

A black and white photograph of a boot print on the moon's surface. The boot is a heavy-duty, military-style boot with a treaded sole. The print is deep and clear, showing the texture of the lunar soil. The background is a grainy, rocky lunar landscape.

# Apollo 11

## Onboard Voice Transcription

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

A large, faint, circular logo for Apollo 11. It features an eagle with its wings spread, perched on a globe. The words "APOLLO 11" are written in a semi-circle above the eagle.

**MANNED SPACECRAFT CENTER  
HOUSTON, TEXAS**



APOLLO 11 - ONBOARD VOICE TRANSCRIPTION



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

~~CONFIDENTIAL~~

10 u/d down on moon  
237 pp. (but 224 missing)  
→ (p 239-240 torn + mended)

2

CLASSIFICATION CHANGED TO  
U

BY AUTHORITY OF E.O. 11652

DATE 9/1/78  
3/11/78

# APOLLO 11 ONBOARD VOICE TRANSCRIPTION (U)

## RECORDED ON THE COMMAND MODULE ONBOARD RECORDER DATA STORAGE EQUIPMENT (DSE)

August 1969

GROUP 4  
DOWNGRADED AT 3 YEAR INTERVALS  
DECLASSIFIED AFTER 12 YEARS

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INDEXING DATA

DATE	OPR	#	T	PCM	SUBJECT	SIGNATOR	LOC
02-00-69	MSC		R	APD	(title)	MSC	078-G1

~~CONFIDENTIAL~~

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

# **Apollo 11 Onboard Voice Transcription**

**July 16 - 24, 1969**

MANNED SPACECRAFT CENTER

HOUSTON, TEXAS





**July 16<sup>th</sup>, 1969**

**1**



**INTRODUCTION**

This is the transcription of the Apollo 11 flightcrew communications as recorded on the command module (CM) data storage equipment (DSE), and subsequently transmitted (dumped) to Manned Space Flight Network stations. Magnetic tapes containing dumped voice and onboard recorded ground elapsed time (GET) were forwarded to the NASA Manned Spacecraft Center, Houston, Texas. Transcription of these tapes was managed by David M. Goldenbaum, Test Division, Apollo Spacecraft Program Office, to whom questions regarding this document should be referred.

The Apollo 11 mission was flown July 16 to July 24, 1969.

Communicators in the text are identified as follows:

**Command module:**

CDR	Commander	Neil A. Armstrong
CMP	Command module pilot	Michael Collins
LMP	Lunar module pilot	Edwin E. Aldrin, Jr.
SC	Unidentifiable crewmember	
MS	Multiple (simultaneous) speakers	

**Mission Control Center:**

CC	Capsule Communicator (CAP COMM)
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In the text, a series of three dots (...) is used to designate those portions of the communications which could not be transcribed because of garbling. One dash (-) is used to indicate a speaker's pause or a self-interruption. Two dashes (- -) are used to indicate an interruption by another speaker or a point at which a recording was abruptly terminated.



## Page 1

00 00 28 53 LMP How are we doing on that time, anybody? Neil, are you sort of master of ceremonies on time, yet?

00 00 29 00 CDR Well, I didn't ...

00 00 29 22 LMP (Singing) Okay, your DRINKING WATER SUPPLY valve is ON.

00 00 29 27 CMP How about this ... circuit configuration? GLYCOL RESERVOIR BYPASS valve OPEN?

00 00 29 33 CDR (Cough) ... BYPASS is OPEN.

00 00 29 38 CMP RESERVOIR OUT valve CLOSED?

00 00 29 40 CDR OUT's CLOSED.

00 00 29 41 CMP IN valve CLOSED?

00 00 29 42 CDR IN's CLOSED.

00 00 29 43 CMP ECS RADIATOR FLOW CONTROL, PRIMARY.

00 00 29 48 LMP . . .

00 00 29 51 CMP Hey, Buzz?

00 00 29 52 LMP Yes.

00 00 29 53 CMP How would you like the camera?

00 00 29 55 LMP Okay.

00 00 29 56 CMP PRIMARY GLYCOL TO RADIATOR valve, NORMAL.

00 00 29 59 LMP Why don't I leave the dark slide - -

00 00 30 01 CDR Are we ready for that, you think? What's the time?

00 00 30 04 LMP 30 minutes. . . .

00 00 30 08 CDR . . . to NORMAL, and check the radiator.

00 00 30 13 CMP It will take awhile, that's - -

## Page 2

00 00 30 16 LMP Okay, now, is that normal for the discharge pressure to zap down low and to do that? Do you think, Mike?

00 00 30 23 CMP What's that? I'm sorry, I wasn't listening.

