

Voice From Moon: 'Eagle Has Landed'

EAGLE (the lunar module): Houston, Tranquility Base here. The Eagle has landed.

HOUSTON: 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.

TRANQUILITY BASE: Thank you.

HOUSTON: You're looking good here.

TRANQUILITY BASE: A very smooth touchdown.

HOUSTON: Eagle, you are stay for T1. [The first step in the lunar operation.] Over.

TRANQUILITY BASE: Roger. Stay for T1.

HOUSTON: Roger and we see you venting the ox.

TRANQUILITY BASE: Roger.

COLUMBIA (the command and service module): How do you read me?

HOUSTON: Columbia, he has landed Tranquility Base. Eagle is at Tranquility. I read you five by. Over.

COLUMBIA: Yes, I heard the whole thing.

HOUSTON: Well, it's a good show.

COLUMBIA: Fantastic.

TRANQUILITY BASE: I'll second that.

APOLLO CONTROL: The next major stay-no stay will be for the T2 event. That is at 21 minutes 26 seconds after initiation of power descent.

COLUMBIA: Up telemetry command reset to re-acquire on high gain.

HOUSTON: Copy. Out.

APOLLO CONTROL: We have an unofficial time for that touchdown of 102 hours, 45 minutes, 42 seconds and we will update that.

HOUSTON: Eagle, you loaded R2 wrong. We want 10254.

TRANQUILITY BASE: Roger. Do you want the horizontal 55 15.2?

HOUSTON: That's affirmative.

APOLLO CONTROL: We're now less than four minutes from our next stay-no stay. It will be for one complete revolution of the command module.

One of the first things that Armstrong and Aldrin will do after getting their next stay-no stay will be to remove their helmets and gloves.

HOUSTON: Eagle, you are stay for T2. Over.

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From the Lunar Surface, a Message to Mission Control: 'The Eagle Has Landed'

Continued From Page 1, Col. 2



CONCENTRATION: Alan L. Bean, an astronaut who will be on the Apollo 12 flight, watching a tracking board at the Manned Space Center record the lunar module landing.

TRANQUILITY BASE: Roger. Stay for T2. We thank you.

HOUSTON: Roger, sir.
APOLLO CONTROL: That's stay for another two minutes plus. The next stay-no stay will be for one revolution.

TRANQUILITY BASE: Houston, that may have seemed like a very long final phase but the auto targeting was taking us right into a football field-sized crater with a large number of big boulders and rocks for about one or two crater diameters around it. And it required us to fly manually over the rock field to find a reasonably good area.

HOUSTON: Roger. We copy. It was beautiful from here, Tranquility. Over.

TRANQUILITY BASE: We'll get to the details of what's around here but it looks like a collection of just about every variety of shape, angularity, granularity, about every variety of rock you could find. The colors vary pretty much depending on how you are looking relative to the zero phase length. 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 they're going to have some interesting colors to them. Over.

HOUSTON: Roger. Copy. Sounds good to us, Tranquility. We'll let you press on through the simulated countdown and we'll talk to you later. Over.

TRANQUILITY BASE: Okay, this one-sixth G is just like an airplane.

HOUSTON: Roger, Tranquility. Be advised there are lots of smiling faces in this room and all over the world. Over.

TRANQUILITY BASE: There are two of them up here.

HOUSTON: Roger. It was a beautiful job, you guys. COLUMBIA: And don't forget one in the command module.

TRANQUILITY BASE: Roger.

Remark by Collins

APOLLO CONTROL: 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.

COLUMBIA: Thanks for putting me on relay, Houston. I was missing all the action.

HOUSTON: Roger. We'll enable relay.

COLUMBIA (4:30 P.M.): I just got it, I think.

HOUSTON: Roger, Columbia. This is Houston. Say something; they ought to be able to hear you. Over.

COLUMBIA: Roger, Tranquility Base. It sure sounded great from up here. You guys did a fantastic job.

TRANQUILITY BASE: Thank you. Just keep that orbiting base ready for us up there, now.

COLUMBIA: Will do.

APOLLO CONTROL: That request from Neil Armstrong.

APOLLO CONTROL: We've just gotten a report from the telcom here in mission control that LM systems look good after that landing. We're about 26 minutes now from loss of signal from the command module.

HOUSTON: Tranquility Base, Houston. All your consumables are solid. You're looking good in every respect. We copy the DPS venting. Everything is copacetic. Over.

TRANQUILITY BASE: Thank you, Houston. Houston, the guys that bet that we wouldn't be able to tell precisely where we are are the winners today. We were a little busy worrying about program alarms and things like that in the 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 came over in the final descent, I haven't been able to pick out the things on the horizon as a reference as yet.

HOUSTON: Rog, Tranquility. No sweat. We'll figure out—we'll figure it out. Over.

TRANQUILITY BASE: You might be interested to know that I don't think we noticed any difficulty at all in adapting to one-sixth G. It seems immediately natural to live in this environment.

HOUSTON: Roger, Tranquility. We copy. Over.

