over.

SC
Will do.

CAPCOM
There is a flurry of activity in the PAO site, for the evening news.

SC
Okay.

SC
How's the weather down there? You got any rain?

CAPCOM
Roger. We've been having a little bit, thunderstorm type the last couple of days. We had a pretty good rain today, and it's been overcast. A slow storm system has been moving through the area in the last couple of days, and primarily evening and afternoon thundershowers.

SC
Roger. We were watching a few clouds in your area through the monocular along the Texas Gulf Coast this afternoon, and we also noticed there were clouds over Baja California which is a little bit unusual.

CAPCOM
Roger. Thank you for the weather report. We can't quite see that far. It seems to have cleared up outside now according to some of the people coming in. It's a constant overcast. The marker here is a little hard to see outside.

SC
Yes, we also noticed it was a little overcast out over - in the Antartic Ice Cap too.

CAPCOM
Roger. It's apparently raining pretty hard up -

SC
I bet they're running out to the ship.

CAPCOM
(Laughter)

SC
He may know that but he doesn't even know whether his grass is wet or dry.

CAPCOM
It's apparently raining fairly hard up in Washington where the all-star game was to be played tonight. They started out on it and then it was rained out, and they called it off.

SC
They really need a roof on their stadium and they can catch all those flys.

CAPCOM
Roger.

SC
In the rain.

COM TECH
B.J.

SC
Hey, Charlie, what's the preliminary outlook on the weather in our recovery area?

CAPCOM
Stand by, Buzz. It looks pretty good

CDT 20:41 GET 156:09 TAPE 490/2

CAPCOM
as far as I could tell. We got the - over the tropical convergence line there - there's a few clouds shown on the weather map I'm looking at here, but nothing of significance. Right now - Stand by. Let's see, right now the mid, yes, the MPL - we've got 3 clouds of scattered, visibility, 10, waves at 3 feet at the present water. I don't think there's anything forecast to be of significance. There are a couple of - Flight just informed me that what I just gave you was the forecast. There are a couple of tropical storms in the - well, not in the area of landing but in the Pacific. A storm called Claudia which is north - correction - about east of Hawaii. It's going northwest and vicinity. There's one called Viola, which is out over Guam, and so they aren't any factor at all. Looks like it's going to be real nice for recovery. Navy called up those special COMM C's for you guys from up there on the Hudson.

SC
Well, we might need it. We'll get a look at it tomorrow, I guess. We ought to be given a pretty close eye.

CAPCOM
Roger.

CAPCOM
11, Houston. The Retros were wondering if you could fill us in on any non-nominal storage that we have onboard. Just location and weight is about all to answer to that. Over.

SC
Roger. We'll do some work on that and let you know, Charlie.

CAPCOM
Thank you, sir.

CAPCOM
And, Apollo 11, Houston. Would you please place O2 tank 1 heater to AUTO? Over.

SC
AUTO it is.

SC
Houston, Apollo 11.

CAPCOM
Go ahead.

SC
What we'll do Charlie, tomorrow, is go through and reconfigure our storage as closely as possible to nominal. Some things that will not be nominal are as follows: the EVA visors were brought back in the command module and we have not yet found a home for them. We'll let you know where they go. In addition, there's about 5 pounds of miscellaneous weight from the LM in Compartment Able-8, and it's taking the place of the LCG's which we moved from A-8 into stoop bag. We got rid of one miscellaneous trash bag, mostly old photographing and also old underwear and helmet protective advisors from the CMP's. We left all that with Eagle. And those are about the only off nominals we have.

CAPCOM
Thank you very much. We appreciate it. Out.

SC
Roger.

END OF TAPE

CDT 20:51 GET 156:19 TAPE 491/1

CAPCOM
Apollo 11, Houston. We got the rates looking copacetic you can go ahead and initiate PTC, over.

SC
Thank you.

CAPCOM
And Buzz, we're still not getting any data from your EKG. It looks like the only way that we're going to be able to get any is if, at your convenience, you would take your, change out your EKG lease, which are the center ones that are connected to the blue pin and there's a spare one in the medical box, over.

SC
Roger, how many did you want me to change?

CAPCOM
Just the center one. I'll get the right nomenclature from the dot. Stand by. It's called the sternal EKG, which is a three center one, and it's got, they lead into a, into the blue strings lead ones, over.

SC
Okay, there's three of them, is that right.

CAPCOM
That's affirmative.

SC
And you want me to change all three.

CAPCOM
That's affirmative and there all hooked together from the PITCH I'm looking at and they go into the center belt, signal conditioner and it's got the blue strained relief on it.

SC
Yea I checked the connectors at both ends on that. I don't guess we have a spare signal conditioner or anything like that, do we.

CAPCOM
No we do not.

SC
Well I can show you my heart's still working.

CAPCOM
We believe it.

SC
Charlie, what we suggest here is, before we start that, turn our two suit powers off and plug his blue lead into my blue signal conditioner and see if we can get his signal through my signal conditioner, okay.

CAPCOM
Roger, that's a good suggestion Neil. We concur, over.

SC
Okay, Charlie we're changing it and lets see if you get any EKG signal on the CDR at this point.

CAPCOM
Roger, stand by.

CAPCOM
Eleven, Houston, we get some data but its got the same problem that we had through Buzz's signal conditioner, so apparently the lead is broken and we'd like you to change it out if you could, over.

SC
Okay.

CAPCOM
Thank you.

END OF TAPE

CDT 21:02 GET 156:30 TAPE 492/1

SC
Houston, Apollo 11.

CAPCOM
Go ahead, sir.

SC
Roger, I think the problem was that the center lead had dried out. After I had put the new one on, and I'll see how that works. Over.

CAPCOM
Rog.

SC
I can't tell you how good it feels to get on them.

CAPCOM
Yeah, I can imagine.

SC
Houston, Apollo 11. Houston, Apollo 11.

CAPCOM
Go ahead, 11. Over.

SC
Roger, how do you read me EKG now?

CAPCOM
Stand by. We'll let the docs look at it. Buzz, we're on low bit rate. We'll get you on a high gain momentarily and we'll let you know then. Over.

SC
Okay, I got my high gain antenna coming out.

CAPCOM
Roger. Just leave on react. We'll get you.

CAPCOM
Apollo 11, Houston. Buzz, your EKG looks good now. The doc said thanks a lot.

SC
Okay, they're welcome.

END OF TAPE

CDT 21:27 GET 156:55 TAPE 493/1

CAPCOM
Apollo 11, Houston, based on our sighting since the midcourse we're showing a gama of -6.57. This is preliminary though and we think that after some more tracking it should come on in, we could tweak it right on to the quarter. It's just about in the center of quarter, everything's looking fine. We'll have you a entry pad in a couple of hours before you go to sleep, and from our friends in public affairs a few headlines, other than your flight. Your still dominating the news, however there are some other things of interest for you. As I mentioned earlier, the all star game was rained out, it's going to be played tomorrow, however President Nixon will not be able to see it as he had planned. We'll keep you posted on results. And also the weathermen are going to be good to you. Our forcast is, looks like it's holding good for the recovery area, it should be real fine out there. President Nixon as he prepares to fly out to greet your return says that within 31 years man will have visited at least 1 other planet having some form of life. In the year 2 thousand we, on this earth, will have visited new worlds where there will be a form of life, he told 2 thousand foreign exchange students at the whitehouse. Before he left for his week long trip the president sent congress his proposal for reorganizing the interstate commerce commission. He also conferred with chairman Earl Wheeler of the Joint Chiefs of Staff on his return from Viet Nam, and the launch of Intelsat was scrubbed and has been rescheduled for 10 PM Eastern Daylight time on Wednesday. The second stage fuel ground support system shows some contamination. And back in Washington, the House Ways and Means committee agreed to tax changes affecting oil companies, banks and utilities that could add nearly 2 billion a year to federal revenue. And also today NASA announced that it will launch a large orbital workshop in 1972, with a cutdown version of the Saturn 5. And your television pictures attracted a lot of interest. They were shown live throughout just about the whole world, and, but we're expecting hundreds of telephone calls from mothers all over the world complaining that their youngsters are trying to drink milk from spoons, thanks to you, Mike.

SC
I take it all back.

CAPCOM
You need more practice.

PAO
This is Apollo Control. Things are beginning to quieten down aboard Apollo 11 as they get nearer their sleep period. There probably won't be too many more exchanges between spacecraft communicator Charlie Duke here in Mission Control and the crew aboard Columbia. Entry countdown clock now showing 37 hours 53 minutes this may be refined a

CDT 21:27 GET 156:55 TAPE 493/2

PAO
few times between now and splash time, or entry. Apollo 11 now is 153 thousand and 80 nautical miles out from earth approaching at 4 thousand 3 hundred 73 feet per second. And at 157 hours 10 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 22:33 GET 158:01 TAPE 494/1

PAO
This is Apollo Control, 158 hours, 1 minute ground elapsed time. There's been a certain amount of conversation between Charlie Duke here in Mission Control and the crew of Apollo 11. We'll play back the accumulated tape at this time and then rejoin the conversation when it does resume on a live basis. Let's roll the tape now.

CAPCOM
Hello Apollo 11, Houston. Buzz you brought the surgeon out of his chair. We see you exercising. Over.

SC
Thank you.

CAPCOM
Exercising. Is that correct Buzz?

SC
Yes Buzz is.

CAPCOM
Roger. We've got his heartbeat way up.

SC
(Garble) I have seen.

CAPCOM
Yes. That's what we thought.

SC
Right - you sure got a busy one tonight, huh Char?

CAPCOM
Say again Mike. Over.

SC
I said the white team really got a busy one today, huh?

CAPCOM
Oh boy. We're really moving along here with all this activity. Can barely believe it.

SC
What are you doing? Sitting there with your feet up on the console doing drawing?

CAPCOM
You must have your x-ray eyes up. You still can see a long way.

SC
We're watching you as well, you know.

CAPCOM
Your right.

SC
You people in the viewing room and the boys in the trench.

CAPCOM
We've got 8 in the viewing room and let's see, about 6 in the trench right now. And this is the highlight of the day, Buzz's exerecise for the surgeon. 11 you copy. Over.

SC
Roger 11.

CAPCOM
Neil has the highest heartbeat ever seen on a manned spaceflight. We just went low bid rate. The surgeon is about to die.

SC
I measured it up here to be 247.

CAPCOM
Boy, that's super.

SC
The units on that furlong per fortnight.

CAPCOM
Roger. We copy that. EECOM says if you keep that up, you're going to have to change your CO2 canisters.

CDT 22:33 GET 158:01 TAPE 494/2

SC
You were going to make me do that in another 45 minutes anyway.

CAPCOM
That's true.

SC
That's why I waited until Monday, I was really looking forward to that.

CAPCOM
Thank you 11. We appreciate you turning that off.

SC
Charlie, could you copy our music down there?

CAPCOM
Did we copy what, Neil?

SC
Did you copy our music down there?

CAPCOM
Roger. We sure did. We're wondering who selected - made your selection?

SC
That's an old favorite of mine. It's an album made about 20 years ago, called Music out of the Moon.

CAPCOM
Roger. It sounded a little scratchey to us, Neil. Either that or you're tape was a little slow.

SC
It's suppose to sound that way.

SC
It sounds a little scratchey to us too, but the czar likes it.

CAPCOM
That's what we figured, he and his 40,000 votes.

SC
Well, the answer we got looks like about 150,000 out now.

SC
It's getting appreciably larger now. It's getting more like the world.

CAPCOM
Roger. I'm looking at the right side of the screen this time.

SC
How's everything going on the - say again, Charlie?

CAPCOM
Roger. I'll never hear the last about that Earth, Moon business on the TV there and I was just saying that I was looking at the right side of the board here so your going towards the earth. What were you going to say Mike?

SC
You'll have a lot of fun at the press conference after this shift, then, won't you?

CAPCOM
It's 2:30, everybody will be asleep. I going to sneak off through the back way.

SC
I was just wondering how everything is going at the homefront. Are all our kids in one piece.

CAPCOM
Roger. Sure are. Everything doing fine. All the gals are having a little party tonight as far as I know.

SC
Roger. Glad to hear it.

END OF TAPE

CDT 22:43 GET 158:11 TAPE 495/1

CAPCOM
Apollo 11, Houston. I was just reading some of the transcripts of earlier today about the earlier PTC that we attempted, and when you keyed into Verb 24 and did the two ENTERS, it took off on you. I think we got a story on that if you'd like to listen to why it had such a high rate, Mike. Over.

SC
Yeah, I'm all ears.

CAPCOM
Okay, I think it would be better if you got your checklist out on 97 and we could walk you through it and that way I could probably get the story straight. Over.

SC
Okay, I got it.

CAPCOM
Okay, Mike, what happened is, you know, you were sitting there monitoring Verb 16, Noun 20 and at step 7 you went into Verb 24, Noun 01 and keyed in the EGRESS and then information information and on the final enter of that 35400 enter, right after that, that did put you back into the 16, Noun 20. Then when you did the Verb 24 ENTER, you were really entering the information in the actual CDU's, and when you got the two entries in in register 1 and 2, it was an instantaneous change in the actual CDU's, and the CMDAC looked at that and saw what it thought it had - My gosh, I got a 600 degree per second rate, and it turns on the jets to try to take that rate out, and the rate filters that it's looking at - well, the rate is looking at its filters, so it doesn't really sense the actual rate until the thing is already built up and then it starts reading the rate filters and it says - well, I really didn't have 600 degrees, so then it turns it off and tries to slow it down, but until that happens, and it is some time lag and that's why the rate was building up. The jets were on and they were going to stay on due to that instantaneous 600 - suspected 600 degree per second range. Over.

SC
Okay, I got you.

CAPCOM
Roger.

SC
Man.

SC
Hey, Charlie, you saying that for a short period of time, he actually loaded Noun 20 with some value other than what's being read by the CDU's?

CAPCOM
I think I got, Buzz. That's affirmative. But when he did that second Verb 24 the noun was 20, so when he did the 3175 and then a 002 ENTER, what he actually did there was load the first two actual CDU locations, and the computer looked at it and the DAP looked at it as an instantaneous change in the actual CDU's. Stand by on your comments. We' re switching antennas.
SC
Okay.

SC
Alright.

CAPCOM
11, Houston. We got you back now on the high gain. Did you copy all that Buzz? Over.

SC
Yeah, I think so. I - I thought that noun 20 was one of those that you can never load from the DSKY and

CDT 22:43 GET 158:11 TAPE 495/2

SC
and that still may be. Maybe you would load it just for the short period of time, and then when the counters read the gimbal angles, then they changed it back to what they actually are, but in the meantime, the DAP is different numbers. Is that right?

CAPCOM
Well, I got it. Guy was telling me that you can actually load those ACDUs, the actual CDUs, but we're checking on that. Over.

SC
Okay.

CAPCOM
11, Houston. Buzz, the word from the back room is that you can actually load the noun 20, but you should not.

SC
Yeah, I got that. Thank you.

CAPCOM
You' re welcome.

END OF TAPE

CDT 22:58 GET 158:26 TAPE 496/1

CAPCOM
Apollo 11, Houston. We got a recommendation for you on your stowage of the LM EVVA's. Over.

SC
Go ahead.

CAPCOM
Okay, we'd like - the span guys say it look - they think that one would go on the helmet that you're going to have in B1, and you could put the other one on Mike's helmet which will be in the sleep restraint. 0ver.

SC
I doubt if it will fit on that one in B1. The other one might - might go into sleep restraint. We've got them in our helmet bags, and I guess we're going to have to keep the helmets in the helmet bags. and the LM EVVA's in the LM EVVA bags.

CAPC0M
Roger.

SC
I've been thinking maybe they ought to stay filled up. It won't hack, Charlie, with a cover. I tried it already.

CAPCOM
Okay. Fine. We weren't sure of that. It was just a suggestion. We thought we'd let you check it out. Sounds like you've already done that so I guess whatever you can come up with, just let us know.

SC
Okay. There's no problem. We'll let you know what we end up with.

CAPCOM
Roger.

END OF TAPE

CDT 23:08 GET 158:36 TAPE 497/1

PAO
This is Apollo Control. We've had no communications with Apollo 11 in the last several minutes. So, at this time, 158 hours 45 minutes Ground Elapsed Time, we will take down the circuit and come back up when and if conversation resumes prior to the time the crew starts their rest period, which tonight is scheduled for 10 hours. 158 hours 46 minutes Ground Elapsed Time, this is Apollo Control.

END OF TAPE

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PAO
This is Apollo Control, 159 hours 49 minutes Ground Elapsed Time. Apollo 11 crew is giving their final report prior to their starting their 10 hour rest period. We've got a little accumulation of tape, then we'll join live. Let's roll the tape now.

SC
Hello, Houston. Apollo 11.

CAPCOM
Go ahead, 11. Over.

SC
Okay. Crew status report. Radiation CDR 11020, CMP 10022, LMP 09024. No medication.

CAPCOM
Roger. Copy. And, Neil, we got - we'd like your onboard readouts of batteries and RCS. Over.

SC
Okay, Charlie. Ready to copy.

CAPCOM
Roger. Go ahead. Over.

SC
Okay. Bat C - Pyro Bat A- Pyro Bat B 37.0. RCS A, 51, B, 63, C, 63, D, 59. Over.

CAPCOM
Thank you. Copy all that, Neil. And we got a entry pad if you're ready to copy. Over.

SC
Houston, Apollo 11. Ready to copy. Over.

CAPCOM
Roger, Buz. In the entry pad MPL, we're starting with roll 05, 35 - correction - 359 152 001. PET 194 46 03 267 plus 1102 minus 17203 068 NOUN 60 36194 656 11894 36275 1950303 0027 NOUN 69, all four lines are NA. Picking up with B zero: 400 02 09. REP is blackout 00170338, 0820. Sextant star 02 09 45, 149. Foresight star is 45 theta. That's 45 theta. Up 315 right 35. Left vector up. Any comments? This entry pad assumes no mid-course six. And for your information, looking at it right now, based on all the tracking we got, that maneuver would only be a tenth of a foot per second. So, we'll probably skip it. We'll let you know more about that later. Okay, your horizon check at EI minus 30 minutes, DET at 194 33 03. Give you a pitch angle of 298 T. The DDC, you back up a line. You set stars for the entry REFSMAT are Deneb and Vega 079 234 340. Standing by for your read-back. Over.

SC
Roger. Lunar entry MPL 359 152 001, 194 46 03, 267 plus 1102 minus 17203 068 36 194 656 11894, 36275, 195 03 03, 0027, 4 NA, 400, 0209, 0017, 0338, 0820, 02 0945, 149, 45 theta. Up 315, right 35, up. Entrance no MCC 6. Horizon at EI minus 30, 194 33 03, and pitch 298. Set stars Deneb and Vega 079 234 340. Over.

CAPCOM
Roger. Very good read-back, Buz, and for your communication setup for tonight's sleep, we'd like OMNI to OMNI. Stand by.