00 00 30 25 LMP When Neil sends the GLYCOL RADIATORS to NORMAL, temporarily, it - -

00 00 30 31 CDR It drops?

00 00 30 33 LMP Yes.

00 00 30 34 CMP The temperature done that?

00 00 30 35 CDR/LMP No, the pressure.

00 00 30 36 CMP Yes, pressure - you might get a little drop in it, I don't really know, but it came back up.

00 00 30 38 LMP Yes, it goes back up.

00 00 30 39 CMP Alright, Buzz, here's one Hasselblad for you.

00 00 30 40 CDR Coming around the right-hand couch.

00 00 30 42 LMP That seems okay.

00 00 30 44 CMP Buzz?

00 00 30 45 LMP Yes, just a second.

00 00 30 47 CMP Okay. I'll just let go of it, Buzz; it will be hanging over here in the air. Coming up - it's occupying my couch.

00 00 31 03 LMP Okay.

00 00 31 05 CMP Just leave the dark slide with it?

00 00 31 08 LMP Well, I thought about . . . the dark slide or something, and then I thought we might need it later for a magazine change; so, I left it with it.

00 00 31 25 CMP Well, I know there's an orange dot on this . . . somewhere.

## Page 3

00 00 32 05 LMP That looks just a couple of degrees still above the -

00 00 32 19 CMP Buzz, did you ever get that camera?

00 00 32 21 LMP Yes.

00 00 32 23 CMP Okay.

00 00 32 44 CDR Now, look.

00 00 32 46 CMP Yes, I guess it's 5 minutes after you do this before . . .

00 00 32 55 LMP It's coming down, but it's - -

00 00 32 56 CDR Is it?

00 00 32 57 LMP - - as I said before, that's -

00 00 33 06 CDR It looks like that's about equal to the limit pressure.

00 00 33 07 CMP Yes, they're about - they're just about the same now.

00 00 33 11 CDR Not getting much out of the radiator.

00 00 33 18 CMP Okay, Buzz, are you ready for 16 millimeter?

00 00 33 20 LMP Yes. How about a bracket?

00 00 33 22 CMP Let - Neil will give you the bracket.

00 00 33 40 CDR And the bracket - bracket slide -

00 00 33 47 CMP Okay, Buzz, I'm going to have to do something about your couch. You mind sliding over to mine?

00 00 33 52 LMP No, that's fine.  
00 00 33 54 CMP Could you - -  
00 00 33 55 LMP Can you work on that strap?  
00 00 33 56 CMP Oh, yes, I will. Sure will. The - the one that your strut's off . . . instrument panel.

## Page 4

00 00 34 01 LMP Yes. . . .  
00 00 34 54 CMP And your . . .  
00 00 35 09 CDR That temperature's coming down a little bit now.  
00 00 35 14 LMP Yes.  
00 00 35 41 LMP Now, let's see. You got an 18 millimeter on here, right?  
00 00 35 44 CMP Yes.  
00 00 35 46 LMP So - Do I push the thing all the way up? Is that right?  
00 00 35 50 CMP Yes.  
00 00 35 51 LMP About with that white mark?  
00 00 35 52 CMP Yes, one's for the 18, and one's for the 75; I - I think just as long it looks like it's out and . . . the window, that's the main thing.  
00 00 36 40 CDR Did you get a secondary radiator leak check?  
00 00 36 43 LMP Yes, we did that.  
00 00 36 44 CDR Okay. We're not hearing them, but we're . . . Tananarive.  
00 00 36 48 CMP Are we on SIMPLEX A?  
00 00 36 49 CDR We're on SIMPLEX A.  
00 00 36 51 LMP We're on SIMPLEX A, but we're not due over Tananarive for another couple of seconds.  
00 00 36 56 CDR Okay.  
00 00 36 58 CMP What - . . . time is 36 something - -  
00 00 37 00 LMP Am I set up on VHF? Can you tell . . .?  
00 00 37 11 CMP Yes, just a second. Just a second - Your MASTER is ON; your INTERCOM is N; your VHF is ON; your PAD COMM is OFF; your S-BAND is ON; and you're in INTERCOM/PUSH-TO-TALK, so you're all squared away, except for maybe VOLUME dial.

## Page 5

00 00 37 29 LMP Okay.  
00 00 37 31 CDR Now, Buzz, this item here at Canaries. LOS, 23:36; POTABLE WATER HEATER, MAIN A - -

00 00 37 38 LMP Yes, I got that.

00 00 37 39 CDR - - PCM BIT RATE, LOW - -

00 00 37 40 LMP I got that.