APOLLO CONTROL: Neil Armstrong reporting there is no difficulty adapting to the one-sixth gravity of the moon.

TRANQUILITY BASE: [Unintelligible] . . . window, with relatively level plain cratered with fairly a large number of craters of the 5- to 50-foot variety. And some ridges, small, 20 to 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 two 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.

HOUSTON: Roger, Tranquility. We copy. Over.

COLUMBIA: Sounds like it looks a lot better than it did yesterday. At that very low sun angle, it looked rough as a cob then.

TRANQUILITY BASE: It really was rough, Mike, over the targeted landing area. It was extremely rough, cratered and large numbers of rocks that were probably some many larger than 5 or 10 feet in size.

COLUMBIA: When in doubt, land long.

TRANQUILITY BASE: Well, we did.

Question on Landing

COLUMBIA: Do you have any idea whether they landed left or right of center line—just a little bit long. Is that all we know?

HOUSTON: Apparently that's about all we can tell. Over.

COLUMBIA: Okay, thank you.

TRANQUILITY BASE: Okay, I'd say the color of the local surface is very comparable to that 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 very white as you look into the zero phase line. And it's considerably darker gray, more like an ashen gray, as you look out 90 degrees to the sun. Some of the surface rocks in close here that have been fractured or disturbed by the rocket engine plume are coated with this light gray on the outside. But where they've been broken, they display a dark, very dark, gray interior and it looks like it could be country basalt.

HOUSTON: Tranquility, Houston. Please vent fuel and ox again. Over. It's building back up.

TRANQUILITY BASE: Okay, ox going now.

HOUSTON: Tranquility, Houston. You can open both fuel and ox vent now. Over.

TRANQUILITY BASE: Houston, Tranquility. Standing by for go AGS to the line and lunar line. Over.

HOUSTON: Stand by.

HOUSTON: Tranquility, Houston. You're go for the AGS the line and the lunar line. Over.

TRANQUILITY BASE: Roger.

HOUSTON: Tranquility, Houston. Please vent the fuel. It's increasing rapidly. Over.

TRANQUILITY BASE: We show 30 psi in the fuel and 30 on the oxidizer.

HOUSTON: Roger, we're reading somewhat different than that. Stand by.

TRANQUILITY BASE: The fuel temperature is reading 64 in the descent two and the oxidizer off scale low. Descent one is showing 61 in the fuel and 65 in the oxidizer.

HOUSTON: Roger, stand by.

HOUSTON: Tranquility, Houston. Please take the fuel vent switch and hold it open. Over.

TRANQUILITY BASE: Okay. We're holding it open, indicating about 24 psi on board.

HOUSTON: Roger.

TRANQUILITY BASE: Now indicating 20 psi in fuel.

HOUSTON: Roger.

TRANQUILITY BASE: And 22 in the ox.

HOUSTON: Roger.

TRANQUILITY BASE: Now indicating 15 psi in both tanks.

HOUSTON: Roger.

HOUSTON: Tranquility, Houston. If you haven't

done so, you can release the fuel vent switch. Over.

TRANQUILITY BASE: Roger.

HOUSTON: Tranquility, Houston. We have indication that we've frozen up the descent fuel helium heat exchanger and with some fuel trapped in the line between air and the valves and the pressure we're looking at is increasing there. Over.

TRANQUILITY BASE: Roger. Understand.

HOUSTON: Tranquility Base, Houston. If you have not done so, please close both fuel and ox vents now.

TRANQUILITY BASE: They're closed.

HOUSTON: Thank you, sir.

TRANQUILITY BASE: From the surface we could not see any stars out the window, but on my overhead patch I'm looking at the earth. It's big and bright, beautiful. Buzz is going to give a try at seeing some stars through the optics.

HOUSTON: Roger, Tranquility. We understand must be a beautiful sight. Over.

APOLLO CONTROL: We would like to point out that the fuel pressure problem that has been called to the attention of the crew is in the descent system. It is apparently 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 I would point out that we do not see this as a significant problem.

'Going Over the Hill'

HOUSTON: Columbia, Houston. Two minutes to LOS [loss of signal]. You're looking great. Going over the hill. Over.

COLUMBIA: Okay. Thank you. Glad to hear it's looking good. Do you have a suggested attitude for me? This one here seems all right.

HOUSTON: Stand by.

COLUMBIA: Let me know when it's lunch time, will ya?

HOUSTON: Say again?

HOUSTON: Columbia, Houston. You got a good attitude right there.

APOLLO CONTROL: This is Apollo Control. We've had loss of signal now from the command module. Of course, we'll maintain constant communication with the lunar module on the lunar surface. We have some heart rates for Neil Armstrong during that powered descent to 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 per minute, and the flight surgeon reports that his heart rate is now in the 90's. We do not have biomedical data on Buzz Aldrin.

APOLLO CONTROL (5:04 P.M.): We have an update on that touchdown time on the lunar surface. This still is not the final official time, which we'll get from read-out 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 those numbers to change perhaps a little bit when we get final data readout.