CAPCOM
Apollo 11, Houston. If you didn't copy that, Buz, it was a good read-back on the pad. We've got a clock update for you that we'll have to you as soon as we get it out to the site. We're in the process of handing it over to Honeysuckle, and will be a couple of minutes. Over.

SC
Okay. Is that the computer clock?

CAPCOM
We'll call you. You can stay Block

CDT 00:21 GET 159:49 TAPE 498/2

right now. We'll give you a call.

END OF TAPE

CDT 00:31 GET 159:59 TAPE 499/1

CAPCOM
Hello Apollo 11, Houston, Will you please give P00 in excess. We've got a clock update for you.

SC
Go ahead Charlie. We're Po0 in excess.

CAPCOM
Roger.

CAPCOM
Apollo 11, Houston. We've got the loading, you can go back to block. Over.

SC
Roger. Thank you.

CAPCOM
Apollo 11, Houston. One final thing. We'd like you to select your OMNI to OMNI, OMNI A to BRAVO, high gain track manual and Beam Y. Your angles are 270 and yaw pitch minus 50. Over.

SC
Roger. 50 and minus 70.

CAPCOM
The angles Buzz were yaw 270 pitch minus 50. Over.

SC
Okay, yaw 270 pitch minus 50.

CAPCOM
That's right. And Apollo 11 it's goodnight from a sleepy White Team. Over.

SC
Roger. Thank you very much. We're not as sleepy tonight as we were last night.

CAPCOM
Yes, I guess you guys were pretty tired last night after that busy day.

SC
After that experiment, I can't even find the chlorine.

PAO
This is Apollo Control. Crew of Columbia at this time should be getting ready to start their 10-hour rest period after having been tucked in by spacecraft communicator Charlie Duke here in mission control. At 160 hours 10 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 02:00 GET 161:28 TAPE 500/1

PAO
This is Apollo Control, 161 hours, 28 minutes ground elapsed time. The crew of Columbia is now in a 10 hour sleep period. The official time they went to sleep according to the surgeon, Dr. Cannon Biers is 160 hours, 42 minutes ground elapsed time, almost an hour ago. The Columbia now is 141,369 nautical miles out from Earth, approaching at a velocity of 1,628 feet per second. Entry clock now showing 33 hours, 34 minutes to entry or 400,000 feet altitude. Here at Mission Control the black team of flight controllers headed up by Glen Lunnie is moving in to take over for the next eight hours or so. Spacecraft communicator, Charlie

Duke will be replaced by Ron Evans, who just entered the room. And at 161 hours, 29 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 03:00 GET 162:28 TAPE 501/1

PAO

This is Apollo control at 162 hours, 28 minutes. The Apollo 11 spacecraft Columbia is 138,674 nautical miles from earth approaching at a velocity of 4692 feet per second. Spacecraft weight, 26,000 pounds. Flight director Glen Lunney has just completed a status check with all of the flight controllers here, has gotten very good reports from all of them. The retrofire office here reports that on the present trajectory, Columbia's entry angle is minus 6.56 degrees. The nominal entry angle is minus 6.51 degrees. Retro expects entry velocity to be 36,194 feet per second. He calls these entry conditions excellent. The flight dynamics officer says that tracking is looking very good. Guidance navigation control officer reports the passive thermal control stable, operating very well. Reaction control system looking very good. ECOMM, the electrical environmental communications office reports cryogenics well balanced. The environmental control system looking good. All of the antennas and the power status in good shape. And, the flight surgeon reports the crew sleeping soundly. His data indicates all three crewmen were asleep by 160 hours, 42 minutes, and he reports they have taken no medication. In recovery reports, the weather looks very good in recovery area, and all conditions there are ready for a successful recovery. This is mission control at Houston.

END OF TAPE

CDT 04:00 GET 163:28 TAPE 502/1

PAO

This is Apollo Control at 163 hours 28 minutes. Apollo 11 is 135,920 nautical miles from earth. Velocity 4,758 feet per second. The crew's been asleep almost three hours now. All systems still performing welt. This is mission control Houston.

END OF TAPE

CDT 05:00 GET 164:28 TAPE 503/1

PAO

This is Apollo Control at 164 hours 28 minutes. Apollo 11 is 133,131 nautical miles from Earth, approaching at a velocity of 4827 feet per second. Crew is asleep. Performance of all systems continues to be normal. We're 30 hours 34 minutes 37 seconds away from entry of Apollo 11 into the Earth's atmosphere. This is Mission Control, Houston.

END OF TAPE

CDT 06:00 GET 165:28 TAPE 504/1

PAO

This is Apollo Control at 165 hours, 28 minutes. Apollo 11 is 130,306 nautical miles from the earth. Velocity 4,900 feet per second. Crew is still asleep and all systems are still performing well. This is Mission Control, Houston.

END OF TAPE

CDT 07:00 GET 166:28 TAPE 505/1

PAO

This is Apollo Control at 166 hours 28 minutes. Apollo 11 is 127,431 nautical miles from the Earth. Velocity 4975 feet per second. Crew still sleeping, all systems still normal. The weather bureau's space flight meteorology group reported today that weather conditions for the landing of Apollo 11 tomorrow expected to be acceptable. Some showers have been reported near the landing area, but these are expected to move westward, leaving the recovery area with partly cloudy skies, east-north easterly winds 10 to 15 knots and 4-foot seas. Although tropical storms will not affect weather in the landing area, the Apollo 11 crew should get a good view of the tropical storm Viola, located in the western North Pacific, and also the remains of the tropical storm Claudia, located southeast of Hawaii. This is Mission Control, Houston.

END OF TAPE

CDT 08:00 GET 167:28 TAPE 506/1

PAO

This is Apollo Control at 167 hours, 28 minutes. Apollo 11 is 124,520 nautical miles from the Earth approaching at a velocity of 5055 feet per second. All still going well aboard Apollo 11 maintaining a stable passive thermal control mode, nose pointed toward the Earth, rotating 3 revolutions per hour. This is Mission Control, Houston.

END OF TAPE

CDT 09:00 GET 168:28 TAPE 507/1

PAO
This is Apollo Control at 168 hours, 28 minutes. Apollo 11's distance from the earth is 121,505 nautical miles, velocity 5138 feet per second. All systems are performing well. The crew is still asleep. Clock here in the Control Center shows 26 hours, 34 minutes, 37 seconds until entry into the earth's atmosphere. This is Mission Control, Houston.

END OF TAPE

CDT 10:00 GET 169:28 TAPE 508/1

PAO
This is Apollo Control at 169 hours 28 minutes. Apollo 11 is 118,542 nautical miles from Earth approaching at a velocity of 5225 feet per second. The crew is still asleep, the performance of all systems continues to be normal. Midcourse correction number 6, which was scheduled for an elapsed time of 172 hours, has been canceled. The trajectory is such that it will not be required. From the Manned Space Flight Network we have a contribution to the Apollo 11 mission from a 10 year old boy in Guam. The Guam tracking station is receiving telemetry from this mission and had a problem with one if its antennas - a bearing. The bearing was replaced with the assistance of a 10 year old boy named Greg Force who had an arm small enough that he could work through a 2 and a half inch diameter hole to pack the new bearing. We're now showing entry interface with the Earth's atmosphere 25 hours 33 minutes 30 seconds from now, and the Green Team of flight controllers, led by Cliff Charlesworth, is now taking over from Glynn Lunney and his Black Team of flight controllers. This is Mission Control Houston.

END OF TAPE

CDT 11:00 GET 170:28 TAPE 509/1

PAO
This is Apollo Control at 170 hours 28 minutes. The Flight Surgeon reports that all three crew members probably are still sleeping. And there are no immediate plans to awaken them at this time. Apollo 11 is presently 115,470 nautical miles from the Earth and the speed is up to 5,317 feet per second. In about 4 hours 174 hours 24 minutes ground elapsed time, Apollo 11 will be in terms of distance half way home. At that point it will be 102,888 nautical miles from the moon, and 102,888 nautical miles from the Earth. All systems on the spacecraft continue to function normally at this time. The spacecraft weight is almost an even 26,000 pounds. At 170 hours 29 minutes, this is Apollo Control, Houston.

END OF TAPE

CDT 11:26 GET 170:54 TAPE 510/1

PAO
This is Apollo Control at 170 hours and 54 minutes. The flight surgeon reported a few minutes ago that telemetry data now indicates all three crewmen are awake after about 10 hours of rest. We expect we will be hearing from them shortly. Apollo 11 at this time is 114,146 nautical miles from here and the spacecraft velocity is 5359 feet per second. A press conference with the principal investigators for lunar samples is scheduled to begin in about 4 or 5 minutes and during that press conference we will tape record any conversation with the crew and play them back following. And 170 hours, 55 minutes, this is Apollo Control, Houston.

END OF TAPE

CDT 12:52 GET 172:20 TAPE 511/1

PAO
This is Apollo Control at 172 hours, 20 minutes. During the press conference we established contact with the crew. Capsule Communicator Owen Gary had put in a call at 171 hours about 10 minutes after the surgeon reported biomedical data showed all three crewmen awake. Neil Armstrong responded and we have received a status report from the crew and we also passed up the information, preliminary information, that they will use in the reentry tomorrow and gave them a weather report for the prime recovery area in the Pacific, the landing zone. We will play back about 12 minutes of taped conversation that we have accumulated to date and then stand by for any further live comments from the spacecraft.

SC
- had then yet. Over.

SC
- eyeballing the (cut out)

CAPCOM
11, Houston. Got your signals loud and clear. How are things this morning? Over.

SC
Do you read us, Owen?

CAPCOM
Roger. Loud and clear, 11.

SC
Okay. Everything seems to be all right here. So far we haven't been looking in the contents yet. We have been spending our time looking outside (cut out).

CAPCOM
Roger, 11. You are breaking up just a little bit there, Neil. Your signals are loud but you are breaking up occasionally. Your spacecraft all looks good here from the ground. We noticed you stirring around the cockpit and thought we'd give you a call. Over.

SC
Stand by.

CAPCOM
Houston. We do have a few items for you here, entry pads, consumables and so forth. After you have had a chance to get organized, whenever you are ready to start on a few of these items, we'll read them up to you. Over.

SC
Okay. Stand by.

SC
Go ahead, Owen, I've got the book now ready to copy.

CAPCOM
Okay, Buzz. On your flight plan items a few updates first of all. We have cancelled the midcourse No. 6. Just remain in PTC. I'll give you a little more time this morning. Second item on the flight plan is we're ready for a Bat B charge anytime you want to put it on the line and third item we'd like a waste water dump a little differently this time. We'd like to do it on our marks on the ground. The PTC is a little bit ragged and we'd like to make the water dump at a time which we think will hold it in its proper configuration

CDT 12:52 GET 172:20 TAPE 511/2

CAPCOM
so it looks like we will have a desirable opportunity coming along in between 15 and 20 minutes and on our mark we would like to have a waste water dump down to about 40 percent. I will give you a more accurate level for the water dump a little later. Over.

SC
Roger. (Inaudible)

CAPCOM
Roger, 11. Stand by just a moment here until we get out of the no-position on the antenna.

CAPCOM
11, Houston. We are on the OMNI DELTA now and I think we can read you better. Did you get all those first three items on your flight plan update? Over.

SC
Okay. Midcourse correction cancelled, Battery B charge and word on your call.

CAPCOM
That's right, Buzz, and the last item here we do request that we do a P-52 even though we are not doing the midcourse correction and we suggest you get to that after the waste water dump has been completed. We also have a state vector update for you, if you can give us a P00 and ACCEPT. Over.

SC
Okay. you have the DSKY now.

CAPCOM
Roger. We'll be sending that up, and I will give you your consumables update now. It is for a time of 170 hours, your RCS total is minus 3.5 percent, Alpha is minus 14.5, BRAVO Plus 7, CHARLES minus 4.5, DELTA minus 3, hydrogen total is minus 1 and your oxygen total is plus 24. Over.

SC
Roger. Copy those. And outboard readouts is D is 69, C is 73, D is - let me say it over again. Okay. A is 51, B is 62, C is 63 and D is 59. Over.

CAPCOM
Roger, 11. Copy those and we've checked them out on the ground also. One correction to my last transmission. We would like that P-52 prior to the waste water dump which is coming up in about 30 minutes now. Will that be possible. Over.

SC
Yes, Owen, we'll take care of that.

CAPCOM
Roger. And if you are ready for an entry pad, I'll read that up to you also, 11.

SC
Ready to copy.

CAPCOM
Okay. Entry pad is area midpack 359153001 1944603 267 plus 1102 minus 17203 06736194 65511875 36275 1950303 0028 DL at VL all four are not applicable, D 0, 400 0210 0018 0338 0821 442932 380 fore sight star is Scorpio Vega, up 314 Right 34 (garble) vector up. Comments, entry data assumed no midcourse

CDT 12:52 GET 172:20 TAPE 511/3

CAPCOM
maneuvers. Your earth entry minus 30 minutes horizon check 194 plus 33 plus 03. Your PITCH is 297. This assumes an entry REFSMMAT. Your GDC align stars are Deneb and Vega. ROLL PITCH YAW is 078233 340. Readback. Over.

SC
Roger. Midpack entry pad 359153001 2944603 267 plus 1102 minus 17203 06736194 65511875 362751950202 0018 DL and VL at AGS, 400 0210 00180338 0821 442932 380, fourth guide DELTA, Scorpio Vega, up 314, Right 34, up. No midcourse correction horizon PI minus 30

END OF TAPE

CDT 13:02 GET 172:30 TAPE 512/1

SC
About the midcourse correction, horizon TI minus 30, 1943303, pitch 97, deneb and vega 078233340. Over.

CAPCOM
11, Houston. That's roger, copy. 11, it's also your computer. Go back to block.

SC
Roger.

SC
Crew status report is 8 1/2, 7, and 8.

CAPCOM
11, Houston. Roger, Neil. 8 1/2, 7, and 8 for your crew status. 11, Houston. Your P52 looks good here on the ground, and we are now estimating that water dump will occur along about 171 plus 40, and we'd like for you to dump to about 45 percent. This should let you arrive at earth interface with just about a full load of waste water. Over.

SC
Okay, 150, 140 approximately. 40 percent.

CAPCOM
11, Houston. We'd like to advance the time on that water dump to about 171 plus 30 just after we reacquire on the next omni,

and have I mentioned that it'll be down to about 45 percent is the new quantity. Also, we're standing by for your CM RCS injector temperature readout. Over. Apollo 11, Houston. I'm not certain you copied my last transmission as we were just in the process of switching omnis. We'd like to advance the time on that water dump until about 5 minutes from now. We'll give you a precise mark on the time to start the dump, and we are standing by for your readout on your CM RCS injector temperatures. Over.

SC
Okay, Owen. We're standing by for your mark, and stand by for the readout.

CAPCOM
Roger.

SC
Houston, Apollo 11. Are you ready to copy injector temperatures? I'll read them in volts.

CAPCOM
That's affirm. Go ahead, Mike.

SC
Okay, 2-4 is reading 4.7 volts. 2-5 is reading 4.8 volts, 1-2 is reading 4.8 volts, 1-4 is reading 4.8, 1-6 is 4.5, and 2-1 4.8. Over.

CAPCOM
11, Houston. Roger. Those - I got them all. Apollo 11, Houston. We're ready for you to start your waste water dump at this time. Over.

SC
Roger, dumping.

CAPCOM
Apollo 11, Houston. We show you -

SC
Apollo 11. We've dumped to 45 percent. We're stopping now. Do you concur?

CAPCOM
Roger, 11. We concur.

CAPCOM
- weather for the recovery anytime you'd like to hear about it. Over.

SC
Go ahead.

CAPCOM
11, Houston. Present forcast

CDT 13:02 GET 172:30 TAPE 512/2

CAPCOM
shows acceptable conditions in your recovery area. 2000 foot scattered, high scattered, wind from 070 degrees, 13 knots, visibility 10 miles, and sea stayed about 4 feet. The forecast yesterday showed a tropical storm, Claudia some 500 to 1000 miles east of Hawaii. The - the pictures from earth satellites you were taking yesterday afternoon showed Claudia dissipating, so this appears to be even less a factor than it was before. Your recovery area is now believed to be just a little ways north of the intertropical conversion zone which you can probably see when you look out your windows there. Yesterday there was also a report of a tropical storm, Viola. Further to the west its present location is some thousand miles east of the Phillipines and moving northwest. Tropical storm, Viola, has been intensifying and should be transfered to the typhoon category within the next 12 hours or so, however, that will be far to your west. As a matter of fact, sunrise terminator has not yet reached Viola. When it does several hours from now, you can probably distinguish it from your viewpoint quite readily. As a matter of fact it should be of interest to take some pictures and comment on it when you get a change to see Viola in a few hours. So that's about the present weather state and situation for your recovery area. Over.

SC
Houston, pretty good forcast.

CAPCOM
Apollo 11, Houston. Over.

SC
Go right ahead, Houston.

CAPCOM
11, Houston. We'd like to try our operation out with the high gain ray here. If you would select reacquire and your S-band antenna to high gain, your positions are pitch plus 40 and yaw 270, and then monitor for acquisition. Over.

SC
Okay, it's in work.

CAPCOM
11, Houston. We're just now ready to switch from omni delta over to your high gain antenna. Can you get confirm that you have gone to reac. Over.

SC
Confirmed.

CAPCOM
That looks real good, Mike. Looks like we picked up about 30 DB on the signal strength.

SC
Yeah, I came in quite quickly. However, I'm showing about 24 yaw and about zero on pitch now.

CAPCOM
Roger, about 240 and 0.

PAO
This is Apollo Control at 172 hours, 38 minutes. Apollo 11 now 108,669 nautical miles from the earth traveling at a speed of 5534 feet per second.

END OF TAPE

CDT 13:12 GET 172:40 TAPE 513/1

All dead air.

END OF TAPE

CDT 13:33 GET 173:01 TAPE 514/1

PAO
This is Apollo Control at 173 hours, 18 minutes. There are virtually no flight plan activities scheduled at this time. The spacecraft systems all continue to perform normally, and at the present time, Apollo 11 is 106,482 nautical miles from the earth, and velocity is 5607 feet per second. At 174 hours, 24 minutes the spacecraft will be approximately half way between the earth and the moon in terms of distance, and it will be 102,888 nautical miles from the earth and the same distance from the moon. The spacecraft weight at this time is 26,000 pounds.

END OF TAPE

CDT 13:52 GET 173:20 TAPE 515/1

CAPCOM
Apollo 11, Houston. Over.

SC
Go ahead.

CAPCOM
I just wanted to make sure you fellows hadn't gone back to sleep again. And I also have a little bit of late news here if you'd like to find out what's happened in the last 12 - 14 hours. Over.

SC
Okay, go ahead.