00 00 37 41 CDR - - You got all that, okay. Okay, when was the - -

00 00 37 44 LMP And the purge check's complete, and I'm working my way down to ECS.

00 00 37 50 CDR Okay.

00 00 37 51 CMP I'm having a hell of a time maintaining my body position down here; I keep floating up.

00 00 37 56 LMP Well, there's such a great tendency to - to try and put a little force . . . want to stay there. Just forget about all that and go wherever you want.

00 00 38 11 CDR Okay, I got the SYSTEMS TEST meter set up on 4-B and . . . attitude . . .

00 00 38 18 LMP 4-B, okay.

00 00 38 19 CMP What are you reading?

00 00 38 20 CDR I'm reading 3.50.

00 00 38 26 LMP . . . our attitude quantities . . .

00 00 38 36 CC Houston, Apollo 11.

00 00 38 41 CDR Hello, Houston; Apollo 11.

00 00 38 46 CMP OPTICS ZERO is OFF. I'm going to jettison the . . . cover - -

00 00 38 50 CC Apollo 11, Apollo 11; this is Houston through Tananarive. Over.

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00 00 38 56 CDR Hello, Houston; Apollo 11. Go ahead.

00 00 39 03 LMP Houston. Apollo 11, read you on VHF A SIMPLEX. How do you read? Over.

00 00 39 09 CC Roger, 11; this is Houston. We're reading you loud and fairly clearly. For your information, Tananarive radar shows you in a 103.0 by 103.0 orbit. Over.

00 00 39 24 LMP Beautiful.

00 00 39 26 CC We concur.

00 00 39 30 CDR Well, we're just coming into the terminator, here.

00 00 39 40 CMP I jettisoned the optics; I hope they went. Did you see them go?

00 00 39 44 LMP I heard a little something, but I - -

00 00 39 47 CMP Don't want to miss that.

00 00 39 48 LMP No.

00 00 39 55 CMP Can't really tell here. I think I'm seeing the horizon - out there, but I'm . . . far from being dark-adapted; it's hard to tell -

00 00 40 08 LMP . . . a double blind on this?

00 00 40 12 CMP Yes. What were those Z-30 angles? 0.22, isn't it?

00 00 40 18 LMP That's right, plus.

00 00 40 19 CMP Sure's a big one, isn't it? Okay, well, I'm standing by to do this - -

00 00 40 28 LMP Got A and B down.

00 00 40 32 CMP - - IMU align. Unstow the optics handles. Anybody wants any of that claptrap out of R-1, now is the time to say it.

00 00 40 47 LMP Give me that little circular Job.

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00 00 40 52 CMP Alright, I'll - I'll look for it, Buzz. Let me get these - optics handles. I guess I really didn't mean what I said right when I said it a little while . . . Oh, I knew there was something messed up.

00 00 41 09 LMP You say you had about 3-point-something volts up there?

00 00 41 12 CMP Yes. . . . and on the . . .

00 00 41 17 LMP 3.4?

00 00 41 19 CMP 3.45, something like that - -

00 00 41 20 LMP Oh, that's - that's the minimum. 3.4, 4.1. And you can whip it over to 4-A, if - -

00 00 41 28 CMP Okay, 4-A is 3.8. Okay.

00 00 41 38 LMP No, 4-A.

00 00 41 41 CMP 4-A?

00 00 41 42 LMP Yes.

00 00 41 43 CMP And 3.8.

00 00 41 44 CC Apollo 11, this is Houston. 1 minute to LOS Tananarive; AOS Carnarvon is at 52:15. Over.

00 00 41 53 CDR Apollo 11, Roger.

00 00 41 56 LMP 52:15.

00 00 41 57 CDR You want some of these lights down further, Mark - Mike?

00 00 42 04 CMP Don't worry about it for the time being; I'm potting around with handholds right now, Neil. . . .

00 00 42 13 LMP That battery compartment pressure, Mike, it ought to be less than 1.5. However, it says NA until first vent.

00 00 42 21 CMP Okay.

00 00 42 22 LMP It's greater than 1.5; that vent - vent -

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00 00 42 25 CMP Well, we haven't even done it yet.

00 00 42 27 LMP . . .

00 00 42 28 CMP Yes.

00 00 43 13 CDR Man, we are in the dark, now.

00 00 43 25 CMP You got any reading off that REPRESS O2 to be greater than 8 . . .

00 00 43 37 LMP We got - No, not quite that much. That's that crazy gage.

00 00 43 48 CDR Okay, can I have the . . . now?

00 00 43 53 LMP Yes, you got it. . . . 50 degrees . . .

00 00 44 06 CDR . . . here is your acid test.