HOUSTON: Tranquility Base, Houston. If you want me to, I can give you a hack on the mission time every 30 minutes. Over.

HOUSTON: Tranquility, Houston. I'm counting down to T3 time. If you'd like to give me a hack, we can set up an event timer. Over.

TRANQUILITY BASE: Okay. How about counting up?

HOUSTON: Roger, you want it counting up? Stand by.

HOUSTON: Tranquility, Houston. On my mark 6230. Mark 6230 from pass TDI.

TRANQUILITY BASE: What we're looking for, Charlie, is time counting up to T2 that will be equal to 60 minutes or T3 equal to 60 minutes—T3.

HOUSTON: Roger. We'll have it for you.

HOUSTON: Tranquility Base, Houston. Reset the event timer to 0 and on my mark at 103 3941. Will give you a hack and it will be in one hour. Over.

TRANQUILITY BASE: Roger.

HOUSTON: And we got about almost 3 minutes to go, Neil. Over.

TRANQUILITY BASE: Okay.

HOUSTON: Tranquility Base, stand by on the event timer.

HOUSTON: Tranquility Base, on my mark start your event timer, 5, 4, 3, 2, 1, Mark.

TRANQUILITY BASE: Roger. We got it. Thank you.

HOUSTON: Rog, Neil.

Statement by Paine

APOLLO CONTROL (5:17 P.M.): There will be a brief statement from Dr. Thomas Paine, NASA administrator, in the Building 1 auditorium at 4:30 [Houston time]. We also have 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 east longitude, which would have put it about four miles from the targeted landing point downrange. We're now 54 minutes—or 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 continue to look very good.

APOLLO CONTROL (5:29 P.M.): We will be taking the release line down briefly for a statement from Dr. Thomas Paine, NASA administrator. We will be recording any further conversations with the spacecraft and will play those back following the statement.

APOLLO CONTROL (5:42 P.M.): We understand there's been a brief delay in the statement from NASA administrator Thomas Paine. We will catch up with the tape-recorded conversation that we've had with Eagle on the lunar surface at this time.

TRANQUILITY BASE: Down 86 plus 0538 plus all zeros and the last one was 0012 and what's the sign of that, please?

HOUSTON: Tranquility, Houston. The delta VY is minus all zeros. The delta VZ is plus 0012. Over.

TRANQUILITY BASE: Roger plus 0012.

HOUSTON: Good readback.

TRANQUILITY BASE: Houston, Tranquility Base.

The disks yours and up data link to data.
HOUSTON: Roger, thank you, Tranquility. Hello, Tranquility Base, Houston. On my mark it will be 37 minutes to T3. Over.

TRANQUILITY BASE: Okay.

HOUSTON: Stand by. Mark 37 minutes till T3.

TRANQUILITY BASE: Okay. Thank you.

HOUSTON: Tranquility, this is Houston. It's your computer. We've got the load in. You can start your P57.

TRANQUILITY BASE: Roger, thank you. Houston, Tranquility Base. Did somebody down there have a mike buskeyed. Over.

HOUSTON: Stand by, we'll check.

TRANQUILITY BASE: Houston, Tranquility Base. Does somebody down there have a life button keyed? Over.

HOUSTON: Stand by. We'll check. Tranquility, Houston. Do you still hear it now? Over.

TRANQUILITY BASE: No, I still hear it. Sounds like somebody is banging some chairs around in the back room.

HOUSTON: Roger, that's a VOGA you hear for the CSM to keep the noise down on the loop. Maybe we got a missed relay or something. Stand by.

APOLLO CONTROL: Ladies and gentlemen, I'd like to at this time introduce the administrator of the National Aeronautics and Space Administration, Dr. Thomas O. Paine. I have a short statement then we'll be glad to accept questions. Dr. Paine.

Report to the President

DR. PAINE: Immediately after the lunar touchdown I called the White House from Mission Control and gave the following report to the President:

Mr. President, it is my honor on behalf of the entire NASA team to report to you that the Eagle has landed on the Sea of Tranquility and our astronauts are safe and looking forward to starting the exploration of the moon. We then discussed the gripping excitement and wonder that has been present in the White House and in Mission Control during the final minutes of this historic touchdown. I emphasized to the President the fact that we still had many difficult steps ahead of us in the Apollo 11 mission, but that at the same time a giant step had been made with our successful landing.

President Nixon asked me to convey to all of the NASA team and its associated industrial and university associates his personal congratulations on the success of the initial lunar landing and gave us his good wishes for the continuing success of this mission.

APOLLO CONTROL (6:01 P.M.): During the news conference with the NASA Administrator, Dr. Thomas Paine, we had conversation with both Eagle and Columbia and we'll play that tape for you now:

HOUSTON: Tranquility Base, on my mark 25 minutes until T3. Stand by. Mark 25 minutes until T3.

TRANQUILITY BASE: Roger. Thank you, Charlie.

COLUMBIA: Houston, how do you read me?