CAPCOM
Oke doak. Hot off the press here, we find Juan Carlos was formally designated yesterday - Tuesday - to become General Franco's successor as the Chief of State of Spain and eventual King. Juan Carlos will be sworn in today as his successor designates after taking an oath of loyalty to the law and the national movement, Spain's only legal political organization. He will apparently be called the Prince of Spain. House Ways and Means Committee also has agreed yesterday to tax changes affecting oil companies, also banks and utilities. House could add as much as 2 billion dollars per year to the federal revenue. The committee also voted tentatively to change the accounting procedures for telephone, electric, and oil pipeline companies and to reduce tax benefits of mutual savings and loans institutions. So, it looks as if tax reform may be on the way. Looking overseas, we find South Korea's first super highway linking toll with the Port of Ingchong has been named the Apollo Highway to commemorate your trip. I think we mentioned last night that President Nixon has already started on his round the world trip and today he is in San Francisco on his first stop which will take him to the U.S.S. Hornet, from which he'll watch the return of your spacecraft. He plans to visit the 7 nations including Rumania during this trip. As I think you also knew, had to miss the All-Star Baseball game yesterday as it was rained out, but it is being played today. The West Coast residents in Seattle, Washington, Portland, Oregon, Vancouver, British Columbia, San Francisco, all plan to make their areas visible to the 3 of you by lighting their lights between 9 p.m. and midnight according to the associated press. We do have clear weather predicted there, so you may be able to see the Christmas lights, porch lights, store lights, and whatever may be turned on. A little closer to home here, back in Memphis, Tennessee, a young lady who is presently tipping the scales at 8 pounds, 2 ounces was named "Module" by her parents, Mr. and Mrs. Eddie Lee McGhee. "It wasn't my idea," said Mrs. McGhee, "it was my husbands." She said she had balked at the name Lunar Module McGhee, because it didn't sound too good, but apparently they compromised on just Module. Over.

CAPCOM
Roger, we hear a few chuckles coming from that direction. And we do have a late report on the sports here also. The All-Star game apparently being played.

CDT 13:52 GET 173:20 TAPE 515/2

CAPCOM
The present score at the end of the 4th inning has the National League leading the American League by 9 to 3. So the hitters are having a good day, you can tell. And rain clouds are over the MSC area at the moment. It began raining here just about 10 minutes ago, and last report, we were having a pretty heavy deluge. So, that's it from the news front for the afternoon here, Apollo 11. Over.

SC
Thank you very much, Owen. I think maybe ya'll could use some water.

CAPCOM
That's very true. I've forgotten exactly how many days it did go Buzz. Something like 30 days without rain, we can appreciate the rain we're getting right now.

SC
That was Neil. This is Buzz. I wonder if you could find out when was the last time my lawn was cut.

CAPCOM
That might be a little more difficult to find out. I'm not sure whether the - whether Mike is ready to admit when he last did the job, but I'll look into that for you.

SC
He'll tell you. He's got a new mower.

CAPCOM
Roger.

SC
Hey, how's my cinch bugs? How are they doing?

CAPCOM
Well, I'm not sure about your's but I can let you know about my own, and their report isn't very good.

PAO
Owen Garriott is the capsule communicator here in mission control at this time.

END OF TAPE

CDT 14:12 GET 173:40 TAPE 516/1

PAO
This is Apollo Control at 173 hours 43 minutes. Apollo 11 now 115,165 nautical miles from Earth, the velocity continuing to increase gradually at 5652 feet per second. The cabin temperature in the spacecraft has been running around 62 degrees and coming up within the next hour Apollo 11 will be crossing the midway point in distance, that to occur at 174 hours 24 minutes and 7 seconds. There will be a briefing at 3:00 p.m. Central Daylight Time in the Building 1 Auditorium on the Lunar Receiving Laboratory.

CAPCOM
11, Houston. Over.

SC
Go ahead.

CAPCOM
Joan wasn't home right now, Buzz, but Janis reports the grass is getting pretty high and I would estimate it's going to be close to your knees by the time you get out of quarentine. Over.

SC
Okay, I'll have to schedule a little dismission I think if I -

CAPCOM
Roger, and no reports from the chinch bugs there, Mike.

SC
Well, they're sort of passive turned little fellows. They don't say much, they just jump away.

CAPCOM
Concur on that.

SC
Which is about what we're doing up here.

CAPCOM
We concur on that, too.

SPEAKER
I'm not use to all this, but I'm sitting here right beside him.

SC
Breakfast was magnificent as usual. I had sliced peaches, sausage patties, 2 cups of coffee, and I forget what all else.

CAPCOM
That does sound pretty good. As a matter of fact, I'm way over due for a meal myself here. I could eat some of that.

SC
Why don't you get Milt to give you 5 minutes off and grab a hamburger?

CAPCOM
I suggested that a while ago. He was pointlng out about the weight problem here. We've got to keep the calories low, so I'd better stand by without it.

END OF TAPE

SC
Houston, Apollo 11. We've been doing a little flight planning for Apollo 12 up here.

CAPCOM
Roger, go ahead.

SC
We're trying to calculate how much spaghetti and meatballs we can get onboard for Al Bean.

CAPCOM
I'm not sure the spacecraft will take that much extra weight. Have you made any estimates?

SC
It'll be close.

PAO
That last comment came from Mike Collins referring Al Bean who is the Lunar Module Pilot for Apollo 12.

CAPCOM
11, Houston. The medics at the next console report that the shrew is one animal that can eat 6 times it's own body weight every 24 hours. This may be a satisfactory baseline for your spaghetti calculations for Al Bean, over.

SC
Okay, I guess there's been worse.

SC
Houston, Apollo 11. It was rightly colder in here last night than it has been on any previous night. Does EECOM notice any change in data or any explanation for that?

CAPCOM
Roger, stand by just a moment. We're going to check some temperatures.

SC
Up until last night it was - if anything on the warm side at night. Last night it was on the chilly side.

CAPCOM
Roger, then we'll run down the temperature for the two nights.

SC
Oh, it's no big thing. Just a matter of interest.

CAPCOM
Roger.

SC
And how did you like the Command Module RCS temperatures?

CAPCOM
11, Houston. They all look very good. The lowest temperature was 40 degrees, and we're taking a look at your cabin temperatures now.

SC
We agree on the CM RCS. No heaters are going to be required by a country mile.

CAPCOM
We think that's correct.

SC
We don't like those heaters, anyway, working out the (garbled) coils.

CAPCOM
Roger.

END OF TAPE

CDT 14:33 GET 174:01 TAPE 518/1

SC
The peculiar thing, Owen, now on the platform alignment is that when I really take my time and do a very slow, careful, precise job of marking, I'm getting about the same star angle difference as when I'm doing it in DPC and have to do a hurried rush job with relatively poor tracking. Star angle difference is - seem insensitive. It almost made me believe there's very small bias there somewhere in the sextant.

CAPCOM
Roger, 11. Perhaps the 3 degrees per second just isn't that much of a bother. Over.

SC
Well, he's really trying to explain why he can't get all zeros.

SC
I think Buzz is probably right. As a matter of fact, one time I made a mark which I thought was a little bit in error, but I thought, well, the heck, I'll go ahead and see how it works out anyway, and I got 5 zeros that time. And when I have thought everything was exactly precisely on I have consistently been getting .01.

CAPCOM
Roger. Apparently it pays to hurry.

SC
I usually do. The visibility through the telescope has been very poor. It's I would say even worse than the simulator is right now. It requires long periods of dark adaptation which most times are most inconvenient, so it's really a tremendous asset to keep the platform powered up at all times and keep - it sweeps within the capability of the sextant field of view.

CAPC0M
Understand, Mike.

CAPCOM
11, Houston. Checking your temperatures, those look like the spacecraft may have cooled down about 2 or 3 degrees in the last 24 hours, and that sounds to be consistent with your report on the comfort level. Over.

SC
Okay. Is that a LM off phenomenon?

CAPCOM
11, Houston. It looks like we'll have to think a little more about that, whether it's a LM off or some effect of being out of lunar orbit, so we don't know, so we'll have to puzzle before we can get a better answer.

SC
Well, if the systems guys have anything they want chased down we'll be happy to give you any readings or reports or what have you.

CAPCOM
Roger. We'll think about that and see if there aren't some other tests to be usefully performed here.

SC
Okay.

END OF TAPE

CDT 14:43 GET 174:11 TAPE 519/1

CAPCOM
11, Houston, I'll be turning things over to the Green CAPCOM at this time and I'll see you on the ground tomorrow.

SC
Okay, Owen. I want to thank you and old purple maroon team there for a good job helping Apollo 11.

CAPCOM
Thank you, sir.

SC
Thanks again fellows. It was really appreciated.

SC
Great job you guys.

CAPCOM
Roger, out.

PAO
Astronaut Bruce McCandless has just relieved Owen Garriott as Capsule Communicator. At 174 hours 14 minutes Apollo 11 is 103,440 nautical miles from Earth traveling at a speed of 5713 feet per second.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead, Houston, Apollo 11.

CAPCOM
11, this is Houston. With reference to your subjective evaluation that it felt cooler inside the spacecraft last night, we reported earlier that we did indeed see a drop of about 3 degrees over the previous night. Looking back, it appears the crew of Apollo 10 reported similar feelings during the translunar and transearth coast phases. We're wondering if you could give us any indication of the relative amount of free or condensed water in the cabin last night and the night before from which we could infer humidity. Over.

SC
That might be a little bit difficult to do. We'll take a look at the tunnel now. It does seem that though between the dirt and all, we've had a little bit more moisture in the tunnel - correction - the LM hadn't been opened yet and we were translunar.

CAPCOM
Roger. We were more curious about the relative amount of moisture between, say last night and the night before, both of which would have the LM missing.

SC
There's more moisture in the tunnel now than there has been at any previous time, but subjectively we have been unable to determine any change in - any build-up in humidity. There appears to be no moisture any other place in the spacecraft for example, the windows are not fogging, and various other cool spots of the spacecraft, all then appear to be completely dry.

CAPCOM
This is Houston. Roger. Thank you.

END OF TAPE

CDT 15:03 GET 174:31 TAPE 520/1

PAO
This is Apollo Control at 174 hours, 35 minutes. Apollo 11 now 102,286 nautical miles from earth and we have crossed the halfway point in terms of distance at 174 hours and 24 minutes and 7 seconds. The briefing on the Lunar Receiving Laboratory is scheduled to begin at MSC in Building 1. We'll tape record any conversations with the spacecraft and play those back immediately following the press conference. This is Apollo Control at 174 hours, 36 minutes.

END OF TAPE

CDT 16:14 GET 175:42 TAPE 521/1

PAO
This is Apollo Control at 175 hours, 42 minutes. Apollo 11 is now 98,512 nautical miles from the earth. The velocity, 5892 feet per second. During the preceding press conference, we accumulated about 7 minutes of taped conversation which we'll play back for you now.

SC
How's all the greens today, Bruce?

CAPCOM
Oh, the greens' in good shape. The actual green team has been here for several hours but we're dogging the watch down here to position on for entry. Over.

SC
Roger. Understand. Did Dave Reed get to explain the lunar search at the press conference?

CAPCOM
No but your comments about Phil Shaffer and the explanations were quoted in the paper last night.

SC
Oh, oh.

CAPCOM
You want to say anything more while your on the line?

SC
He's right. He's absolutely right.

SC
How about White Burr, did he ever let you go get a cup of coffee when we were over on the back side?

CAPCOM
Oh things have been going pretty smoothly down here. He's really not that hard to get along with.

SC
He must be mellowing.

CAPCOM
Well we've only got 2 of them back there right now.

SC
He always used to make me sit at the console through the back side then, just for training.

CAPCOM
Well what we have here is - that was because we're having you come back. You have to retrain.

SC
I'm excited.

SC
Houston, Apollo 11. Out of curosity on those 70 millimeter cameras we figured we exposed some 300 in the LM and around a thousand in the Command Module and both cameras are in the cabin (garble) if only all cameras worked this fine.

CAPCOM
Okay very good. Thank you.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead, Houston.

CAPCOM
11, this is Houston. You won't have to change LIMA for your entry operations checklist dated July 23. Over.

SC
Dated when?

CAPCOM
July 23.

SC
I'm not sure that we've been gone long enough. Oh well.

CAPCOM
Okay. If you've got the entry

CDT 16:14 GET 175:42 TAPE 521/2

CAPCOM
operations checklist handy then I'll pass it up to you. Over.

SC
How can you make changes after lift-off?

CAPCOM
You sure you don't mean Jim?

SC
Negative. It just came up today. Over.

SC
So you're the first to get to us. Go ahead.

CAPCOM
Okay. On page 6-1 of the entry out checklist down towards the bottom after main deploy push button, we have 3 additional steps we'd like you to accomplish. The intent of this is to reduce the oxygen pressure in your manifold and to eliminate the oxygen GLYCOL through the portable and waste water tanks during descent. Over.

SC
Okay. We (garble)

CAPCOM
Okay. Down at the bottom, you've got 10,000 feet main parachute deploy, main deploy push button push within 1 second. And after that step, we'd like you insert stowage tank O2 valve OFF, repress package valve OFF and director O2 valve OPEN. You copy.

SC
Okay. At the bottom, after main deploy push button push, stowage tank O2 OFF and repress vacuum center OFF Director 2 ON. Over.

CAPCOM
Roger. And down at the very bottom of 6-2 where you see director 2 OFF verify, delete that step completely. Over.

SC
Roger.

CAPCOM
And for record purposes, this will be change LIMA. Over.

SC
Okay. We've got it. How far open do you want this Director 2, to be open at this point? I guess you want it - just leave it open from that point on?

CAPCOM
Roger. It should go all the way open and you can just leave it on from that point on. The intent is to completely depressurize the oxygen manifold. Over.

SC
Roger. Copy.

CAPCOM
Apollo 11, this is Houston. For your information the all-star game has just ended with the National League winning 9-3 over American. Over.

SC
Roger. Thank you.

CAPCOM
And I have a message here for Mike that says "All the chinch bugs are gone". Over.

SC
Having done their job I guess.

CAPCOM
Along with 1 tree it turns out.

SC
Yes. I heard about that and that was right before the flight..

CDT 16:14 GET 175:42 TAPE 521/3

CAPCOM
Right. That big storm.

PAO
This is Apollo Control. That brings us up to date with the tape recorded conversation. We'll continue to stand by for any further communications with the spacecraft. During the previous conversations you heard Mike Collins toss a couple of good-natured bobs at Flight Director Cliff Charlesworth. Collins was Capsule Communicator on Charlesworth's shift during the Apollo 8 mission. At 175 hours, 51 minutes Apollo 11 is 98,034 nautical miles from the earth.

END OF TAPE

CDT 16:24 GET 175:52 TAPE 522/1

All dead air.

END OF TAPE

CDT 16:54 GET 176:22 TAPE 523/1

CAPCOM
Apollo 11, this is Houston. Are you still up there? Over.

SC
Yes, we are, but not quite so far as we were a while ago.

CAPCOM
Roger. We concur. We just wanted to make sure that we had good comm with you.

SC
Okay.

CAPCOM
For general information, 11, you are now 95,970 miles out from the earth. Over.

SC
Our own back yard.

CAPCOM
Say again.

SC
Right in our own back yard.

CAPCOM
Roger that.

SC
Trying to come down hill a little bit now. What's our velocity?

CAPCOM
Your velocity is 5,991 feet per second.

SC
Thank you.

CAPCOM
And you are indeed coming down hill.

PAO
This is Apollo Control at 176 hours 44 minutes. Apollo 11 now 94,961 nautical miles from earth. The velocity has just gone over the 6,000 foot per second mark. We're 6,029 feet per second. The next item scheduled on the flight plan is a television transmission. That's scheduled to occur at ground elapsed time of 177 hours 30 minutes, which would be 6:02 PM Central Daylight Time. Among the clocks counting down or up to and from significant events here in Mission Control. We have one counting down to entry. That clock now shows 18 hours 18 minutes and 12 seconds until entry. Reentry is scheduled to begin based on no further midcourse corrections at 195 hours 3 minutes 5 seconds. At this time, it appears that midcourse correction 7, if it were done, would only require 0.2 of a foot per second, and based on current tracking, we wouldn't expect to have to midcourse correction 7, although the tracking will be continued and a decision on midcourse correction 7 will not be made - until closer to the time of the maneuver.

END OF TAPE

CDT 17:19 GET 176:47 TAPE 524/1

All dead air.

END OF TAPE

CDT 17:39 GET 177:07 TAPE 525/1

CAPCOM
Apollo 11, this is Houston, over.

SC
Go ahead, Houston.

CAPCOM
Roger, 11, I've got a flight plan update for you to give an optimum attitude for the earth in the number 1 window and the moon in number 5 window, over.

SC
Ready to copy.

CAPCOM
Roger, your attitude will be roll 12 degrees, pitch 270 degrees, yaw zero degrees. High gain antenna angles, pitch +14, yaw 263, over.

SC
Roger, I copy. Roll 012 Pitch 270, Yaw zero, high gain antenna pitch +14 and Yaw 263.

CAPCOM
Roger, I have one coming out of PGC. You might be advised that your dead band has been collapsed, so that's all the check list items, over.

SC
Roger, that.

PAO
And this is Apollo Control at 177 hours 11 minutes. Our network controller advises that we're starting to get some semblance of TV signal from the spacecraft. We suspect that we may be getting some checkout. We'll continue to stand by and be prepared to take whatever's happening.

CAPCOM
Eleven, this is Houston. We're receiving a light signal from you right now but we are getting TV, over.

PAO
This is Apollo Control. The network controller now reports that the TV signal is down. Apparently having been turned off and we suspect that what we have is a test of the system by the crew. The television transmission from the spacecraft is scheduled to begin at 177 hours 30 minutes or about 2 minutes past 6, Central Daylight time. At the present time Apollo 11 is 93 thousand 2 hundred 18 nautical miles from the earth.

END OF TAPE

CDT 17:49 GET 177:17 TAPE 526/1

COMM TECH
Goldstone Comm Tech Net 1.

COMM TECH
Goldstone Houston Comm Tech Net 1.

COMM TECH
Goldstone Comm Tech.

COMM TECH
Roger. Check for keys please.

COMM TECH
Roger.

COMM TECH
Goldstone, Houston Comm Tech.

COMM TECH
Goldstone Comm Tech. 100 percent keys.

COMM TECH
Roger. Thank you.

COMM TECH
I'm in mode Net 1 now.

COMM TECH
Roger.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead.

CAPCOM
Some signal strength indications that a steer or two may be locked up on a side lobe with a high gain antenna. We'd like you to go into wide band width for about 15 seconds and then back to narrow. Over.

SC
Alright.

PAO
This is Apollo Control at 177 hours, 30 minutes. We're standing by at this time to receive television pictures from the Apollo 11 spacecraft. A short while ago we received the test transmission and apparently everything is functioning normally. We were receiving television signal from Goldstone relayed on through to Houston. We'll continue to stand by for the TV.

SC
You want us to go to S-band signal transfer, Houston?

CAPCOM
That.'s affirmative, 11.

SC
You all set for TV?

CAPCOM
Roger, we're all set whenever you're ready to send.

SC
Okay.

CAPCOM
Okay, you're coming through loud and clear now, 11, with your patch.