00 00 44 10 CMP Okay, what did he say 52 -

00 00 44 11 CDR 52 . . . percent, about.

00 00 44 15 CMP As I say, I can't see . . . Let me know if you want me to - come back . . .

00 00 44 52 CMP It's - Menkent.

00 00 44 58 LMP . . . ball on that pad - it's maintaining about 39 degrees, Mike.

00 00 45 02 CMP Yes, I noticed that. Before, it was maintaining less than that; it was abnormally low. I almost asked them about it during boost, and then I decided to heck with it. Damn, it'll be hard to see through these optics . . . down a little bit. Okay, proceed to Menkent. There she goes - Menkent.

00 00 45 31 CMP Menkent - God, what a star.

00 00 45 35 LMP Nobody in their right - -

00 00 45 36 CMP Menkent's good - -

00 00 45 37 LMP - - nobody in their right mind would pick that one.

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00 00 45 38 CMP - - Menkent's a good star.

00 00 45 40 LMP Hey, I sure wish you'd get out that - that star chart.

00 00 45 45 CDR Can't see a thing, huh?

00 00 45 46 CMP No. It's in the - -

00 00 45 48 CDR Did you look in the telescope?

00 00 45 49 CMP - - in the sextant. Yes, but I can't see it in the telescope; in the sextant - I can't.

00 00 45 53 CDR Okay.

00 00 45 54 CMP I believe it's at the angle we have to mark on it.

00 00 46 06 LMP It's a little on the chilly side in the cabin. Would you like - -

00 00 46 08 CDR Feels comfortable to me.

00 00 46 09 LMP - - would you like it a little warmer, anybody?

00 00 46 10 CDR I don't think so; I think it's a little on the - -

00 00 46 13 LMP . . .

00 00 46 16 CDR It sure doesn't look - sure doesn't feel like - Actually, it may be a little - it may be a little warm.

00 00 46 20 LMP Well, my - my feet are a little chilly; see, it's 47. Okay, 37 is - -

00 00 46 26 CMP No, that's - -

00 00 46 27 LMP - - is Nunki. What?

00 00 46 30 CMP Okay. Hey, Buzz?

00 00 46 31 LMP What?

00 00 46 32 CMP Did you write down any marks on 30 and on 37?

00 00 46 35 LMP I was going to mark on 37, and that's Nunki; 30 and 37?

## Page 10

00 00 46 39 CMP Yes, sir.

00 00 46 43 LMP 30 -

00 00 46 45 CDR I can see some stars. Well, maybe I . . .

00 00 46 53 CMP Okay, again, looking through the telescope, I'm absolutely unable to tell if it's Nunki, but I have it in the sextant - so let's mark on it.

00 00 47 18 CMP . . . you guys would appreciate doing this with old G&N men.

00 00 47 24 CDR 0.01.

00 00 47 26 CMP 0.01, alright. - Shoot, I forget, I think that's gray Gienah.

00 00 47 29 CDR Cup of coffee around here later on when you get a little time.

00 00 47 34 LMP You like that, Neil? You want us to record that star?

00 00 47 40 CMP I got it, I got it; go ahead.

00 00 47 41 LMP Let's see, what's tearing me up is we're going to ORB rate on this damn booster, and the rate is very evident.

00 00 47 48 CMP Okay, Z torque is plus 0.152 instead of 150; I suppose that's close enough. Now then, you got those numbers written down, Buzz?

00 00 48 01 LMP Copy.

00 00 48 02 CMP Okay. Now I - I - If I remember right, I think you're just supposed to torque without further ado. We give them the time at which we torque. So, as soon as you got them written down, let me know and I'll proceed and you can mark the time.

00 00 48 13 LMP I've got it.

00 00 48 14 CMP Okay, here we go. Proceed - torque.

00 00 48 15 LMP 48:15.

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00 00 48 18 CMP Okay, now I - I'm going to verify with the third star, and let's see what that star's going to be. Star number 34 - -

00 00 48 34 LMP Atria - -

00 00 48 35 CMP - - is Atria. You might note that, Buzz, also. I think - -

00 00 48 39 LMP 34?

00 00 48 40 CMP Yes, I think that's the third star; it'll say somewhere in that checklist. Proceed to Atria. Alright, if IMU is realigned, realign the GDC.

00 00 49 04 LMP 0.1 degree. Probably GDC's off a lot more than that.

00 00 49 12 CMP Okay, and Atria is there in the sextant. Well, you know, it's not right in the middle of the sextant. Of course, I guess - I don't know what - Have you ever heard any rules on what constitutes a good third star check?

00 00 49 32 LMP No, all you're really doing is seeing that you've got the right stars, it seems to me.