HOUSTON: Columbia, we read you about 3 by 5. You might be advised we have an update for you on the P22 for the LM. We estimate he landed about four miles downrange. Your T1 times are updated and the T2 if you are ready to copy it. Over.

HOUSTON: Hello, Tranquility Base. We copy the now 93. You can torque him. Over.

COLUMBIA: Is that four miles?

HOUSTON: Stand by, we'll have a map location.

TRANQUILITY BASE: Houston, do you have an updated LM wait for us? Over.

HOUSTON: Affirmative. Stand by on the data.

HOUSTON: LM weight 10,906.

HOUSTON: Columbia with a latitude and longitude over 2 update for LM position. Over.

COLUMBIA: Go ahead.

HOUSTON: Roger, Columbia. It's plus .799 for the lat plus 11.730 for the longitude over 2 over.

COLUMBIA: Thank you.

HOUSTON: Hello Tranquility Base. You are stay for T3. We have some surface block data if you're ready to copy. Over.

TRANQUILITY BASE: Roger. Understand we're stay for T3. Stand by. Okay, Houston, go ahead with your block data.

HOUSTON: Roger. Hello Columbia, Houston. Columbia we don't want you to transmit, Mike. We just want you in that position in case you want to talk to Tranquility.

HOUSTON: Tranquility, Houston, say again. Over.

TRANQUILITY BASE: Roger. I have a fairly good-sized difference between battery volts on five and six. Six is reading 33.5 and five is reading 36.5. Is that what you expect? Over.

HOUSTON: Tranquility. They are both coming up in voltage. No problem. We're still go. Over.

Praise Is Returned

HOUSTON: Hello Tranquility Base, Houston. You can start your power down now. Over.

TRANQUILITY BASE: Roger.

HOUSTON: Tranquility Base, the white team is going off now and the maroon team take over. We appreciate the great show; it was a beautiful job, you guys.

TRANQUILITY BASE: Roger. Couldn't ask for better treatment from all the way back there.

TRANQUILITY BASE: Houston, our recommendation at this point is planning an EVA [Extra Vehicular Activity] with your concurrence starting at about 8 o'clock this evening, Houston time. That is about three hours from now.

HOUSTON: Stand by.

TRANQUILITY BASE: We will give you some time to think about that.

HOUSTON: Tranquility Base, Houston. We thought about it. We will support it. We'll go at that time.

TRANQUILITY BASE: Roger.

HOUSTON: You guys are getting prime time on TV there.

TRANQUILITY BASE: I hope that little TV set works. We'll see.

HOUSTON: Tranquility Base, Houston. That's fine. We're ready to support you any time, Neil. Over.

TRANQUILITY BASE: Right.

HOUSTON: Right. Columbia, we see the noun 49. Stand by.

HOUSTON: Columbia, Houston. We got the data. We'd like a verb 34. Over.

COLUMBIA: Roger, Stand-by one, Charlie, for . . .

HOUSTON: Roger, Columbia. How did Tranquility look down there to you? Over.

COLUMBIA (6:03 P.M.): Well the area looked smooth. But I was unable to see him. I just picked out a distinguishable crater nearby and marked on it.

HOUSTON: Roger.

COLUMBIA: Looks like a nice area, though.

HOUSTON: Hello Columbia, Houston. I understand you could not see Tranquility. What were you marking on? Over.

COLUMBIA: Houston, Columbia. I say again. I could not see him. Auto optics pointed at a spot very close to the coordinates which you gave me. So I picked out a tiny crater in that area and marked on it so that I'll be able to have repeatable data. But I was unable to see him.

HOUSTON: Roger. Copy.

APOLLO CONTROL: You heard that last exchange and there is a very strong indication we might have an early EVA, with the hatch open perhaps at 8 o'clock, Houston time. One other item of significance: The pressure rise in descent propellant line downstage of the tanks has relieved. All aspects of the mission looking very good at this time.

HOUSTON (6:05 P.M.): Hello Tranquility Base, Houston. On our dips venting and that fuel problem, our heat exchangers, it's cleared up. It appears that the ice has melted and we're in good shape now. Out.

APOLLO CONTROL (6:31 P.M.): We expect Capsule Communicator Owen Garrett to pass along data to spacecraft Columbia momentarily. We are standing by for that. Meanwhile I think we should discuss a little further the projected EVA. Our current plan is to have crew members aboard the Eagle eat and relax for a little while prior to starting EVA prep. We won't know with certainty or have a reasonable time hack until about an hour before the scheduled event. Right now it looks like it could occur at 8 o'clock, Houston time. We have conversation going now with the spacecraft and we'll pick that up.

Following is replay of tape of astronaut conversations recorded during the news briefing and press conference.

APOLLO CONTROL: At 105 hours, 30 minutes now into the mission Apollo 11. The spacecraft Columbia 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 5,367 feet per second. We've had conversation both with Tranquility Base and Columbia during this span of time. Also, as will come up in the course of that conversation, Lunar Module pilot Buzz Aldrin delivers a message to people everywhere listening. We'll play those tapes for you now.