END OF TAPE

CDT 18:04 GET 177:32 TAPE 527/1

CAPCOM
Okay, you're coming through loud and clear now, 11, with your patch.

PAO
We have black and white signals. We should have the conversion up shortly.

CAPCOM
With your patch.

ARMSTRONG
Good evening. This is the Commander of Apollo 11. A hundred years ago, Jules Vernes wrote a book about a voyage to the moon. His spaceship, Columbia, took off from Florida and landed in the Pacific Ocean, after completeing a trip to the moon. It seems appropriate to us to share with you some of the reflections of the crew as the modern day Columbia completes its rendezvous with the planet earth and the same Pacific Ocean tomorrow. First, Mike Collins.

CAPCOM
11, this is Houston. We have an LOS here.

ARMSTRONG
We'll be right back with you.

CAPCOM
Roger.

CAPCOM
In the interim, you may be interested in knowing that Jan and the children and Pat and the youngsters and Andy Aldrin are down here in the viewing room watching this evening.

ARMSTRONG
We're glad to hear that.

CAPCOM
Okay 11, you're back on with Mike in the middle of the screen there.

COLLINS
Roger. This trip of ours to the moon may have looked, to you, simple or easy. I'd like to say that it has not been a game. The Saturn V rocket which put us into orbit is an incredibly complicated piece of machinery. Every piece of which worked flawlessly. This computer up above my head has a 38,000 word vocabulary. Each word of which has been very carefully chosen to be of the utmost value to us, the crew. This switch which I have in my hand now, has over 300 counterparts in the command module alone. There is one single switch designed. In addition to that, there are myriad of circuit breakers, levers, rods, and other associated controls. The SPS engine, our large rocket engine on the AFT end of our service module, must have performed flawlessly or we would have been stranded in lunar orbit. The parachutes up above my head must work perfectly tomorrow, or we will plummet into the ocean. We have always had confidence that all this equipment will work, and work properly, and we continue to have confidence that it will do so for the remainder of the flight. All this is possible only through the blood, sweat, and tears of a number of people. First the American workmen, who put these pieces of machinery together in the factory. Second, the painstaking work done by the various test teams during the assembly and retest after assembly. And finally, the people at the Manned Spacecraft Center, both in management, in mission planning, in flight control, and last, but not least, in crew training. This operation is

CDT 18:04 GET 177:32 TAPE 527/2

COLLINS
somewhat like the periscope of a submarine. All you see is the three of us, but beneath the surface, are thousands and thousands of others, and to all those, I would like to say thank you very much.
CAPCOM
11, this is Houston. We're getting a good picture of Buzz now, but no voice modilation. And would you open up the F-stop on the TV camera, try 22, please? That appears to be a lot better now. We're still not receiving Buzz's audio.

ALDRIN
Good evening. I'd like to discuss with you a few of the more symbolic aspects of the flight of our mission, Apollo 11. But we've been discussing the events that have taken place in the past 2 or 3 days here on board our spacecraft. We've come to the conclusion that this has been far more than 3 men on a voyage to the moon. More still than the efforts of a government and industry team. More even, than the efforts of one nation. We feel that this stands as a symbol of the insatiable curiosity of all mankind to explore the unknown. Neil's statement the other day upon first settiag foot on the surface of the moon, "this is a small step for a man, but a great leap for mankind," I believe sums up these feelings very nicely. We accepted the challenge of going to the moon. The acceptance of this challenge was inevitable. The relative ease with which we carried out our mission, I believe, is a tribute to the timeliness of that acceptance. Today, I feel we're fully capable of accepting expanded roles in the exploration of space. In retrospect, we have all been particularly pleased with the call signs that we very laboriously chose for our spacecraft, Columbia and Eagle. We've been particularly pleased with the emblem of our flight. Depicting the US eagle, bringing the universal symbol of peace from the earth, from the planet earth to the moon, that symbol being the olive branch. It was our overall crew choice to deposit a replica of this symbol on the moon. Personally, in reflecting the events of the past several days, a verse from Psalms comes to mind to me. "When I considered the heavens, the work of Thy fingers, the moon and the stars which Thou hast ordained, what is man that Thou art mindful of him."

ARMSTRONG
The responsibility for this flight lies first, with history.

END OF TAPE

CDT 18:14 GET 177:42 TAPE 528/1

ARMSTRONG
The responsibility for the flight lies first with, history and with the giants of science who have preceded this effort. Next with the American people, who have through their will, indicated their desire. Next to four administrations, and their congresses, for implementing that will, and then to the agency and industry teams that built our spacecraft, the saturn, the Columbia, the Eagle, and the little EMU, the space suit and back pack that was our small spacecraft out on the lunar surface. We would like to give a special thanks to all those Americans who built the spacecraft, who did the construction, design, the tests, and put their, their hearts and all their abilities into those crafts. To those people, tonight we give a special thank you, and to all the other people that are listening and watching tonight, God Bless you. Good night from Apollo 11.

CAPCOM
Eleven, this is Houston, we're getting a zoom view out the window now.

SC
Apollo 11, signing off.

PAO
That brief view of the earth came from 91 thousand 3 hundred 71 nautical miles out in space. After a brief and sincere and moving transmission from the Apollo 11 spacecraft. This is Apollo Control at 177 hours 45 minutes.

SC
Houston, Apollo 11, do you want to crank that PTC again, do you have some reason to hold its attitude or what's your pleasure.

CAPCOM
You can crank up PTC again, Mike, any time you like. And I might add I thought that was a mighty fine TV presentation there's certainly nothing I can add to it from down here.

SC
garbled.

END OF TAPE

CDT 18:24 GET 177:52 TAPE 529/1

CAPCOM
Apollo 11, this is Houston, over.

SC
Go ahead.

CAPCOM
Okay 11. I've gotta few small items here. One's flight plan update, and some entry photography information if you are ready to copy, over.

SC
Go ahead.

CAPCOM
Roger. At 180 hours 50 minutes GET we would like to delete your oxygen fuel cell purge.

SC
Okay.

CAPCOM
And on the entry photography, if you are going to use a fresh - magazine of color interior film, we recommend the following exposure settings. F 11 at 1/250th frames per second. Focus on 7 feet for the fireball. F 2.0 1/60th of a second. 6 frames per second. Focus on 50 feet when the chute's opened. If you are using a magazine part of which has already been used for interior shots, we recommend F 16 at 1/500th of a second. 6 frames per second. Focus on 7 feet for the fireball. F 2.8 1/60th of a second. 6 frames per second. Focus on 50 feet when the parachutes open, and we would like to know the magazine number if you are intending to use if you have a chance, over.

SC
Okay, I think we got those. We will be using a fresh one and it will be - color interior, over.

CAPCOM
Roger. When you get - get it out we would like to have the number of the magazine and the letter of the magazine relayed down.

SC
Okay, and we're thinking that we might want to run some of this at 12 frames per second. And I think we can get everything from point size of - point 0 size B down that will only give us about 7.8 minutes and (garbled) double that. I guess maybe just an occasional burst to 12 frames would be what we want and the rest of it six.

CAPCOM
This is Houston. That plan sounds fine with us Neil.

SC
Okay.

CAPCOM
And lastly, we would like to know if your storage configuration for entry is going to conform to the nominal. The retros down here are acted to get accurate CG computed for you and in particular where the EVVAS are being stowed, over.

SC
Okay. I think we are going to put the EVVAS and helmets the - in the hatch bag and we'll let you know any nonstandard stowage locations that we complete this evening.

CAPCOM
This is Houston, Roger, out.

END OF TAPE

CDT 18:34 GET 178:02 TAPE 530/1

SC
Houston, Apollo 11.

CAPCOM
Go ahead, 11.

SC
Roger. The magazine will be using perhaps a large magazine M. Over.

CAPCOM
Roger. Understand. Magazine hand is in Mike.

SC
That's right.

CAPCOM
Thank you. Out.

CAPCOM
Apollo 11, this is Houston. You're friendly green team going off for the night, and going off for the last time. We wish to bid you a good night and God speed.

SC
Thank you. We appreciate all that time worked up by the green team and we'll be thanking your crew as soon as we get back.

CAPCOM
Roger. We'll see you on the ground.

SC
We really enjoyed working with all of you. Thank you very much. Over.

CAPCOM
Roger.

SC
As usual all you green.

CAPCOM
They're all smiles down here, even the trench.

END OF TAPE

CDT 18:54 GET 178:22 TAPE 531/1

PAO
This is Apollo Control. Here in the Mission's Control room of Mission Control Center the white team of flight controllers under Flight Director Gene Kranz settling in for the 10 hour shift ahead until 5:00 A.M. Green team Flight Director Cliff Charlesworth is now enroute to the Houston Apollo News Center and shortly will be there for his Change of Shift Press Conference estimating about 10 minutes for his arrival. We'll continue to monitor the Apollo 11 air to ground circuit should the communications resume. Standing by 178 hours, 25 minutes ground elapsed time, this is Apollo Control.

PAO
This is Apollo Control. Apollo 11 now 88,442 nautical miles out from earth approaching at a velocity of 6299 feet per second. Change of Shift Press Conference with green team Flight Director Cliff Charlesworth due to begin any moment now in the NASA Apollo News Center Auditorium. And at 178 hours, 34 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 19:41 GET 179:09 TAPE 532/1

PAO
This is Apollo Control, 179 hours, 9 minutes ground elapsed time. During the past half hour there have been some exchanges between the spacecraft communicator Bruce McCandless here in Mission Control and the crew of Apollo 11. One item they're trying to sort out and troubleshoot some difficulties with the biomedical sensors attached to the chest of Command Module Pilot Mike Collins. Let's play back the accumulated tape and hopefully by the time it's ended, we will have picked up communications again and we'll rejoin the conversation live. Roll tape please.

SC
Houston, Apollo 11.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Roger, I was in a thruster firing activity. We're about ready to crank up PTC if you are.

CAPCOM
Roger, go ahead.

SC
Okay, thank you.

COMM TECH
Go ahead.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead, Houston.

CAPCOM
11, we'd like you to shift to an OMNI antenna configuration at the present time. We're requesting the S-band antenna OMNI switch to Bravo and S-band antenna OMNI switch to OMNI. The high gain antenna track in MANUAL, pitch minus 50, yaw 270. Over.

SC
Roger. I'll do that right now.

CAPCOM
Roger, and if Mike has a minute, we'd like to do a little bit of troubleshooting. It seems that he's either flatchested or something because we've lost respiration rate on the biomed telemetry. That is, the ZPN trace down here is flat.

SC
He was shaving a little bit ago. He might not be finished. Hold on one.

SC
The whole blasted wires are connected is all I know.

CAPCOM
Okay, Mike. We had a request that you disconnect the yellow connector from the signal conditioner and verify that it looks okay, reconnect it and then if you would check the two electrodes that is placed one on each side of your lower ribcage. Over.

SC
Okay, there's a smile on Charles Worth's face now.

CAPCOM
Cliff is not on right now. Gene Kranz just relieved him a few minutes ago.

SC
Roger.

SC
All those wires and things look all right here.

CAPCOM
Roger, Mike. We just see variations on our traces. You've connected and disconnected, but the medics still don't have a signal. Looks like you're sending us a message of some sort.

CDT 19:41 GET 179:09 TAPE 532/2

SC
Well, I promise to let you know if I stop breathing.

CAPCOM
Apollo 11, Apollo 11, this is Houston broadcasting in the blind. Request OMNI BRAVO. Request OMNI BRAVO. Over.

CAPCOM
Apollo 11, this is Houston. Communication reestablished.

SC
What?

CAPCOM
Apollo 11, this is Houston. Will you confirm you're in OMNI BRAVO? Over.

SC
Okay, that ought to give it to you.

CAPCOM
Roger. Out.

CAPCOM
Apollo 11, this is Houston. Mike, we're still getting a flat trace on you for the impedance - memograph. Before you turn in this evening you might try putting some fresh paste in the sensors and if that doesn't work the medics have agreed to forget about it. Over.

SC
Mike is out of the loop right now. I'll explain that.

CAPCOM
Okay, thank you.

SC
Houston, Apollo 11. Say again.

CAPCOM
Roger, Mike. The trace on your respiration rate is still flat. If you have time this evening before turning in, we would suggest that

you try putting some fresh paste in the two electrodes that go on the side of your lower rib cage, and if that doesn't work just give up on it.

SC
Out.

END OF TAPE

CDT 19:51 GET 179:19 TAPE 533/1

PAO
This is Apollo Control. Columbia now 85,198 nautical miles out from earth, approaching earth at a velocity of 6443 feet per second. Still standing by for resumption of air to ground communications which may be difficult in as much as CAPCOM is leaving the room. We'll continue to monitor air to ground as the crew prepares for they're presleep checklists, sets up the passive thermal control mode and sacks out for about a 10-hour rest period in preparation for tomorrow's entry and subsequent recovery in the mid-Pacific aboard the carrier Hornet now hove-to on the aiming point or near the aiming point. Standing by at 179 hours, 27 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 20:16 GET 179:44 TAPE 534/1

PAO
This is Apollo Control. Columbia now 82,972 nautical miles out from Earth traveling inbound at 6,546 feet per second. There has been no further communications with the crew of Apollo 11 in the last half hour or so. At this time they should be going through their presleep check list or possibly their evening meal before beginning a 7 hour rest period. We'll take down the circuit at this time and come back when and if the conversation resumes prior to - the time the crew begins their rest period. At 180 hours 03 minutes Ground Elasped Time, this is Apollo Control.

END OF TAPE

CDT 20:52 GET 180:20 TAPE 535/1

PAO
This is Apollo Control. 180 hours 25 minutes ground elapsed time. We have some 4 minutes accumulated tape in recent transmission between Columbia and the ground. We'll roll these tapes at this time.

SC
(sound of train)

CAPCOM
Hey 11, this is Houston. You might tell Buzz not to exercise quite so strenuously. Over.

SC
What's the problem?

CAPCOM
Say again.

SC
What's the problem?

CAPCOM
Okay, that's one on us. 11, Houston. Seriously, that comment was just aimed at your musical selection.

SC
Okay. (sound of train) Come on Neil, not so fast. (sound of train) You have an ergometer up here.

CAPCOM
What was that? Realtime exercise?

SC
Just trying to be your ergometer.

CAPCOM
Roger.

CAPCOM
Apollo 11, this is Houston. Over.

SC
Go ahead, Houston.

CAPCOM
We'd like to know what your plans are as far as turning in this evening. In our flight plan we show you coming up to a rest period at about 182 hours and what are you planning to do on that? We're going to be watching the weather here, and we expect to have an update on the weather, here, in about half hour or 45 minutes to pass to you. Over.

SC
I wonder if you probably stick with the flight plan pretty much. We are going to check the lights in the northwest corner of the US and southwest corner of Canada. If we can see up that high in the northern hemisphere. Other than that, we'll be on the flight plan.

CAPCOM
Roger. For your information, the laser from McDonald Observatory in West Texas will be up from about 181 hours and 30 minutes, on for 1 hour. You should be able to spot the earth out of the number 1 window every time you pass roll 357 degrees and I add, of course, you're in West Texas. Over.

SC
Okay, thank you. How about the number 5 window.

CAPCOM
Stand by a minute. Roger. For the number 5 window. That'll be - everytime you pass 2230 degrees in roll. Over.

SC
Beautiful. Thank you. You guys are on your toes down there. You have a new, new star chart. You must have a new, new star chart. Huh?

CAPCOM
Oh, we got a fresh, fresh FAO, here.

CDT 20:52 GET 180:20 TAPE 535/2

CAPCOM
Honeysuckle, Houston. Contact net 1 voice check.

HSK
Honeysuckle, read you loud and clear.

CAPCOM
Roger. Read you the same.

SC
Houston, Apollo 11. How much longer do you want to keep charging battery B?

CAPCOM
11, this is Houston. And nominally we're looking for about another hour and a half, but what we'd like to do, is charging until shortly before you turn in for the night. Over.

SC
That'll be fine. Are you going to want to charge A again at all?

CAPCOM
Negative, 11.

SC
Okay.

END OF TAPE

CDT 21:12 GET 180:40 TAPE 536/1

CAPCOM
Eleven, this is Houston. At about 180:45, we'll be handing over from Goldstone to Honeysuckle, and I'm handing over to Charlie. See you when you get back, over.

SC
Okay, Bruce, good night, thank you. Thank you very much, Bruce, it's been a pleasure working with you.

CAPCOM
Have a nice trip down.

PAO
This is Apollo Control. The weird noise has been reported by network controllers as not being on the down link from the spacecraft. Now it's stopped. Lets leave the circuit open here in the period prior to the time the crew goes to sleep and moniter the air ground circuit.

END OF TAPE

CDT 21:32 GET 181:00 TAPE 537/1

PAO
This is Apollo Control. We've been standing by now for quite some time for resumption of communications but apparently no one is saying anything tonight. Apollo 11 now 78,134 nautical miles out from Earth, approaching at 6785 feet per second. And at 181 hours, 17 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 21:59 GET 181:27 TAPE 538/1

PAO
This is Apollo Control. We've had one brief communication from Apollo 11. Spacecraft Communicator Bruce McCandless is out of the room, the Assistant Flight Director Chuck Lewis went down to the console to talk. Let's play that tape back and rejoin live when the conversation picks up again.

SC
Houston, Apollo 11. Over.

CAPCOM
Apollo 11, go ahead.

SC
Roger, Houston. For retro I have the anticipated location of all the entries stowage and I suggest you pull out the entry checklist and we'll go through those maps in the front of it.

CAPCOM
Apollo 11, Houston. Could you stand by just a few minutes. Charlie and flight are out getting a weather briefing. They're be back shortly.

SC
Again?

CAPCOM
Say again?

SC
Is this Owen?

CAPCOM
No, this is Chuck Lewis. Charlie Duke is out with flight getting a weather briefing right now.

SC
Okay. Out drinking coffe, I know.

CAPCOM
(Laughter) They'll be back momentarily.

PAO
I stand corrected. That's Charlie Duke on the CAPCOM slot. Bruce McCandless on the last half hour has been relieved. Charlie is likely to respond. Now he's putting on his headset. We'll listen in.

CAPCOM
Hello Apollo 11, Houston. Over.

SC
Roger, Houston, Apollo 11. Did you get the word on the entry checklist?

CAPCOM
Roger, Mike. We sure did. We're ready to talk about it, if you are. Over.

SC
I think the quickest thing is go through page by page, the first part of the entry checklist where it has a map. Starting on the page with compartment L2 and L3. Are you with me?

CAPCOM
Roger. With you.

SC
Okay. L2 is as shown. L3 is as shown, there is about half the food remaining in L3.

CAPCOM
Roger.

SC
Where it says "and note" the CMP PGA's is located in the L-shaped bag with the other 2 PGAs. The LM shield was jettisoned with the - correction, the CMP's helmet shield was jettisoned with the LM and his helmet and gloves instead of being in the sleep restraint are in the hatch bags.

CDT 21:59 GET 181:27 TAPE 538/2

CAPCOM
Okay. Let's see now. Your PGA is in the L-shape bag with the other two PGAs and your helmet and gloves are in the L-shape bag instead of the sleep restraint.