00 00 49 36 CMP It's there, but it's not dab-smack in the middle of the sextant; it's off, I would guess - 0.02 or some crazy number like that. Alright, having done that, VERB 37, ENTER; . . . ENTER, and I'm going OPTICS ZERO and MANUAL, and cranking up the floodlights down here.

00 00 50 04 CMP God, I'll tell you, the visibility through that telescope is a big disappointment.

00 00 50 10 LMP It's . . .

00 00 50 13 CMP Okay, Buzz, got all that good stuff?

00 00 50 20 CDR GDC's realigned, okay -

00 00 50 27 CMP Reticle brightness . . . I don't know anything about that. . . . Stow optics eyepieces, okay, that's in work.

00 00 50 35 CDR And . . . out there right now. . . . , Buzz?

## Page 12

00 00 50 46 LMP Neil, I haven't been looking out - My eyes aren't very well adapted.

00 00 50 52 CDR You got your light on.

00 00 50 59 CMP Yes, look at those bright ones down here.

00 00 51 09 LMP Lightning! Is that lightning out your window?

00 00 51 12 CDR No, I haven't seen any lightning.

00 00 51 15 LMP Hell, that must be lightning. Either that or it's the . . .

00 00 51 19 CMP You know, no matter how many times I put these optics eyepieces - -

00 00 51 23 CDR I just saw something. Maybe it is the . . . They said that Borman's . . . could see it; they couldn't hear it, but they could see it alright -

00 00 51 30 LMP Yes.

00 00 51 35 CMP No matter how many times I put these optics eyepieces in their box, it doesn't seem right.

00 00 51 45 CMP 0.01, God damn it! Now that's enough to piss a body off.  
00 00 51 51 CDR . . . that time.  
00 00 51 53 LMP S-band noise.  
00 00 51 57 CDR We're about to get - 10 seconds until acquisition.  
00 00 51 59 LMP Okay.  
00 00 52 02 CMP Okay, and my optics eyepieces are stowed.  
00 00 52 09 CDR You want me to take your checklist, Mike, and kind of skim through it?  
00 00 52 16 CMP It says here, coming up on Carnarvon LOS at - -  
00 01 04 44 CMP Let - let me tell them about the TV . . .

## Page 13

00 01 04 47 CMP Roger, Bruce. Thank you. We expect TV. We've got it all hooked up. We have not yet turned it on; we're ready to do that now.  
00 01 05 02 CMP Okay, you think we can do that?  
00 01 05 04 LMP That's fine with us.  
00 01 05 05 CDR This one here?  
00 01 05 17 LMP Tell them that we've got nothing to do here but recheck it here for the next 20 minutes or so.  
00 01 05 26 LMP Okay. I'm ready to turn the TV on. Play with it. . . . flashlight . . . hook it up . . .  
00 01 06 00 CDR Want a - . . .? Mike?  
00 01 06 01 LMP No.  
00 01 06 04 CMP Yes, I'd love one, Neil; thank you. I just stuck it in my pocket.  
00 01 06 15 CMP Can I give you the wrapping back?  
00 01 06 18 CDR (Laughing) Now that is a problem, trying to find - -  
00 01 06 21 CMP It's a gooey one. Gooey when the paper doesn't want to come off, but thanks anyway.  
00 01 06 54 LMP What was you doing? (Laughter)  
00 01 06 57 CMP I don't know . . . I almost lost it. I figured I'd really go along with the . . . and put some of that ointment on - so slick that I rubbed my ring off (laughter).  
00 01 07 08 LMP Is that right?  
00 01 07 09 CMP Yes.  
00 01 07 18 CMP Have we got any daylight? I can't see outside at all.  
00 01 07 22 CDR Nothing yet, . . .  
00 01 07 26 LMP How are you going to rig that up, Michael?

## Page 14

00 01 07 29 CMP Well, Buzz, I'm going to hold it out that hatch window.

00 01 07 30 LMP Handhold it?

00 01 07 32 CMP Yes - yes, yes, handhold it; don't dick with that.

00 01 07 38 CDR Buzz can hold it, and you're going to run the monitor; have you run . . . ?

00 01 07 40 CMP Yes.

00 01 08 09 CDR Mike, how about this thing?

00 01 08 16 CMP REPRESS - let's see, it's supposed to be - 865.

00 01 08 22 LMP Go ahead.

00 01 08 23 CMP And it - it kind of varies - not 865, but it's - 830.

00 01 08 33 CDR . . .

00 01 08 40 CMP Well, I don't know how - that ought to . . .

00 01 08 44 CDR I can turn - turn it on FILL for a minute, if you like. That's what we need to do, I think.