'They'll Need Some Lunch'

HOUSTON: Columbia, we will have a stat vector update for you a little later. We're not prepared with it right now. And on another subject. From Tranquility Base they are prepared to begin the EVA early. They expect to begin depress operations in about three hours.

COLUMBIA: I guess they'll need some lunch before they go.

HOUSTON: We'd like your PRD readouts when possible and we've checked over your EM data and it's all okay.

COLUMBIA: Columbia's on the high-gain.

HOUSTON: Roger, Columbia. You're sounding much better now. Request accept and will uplink another stat vector. Over.

COLUMBIA: Roger. Accept.

HOUSTON: Suggest you put bat A on your bat relay buss. Over.

HOUSTON: Columbia, we're through with your computer. You can go to block.

COLUMBIA: Roger. Block.

HOUSTON: Tranquility Base. Over.

TRANQUILITY BASE: Go ahead, Houston.

HOUSTON: We've reviewed the checklist. About the only change in order to advance EVA that we've found is that you'll want to delay your hydroxide change and go after the EVA rather than before. Over.

TRANQUILITY BASE: Roger. We'd just as soon make the change and jettison the old one. Over.

HOUSTON: We would like to delay that LIOH change until after the EVA. There is a possibility you could jettison the canister when you jettison your pliss. Over.

TRANQUILITY BASE: All right. We'll plan it that way.

HOUSTON: Roger, Tranquility.

HOUSTON: Columbia. Over.

COLUMBIA: This is 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 Manual 17. Over.

COLUMBIA: Roger.

TRANQUILITY BASE: This is the LM pilot. I'd like to take this opportunity to ask every person listening in, whoever, 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.

HOUSTON: Roger, Tranquility Base.

APOLLO CONTROL (7:15 P.M.): You heard that statement in our taped transmission from lunar module pilot Buzz Aldrin. Our projected time for Extra Vehicular Activity at this point is still very preliminary. I repeat, it could come as soon as 8 P.M., Houston time. We won't know for sure about the time with reasonable certainty until about an hour before the event. Meanwhile, 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 that we've never seen before. Our visual of the lunar module—our visual display now standing still, our velocity digitals for our Tranquility Base now reading zero. Reverting, if we could, to the terminology of an earlier form of transportation—the railroad—what we're witnessing now is man's very first trip into space with a station-stop along the route.

HOUSTON: 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.

TRANQUILITY BASE: I think that we'll be ready to start EVA prep in about a half hour or so.

TRANQUILITY BASE: We are beginning our EVA prep.

HOUSTON: Tranquility Base, this is Houston. Roger copy your beginning EVA prep. Break. Break. Columbia, Columbia. This is Houston, reading you loud and clear.

After Years of Anticipation, an Astronaut Tells About His Walk on the Moon

Continued From Page 4

HOUSTON: Roger. It's the best type. Out.
COLUMBIA: I did cycle out of auto into manual back into auto.

HOUSTON (7:55 P.M.): Tranquility Base. Tranquility Base. This is Houston. Over.

TRANQUILITY BASE: Go ahead, Houston.
HOUSTON: Tranquility, this is Houston. We need a second set of PRD ratings so that we may establish a rate. Over.

COLUMBIA (8:09 P.M.): Houston, Columbia. I'm coming up from . . . Do you have any topographical cues that might help me out here. I'm tracking between two craters. One of them is . . . that would be long at 11 o'clock. The other would be short and behind him at 5 o'clock. These are great big old craters, depressions.

HOUSTON: Columbia, this is Houston. The best we can do on topo features is to advise you to look to the west of the irregularly shaped crater and then work on down to the southwest of it. Over.

HOUSTON: Columbia, Houston. Another possibility is the southern rim of the southern of the two old-looking craters. Over.

COLUMBIA: Houston, Columbia. I kept my eyes glued to the . . . that time, hoping I'd get a flash of vector light off the LM but I was unable see in my scan areas that you suggested.

HOUSTON: Roger. On that southern of the old craters there is a small bright crater on the southern rim. One plot would put him slightly to the west of that small bright crater about 500 to 1,000 feet. Do you see anything down there? Over.

COLUMBIA: It's gone past now, Bruce. But I scanned that area that you're talking about very closely and, no, I did not see anything.

HOUSTON: Roger. Out.
HOUSTON: Columbia, this is Houston. Over.

COLUMBIA: Here I am.
HOUSTON: Columbia, this is Houston. On your LAM 2 map, we'd like to confirm the topographical area in which you were looking on this last period of sightings. As we understand you, you were looking in the vicinity of Papa 7 to November 8. Is that correct?

COLUMBIA: Stand by.
HOUSTON: Roger.

HOUSTON (8:17 P.M.): Columbia, go ahead.
COLUMBIA: One of the craters I was talking about is located exactly at 56.7.

HOUSTON: Roger, we found that one.
COLUMBIA: The other one's located at 7.2 two-thirds of the way from . . .