SC
A - the helmet and gloves are in the hatch bag, the great big bag that's underneath the left hand couch that you put the hatch in.

CAPCOM
Roger. I thought I - that's what I copied. Okay. Go ahead.

SC
Okay, the next page is identical except nit picking point are one - -

END OF TAPE

CDT 22:09 GET 181:37 TAPE 539/1

SC
Okay, the next page is identical nit-picking point out R 1 we got the entry check list, other than that it is identical and the third page is got some changes.

CAPCOM
Go ahead.

SC
In A 1, are you with me? I'm over there in compartment A 1.

CAPCOM
Go ahead, Mike, over.

SC
In compartment A 1 16 millimeter magazine will be located in window number 04 instead of 05. Tissue dispensers, there is only one of them left, and compartment U 3 the 16 millimeter bracket is on window 04 and the PGA bag add the CMP PGA plus add 2 LCG, and compartment A 8, delete 2 LCG, add 1 TPK making a total of 4, and add 10 pounds of LM miscellaneous equipment. We told you 5 the other day. We think 10 is probably closer, over.
CAPCOM
Copy.

SC
That's all the changes on that page. Ready for the next page?

CAPCOM
Rog, go ahead, Mike.

SC
On your next page in compartment B 1, we estimate about 15 percent of that food is remaining. In B 2 we took EPK and put trash in it. In B 3 the 16 millimeter cable, the 18 millimeter lens and the right angle mirror are on window number 04 and that's - there brings you all up-to-date.

CAPCOM
Roger, how about the - the levers, Mike, where did you put those, over?

SC
They're in the hatch bag.

CAPCOM
Roger. Standby, - our only concern, 11 is with the stuff you got in the hatch bag. That's pretty big bulk between you and AA and we'd like to talk about moving that over to the sleep restraint if you will standby I'll verify that, over.

SC
Okay.

CAPCOM
11, Houston. Our recommendation on the gear you got on the helmet bag, correction hatch bag, would be to remove that stuff and put it in the sleep restraint on the right couch. The reason is that the hatch bags traps are only - configured for zero "G" and it is a pretty difficult job getting it latched down. With the gear in the sleep restraint, it's a pretty standard latch down procedure and you could also use the Betta cord that you have onboard. You concurr, over.

SC
Yeah, we'll look at it Charlie, and let you know.

CAPCOM
Roger, and I got a couple of other things, Mike. We need to terminate battery B charge at this time and also the weather is clobbering in at our targeted landing point due to scattered thunderstorms. We don't want to tangle with one of those so we are going to move the - your aim point uprange, correction, it will be downrange, to target for 1500 nautical mile entry so we can guarantee uplift control. The new coordinates are

CDT 22:09 GET 181:37 TAPE 539/2

CAPCOM
13 degrees, 19 minutes North, 169 10 minutes West. The weather in that area is super. We got 2,000 scattered, 8,000 scattered with 10 miles visibility and 6 foot seas and the Hornet is sitting in great position to get to that targeted position, over.

SC
Roger.

END OF TAPE

CDT 22:19 GET 181:47 TAPE 540/1

PAO
This is Apollo Control. To recap briefly, the conversation a few moments ago between Charlie Duke and the crew of Columbia. Because of forecast thunderstorms in the prime recovery area in the midpacific for tomorrow the Apollo Spacecrafts lifting capabilities will be used to stretch the entry path some 215 nautical miles farther down range toward Hawaii to a new landing point, aiming point with the very rough preliminary coordinates of 13 degrees 19 minutes north by 169 degrees 10 minutes west. These numbers will be refined through the night as retrofire officer exercises the computer and comes up with more definitive numbers. These will be passed on as they are available. Apollo 11 now 75 thousand 9 hundred 51 nautical miles out from earth approaching at 6 thousand 8 hundred 99 feet per second. At 181 hours 50 minutes and standing by on the air ground circuit this is Apollo Control.

CAPCOM
Apollo 11, Houston, some of the general last minute updates here. On the entry, we had told you on the camera to set it at 50 feet, it turns out the biggest number on the camera is 25 feet so just set it at infinity, over.

SC
Roger, infinity.

END OF TAPE

CDT 22:29 GET 181:57 TAPE 541/1

CAPCOM
Hello, Apollo 11, Houston. We're ready to put you to bed and say good night if you give us your crew status report and verify that you chased out the CO2 canister a moment ago. Over.

SC
Stand by.

SC
Okay, Charlie. Crew status report follows. CDR 11023, CMP 10025, LMP 09027. Canister change complete.

CAPCOM
Roger. Thank you very much there.

SC
All men okay.

CAPCOM
Roger. Thank you. Could you give us the onboard readout, please, sir?

SC
Stand by. Okay, Bat C 37, Pyro Bat A 37, Bat B 37, RCS A 51, D 63, C 62, D 58.

CAPCOM
Roger. Copy. Thank you much.

CAPCOM
Apollo 11, Houston. It's good night from the white team for the last time. We'll be off when you wake up in the morning. It's been a pleasure working with you guys. It was a beautiful show from all three of you. We appreciate it very much and we'll see you when you get out of the LRL. Over.

SC
Okay, Charlie, thanks to you and all the white team for a great job done there all the way through. Thank you.

SC
Outstanding.

SC
Thank you guys very much, Charlie. Thanks.

CAPCOM
Thanks to you guys, too.

CAPCOM
11, Houston. Mike, you get your chance at landing tomorrow. No go around.

SC
Roger. You're going to let me land closer to Hawaii, too, aren't you?

CAPCOM
That's right, sir.

PAO
This is Apollo Control. All good nights having been said, the crew of Apollo 11 is now preparing to get their 10 hours rest and their last night in space. Here in the Control Center one of the 10 by 10 Eidophor television projectors - a drawing has been projected on the screen ribbing Capcom Charlie Duke for his slight error yesterday on the television pass where he mistook the moon for Earth. It has the spacecraft midway between the moon and Earth and it says, "Neil, I just spotted a continent on the moon. Charlie, the camera's on Earth now." Apollo 11 now 74,906 nautical miles out from Earth approaching at 6954 feet per second. And at 182 hours, 6 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

CDT 22:42 GET 182:10 TAPE 542/1

PAO
This is Apollo Control. 182 hours 10 minutes ground elapsed time. We thought that was all the air-to-ground for tonight prior to the crew going to sleep, but just a few moments ago, there was a brief exchange reporting to Apollo 11 crew that the McDonald Observation or West Texas had the spacecraft in their telescope field of view. Let's roll that tape now and then shut it down again.

CAPCOM
11, Houston. We got some word just a moment ago, that the McDonald Observatory is - said they had picked up the spacecraft in their telescope. Over.

SC
Outstanding. We have been looking for their laser for - but haven't had much luck yet.

CAPCOM
Roger. We'll pass it on to them, Neil. Thank you.

END OF TAPE

CDT 23:57 GET 183:25 TAPE 543/1

PAO
This is Apollo Control, 183 hours, 25 minutes ground elapsed time. Columbia spacecraft, now - 69,520 nautical miles out from earth. Approaching at 7,262 feet per second. Crew now in their rest period. Started their sleep period a little over an hour ago. To reiterate the change in landing point, this is a weather avoidance situation where thunder storms are forecast for the landing point - the original landing point in the Pacific, therefore, after the normal entry interface the lifting characteristics of the Apollo Command Module will be used to extend entry range some 250 nautical miles farther down range toward Hawaii to a preliminary aiming point, that is the aiming point may shift around between now and entry which is some 11 hours, 36 minutes from now. But at any rate the aiming point as calculated now is some 13 degrees 19 minutes north latitude, by 169 degrees 10 minutes west longitude. The preliminary time of drogue decline is 195 hours, 12 minutes. As you were - yes 195 hours, I2 minutes, 4 seconds. And the net extention of - over the earlier splash time is something like 40 seconds. At 183 hours, 27 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

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CDT 02:01 GET 185:29 TAPE 544/1

PAO

This is Apollo Control at 185 hours 29 minutes Ground Elapsed Time. 9 hours 33 minutes until entry. Crew is still asleep at this time, scheduled to wake up at 189 hours Ground Elapsed Time, some 3 and one half hours from now. We've had no word from the crew since the scheduled sleep period began. Apollo 11 now 61,034 nautical miles out from the Earth, and velocity of 7815 feet per second. At 185 hours 30 minutes Ground Elapsed Time, this is Apollo Control.

END OF TAPE

CDT 03:00 GET 186:28 TAPE 545/1

PAO

This is Apollo Control 186 hours 28 minutes Ground Elapsed Time. 8 hours 35 minutes to entry. Crew of Columbia still asleep at this time. Some 2 and a half hours away from wakeup time at 189 hours Ground Elapsed Time. Because of weather avoidance in the prime recovery zone in the mid-Pacific, southwest of Hawaii, it has been decided some time ago to shift the landing point - aiming point - some 215 nautical miles downrange from the pre-mission aiming point. And all the numbers concerned with entry and post-entry events have been generated, and we shall forward them at this time. Pencils ready? Command Module-Service Module separation, 194:48:07 Ground Elapsed Time, 11:20:08 Central Daylight Time; entry enterphase, that's 400 000 feet above the Earth's surface, Ground Elapsed Time 195:03:07, 11:35:08 Central Daylight Time; begin blackout, 195:03:25 Ground Elapsed Time, 11:35:26 Central Daylight Time; 05G, 195:03:35 GET, 11:35:36 CDT; end of blackout, 195:06:56 GET, 11:38:57 CDT; drogue parachutes deploy, 195:12:04 GET, 11:44:05 CDT; main parachutes deploy, 195:12:52, 11:44:53 CDT; touchdown, 195:17:49 GET, 11:49:50 CDT. Maximum G-loading to be pulled during the entry phase will be 6.12G's. Entry velocity, that's at entry enterphase of 400 000 feet, will be 36,194 feet per second. Flight path angle, minus 6.5 degrees. Aiming point location, 13 degrees 19 minutes north latitude, 169 degrees 09 minutes west longitude. At 186 hours 32 minutes Ground Elapsed Time, this is Apollo Control.

END OF TAPE

CDT 04:00 GET 187:28 TAPE 546/1

PAO

This is Apollo control 187 hours, 28 minutes ground elapsed time. 7 hours, 34 minutes to entry. Flight surgeon Ken Beers reports that all three crew members are sleeping soundly at this time. Their sleep period will end probably at 189 hours although they may sleep an additional hour to 190 hours. Spacecraft being tracked now through the Guam station. A line projected out from earth to what is called a subsatellite point or a point directly under the spacecraft would put it over dead center of Australia. At 187 hours, 29 minutes ground elapsed time, this is Apollo control.

END OF TAPE

CDT 05:00 GET 188:28 TAPE 547/1

PAO

This is Apollo Control 188 hours, 28 minutes ground elapse time. Apollo 11 now 46,254 nautical miles out from Earth. Velocity continuing to increase, now 9,081 feet per second. There will be a dramatic increase in velocity as the spacecraft gets closer in. Here in Mission Control Center the entry team headed up by Flight Director Milt Windler is beginning to come aboard. Hand over in progress from Gene Kranz white team. The crew is still asleep at this time. They're some 6 hours, 34 minutes from entry interface. And at 188 hours, 29 minutes ground elapse time, this is Apollo Control.

END OF TAPE

CDT 05:15 GET 188:43 TAPE 548/1

PAO

This is Apollo Control at 188 hours 43 minutes. Mid course correction number 7 has been cancelled, and we will add one hour of rest time to the flight plan. Crew will be awakened at 190 hours elapsed time. To repeat, we have cancelled mid course correction number 7 and we will allow the crew to sleep until 190 hours elapsed time. This is mission control Houston.

END OF TAPE

CDT 06:00 GET 189:28 TAPE 549/1

PAO

This is Apollo Control at 189 hours 28 minutes. Apollo 11 is 40,961 nautical miles from the earth. Approaching at a velocity of 9,671 feet per second. Mid course correction number 7 has been cancelled and as a result we will let the crew sleep until an elapsed time of 190 hours. Weather in the recovery area. Well we're getting a call from Apollo 11, now. Let's listen to that.

SC
Roger. What's the status on mid course 7?

CAPCOM
Roger. We were going to let you sleep in until about 190 hours. Mid course 7 is not required.

SC
Okay. Thank you.

PAO
The crew gave us a call at 189 hours, 29 minutes. We advised them of the cancellation of the mid course correction. Weather in the recovery area - skys will be partly cloudy. Cloud base is at 2,000 feet scattered. Wind, east north east at 18 knots. 6 foot sea. Temperature 80 degrees. This landing area is 215 miles to the northeast from the original landing area, moved because of thunder showers in the original area. This new location should allow the recovery ship USS Hornet to arrive in Hawaii 4 to 5 hours earlier than originally planned. We expect that it may be possible for the carrier to arrive at Pearl Harbor somewhere between 8 and 9 o'clock, on July 26, that's Saturday.

PAO
The crew is probably preparing breakfast now and it's not likely that we'll hear a lot from them right away, but we'll continue to stay up alive for any conversation.

PAO
Visibility in the recovery area is 10 miles.

PAO
Clock shows we are 5 1/2 hours away from entry interface the point at which Apollo 11 will enter the earth's atmosphere. That's scheduled to occur at an elapsed time of 195 hours, 3 minutes, 7 seconds. We expect landing at 195 hours, 17 minutes, 49 seconds.

PAO
This is Apollo Control. Apollo 11 is now 38,793 nautical miles from the earth. Velocity 9,947 feet per second.

END OF TAPE

CDT 06:25 GET 189:53 TAPE 550/1

PAO
- - headed up by flight director Milt Wendler is beginning to come aboard, handover and progress from Gene Kranz, white team. Crew still asleep at this time. Some 6 hours, 34 minutes from entry enterphase. And, at 188 hours, 29 minutes ground elapsed time this is Apollo control.

PAO
This is Apollo control at 190 hours, 10 minutes. Apollo 11's distance from earth, 36,956 nautical miles. Velocity, 10,195 feet per second.

END OF TAPE

CDT 06:45 GET 190:13 TAPE 551/1

CAPCOM
Apollo 11. Good morning from Houston. Over.

SC
Good morning, (garbled).

CAPCOM
Roger. We saw you up stirring around, and we thought that you were probably eating your breakfast there. Just in general we'll probably start coming up with the uplink and the state vector and the target loads and what have you at about 190:50 somewhere there in and get you started to work.

SC
Okay.

CAPCOM
And in the meantime while you're eating your breakfast there, I've got the Maroon Bugle all standing by here to give you the morning news.

SC
Glad to hear it.

CAPCOM
Okay, Apollo 11 remains the prime story with the world awaiting your landing today at about 11:49 a.m. Houston time. In Washington, House tax reformers have fashioned a provision which would make it impossible for wealthy individuals to avoid income tax entirely through tax free investments or special allowances. Under the proposal tentatively adopted by the House Ways and Means Committee, everyone would pay taxes on at least half of their income.

SC
Hang on a minute.

CAPCOM
Roger, standing by.

SC
Okay, roger. Okay, Ron, we're ready to go again. Thank you.

CAPCOM
Roger, continuing with the Maroon Bugle. President Nixon surprised your wives with a phone call from San Francisco just before he boarded a plane to fly out to meet you. All of them were very touched by your television broadcast. Jan and Pat watched from mission control here. The Launch of Intelsat from the Cape was postponed for the fourth time last night. The problem was said to be a malfunctioning nitrogen regulator in the second stage of the Delta. A new attempt will be made to launch it tonight. The research submarine Ben Franklin, which is studying the gulf stream, set a record by drifting 24 hours from 10 to 100 feet above the ocean floor in 1300 feet of water off the Georgia coast. The mission is lead by Jacques Piccard. Wally Schirra has been elected to a five year term on the Board of Trustees of the Detroit Institute of Technology. He will serve on the Institute's development committee. Air Canada says it has accepted 2,300 reservations for flights to the moon in the past five days. It might be noted that more than 100 have been made by men for their mothers-in-law. And finally it appears that rather than killing romantic songs about the moon, you have inspired hundreds of song writers. Nashville, Tennessee which probably houses the largest collection of recording companies and song publishers in the country now

CDT 06:45 GET 190:13 TAPE 551/2

CAPCOM
reports it is being flooded by moon songs. Some will make it. The song at the top of the best sellers list this week is, "In the year 2525." Morning Bugle. Out.

SC
Thank you very much, Ron.

END OF TAPE

CDT 06:59 GET 190:27 TAPE 552/1

SC
Crew status report. 5.575.5.

CAPCOM
Apollo 11, Houston. Roger, we copy, and I have your consumables update if you're ready to copy.

SC
Go ahead.

CAPCOM
Roger. GET 189 plus 00. RCS minus 1 percent. ALPHA minus 11, BRAVO plus 10, CHARLIE minus 1, DELTA minus 1. H2 total minus .76 pounds, oxygen total plus 17.6 pounds. Over.

SC
Okay. It doesn't look like we're going to be able to get quite back on the flight plan.

CAPCOM
Not quite, just about though.

PAO
This is Apollo. Control at 190 hours, 34 minutes. Apollo 11's distance from the Earth 34,622 nautical miles, velocity 10,534 feet per second.

CAPCOM
Apollo 11, Houston. Request P00 and ACCEPT, and we'll send your REFSMMAT, state vector, and entry target load. Over.

SC
You have it.

CAPCOM
Roger, it'll be coming up.

END OF TAPE

CDT 07:19 GET 190:47 TAPE 553/1

CAPCOM
Apollo 11, Houston. Can you tell us where the visor assemblies ended up there?

SC
We're going to follow your suggestion and stow them under right-hand couch.

CAPCOM
Roger, mighty fine. Break the weather forecast in the landing area, right now is 2000 scattered, high scattered 10 miles. The wind about 080 at 18 knots. You'll have about 3 to 6 foot waves. Your Delta H is plus 10 feet. And it looks like you'll be landing about 10 minutes before sunrise, over.

SC
Okay, sounds good.

CAPCOM
Roger.
CAPCOM
Apollo 11, Houston. All 3 loads are in. The computer is yours, over.

SC
Roger.

CAPCOM
And Mike, if you're on loop there to extend the range in the compass G reentry, here, I've got a little procedure, is you would like to look at them.

SC
Stand by, one. I'm right in the middle of my orange juice, just be with you in about 5 minutes.

CAPCOM
Sure, no problem, standing by.

SC
Houston, Apollo 11. Heh, Ron, I wonder if you could give us a good Navy explanation for this Delta H time, over.

CAPCOM
Roger, let me think about it, and I'll come back.

SC
You too, uh.

CAPCOM
Right.

SC
Collins has got one, but I'm not sure I buy it.

PAO
This is Apollo Control at 190 hours 56 minutes. Apollo 11's distance from earth 32,447 nautical miles; velocity 10,876 feet per second.

CAPCOM
Apollo 11, Houston.
SC
Go ahead.