00 01 08 51 CMP Maybe the . . . this son of a bitch is working or not.

00 01 09 06 CDR You got the power switches turned on up there at the - -

00 01 09 10 CMP Yes. . . .

00 01 09 21 LMP Let's get into the Hasselblad . . . get the right settings on it.

00 01 09 26 CMP Okay.

00 01 09 29 LMP Is Goldstone the only station that's going to get this?

00 01 09 32 CDR Yes, that's all. That's the only one that's got a scanner converter. We've only got about 4 minutes, looks like.

## Page 15

00 01 09 44 LMP That must be doing something.

00 01 09 46 CMP Yes.

00 01 09 47 CDR How long - -

00 01 09 48 CMP You got it on infinity for one thing; let me put it down here.

00 01 09 52 CDR - - how long is it supposed to take to - -

00 01 09 53 CMP . . . ?

00 01 09 54 CDR No, no, it's the one with the . . .

00 01 09 59 LMP Okay, it's - it's working somewhat; it's just the question of not enough light in here when I get it.

00 01 10 06 CDR Yes.

00 01 10 07 LMP . . . It's, I think, working okay.

00 01 10 10 CDR We ought to be coming out into the daylight here in a little bit. Get it all shaped up?

00 01 10 22 LMP I think it's fine. Now the one thing I forget about this is this zoom.

00 01 10 30 CMP Do we want to write on this what - what we're taking pictures of? 0.5 millimeter.

00 01 10 46 LMP Who knows about zoom lenses? This lens goes from 12.5 millimeters to 75; I assume that's the same nomenclature as on a camera. Right, 75 is zoom - -

00 01 10 58 CDR I would think so.

00 01 10 59 LMP - - and 12.5 is wide angle. The only thing that confuses me is that it says for vehicle to vehicle - We want to be zoom on 12.5. I guess they just want to make sure you got the other vehicle in view. Probably . . . telephoto.

00 01 11 15 CMP Okay, well, then, I'll put the zoom on 12.5.

00 01 11 18 LMP Okay. You didn't touch this lighting?

## Page 16

00 01 11 21 CMP No, I didn't . . . Minimum . . .

00 01 11 29 LMP I've got bright.

00 01 11 32 CMP Focus, I'll put at infinity, and the f-stop for vehicle to vehicle is - -

00 01 11 58 CDR Not much light in here.

00 01 12 02 CMP - - f:2.8.

00 01 12 04 LMP What?

00 01 12 09 CMP Okay. I - I'll show what it looks like inside of the cabin.

00 01 12 27 LMP Okay, this looks alright, I think.

00 01 12 30 CMP Point that at Neil or point it at somebody who's in the light. Yes, we'll get it. . . . You want to see the monitor?

00 01 12 41 LMP . . .

00 01 12 43 CMP Yes. You want to see the monitor?

00 01 12 49 CDR Is this all ready to go; I'm going to put it back over here. It's over here under your stuff. Now, it seems to me if Buzz wants his camera to drift up, so what I ought to do is probably - Hey, Buzz.

00 01 13 02 LMP Yes.

00 01 13 07 CDR Hey, it seemed to stick pretty well if you stood it up on the - with the lens kind of pointing out. There are two pieces of Velcro over there.

00 01 13 14 LMP Okay.

00 01 13 16 CDR There are two pieces on the back of them . . .

00 01 13 17 LMP You think so, huh?

00 01 13 18 CDR Yes, over, just a little up toward the . . .

00 01 13 28 LMP Now, . . . - It's rolling around, so I can start looking outside, upside down.

## Page 17

00 01 13 53 CDR I don't know, I think we'd almost be better just by looking at the monitor, Buzz.

00 01 13 59 LMP Yes, yes, but this way I think I'll know how to - know which way to move it.

00 01 14 07 CDR Are you going the right way for those hoses? It looks to me like you ought to roll over the other way.

00 01 14 25 LMP Hey, there's something. How's that window?

00 01 14 37 CDR When you get around there, Buzz, I'll give you the briefing (laughter). You just slid out of your - -

00 01 14 40 LMP I was out of my . . .

00 01 14 57 CMP Handkerchief or something - -

00 01 14 59 LMP Where do we have to go to get a tissue?

00 01 15 02 CMP All the way down to the . . .

00 01 15 04 CDR How about - using a piece of cloth, like - -

00 01 15 10 LMP While I'm here, let me - -

00 01 15 11 CMP What - what - do you want a tissue for?

00 01 15 14 CDR Hey, that's a good idea. We can get rid of that stuff - -

00 01 15 16 LMP . . .

00 01 15 17 CDR - - that's a good idea; good head.

00 01 15 22 LMP Brilliant . . .