HOUSTON: Roger, we believe you were looking a little too far to the west and south.

COLUMBIA: Roger, I was looking where . . . was tracking on the average and I understand it should have been more to the north and more to the west; actually, a tiny bit outside the circle.

HOUSTON: More to the north and a little more to the east. The feature that I was describing to you, the small bright crater on the rim of the large fairly old crater, would be about Mike .8 and 8.2.

HOUSTON: Tranquility Base, this is Houston. Can you give us some idea where you are in the surface checklist at the present time.

TRANQUILITY BASE: They were at the top of page 27.

COLUMBIA: Roger. Finally got you back on. I've been unsuccessfully trying to get you on the high gain and I've got command to reset the process. How do you read me now?

HOUSTON: Roger. I hear you loud with background noise.

COLUMBIA: Omni Delta and you were cut out and I never got your coordination or estimated LM position.

HOUSTON: Estimated LM position is latitude plus .799, longitude over 2 plus 11.730.

COLUMBIA: What I'm interested is in direct coordination on that map reading.

COLUMBIA: Could you enable the S-band relay at least one way from Eagle to Columbia, so I can hear what's going on?

HOUSTON: Roger. There's not much going on at the present time, Columbia. I'll see what I can do about the relay. . . .

HOUSTON: Columbia, this is Houston. Are you aware that Eagle plans the EVA about four hours early?

COLUMBIA: Affirmative. I haven't had any word from those guys and I thought I'd be hearing them through your S-band relay.

APOLLO CONTROL (8:48 P.M.): We'll still have acquisition of Columbia for another eight minutes. All systems in Eagle still looking good. Cabin pressure 4.86 pounds, showing a temperature of 63 degrees in the Eagle's cabin.

COLUMBIA: During the next pass I'd appreciate the S-band relay mode.

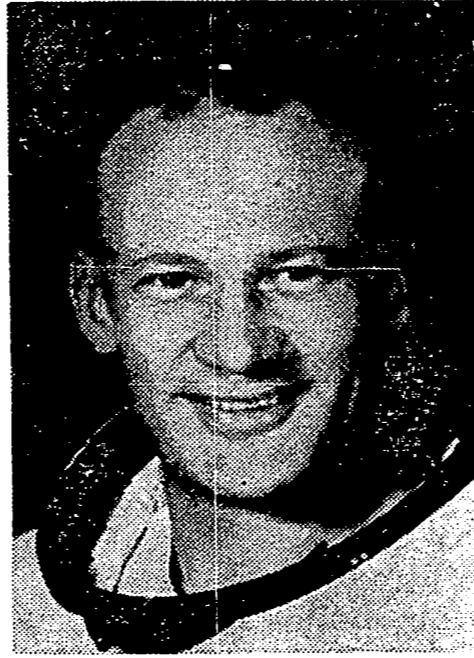
HOUSTON: We're working on that. There haven't been any transmissions from Tranquility Base since we last talked to you.

APOLLO CONTROL: We've had loss of signal on Columbia. The clock here at 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 the EVA preparation.

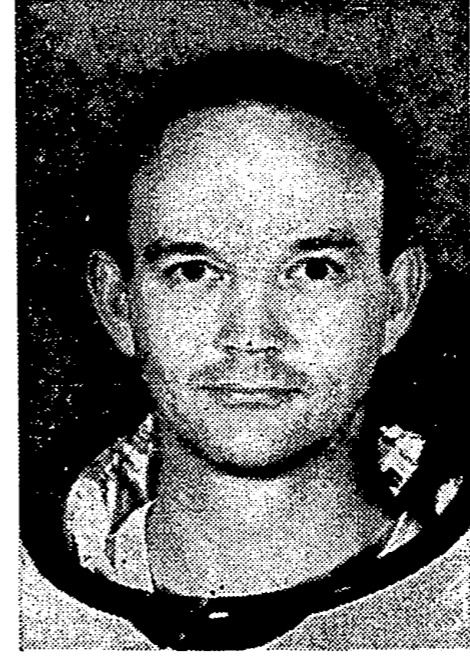
APOLLO CONTROL (9:36 P.M.): This latest report



Neil A. Armstrong



Col. Edwin E. Aldrin Jr.



Lieut. Col. Michael Collins

the crew is—they're getting the electrical checkout—indicates they are about 40 minutes behind the time line. We will acquire Columbia in six minutes.

TRANQUILITY BASE: How do you read now?
HOUSTON: Okay. I think that's going to better.

HOUSTON: We have acquisition of Columbia.
HOUSTON: Roger, Columbia. Reading you loud and clear on the high gain. We have enabled the one-way Nixon relay that you requested. The crew of Tranquility Base is currently donning PLSSes [portable life support systems]. Com checks out.

COLUMBIA: Sounds okay.
TRANQUILITY BASE (9:45 P.M.): Houston, Tranquility. You'll 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'll see the—you'll get a picture from the lighted horizon.

HOUSTON: Neil, Neil, this is Houston. I can hear you trying to transmit. However, your transmission is beaking up.