CAPCOM
Roger, 11. We don't have worry about it any more. The altimeter out there, is now standard 29.92, but basically what it means is that if I give you a plus 10 feet for instance, that means that you will hit the water with the altimeter reading 10 feet, over.

SC
All right. Now, Collins was wrong.

END OF TAPE

CDT 07:39 GET 191:07 TAPE 554/1

PAO
This is Apollo Control at 191 hours, 15 minutes. Apollo 11 is now 30,469 nautical miles from earth approaching at a velocity of 11,221 feet per second.

END OF TAPE

CDT 07:59 GET 191:27 TAPE 555/1

PAO
This is Apollo Control at 191 hours 38 minutes. Apollo 11's distance from Earth now 27,979 nautical miles, velocity 11,689 feet per second.

CAPCOM
Apollo 11, Houston. I have your entry pad. Over.

SC
Stand by one.

CAPCOM
Roger, standing by.

SC
Okay, I'm ready to copy.

CAPCOM
Roger. Entry pad area is the mid-Pacific, roll 000 152 001. GET 194:46:06 267. Latitude plus 1332 minus 16917 064 36 194 649. Range to go 14045 36275 195 03 06 0028 VL max 154 084 22400 18000 B0 400 0213 0017 0351 0902 Sextant star 450189 277. Foresight star none available. Lift vector UP. Comments, GDC align Vega and Deneb roll 078, pitch 223, yaw 340. Additional comments: Use non-exit EMS pattern EI minus 30, horizon check GET 194:33:06. Pitch 298, you'll get P65 but no P66. Additional notes: Initial bank angle in P67 may not be full lift. Apollo 11, Houston. Read back.

END OF TAPE

CDT 08:20 GET 191:48 TAPE 556/1

SC
Okay, Ron, for Mid Pac: 000152001 1944606 267 plus 1332 minus 16917 06436194 649 14045 36275 1950306 003 154 084 2240 180 400 0213 0017 0351 0902 45 0189 277 None available Lift vector UP, GET align Vega and Deneb, roll 078, pitch 223, yaw

340. Use non-exit EMS. EI minus 30 horizon check 1943306 pitch 298. Initial bank angle in P67 may not be full lift, and we will get P65 but no P66.

CAPCOM
Apollo 11, Houston. Roger on your GDC align pitch, it should be 233, 233 in the pitch. Over.

SC
Okay. I've got a 233.

CAPCOM
Also your VL and MAX and MIN I'm sure are 22 400, and 18 000. Over.

SC
Yes, that's right.

CAPCOM
Okay, if you'll dig out your entry checklist there on page E6-1, I'll update your retro times there for the various altitudes. Over.

SC
Okay, go ahead.

CAPCOM
Okay, on page E6-1, your RRT is 0720, your 50K is 0816, 40K is 0830, 24K is 0902, and your 1OK is 0951. Over.

SC
Okay, RRT 0720 50 000 0816. That's - 0720 is the time of (garbled) from RRT, and 40 000 0830, 24 000 0902, 10 000 0951.

CAPCOM
11, Houston. You started out right then the numbers you read back were correct. I didn't get your comment in between there.

SC
I said that all I wanted to know is that first time 0720, that's the time of (garbled), right?

CAPCOM
That's affirmative.

SC
Okay.

SC
Houston, Apollo 11. I'm ready to copy your message about the constant drag level.

CAPCOM
Okay, Mike. Of course, this is in the event the G&N and the EMS quits and you have to fly the constant G, and what we're trying to do is extend the constant G range from 1100 to 1500 miles. We've run this procedure in the simulators and it works fine. The best way to go through it, just go through it and if you have any questions come back. But it's the same lift vector UP until MAX G, and then lift vector DOWN and then modulate the lift vector until g dot goes to zero. Okay, this procedure is essentially the same so far, and then hold g dot zero until you pass the retro elapsed time of V circular and then after you pass this retro elapsed time of V circular, roll to a gimbal angle of 45 degrees, and then hold this constant bank angle of 45 degrees until you've come to the retro elapsed time of drogues. Over.

SC
Okay, it sounds straight forward enough. Understand constant G backup procedure lift vector UP until MAX g and then lift vector,DOWN, then modulate until bank angle until g dot equals zero, then g dot equals zero until

CDT 08:20 GET 191:48 TAPE 556/2

SC
sub circular and then roll 45 degrees and hold until drogue time. Over.

CAPCOM
Hey, that's mighty fine, Mike. That's correct.

PAO
This is Apollo Control at 192 hours 2 minutes. This will be first time in Apollo that crews have flown lift vector UP during reentry. Normally, lift vector is down. However, we want to extend the range by 215 miles so for a short period about a minute and 25 seconds during the blackout period the spacecraft will be flown with lift vector up. The computer program for that is number 65, up control. Apollo 11 is now 25,301 nautical miles from Earth, velocity has increased to 12,263 feet per second.

END OF TAPE

CDT 08:35 GET 192:03 TAPE 557/1

PAO
This is Apollo Control at 192 hours 30 minutes. Apollo 11 now 22,130 nautical miles from earth; velocity 13,053 feet per second. We're 2 hours 32 minutes 32 seconds away from entry interface.

END OF TAPE

CDT 09:05 GET 192:33 TAPE 558/1

PAO
This is Apollo Control at 192 hours, 48 minutes. Apollo 11 is 19,914 nautical miles from the Earth approaching at a velocity of 13,695 feet per second. We're 2 hours, 14 minutes, 16 seconds away from entry into the atmosphere, the U.S. Air Force C-135 crew will attempt to photograph this re-entry of the command module. Aircraft designated A-lots for airborn light-weight optical tracker system will attempt to record the entry on 70-millimeter still film. Pilot of that aircraft is the ARIA Squadron Commander. Three of his ARIA Aircraft will be in the entry area to provide communications during re-entry of the command module. Crew of ALOTS includes the Commander, Colonel Robert W. Hoffman of Wichita Falls, Texas. The pilot who is the ARIA Squadron Commander Colonel Oakley W. Baron of Kankakee, Illinois, Co-Pilot Lt. Col. Wallace L. Emory, San Angelo, Texas. Navigators are Lt. Col. Ervin O. Stewart, Jr., Greensboro, North Carolina, and Major Charles W. Hinton, Mt. Auburn, Illinois. The photographic Specialist Master Sergeant Paul T. Swieczkowski whose home town is not listed. Col. Baron's nickname is the Red Baron who is a veteran of more than 10,000 flying hours, and has flown more than 80 different types of aircraft.

PAO
Normally the mission control center here in Houston will not attempt to contact Apollo 11 after drogue chute deployment. We will stay off the air and let the recovery forces attempt to establish voice contact. If for some reason, Capcom does want to communicate with the crew, he will request clearance from the recovery forces before putting in a call.

END OF TAPE

CDT 09:25 GET 192:53 TAPE 559/1

PAO
This is Apollo Control at 192 hours, 55 minutes. A few of the entry event times have changed from a second to 4 seconds. Others remain the same. Here's the updated times: entry, 195 hours, 3 minutes, 7 seconds; begin blackout, 195:03:25, 05g 195:03:36; end blackout, 195:07:00; drogue shoot deployment, 195:12:08; main shoot deployment, 195:12:56; landing 195:17:53. Maximum G load expected during the entry, 6.20.

SC
This entry time line is my kind of time line. Nice and slow.

CAPCOM
11, Houston. Roger, it sure is. EECOM is anxiously awaiting his big moment here for the launching sequence check whenever you're ready.

SC
Okay, we'll be ready for this in just a flash.

CAPCOM
Roger.

CAPCOM
Apollo 11, Houston.

SC
Go ahead, Ron.

CAPCOM
This is Jim, Mike. Our crew is still standing by. I just want to remind you that the most difficult part of your mission is going to after your recovery.

SC
Well, we're looking forward to all parts of it.

CAPCOM
Please don't sneeze.

SC
Keep the mice healthy.

END OF TAPE

CDT 09:35 GET 193:03 TAPE 560/1

SC
The earth is really getting bigger up here and, of course, we see a crescent.

CAPCOM
Yes.

SC
We've been taking pictures and we have four exposures to go and we'll take those and then pack to camera.

PAO
And the Apollo 11 backup crew there has Joined CAPCOM Ron Evans at his console, Jim Lovell , Bill Anders and Fred Hayes. Also Donald K. Slayton, Director of Flight Crew Operations, is at that console.

SC
Houston, Apollo 11, we're ready for the logic check whenever you are. We're standing by to arm the logic. We've got ELS logic on, ELS auto and all the circuit breakers in.

CAPCOM
Apollo 11, Houston. Roger you can press on with the SECS logic.

SC
Okay, logic 1 coming on. MARK it. Logic 2 coming on, MARK it.

CAPCOM
Apollo 11, Houston, logic checks good. You're GO for PYRO arm.

SC
Thank you, Sir.

SC
Houston, Apollo 11, has VHF simplex on -

CAPCOM
Apollo 11, Houston. Roger. You faded out a little there, Buzz. I understand you have the VHF simplex A on now. Is that correct? Over.

SC
That's affirmative, VHF simplex A and we're PR on VHF.

CAPCOM
Roger. Mighty fine. We'll watch it as you are coming on in and let you know when the intelligibility is up and we'll make a voice check with you at that time.

SC
Houston, Apollo 11. I've been holding here in SCS control minimum deadband rate low with the limit cycle on just as a matter of curiosity, if you guys wanted some fuel numbers from us.

CAPCOM
11, Houston. Roger. We copy and we've been figuring it out.

SC
Okay.

SC
It's a pleasure to be able to waste gas.

CAPCOM
Roger. That's affirm.

PAO
This is Apollo Control at 193 hours, 10 minutes. Apollo 11 is now 17,158 nautical miles from earth. Velocity 14,633 feet per second.

CDT 09:35 GET 193:03 TAPE 560/2

CAPCOM
Apollo 11, Houston, with a little recovery force information. Over.

SC
Go ahead.

CAPCOM
Roger. The Hornet is on station just far enough off the target point to keep from getting hit. Recovery 1, the chopper is there. They are on station and Hawaii rescue 1 and 2 the C130's are within 40 minutes of your target point. Over.

SC
Sounds good. Thank you.

END OF TAPE

CDT 09:50 GET 193:18 TAPE 561/1

PAO
This is Apollo Control at 193 hours 20 minutes. Apollo 11 is 15,854 nautical miles from Earth, velocity 15,154 feet per second. We're just - we're 1 hour 43 minutes away from entry and here are the altitudes at which the entry events are expected to occur. Entry at 75 statute miles, beginning blackout at 62 statute miles, 05 g 57 statute miles, end blackout 41 statute miles, drogue chute deployment 23,300 feet, and main chute deployment 10,500 feet

CAPCOM
Apollo 11, Houston.

SC
Roger. Just to get a little down link here to check out our VHF. I show us about an hour and 37 minutes approximately from entry interface. Over.

SC
Okay, that's about right.

CAPCOM
Okay, looks like we're together on that, and I guess we're standing by for you to whip into the entry attitude.

SC
Okay. We've just been taking a couple of last minute pictures. We've finished the EMS entry check, primary water evap activation.

CAPCOM
Roger, mighty fine.

END OF TAPE

PAO
This is Apollo Control at 193 hours 30 minutes. Apollo 11 now 14,374 nautical miles from earth; velocity 15,788. We expect entry velocity at 36,194 feet per second.

CAPCOM
Apollo 11, Houston.

SC
Go ahead.

CAPCOM
Roger. Mike, we recommend the left VHF antenna for VHF.

SC
Thank you, Ron.

CAPCOM
And this is your friendly backup CMP, have a good trip, and may (garbled) come in BEF.

SC
You better believe, thank you kindly.

PAO
Capcom that time was Fred Hayes, the backup lunar module pilot.

SC
Looks what I considered to be a correct size.

SC
Houston, Apollo 11. Like to switch to S-band OMNI C. I just did a minute ago, and noticed a loss of signal strength, over.

CAPCOM
Roger, Apollo 11. Go ahead and try it again now that you're in attitude.

SC
Roger, going OMNI C.

CAPCOM
Apollo 11, Houston.

CAPCOM
Apollo 11, Houston. Recommend antenna Bravo, over.

PAO
At 193 hours 40 minutes, Apollo 11's distance from earth is 13,044 nautical miles; velocity 16,439 feet per second.

CAPCOM
Apollo 11, Houston. Recommend antenna Bravo, or at least a better one, over.

CAPCOM
Apollo 11, Houston.

SC
Go ahead, Ron.

CAPCOM
Roger. Our faces are red here. We lost data with you - there for a while. Did you do the P52, over.

SC
That's affirmative, we completed the P52. We'll give you the data from it in just a second. We passed our sextant star check at entry attitude and right now we're maneuvering to our first horizon check pitch attitude of 298 degrees.

CAPCOM
Roger, copy that, 11.

END OF TAPE

CDT 10:20 GET 193:48 TAPE 563/1

PAO
Apollo Control at 193 hours, 50 minutes. Apollo 11's distance now 11,463 nautical miles approaching at a velocity of 17,322 feet per second. We're just under an hour away from scheduled command module-service module separation and about an hour and 12 minutes away from entry.

CAPCOM
Apollo 11, Houston. About 4 minutes to 1 hour, and we'll give you the mark on 1 hour. Was a command module pre-heat necessary? Over.

SC
Negative that.

CAPCOM
Roger, copy. Negative command module pre-heat.

PAO
This is Apollo Control at 194 hours. Apollo 11's distance from Earth now 10,066 nautical miles. Velocity 18,227 feet per second.

CAPCOM
Apollo 11, Houston.

SC
Go ahead.

CAPCOM
Roger. We don't want to jettison the hydrogen tank that stratifies, so could you cycle the fans in tank 2, please? Hydrogen tank 2.

SC
You better believe. That old service module has taken good care of us. You better take good care of it.

CAPCOM
It sure has hasn't it.

SC
It's been a champ.

PAO
That was Mike Collins.

PAO
Apollo 11 is 1 hour away now from entry into the Earth's atmosphere.

END OF TAPE

CDT 10:35 GET 194:03 TAPE 564/1

CAPCOM
11, Houston. I'll give you a time hack at 58 minutes to go. It's about 15 seconds yet.

SC
Thank you.

CAPCOM
Stand by. MARK, 58 minutes.

SC
Roger.

PAO
This is Apollo Control at 194 hours, 10 minutes. Apollo 11 is now 8 5 -

SC
Go ahead, Houston. Apollo 11.

CAPCOM
Roger. We have our update at the state vector for you. Request P00 and accept. Over.

SC
Okay, you've got it.

CAPCOM
Okay, here it comes.

PAO
Spacecraft distance is 8,393 nautical miles. Velocity 19,512 feet per second. Rescue and ARIA aircraft are reported on station, and the Hornet's helicopters containing the swimmers are recorded airborne. Swim 1 is helicopter number 53. Three swimmers from that helo are expected to place the collar on the spacecraft, floatation collar. Crew of swim 1 consists of Leutinant Commander Donald G. Pitchmand, pilot.

CAPCOM
Apollo 11, Houston.

SC
Go ahead.

CAPCOM
Roger. The computer's yours now. Looks like you're in VHF range here. So we'll try a VHF check for you. We'll just send VHF up to you. Stand by.

SC
Okay.

CAPCOM
Apollo 11, Houston. VHF check on simplex ALFA. Over.

SC
Roger, Houston. Apollo 11 VHF simplex ALFA loud and clear. How me? Over

CAPCOM
Roger, 11. Houston. You're loud. The standard VHF noise though makes you realize that S-band is good.

SC
Roger, understand. Thank you.

CAPCOM
Apollo 11, Houston. Back up S-band now, and we're standing by for command module RCS activation.

SC
Okay, we're just about there.

END OF TAPE

PAO
Swim One's pilot Commander Richmond is from Orlando, Florida. Copilot Lt. William W. Strawn of Plymouth, Michigan, Crewman James R. Johnson, Raleigh, North Carolina. The swimmers aboard Swim One are Lt JG John McLachlan of Spokane, Washington, PH2 Terry A. Muehlenbach, Chatsworth, California, and ADJ3 Mitchell L. Bucklew, Sanford, Florida. These 3 swimmers are scheduled to attach the floatation collar and then move away from the command module while helicopter number 66, designated Recovery One, moves into the area and deploys 1 swimmer, Lt. Clancey Hatelberg.

CAPCOM
Apollo 11, Houston, you are GO for pyro arm.

SC
Thank you, Houston.

PAO
Lt. Clancey Hatelberg, Chippewa Falls, Wisconsin, will deploy from Recovery One wearing a biological isolation garment and he will hand to the crew through the hatch their biological isolation garments. At 194 hours 16 minutes Apollo 11 is 7512 nautical miles from Earth, velocity 20,304 feet per second.

CAPCOM
Apollo 11, Houston, your command module pressurization looks mighty good to us.

SC
Looks good here, too.

CAPCOM
And 11, Houston, I've got an update for about 4 items on your entry pad.

SC
Ready to copy.

CAPCOM
Roger, your MAX G 063. Your NOUN 60 your GAMMA at 400K, 648, your range to go on the EMS 14033 and your retro time for V circular 0214. Over.

SC
Roger, copy MAX G 6.3, R2 at NOUN 60 6.48, range to go EMS 14033, our ETV circular 0214. Over.

CAPCOM
Roger, readback is correct there.

PAO
The crew of helicopter 66, Recovery One the pilot Cdr. D. S. Jones of Madison, Wiscon; Copilot LtJG Bruce A. Johnson, Bremerton, Washington, andl the 2 crewmen who will assist the astronauts into the Helo AWHC Norvel L. Wood of Carmi, Illinois and AWHC Stanley G. Robnett of Portales, New Mexico.

PAO
At 194 hours 22 minutes distance is 6509 nautical miles velocity 21,366 feet per second.

SC
Houston, Apollo 11.

CAPCOM
Apollo 11, Houston, go.

SC
Roger, the first horizon check 1942306 at a pitch angle of 298 does not quite fall on the 31 7 line. It's Just a little high, it's within sight of the greton.

CAPCOM
Apollo 11, Houston, the horizon check there was supposed to be at 33. Over.

SC
That's fine, thank you.

CAPCOM
Roger.

PAO
Helo number 64 is designated Swim Two.

CDT 10:45 GET 194:13 TAPE 565/2

PAO
If that helicopter than Swim One to the landing point swimmers will be deployed from Swim Two to attach the collar. Those swimmers are LtJG Wesley T. Chesser of Arlington, Virginia, QM3 Michael G. Mallary of Alderwood Mannor, Washington, and SN John M. Wolfram of Fort Atkinson, Wisconsin. The Helo's crew consists of pilot Lt. Richard J. Barrett of Squannanoa, North Carolina, copilot Lt. George Ro. Conn, Imperial Beach, California, AWH2 Curtis E. Hill, Black Rock Arkansas, and AWH2 Richard B. Seaton, Hibbing, Minnesota.

CAPCOM
Apollo 11 -

END OF TAPE

CDT 11:00 GET 194:28 TAPE 566/1

PA0
Apollo 11's distance now 5411 nautical miles; velocity 22,642 feet per second.