00 01 15 23 CDR I got your checklist, Mike; you want it back?

00 01 15 27 CMP Yes, I'll take it back, Neil - Thank you, just put it here.

00 01 15 37 CMP No, you got Buzz's checklist here. You gave me BUZZ'S.

00 01 15 41 CDR Excuse me.

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00 01 15 44 CMP . . . I'd rather have my own.

00 01 15 47 LMP How does the checklist look to you, Neil? You happy with it?

00 01 15 51 CDR Yes, it looks fine to me.

00 01 15 53 LMP Good.

00 01 15 56 CMP I'll take your word for it, but the SPS and ECS and the EPS are now on . . .

00 01 16 06 LMP . . .

00 01 16 07 CMP Yes, I'll do that. Are you ready for me to hand you your light test?

00 01 16 16 LMP No, one-handed snap. . . . I'm in the center now.

00 01 16 28 CMP Okay, Buzz, the - -

00 01 16 29 LMP Alright, I'll put yours on the left.

00 01 16 32 CMP It doesn't matter, they're all good - far as I'm concerned, one's like another.

00 01 16 37 LMP As a matter of fact, I'll put yours on the right.

00 01 16 38 CMP Okay.

00 01 16 40 LMP . . .

00 01 16 43 CMP This 16-millimeter camera, Buzz, with the 18-millimeter lens - you got it shoved all the way up toward the window. I think we can - on this bracket.

00 01 16 52 LMP Yes.

00 01 16 53 CDR Okay, that was correct. You - you were asking about that.

00 01 16 58 CMP And you have 6 frames per second, and it's color; you got 15 minutes worth - 6 frames a second, f:8, infinity, 1/250th.

00 01 17 20 LMP Okay. The only question is, how much do we want to indicate on that?

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00 01 17 31 LMP Outside of it - on the magazine?

00 01 17 36 CMP Yes.

00 01 17 41 CDR How does zero g feel? Your head feel funny, anybody, or anything like that?

00 01 17 44 CMP No, I don't know, it just feels like we're going around upside down.

00 01 17 46 LMP . . . I don't know - even feel that.

00 01 17 49 CDR I feel the horizon coming up.

00 01 17 52 CMP Oh, yes.

00 01 17 54 CDR Buzz, are you ready to - -

00 01 17 55 CMP . . . 90 degrees the wrong way - -

00 01 17 58 CDR - - are you ready for this briefing? Buzz?

00 01 18 00 LMP Yes, let me get this.

00 01 18 01 CDR Oh! Okay.

00 01 18 04 CMP Oh, yes, stand by for sunrise.

00 01 18 09 CDR Say, we got the rookie with us; he hasn't seen so many of those.

00 01 18 23 CDR (Laughter) Okay. 30 seconds.

00 01 18 30 CMP Oh, no, there is a possibility.

00 01 18 33 CDR We haven't got too many of them on this flight, so you might as well enjoy it while you can. Buzz, how are you doing?

00 01 18 42LMPOkay, go ahead and talk.

00 01 18 44 CDR Okay, I'd like to show this to you while I'm talking. It works like a camera. It has the - The f-stop control is right here, and you set it on f:22 which, of course, lets in the smallest amount of light, and that's a safety precaution. Now, later you'll probably find that you want to go away from f:22. Okay? Under zoom - Your zoom

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control, can you see? The zoom is the middle one, and it's 12.5 millimeters on the middle one - See the 12.5 millimeters? That's the zoom.

00 01 19 18 LMP Yes.

00 01 19 19 CDR Focus is on infinity. You ought to just leave that on infinity; no doubt about that. Now, the zoom, they may want you to zoom in on the horizon a little bit, or the land or whatever. I'd start out with a wide angle at 12.5, and I'd start out with this on f:22 just for protection against getting too much light in. In all likelihood, you'll have to change that a little bit.

00 01 19 46 LMP I think that - that's going to do it.

00 01 19 55 CDR Yes, that looks good. I don't see how that can miss.

00 01 19 57 CMP Jesus Christ, look at that horizon!

00 01 19 59 CDR Isn't that something?

00 01 20 00 CMP God damn, that's pretty; it's unreal.

00 01 20 08 CDR Get a picture of that.

00 01 20 10 CMP Ooh, sure, I will. I've lost a Hasselblad. . . . Has anybody seen a Hasselblad floating by? It couldn't have gone very far - big son of a gun like that.

00 01 20 40 CDR Now, what do we have - Is that all the -

00 01 20 44 CMP You had the switch down - inside. . . . automatic light control features.