TRANQUILITY BASE: Neil's got his antenna up now. Let's see if he comes through any better now.

TRANQUILITY BASE: Okay, Houston, this is Neil. How do you read?

HOUSTON: Neil, this is Houston, reading you beautifully.

TRANQUILITY BASE: My antenna's scratching the roof. Do we have a go for cabin depress?

COLUMBIA: They hear everything but that.
TRANQUILITY BASE: Houston, this is Tranquility. We're standing by for go for cabin depress.

HOUSTON: You are go for cabin depressurization. Go for cabin depressurization.

COLUMBIA (10 P.M.): I don't know if you guys can read me on VHF, but you sure sound good down there.

TRANQUILITY BASE: Okay, the vent window is clear. I remove lever from the engine cover.

HOUSTON: Buzz, you're coming through loud and clear, and Mike passes on the word that he's receiving you and following your progress with interest.

TRANQUILITY BASE: Lock system, decks, exit check, blue locks are checked, lock locks, red locks, perch locks, and on this side the perch locks and lock locks—both sides, body locks, and the calm.

HOUSTON (10:17 P.M.): Columbia, this is Houston. Do you read?

COLUMBIA: Read you loud and clear.
HOUSTON: Were you successful in spotting the LM on that pass?

COLUMBIA: Negative. I checked both locations and it's no dice.

APOLLO CONTROL (10:25 P.M.): In the control center a clock has been set up to record the operating time on Neil Armstrong's total life support system. EVA will be counted from that time.

TRANQUILITY BASE: Cabin repress closed. Now comes the gymnastics. Air pressure going toward zero. Standby LM suit circuit 36 to 43. That's verified. FIT GA pressure about 4.5, 4.75 and coming down. We'll open the hatch when we get to zero. Do you want to bring down one of your visors now or leave them up? We can put them down if we need them. We have visor down.

APOLLO CONTROL (10:33 P.M.): Coming up on five minutes of operation of Neil Armstrong's portable life support system now.

HOUSTON (10:37): Neil, this is Houston, what's your status on hatch opening?

TRANQUILITY BASE: Everything is go here. We're just waiting for the cabin pressure to bleed to a low enough pressure to open the hatch. It's about .1 on our gauge now. (Aldrin) I'd hate to tug on that thing. Alternative would be to open that one too.

HOUSTON: We're seeing a relatively static pressure on your cabin. Do you think you can open the hatch at this pressure?

TRANQUILITY BASE: We're going to try it. The hatch is coming open. (Aldrin) Hold it from going closed and I'll get the valve turner. I'd better get up first.

ALDRIN: Your window cleared yet?
ARMSTRONG: It was, yeah.

ALDRIN: Mine hasn't cleared yet.
(Following Is Conversation Between Armstrong and Aldrin): Okay. Bical pump secondary circuit breaker open. Back to lean—this way. Radar circuit breakers open. Well, I'm looking head-on at it. I'll get it. Okay. My antenna's out. Right. Okay, now we're ready to hook up the LEC. Okay. Now we need to hook this. Your visor. Yep. Your back is up against the perch. Now you're clear. Over toward me. Straight down, to your left a little bit. Plenty of room. You're lined up nicely.

Toward me a little bit. Down. Okay. Now you're clear. You're catching the first hinge. The what hinge? All right, move. 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. More left. Good.

'I'm on the Porch'

ARMSTRONG: Okay, Houston, I'm on the porch.
HOUSTON: Roger, Neil.

HOUSTON: Columbia, Columbia, This is Houston. One minute, 30 seconds LOS, all systems go. Over.

ALDRIN: Halt where you are a minute, Neil.
ARMSTRONG AND ALDRIN: Okay. Everything's nice and straight in here. Okay, can you pull the door open a little more? Right.

HOUSTON: We're getting a picture on the TV.
ALDRIN: You've got a good picture, huh?
HOUSTON: There's a great deal of contrast in it and currently it's upside down on monitor. But we can make out a fair amount of detail.

ARMSTRONG: Okay, will you verify the position, the opening I ought to have on the camera.
HOUSTON: The what? We can see you coming down the ladder now.

ARMSTRONG: Okay. I just checked getting back up to that first step. It didn't collapse too far. But it's adequate to get back up. It's a pretty good little jump.

ARMSTRONG: I'm at the foot of the ladder. The LM foot beds are only depressed in the surface about one or two inches, although the surface appears to be very, very fine-grained as you get close to it. It's almost like a powder. It's very fine. I'm going to step off the LM now.

That's one small step for man, one giant leap for mankind.

The surface is fine and powdery. I can pick it up loosely with my toe. It does adhere in fine layers like powdered charcoal to the sole and the 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.

There seems to be no difficulty in moving around this and we suspect that it's even perhaps easier than the simulations of 1/6 G that we performed in various simulations on the ground. Actually no trouble to walk around.

No Crater from Descent

The descent engine did not leave a crater of any size. It has about one 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 a very insignificant amount.