CAPCOM
Apollo 11, Houston. Command module RCS looks fine to us.

SC
Same here, Ron, looks very good. Doesn't make as much noise as we thought. Some of them are barely audible.

CAPCOM
Roger. And 11, Houston. Weather still holding real fine in the recovery area. Looks like it's about 1500 scattered, high scattered. And it's still 3 to 6 foot waves.

SC
The air part of it sounds good.

CAPCOM
Roger. 11, Houston, I'll give you another mark at 33 minutes. Stand by. Mark.

SC
Roger, thanks.

SC
Houston, Apollo 11. Do you have any recommended settings to catch the sunset, over.

CAPCOM
Roger. We'll - the time is 36 41. And stand by for some settings.

SC
Okay, I'll probably only be doing it maybe - part of it at 6 frames a second, some it at 1. So I can be changing settings as it goes through.

CAPCOM
Roger, copy.

SC
And the horizon check passes, it's right on the money.

CAPCOM
Mighty fine, sounds good.

CAPCOM
Apollo 11, Houston. On the shooting of the sun, that's 16 at 1 over 250.

SC
Understand that's 16 at 1 over 250.

CAPCOM
Roger.

SC
And the sun's going down on schedule. It's getting real dark here.

CAPCOM
Fine Apollo 11, Houston, copy.

PAO
Distance 3896 nautical miles; velocity 24,915 feet per second.

PAO
And we're about 10 minutes away from the scheduled separation time now.

PAO
Apollo 11's distance now is 3000 nautical miles; velocity 26,685 feet per second. In the next 20 minutes Apollo 11 will add almost 10,000 feet per second to that figure.

END OF TAPE

CDT 11:15 GET 194:43 TAPE 567/1

PAO
Technical difficulties have interrupted the radio-TV news pool feed from the carrier USS HORNET and also the newswriters copy feed from that ship.

PAO
Guidance Officer reports the command module computer looks good and the guidance and navigation system is GO aboard the spacecraft.

CAPCOM
Apollo 11, Houston. We see you getting ready for sep. Everything looks mighty fine down here.

SC
Thank you, Ron. Thank you.

PAO
We are awaiting confirmation of separation. We confirm separation now from on the ground readings from telemetry. We confirm separation.

CAPCOM
Apollo 11, Houston. You still look mighty fine from here. You're cleared for landing.

SC
We appreciate that, Ron.

SC
Roger. Gears down the lock.

CAPCOM
Roger.

PAO
Altitude 1288 nautical miles, velocity 31,232 feet per second.

END OF TAPE

CDT 11:25 GET 194:53 TAPE 568/1

PAO
Flight Director, Milt Windler, has just informed recovery "We're on the final for the carrier."

SC
Houston, we've got your service module on 5. A little high and a little bit to the right.

CAPCOM
Roger, thank you.

SC
And it's rotating just like it should be. Thrusters firing.

CAPCOM
Good, it's got alot of gas there to burn out too.

SC
Coming across now from right to left.

CAPCOM
Houston, roger.

PAO
800 nautical miles high. Velocity 33,000 feet per second. Guidance reports Apollo 11 right down the middle of the corridor. 7 minutes away from entry.

SC
Houston, Apollo 11. You going to turn on the tape recorder shortly?

CAPCOM
11, Houston. You can go ahead and turn it on.

SC
Okay, I'll have to go to command reset to do that.

CAPCOM
11, Houston. That's negative. All you have to do is turn it on. That'll be fine.

SC
I guess I don't know how to turn it on then. I got PCM on lock, record forward, high bit rate at barberpole.

CAPCOM
11, Houston. We'll send the on command from down here and see if it works.

SC
Okay.

PAO
Velocity 34,630 feet per second.

SC
There's the moon whipping by the field of view right now.

CAPCOM
Roger, copy.

PAO
Velcoity coming up on 35,000 feet per second now. 3 minutes to entry. Apollo 11 in the proper attitude and -

CAPCOM
11, Houston. We'll have you for about 3 or 4 minutes through Redstone, then we'll pick you up after black out through ARIA.

SC
Roger.

PAO
Apollo 11 lined up right down the middle of the entry corridor. Velocity's now 35,578 feet per second. We're a minute and 45 seconds from entry. Black out will begin 18 seconds after entry.

END OF TAPE

CDT 11:33 GET 195:01 TAPE 569/1

SC
Houston, Apollo 11, I'm going to go to command reset and turn the tape on, out.

CAPCOM
11, Houston. Recommend negative on that. That will put us in low bit-rate.

SC
Okay, I already put it to command reset, but they still have barber-pole on the tape. And my light switch is high bit-rate.

CAPCOM
Okay, that will be fine. On 225 there if you can reach it, Buzz, the last two set of records on the second row from the bottom, you can punch those in.

PAO
36,000 feet per second.

CAPCOM
And 11, Houston, don't mess around with that 225 there.

SC
Okay.

CAPCOM
And 11, Houston, you're going over hill there shortly, you're looking mighty fine to us.

SC
See you later.

PAO
We're at entry time. Blackout very shortly. Range to go to splash 1533 nautical miles. There's blackout. This blackout period should last for about 3 minutes 45 seconds. At blackout we were showing velocity 36,237 feet per second. Range to go to splash 1510 nautical miles. The elapse time for end of blackout 195 hours 7 minutes even. Drogue shoot deployment time is 195 hours 12 minutes 8 seconds. And the Control Center will not attempt to communicate with Apollo 11 after drogue deploy time. It will leave the air ways clear for the recovery forces.

PAO
ARIA 3 reported a visual contact.

PAO
We're at 3 minutes 20 seconds since entry, and the blackout should end about 3 minutes 53 seconds after entry. We're about 11 minutes away from landing. ARIA 3 would - is the up range ARIA aircraft.

CAPCOM
Apollo 11, Houston through ARIA.

CAPCOM
Apollo 11, Houston through ARIA.

CAPCOM
Apollo 11, Houston through ARIA 4.

PAO
The Hornet reports Air-Boss 1 has visual contact.

CAPCOM
Apollo 11, Houston through ARIA, standing by, over.

CAPCOM
Apollo 11, Houston, in the blind Air-Boss has a visual contact.

PAO
The Hornet now reports a visual contact. Visual contact from the recovery ship.

PAO
Hornet reports momentary visual contact has now disappeared behind clouds.

END OF TAPE

CDT 11:42 GET 195:10 TAPE 570/1

PAO
We're 7 minutes, 44 seconds from entry. Drogue shoot deployment scheduled for an elapsed time for an entry of 9 minutes, 1 second.

CAPCOM
Apollo 11, Houston. Standing by for your DSKY reading. Over.

PAO
Hawaii rescue 2 reports an S-band contact with the spacecraft.

CAPCOM
Apollo 11, Houston. Stand by for your miss distance. Over. Apollo 11, Houston. Standing by for your DSKY reading. Over.

SC
Drogues.

CAPCOM
Apollo 11, Houston. Your DSKY reading please. Over.

SC
(Garble)

PAO
Apollo 11 reports right on. We take that to mean that the drogues deployed on time.

SC
69, 15.

PAO
Apollo 11 should be on main chutes now. Hornet reports a sonic boom a short time ago. We're just under 4 minutes to landing. We will continue to monitor for any conversations between the spacecraft and recovery forces, but we will not initiate a call from now on for the spacecraft from the control center.

HORNET
Apollo 11, Apollo 11. This is Hornet, Hornet. Over.

SC
Hello, Hornet, this is Apollo 11 reading you load and clear. Our position 133:0, -69:15.

HORNET
Roger, Hornet copy. 13301675. Any further data?

SC
330, 169, 15.

PAO
Hornet has voice contact. Aircraft reports visual with 3 full chutes.

HORNET
A condition of crew. Over.

SC
The condition of crew is 4000 - 3500 feet on the way down.

HORNET
11, this is Hornet. Copy. 11, what's your splashdown error? Over.

SC
Okay. Our splashdown error is by latitude, longitude, 133016915. That's (garbled).

HORNET
Roger, out.

PAO
Hornet reports spacecraft right on target point.

HELO
Okay, Hornet. Apollo 11 in sight.

HORNET
Roger. Apollo sighted on chutes.

HELO
(Garbled) contact here at 150 holding. Apollo 11, (garbled).

CDT 11:42 GET 195:10 TAPE 570/2

HELO
190.

HORNET
Hornet, roger, out.

HELO
(garbled) bearing 2 zero zero.

SC
Apollo 11 at 1500 feet.

HORNET
Hornet, roger, copy, out.

PAO
That's Neil Armstrong giving the position report.

HELO
Have a visual of about a mile and a half.

HELOS
(garlbed)

HORNET
Hornet, roger.

HELOS
(garbled) spacecraft.

SWIM 1
Roger, this is swim 1, Apollo 11.

SC
(garbled) 100 feet.

SWIM 1
Roger, you're looking real good.

HELOS
(garbled)

SWIM 1
Splashdown, Apollo has splashdown.

HORNET
Hornet, copy. (Garble)

HELOS
(garbled)

SC
(garbled) splashdown.

SWIM 1
This is Swim 1. The command module is stable 2, stable 2. Over.

HORNET
Hornet, roger.

AIRBOSS
Okay, Hornet. This is Airboss. We're orbiting your data at 1000 feet. Roger, out.

HORNET
Roger.

PAO
Stable 2 is upside down. The flotation bags will right the spacecraft.

SWIM 1
Roger. The module is in stable 2. The dye marker is deployed, and the chutes appear to be detached and are down wind from the command module.

HORNET
Hornet, roger.

AIRBOSS
Roger, thank you. 235135. 235 (garbled)

SWIM 1
This is Swim 1. The command module is still in stable 2. The dye marker is beginning to trail now just a (garbled) in the west. The main chutes are detached and (garbled) down wind.

HORNET
Hornet, copy.

PAO
It normally takes 8 to 10 minutes for the rotation bags to right the spacecraft. Swim 1 is getting ready to deploy swimmers.

AIRBOSS
This is Airboss, Recovery 1 and photo 1, go to high frequency.

RECOVERY
Roger, Recovery to high frequency.

END OF TAPE

CDT 11:52 GET 195:20 TAPE 571/1

RECOVERY
Roger, Recovery 1.

RECOVERY
4 to 1, 4 to 1, (garbled) Over.

SWIM 1
This is Swim 1 (garbled)

RECOVERY
Hornet, copy.

RECOVERY
Photo, are you going to pick up (garbled)

PHOTO 1
This is Photo 1, roger.

ARIA 3
(garbled) Air Boss 1, this is Hornet bridge. Request commentary if available, over.

AIR BOSS
Visible trailing (garbled) west at 060 15 knots. (garbled) 30 degrees to the vertical toward the downwind side.

AIR BOSS
Recovery 1, the drogue chutes shall be clear of all aircraft.

RECOVERY
It's a few miles to the north.

AIR BOSS
This is Air Boss. We currently have 3 helos on the screen the drogue chutes splashed down approximately 1500 yards on a bearing of 240 from the command module.

AIR BOSS
Hornet, this is Air Boss. I see you copying the commentary.

RECOVERY
This is Hornet, copy affirmative.

PHOTO 1
This is Photo One. The 3 (garbled) is (garbled) plus 20 feet and two floatation bags are visible at this time (garbled) to go to 4. (garbled) module (garbled) above the other (garbled) of the vertical axis (garbled).

AIR BOSS
Hornet, I didn't copy Photo 1's full report. Understand 2 floatation bags deployed and in stable 1 now. Is that correct? Over.

PHOTO 1
(garbled) it is upright, but it isn't (garbled) stable 2.

AIR BOSS
Understand still stable 2.

PHOTO 1
(garbled)

PAO
Apollo 11 reported still in stable 2, but gradually righting itself.

RECOVERY
Air Boss comment. I am not copying Photo 1's relay. Over.

AIR BOSS
This is Air Boss 1. Photo 1 says that it is still in stable 2. The bags are inflated. It is not absolutely inverted now, it's 70 degrees to the vertical axis. Still in stable 2.

PHOTO 1
This is Photo 1. The module is now 90 degrees to the vertical axis.

PHOTO 1
This is Photo 1. The command module is stable 1 floatation bags are inflated.

PAO
Apollo 11 is stable 1 now, stable 1.

PHOTO 1
(garbled)

HORNET
Air Boss 1, this is Hornet Bridge. Say when it is stable 1. Over.

AIR BOSS
(garbled) stability above the vertical axis is approximately 30 degrees.

HORNET
Roger.

HORNET
Air Boss, Hornet. Recovery 1 is ready to deploy swimmers in 1 minutes, Swim Two, Swim Two. (garbled)

CDT 11:52 GET 195:20 TAPE 571/2

HORNET
(garbled)

HORNET
Hornet, roger.

RECOVERY
(garbled) is on low mode.

PAO
Swimmers to deploy in about 1 minute.

SWIM 2
(garbled) is in position. (garbled) we are going to lower the first swimmer.

AIR BOSS
Roger, Swim Two start recovery at once. You are cleared.

RECOVERY
Okay, commencing.

SWIM 2
Swim Two is commencing to put the first swimmer in the water.

PHOTO 1
The hatch of the capsule is now to the up wind to the first swimmer. This is Photo 1. There are no dye markers in the water. The first swimmer (garbled)

HORNET
This is the Hornet. Did -

PHOTO 1
Swim Two dropped his first swimmer.

AIR BOSS
Yes, affirmative. This is Air Boss. The swimmer is in the water.

PHOTO 1
The swimmer is in the water and he is connecting (garbled) deployed.

AIR BOSS
Hornet, the sea anchor has been detached and is deployed.

HORNET
Has deployed, roger, copy swim one now.

SWIM 2
The sea anchor is deployed (garbled)

AIR BOSS
Roger, copy.

PAO
The sea anchor has been deployed by the swimmer.

SC
(garbled) Apollo 11.

PHOTO 1
This is Photo 1. The swimmer has given us thumbs up. (garbled) 2 is standing (garbled) for 2 swimmers and the floatation collar.

AIR BOSS
Apollo 11, Air Boss condition of the crew?

SC
Air Boss Apollo 11, everyone inside, our checklist is complete, awaiting swimmers.

SWIM 2
(garbled) 2 swimmers and the floatation collar secured to the command module.

AIR BOSS
Air Boss, Hornet. What's the condition?

SWIM 2
The crew is excellent. Both checklists have been completed. They are ready to take on the swimmers.

SWIM 2
(garbled) the water.

PAO
3 swimmers in the water from Swim Two, Swim Two Helo.

SWIM 2
(garbled)

AIR BOSS
Apollo 11, this is Air Boss. Are you copying a narration or following the sequences of recovery operations?

SWIM 2
This is Photo L. (Garbled)

SC
(garbled) just before that last call. We've just been picking up your COMM now.

SWIM 2
(garbled) Floatation collar half way around the command module.

CDT 11:52 GET 195:20 TAPE 571/3

PAO
The crew has reported to Air Boss that they are in excellent condition. Floatation collar is about half way around the spacecraft now.

SWIM 2
The command module (garbled) quite well vertical axis of (garbled) down wind 10 degrees. (garbled) floatation collar. The 4 to 1, the uprighting bags 2 are fully inflated, 1 is partially inflated.

END OF TAPE

CDT 12:02 GET 195:30 TAPE 572/1

HORNET
- of the flotation collar. Photo 1, the uprighting bags - 2 are fully inflated, 1 is partially inflated.

SWIM 1
Air Boss. Are you copying?

AIR BOSS
Affirmative, roger.

PHOTO 1
The flotation collar has been attached.

PAO
The flotation collar is attached now.

PAO
And the collar is inflated.

PHOTO 1
Photo 1, the swimmers are - the lift has approached.

PAO
Air boss reporting the spacecraft riding very smoothly.

HORNET
Swan, this is Hornet. Bridge, request the tacan on top. Over.
PHOTO 1
This is Photo 1. The raft is in the water - 241 radial - nine miles. The raft is inflated.

PHOTO 1
(garble) command module.

PHOTO 1
Photo 1, I repeat very - from Hornet, 241 radial, 9 miles. Over.

HORNET
Roger.

PHOTO 1
Photo 1, (garbled)

(GARBLED)

AIR BOSS
Apollo 11 this is Air Boss 1. We have the command module on radar bearing of 244. (garble) - 12 miles.

PHOTO 1
Second raft is in the water. Raft number 2 is inflated. And number 2 is being (garble).

PHOTO 1
Rocovery 1 has moved into position. Standing by to deploy the swimmer.

HORNET
Roger

PAO
Recovery 1 getting ready to deploy the swimmer with the biological isolation garments. The other swimmers -

PHOTO 1
Photo 1, the water in the area - (garble) 1 swimmer is in raft number 1 (garble) In raft number 2 the (garble) deploy the sea anchor.

PHOTO 1
Recovery is approaching - to drop the -

PHOTO 1
Swimmer is in the water. Swimmer is in raft number 2. Recovery 1 is in position standing by to lower the (garbled).

PAO
The swimmer with the biological isolation garments is in the raft next to the spacecraft. That's Lt. Clancy Hadleburgh of Chippawaw Falls, Wisconsin. He's also wearing a biological isolation garment.

PHOTO 1
Recovery 1 is in this position lowering the bag of BIGS at this time.

HORNET
Roger.

PAO
And the HELO is lowering the astronauts BIGS, or biological isolation garments to Lt. Hadleburgh.

PHOTO 1
The bag of BIGS is -

PAO
And the report is that the bag of BIGS is in raft number 2.

PHOTO 1
The swimmers are unloading the net at this time.

CDT 12:02 GET 195:30 TAPE 572/2

PHOTO 1
This is Photo 1. The bag of BIGS and pecontaminant are in raft number 2 - module is very stable, very stable. There's only, about the verticle axis, a (garbled)

HORNET
Roger.

HORNET
Air Boss, Hornet. What is the present condition of the Astronauts?

AIR BOSS
determing the condition of the astronauts. Hello Apollo 11, Air Boss 1 - what is you condition?

SC
Our condition is all 3 excellent. We're just fine. Take your time.

HORNET
All right.

PAO
That was Mike Collins reporting the crew was excellent.

PHOTO 1
One swimmer is trying to don - one swimmer is in raft No. 1.

HORNET
All right, we copy. Big swimmer preparing to don suit. One swimmer in raft with full suit - (garble).

PHOTO 1
This is Photo 1 (garble).

PAO
Lt. Hatleberg putting on his biological isolation garment.

PHOTO 1
The visibility is in vicinity of 17 miles.

AIR BOSS
Photo 1, this is Air Boss. (Garble)

SC
Photo 1. The winds are from 065 or 060 - 20 knots - 4 to 6 feet. Over.

HORNET
Roger.

SWIMMER
This is Photo 1. The big swimmer is making adjustments to his garment. He has his helmet on - raised to his shoulders. He's trying to zip it up at this time.

END OF TAPE

CDT 12:13 GET 195:41 TAPE 573/1

PAO
The ship reports it is now 7 miles from the spacecraft.