Okay, Buzz, are we ready to bring down the camera?
ALDRIN: I'm all ready. I think it's squared away and in good shape. But you'll have to pay out all the LEC. Looks like it's coming out nice and evenly.

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.

ARMSTRONG: Looking up at the LM, I'm standing directly in the shadow now looking up at . . . in the windows and I can see everything quite clearly. The light is sufficiently bright backlit into the front of the LM that everything is clearly visible.

I'll step out and take some of my first pictures here.
ALDRIN: Are you going to get the contingency sample? Okay. That's good.

ARMSTRONG: The contingency sample is down and it's up. Like it's a little difficult to dig through the crust. It's very interesting. It's a very soft surface but here and there where I plug with the contingency sample collector I run into very hard surface but it appears to be very cohesive material of the same sort. I'll try to get a rock in here.

HOUSTON: Oh, 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 appears to be vesicles in the surface.

ARMSTRONG: This has been about six or eight inches into the surface. It's easy to push on it. I'm sure I could push it in farther but it's hard for me to bend down farther than that.

ALDRIN: Ready for me to come out?
ARMSTRONG: Yeah. Just stand by a second, I'll move this over the handrail.

ALDRIN: Okay?
ARMSTRONG: All right, that's got it. Are you ready?

ALDRIN: All set.
ARMSTRONG: Okay. You saw what difficulties I was having. I'll try to watch your PLSS from underneath here. The toes are about to come over the sill. Now drop your PLSS down. There you go, you're clear. And laterally you're good. About an inch clearance on top of your PLSS. You need a little bit of arching of the back to come down.

ALDRIN: How far are my feet from the . . .
ARMSTRONG: You're right at the edge of the porch.
ALDRIN: Small little foot movement. Porch. Arching of the back . . . without any trouble at all.

ALDRIN: Now I want to back up and partially close the hatch—making sure not to lock it on my way out.
ARMSTRONG: Good thought.

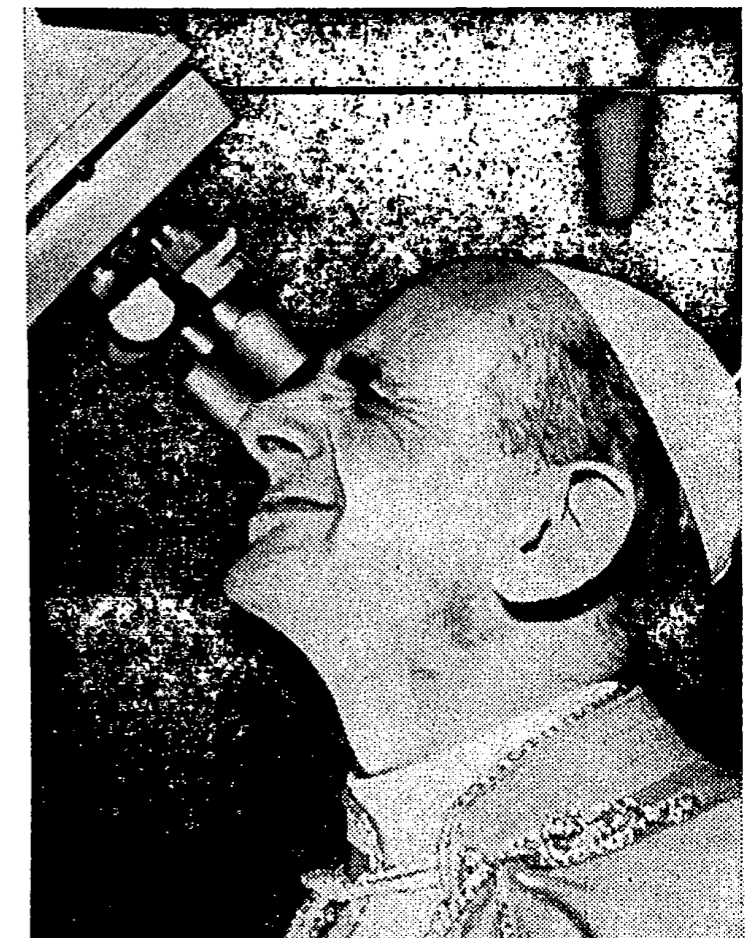
ALDRIN: That's our home for the next couple of hours; we want to take care of it. I'm on the top step. It's a very simple matter to hop down from one step to the next.

ARMSTRONG: Yes, I found that to be very comfortable, and walking is also very comfortable, Houston. You've got three more steps and then a long one.

ALDRIN: I'm going to leave that one foot up there and both hands down to about the fourth rung up.

ARMSTRONG: A little more. About another inch, there you got it. That's a good step.

ALDRIN: About a three footer. Beautiful view.
ARMSTRONG: Ain't that somethin'?



Associated Press
VIEWS LANDING ZONE: Pope Paul VI using a telescope to examine the area where the Apollo lunar module touched down. The Pope, at his summer residence at Castel Gandolfo, Italy, watched the landing on television.