SWIMMER I
This is swimmer 1 saying big swimmer is - (garble) at this time.

RECOVERY
(Garble) position of the sea buide. Over.

SWIMMER 1
This is Swimmer 1, reported earlier there was no dye marker (garble)

RECOVERY
(Garble)

SWIMMER 1
(Garble)

RECOVERY
(Garble)

SWIMMER 1
(Garble) command module.

RECOVERY
(garble) identify (garble).

SC
This is Apollo 11. Tell everybody take your sweet time. We're doing just fine in here. It's not as stable as the Hornet, but all right.

PHOTO 1
This is Photo 1. Apollo 11 reports everything is fine. Not as stable as the Hornet but almost. Over.

RECOVERY
Hornet, roger.

PHOTO 1
This is Photo 1, Raft No. 2 is within 10 feet of the command module at this time.

PHOTO 1
Roger. Photo 1 my big trouble is trying to transport to raft No. 2 to (garble) transfer the -

PAO
Unofficial splash time is 195 hours, 18 minutes, 21 seconds.

SWIMMER 1
(Garbled) No. 1 at this time. We recovered the command module (garble)

PAO
Hornet reports the other swimmers are now upwind of the command module leaving Lt. Hatleberg in his BIG and with the decontaminate that will be placed around the hatch and on the -

SWIMMER 1
The big swimmer is securing (garble).

SWIMMER 1
The big swimmer is (cut out).

PAO
Lt. Hatleberg is now transferring the BIGS to the crew.

SWIMMER 1
(Garble)

PAO
The Hornet now estimates they are 4 and three-quarters miles away from the spacecraft.

SWIMMER 1
(Garble)

PAO
The BIGS are in the command module and the hatch has been closed again.

RECOVERY
(Garble) over.

SWIMMER 1
(Garble)

PAO
Lt. Hatleberg is called the BIG swimmer.

CDT 12:13 GET 195:41 TAPE 573/2

SWIMMER 1
This is Swimmer 1. The big swimmer is (garble) normal procedures on the command module.

PAO
The big swimmer is now spraying the hatch area and the top deck and around the hatch on the command module with the decontaminate.

HORNET
Apollo 11, this is Hornet. We're 4 miles out, making our approach.

PAO
The Hornet advises the crew they are 4 miles away.

SWIMMER 1
This is Swimmer 1. The big swimmer has attached the flotation collar and is now in raft No. 1.

SWIMMER 1
This is Swimmer No. 1. The big swimmer is still in Raft No. 1.

HORNET
Swimmer 1, Hornet. Understand big swimmer has completed his decontamination of the command module, is that correct ?

SWIMMER 1
(Garble) on the flotation collar.

HORNET
Roger.

PHOTO 1
Photo 1, Hornet I passed from Pacific Chief, you are cutting out. You may be releasing your teeth too early on transmissions. Over.

SWIMMER 1
This is Swimmer 1. Roger. Out.

PAO
The Hornet reports it was 13 miles along the aim point at splash. The carrier was 13 miles from the aim point at splash.

SWIMMER 1
This is Swimmer 1. Earlier (garble) made preparations to commence

RECOVERY
Roger.

SWIMMER 1
This is Swimmer 1, the big swimmer (garble)

PAO
The big swimmer has reported communicating with the astronauts by visual hand signals through the hatch window.

END OF TAPE

SC
Photo 1, on the (garbled).

SWIMMER
Photo 1. The astronauts have opened the hatch. The first astronaut - got out of the hatch. The first - astronaut, right.

SWIMMER
Photo 1, the -

PAO
The first astronaut is now emerging.

SWIMMER
(garbled).

SWIMMER
(garbled) Okay, up wind.

SWIMMER
This is (garbled). There is a Photo 1 the position very shortly. Position - report on the first astronaut is up.

HORNET
Roger.

SWIMMER
Photo 1.

PAO
Astronaut number 2 coming up the hatch now.

SWIMMER
The second one. That is (garbled). The third astronaut is out of the hatch.

PAO
And the third crewmen is out of the spacecraft now.

SWIMMER
(garbled)

PAO
Hatch is closed and secured.

SWIMMER
Every crewmen out. All the astronauts. (Garble)

HORNET
Roger.

PAO
Hornet now reports that the swimmer is having some difficulty in securing the hatch and one of the astronauts is helping him.

SWIMMER
(garbled) locked (garbled) are in. (garbled) Report of hatch secure. All three astronauts are out. (garbled)

PAO
Hatch is now supported secure.

SWIMMER
Photo 1 (garbled)

PAO
Hornet now 1 and one-quarter miles from the spacecraft.

SWIMMER
(garbled)

SWIMMER
(garbled) Photo 1 - - (garbled) on the upper portion of the command module.

HORNET
Roger.

SWIMMER
(garbled)

PAO
And the Lt. Hatleberg sprayed decontaminate around the hatch.

SWIMMER
(garbled) the decontaminate putting out the lower portion of the command module.

HORNET
Hornet, roger.

SWIMMER
I am now scrubbing (garble)

HORNET
Roger.

PAO
And the swimmer now scrubbing down the command module with the decontaminate.

SWIMMER
Photo 1 (garbled). I have completed scrubbing the command module. (garbled) The first and the second astronaut.

CDT 12:25 GET 195:53 TAPE 574/2

PAO
The swimmer has now started scrubbing the astronauts biological isolations garments with the decontaminate.

SWIMMER
(garbled) is complete. And now I'm s'crubbing the shoulders of the first astronaut.

PAO
Hornet estimates distance three-quarters of a mile now.

SWIMMER
Hornet, swimmer is scrubbing the arm and shoulders of the first astronaut.

HORNET
Hornet, roger.

END OF TAPE

CDT GET TAPE 575/1

SWIM 1
The first astronaut is now having his BIG put on him.

HORNET
Hornet, roger.

SWIM 1
The swimmer has completed decontaminating the first astronaut.

HORNET
Hornet, over.

SWIM 1
Coming to the BIG for the second astronaut.

PAO
And the first astronaut has been scrubbed down and the swimmer has started the decontaminated processes on the BIG of the second astronaut.

SWIM I
(garbled)

HORNET
Roger.

SWIM 1
The swimmer has scrubbed the front side of the second astronaut. He is now in the BIG.

HORNET
Roger.

SWIM 1
Swim 1. The swimmer has completed the (garbled).

HORNET
Roger.

PAO
Scrub down on the second astronaut completed.

HORNET
Hornet, roger.

SWIM 1
This is Swim 1. The swimmer is observing the (garbled) astronauts.

HORNET
Hornet, roger.

SWIM 1
The swimmer is (garbled) over the head of the astronaut.

HORNET
Hard to see, isn't it?

HORNET
Swim 1. You were cut out. Say again.

SWIM 1
(garbled) says stand by for a call from the recovery station.

HORNET
Roger.

SWIM 1
This is swim 1. The third astronaut has been scrubbed. (garbled).

HORNET
Hornet, roger.

PAO
And the third astronaut has been scrubbed down, and now the astronauts are scrubbing down the swimmer.

SWIM 1
The swimmer 1 is ready and standing by for completion of the decontamination maneuver.

HORNET
Hornet, roger.

SWIM 1
This is Swim 1. The (garbled). Both in (garbled)

HORNET
Roger.

SWIM 1
Swim 1 has the astronaut 1 and 2 are still in the (garbled).

HORNET
Hornet, roger.

SWIM 1
Swim 1 the -

HORNET
Hornet, roger.

CDT GET TAPE 575/2

SWIM 1
Swimmer 1 contamination of the BIG swimmer is complete. The BIG swimmer is now decontaminating swimmer number 1.

HORNET
Roger.

SWIM 1
The BIG swimmer has given the signal to the swimming team to prepare to close the CM module.

HORNET
All right.

PAO
The other swimmers will now proceed to the command module. It has been decontaminated, and the swimmers will remain on their scuba air.

PHOTO 1
Photo 1, Hornet. We request you reconfirm that they are decontaminating raft number 1.

HORNET
All right. Photo 1, that is affirmative. Decontaminating raft number 1. The others (garbled).

PHOTO 1
Photo, roger, out.

HORNET
Photo 1, raft number 2 is now closing the command module. All 3 swimmers are on board on scuba.

PHOTO 1
Photo, roger.

RECOVERY 1
Recovery 1 are in (garbled) position. Standing by.

HORNET
Rog.

SWIM 1
The raft number 2 are at the command module. The swimmers are taking their positions.

HORNET
Roger.

RECOVERY 1
Recovery 1 is commencing, his approach.

HORNET
Hornet, copy.

SWIM 1
Raft 1 is riding very smooth.

HORNET
Hornet, roger.

END OF TAPE

CDT 12:45 GET 196:13 TAPE 576/1

SWIM 2
(garbled) The astronauts are in a cheerful mood. They are waving at the photographers. (garbled)

AIR BOSS
Photo 1, Hornet understand recovery is making approach to pick up the first astronaut?

PHOTO 1
This is Photo 1. He's in position ready to commence recovery. Over.

AIR BOSS
Roger.

PHOTO 1
Hornet, this is Photo 1. Recovery 1 is commencing his first approach.

AIR BOSS
Roger.

PAO
And Recovery 1 going in now to pick up the first astronaut.

PHOTO 1
This is Photo 1. The net is being lowered.

AIR BOSS
Roger.

PHOTO 1
This is Photo 1. The net is at the raft The first astronaut is climbing into the net, and the first astronaut is in the net on the way up clear of the command module. The first astronaut is half way up. The first astronaut is at the hatch.

AIR BOSS
Roger.

PHOTO 1
The first astronaut is in the helicopter, the net is on its way down.

AIR BOSS
Roger.

PHOTO 1
Recovery 1 is commencing his second approach. The net is at the raft, the second astronaut is in the net and is on his way up clear of the command module.

AIR BOSS
Roger.

PHOTO 1
The net is at the hatch. The second astronaut is in the helicopter.

AIR BOSS
Roger.

PHOTO 1
The net is on its way down, Recovery 1 is making a third approach.

AIR BOSS
Roger.

PHOTO 1
The net is at the raft, in, the third astronaut is climbing in the net, the third astronaut is in the net and on his way up clear of the command module. The third astronaut is half way up. The third astronaut is in the hatch, he is climbing in the helicopter.

AIR BOSS
Roger.

PHOTO 1
All three astronauts are aboard.

AIR BOSS
Roger, Photo 1.

PHOTO 1
Roger, this is Photo 1. We have hatch on the Recovery 1 is closed.

RECOVERY 1
This is Recovery 1. I have 3 astronauts aboard switching power frequency, power frequency.

AIR BOSS
Roger (garbled)

SWIM 2
This is Swim 2 along side the command module. The BIG swimmer decontaminating the module

CDT 12:45 GET 196:13 TAPE 576/2

SWIM 2
at this time the 3 swimmers are in the raft (garbled)

PAO
Mission Director George Hage has just thanked the flight controllers assembled here in the Control Center on behalf of himself and Gen. Phillips for the way in which they conducted this mission.

AIR BOSS
Stand by Swim 1 and 3. This is Air Boss. I haven't seen any more of the 2 drogue chutes nor the apex chute.

PAO
No cigars being lit up here yet. We're waiting until the crew is on the carrier. A few are being wetted in anticipation of a match, but we don't see any lit yet.

END OF TAPE

CDT 12:55 GET 196:23 TAPE 577/1

PAO
The elevator will take recovery 1 down to the hangar deck and where the crew will enter the mobile quarantine facility. And the flags are waving and the cigars are being lit up. And clear across the big board in front is President John F. Kennedy's message to Congress of May, 1961: I believe that this Nation should commit itself to achieving the goal before this decade is out of landing a man on the moon and returning him safely to Earth. That has been accomplished.

PAO
The Apollo 11 placque has been hung in the mission control center - a replica of the crew patch.

PAO
This control center becoming jammed with people as - people from the staff support room is coming in here. We've never seen this many people in the control center at one time before.

END OF TAPE

CDT 13:05 TAPE 578/1

NOT TRANSCRIBED - COMMERCIAL TV

CDT 13:17 TAPE 579/1

NOT TRANSCRIBED - COMMERCIAL TV

CDT 13:27 TAPE 580/1

NOT TRANSCRIBED - COMMERCIAL TV

PRESIDENT'S MESSAGE TAPE 581/1

SPEAKER
President Nixon waving to the astronauts. The curtains have been drawn. There they are in the rear window. President is receiving applause from the crowd. Astronauts gather in the window.

NIXON
Neil, Buzz, and Mike. I want you to know that I think I'm luckiest man in the world. And I say this not only because I have the honor to be President of the United States, but particularly because I have the privilege of speaking for so many in welcoming you back to earth. I could tell you about all the messages we received in Washington. Over one hundred foreign governments, Emperors, and Presidents and Prime Ministers and Kings have sent the most warm messages that we have ever received. They represent over 2 billion people on this earth. All of them who have had the opportunity through television to see what you have done. And then I also bring you messages from members of the Cabinet and members of the Senate and members of the House and Space Agency. And in the streets of San Francisco where people stopped me a few days ago, and you all love that city, I know, as I do. But most important, I had a telephone call yesterday. The toll wasn't, incidently, as great as the one I made to you fellows on the moon. (Laughter) I made that collect, just in case you didn't know. But I called the three of, in my view, three of the greatest ladies and most courageous ladies in the whole world today, your wives. And from Jan and Joan and Pat, I bring their love and their congratulations. We think that it is just wonderful that they could have participated at least through television in this return; we're only sorry they couldn't be here. And also, I've got to let you in on a little secret - I made a date with them. (Laughter) I invited them to dinner on the thirteenth of August, right after you come out of quarantine. It will be a State dinner held in Los Angelos. The govenors of all the 50 States will be there, the ambassardors, others from around the world and in America. And they told me that you would come too. And all I want to know - will you come? We want to honor you then.

ARMSTRONG
We'll do anything you say, Mr. President. Just anything.

NIXON
One question, I think, all of us would like to ask. As we say you bouncing around in that boat out there, I wonder if that wasn't the hardest part of the journey. Was that - did any of you get seasick?

ARMSTRONG
No, we didn't. And it was one of the harder parts, but it was one of the most pleasant, we can assure you.

NIXON
Yes, well, I just know that you can sense what we all sense. When you get back now - incidently,

PRESIDENT'S MESSAGE TAPE 581/2

have you been able to follow some of the things that happen when you've gone. Did you know about the All-Star game?

ARMSTRONG
Yes, sir. The Capsule Communicators have been giving us daily news stories.

COLLINS
They daily post us.

NIXON
Were you American League or National League?

ARMSTRONG
I'm National League man.

ALDRIN
I'm nonpartison, sir.

COLLINS
That's right.

NIXON
There's the politician in the group, right.

ARMSTRONG
We're sorry you missed that game.

NIXON
Yes, well - you knew that too.

ARMSTRONG
We hear that -

NIXON
The rain -

ARMSTRONG
The rain. Well, we haven't been able to control the weather yet, but that's something we can look forward to as tomorrow's challenge.

NIXON
Right, right. Well, I can only summarize it because I don't want to hold you now. You have so much more to do. And gee, you look great; do you feel as good as you look?

ARMSTRONG
Oh, we feel just perfectly, Mr. President.

NIXON
Yeah, I understand your - Frank Borman says you're a little younger by reason of having gone into space, is that right. Do you feel that way, a little younger?

COLLINS
We're a lot younger than Frank Borman. (Laughter).

NIXON
There he is, over there. Come on over Frank so they can see you. You going to take that lying down?

ALDRIN
It looks like he has aged in the last couple of days.

NIXON
Come on Frank.

BORMAN
Mr. President, the one thing I wanted. You know we have a poet in Mike Collins and he really gave me a hard time for describing new words of fantastic and beautiful. And you - and counted them, in three minutes up there you used four fantastics and two beautifuls. (Laughter).

NIXON
Well, just let me close off with this one thing. I was thinking as you know, as you came down and we knew it was a success, and it had only been eight days, just a week, a long week. But this is the greatest week in the history of the world since the creation. Because as a result of what happened in this week, the world is bigger infinitely, and also as I'm going to find on this trip around the world and as Secretary Rogers will find as he covers the other countries and Asia. As a result of what you've done the world's never been closer together before. And we just thank you for that. And I only hope that all of us in government,

PRESIDENT'S MESSAGE TAPE 581/3

all of us in America that as a result of what you've done, we can do our job a little better. We can reach for the stars just as you have reached so far for the stars. We don't want to hold you any longer. Anybody have a last re- How about promotions, do you think we could arrange something? (Laughter)

ARMSTRONG
We're just pleased to be back and very honored that you were so kind as to come out here and welcome us back, and we look forward to getting out of this quarantine -

COLLINS
Great.

ARMSTRONG
- and talking without having glass between us.

NIXON
And incidently, the speeches that you have to make at this dinner can be very short. And if you want to say fantastic or beautiful, that's all right with us. Don't try to think of any new adjectives; they've all been said. And now, I think incidently, that all of us who - the millions that are seeing us on television now, are seeing you, would feel as I do that in a sense our prayers have been answered, and I think it would be very appropriate if Chaplain Pierto, the Chaplain of this ship were to offer a prayer of thanksgiving. If he would step up now. Chaplain, thank you.

CHAPLAIN
Let us pray. Lord, God, our Heavenly Father. Our minds are staggered and our spirit exalted with the magnitude and precision of this entire Apollo 11 mission. We have spent the past week in communal anxiety and hope as our astronauts sped through the glories and dangers of the heavens. As we try to understand and analyze the scope of this achievement for human life, our reason is overwhelmed with abounding gratitude and joy, even as we realize the increasing challenges of the future. This magnificent event illustrates a new what man can accomplish when purpose is firm and intent corporate. A man on the moon was promised in this decade. And though, some were unconvinced, the reality is with us this morning, in the persons of Astronauts Armstrong, Aldrin, and Collins. We applaud their splended exploits and we pour out our thanksgiving for their safe return to us, to their families, to all mankind. From our inmost beings, we sing humble, yet exhuberant praise. May the great effort, and commitment seen in this project, Apollo, inspire our lives to move similiarly in other areas of need. May we the people by our enthusiasm and devotion and insight move to new landings in brotherhood, human concern, and mutual respect. May our country, afire with inventive leadership and backed by a committed followership, blaze new trails into all areas of human cares. See our enthusiasm and bless our joy with dedicated purpose for the many needs at hand. Link us in friendship with peoples throughout the world as we strive together to better the human condition. Grant us peace beginning

PRESIDENT'S MESSAGE TAPE 581/4

in our own hearts. And a mind atuned with good will toward our neighbor. All this we pray as our thanksgiving rings out to thee. In the name of our Lord, amen.

COLLINS
Amen.

(play anthem)

SPEAKER
The astronauts stood at attention.

END OF TAPE

CDT 14:10 TAPE 582/1

PAO
This is Apollo Control. The participants in the post-recovery news conference have left the control center, and the post-recovery news conference will begin within the next few minutes in the MSC building 1 auditorium.

END OF TAPE

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