00 01 21 05 CMP Well, that pisses me off. Hasselblad gone. Find that mother before she or I ends the . . . Everybody look for a floating Hasselblad. I see a pen floating loose down here, too. Is anybody missing a ballpoint pen?

00 01 21 17LMPGot mine. Is it ballpoint, or is it . . .?

00 01 21 23CMPYes, ballpoint. Here it is. I mean felt tip.

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00 01 21 45 CMP . . . much embarrassed to say they've lost a Hasselblad. I seem to be prone to that.

00 01 22 01 CDR And we're about 7 minutes away, so we got about 7 minutes of practice time.

00 01 22 13 CMP I've looked - I've looked everywhere over here for that Hasselblad, and I just don't see it.

00 01 22 21 LMP You can go to your . . .

00 01 22 24 CDR It's too late for sunrise, anyway.

00 01 22 27 CMP I know, but I'm worried about - -

00 01 22 28 LMP But you want to get it before TLI.

00 01 22 30 CMP - - I know it. That's what I'm worried about.

00 01 22 31 LMP Neil, could you look around over there?

00 01 22 32 CDR Yes, I'll look.

00 01 22 35 CMP I don't know if we want to go through any wild contortions looking for it - Do we have to throw some other switches?

00 01 22 41 LMP No, the switches are all thrown.

00 01 22 45 CMP . . . under you.

00 01 22 57 CMP Buzz, you don't see the Hasselblad anywhere down below?

00 01 23 10 CMP Let me go on a little expedition here. Has somebody . . . ?

00 01 23 18 LMP I've looked already.

00 01 23 24 CMP Ah! Here it is.

00 01 23 25 CDR Find it?

00 01 23 26 CMP Yes.

00 01 23 27 CDR Beautiful.

00 01 23 28 CMP It was floating in the aft bulkhead.

## Page 22

00 01 23 30 CDR On your side?

00 01 23 34 CMP I got a way on it - of keeping it.

00 01 24 17 CMP I got a little horizon. Man, look at that!

00 01 24 21 LMP Looks like what you have to do to this, is not hold it against the window, because it's going to pick up - -

00 01 24 27 CDR How's the monitor, working okay for you? Anything I can do to help?

00 01 24 33 CMP . . .

00 01 24 46 CMP I found a spot that really . . . my window.

00 01 24 50 LMP Yes, it looks like . . . I got my - -

00 01 24 51 CMP Trees and a forest down there; it looks like trees and a forest or something. Looks like snow and trees. Fantastic. I have no conception of where we're pointed or which way we're going or a crapping thing, but it's a beautiful low pressure cell out here.

00 01 25 10 LMP Yes, go ahead and take a picture. Keep your . . . down.

00 01 25 15 CMP Beautiful low pressure.

00 01 25 16 LMP Must be past Hawaii by now. 01:28 is AOS.

00 01 25 22 CDR Buzz, how's it going there, the monitor giving you good service?  
00 01 25 25 LMP Not yet - flicking an awful lot.  
00 01 25 26 CDR Well, that's . . . - It looks to me like you're home free. Just remember now, you're going to have to get that f-stop probably off 22, maybe not - focus stays on infinity and the zoom beats me. You can take your choice, you can zoom with that thing all the way in if you take it fairly slowly.  
00 01 25 44 LMP Sun is bright, isn't it? . . . It's a pretty nice camera, to tell you the truth.

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00 01 26 00 CDR I think you probably want sort of a wide angle - -  
00 01 26 07 LMP Yes, I think . . . would be something . . .  
00 01 26 20 LMP Well, if I take normal to the window, it's going to be . . ., . . .?  
00 01 26 26 CDR Yes, that would be pretty nice.  
00 01 26 41 CDR Getting a little of the rim there?  
00 01 26 44 CMP To get a little more view, you have to move down - away from -  
00 01 27 18 CDR Now, how we doing checklist-wise? Let's make sure we don't screw up and forget - -  
00 01 27 22 CMP I'm working on the attitude reference check right now.  
00 01 27 29 LMP Now, do we need to do anything else to configure this for . . . receiver?  
00 01 27 32 CDR No, far as I know it's all up to them.  
00 01 27 50 LMP Oh, shoot; they're going to - Let's see, they're going to have to send us up a TLI pad, TLI abort, and a P37 pad. They're all right here in this little book; don't forget to remind me of that.  
00 01 28 02 CMP Okay, that's good.  
00 01 28 14 LMP How do you think we can . . .?  
00 01 28 17 CDR Yes, you can fold it flat; would that help you?  
00 01 28 19 LMP Yes.  
00 01 28 20 CDR That's pull - pull - -  
00 01 28 28 CMP See that, Buzz? You're a TV expert.  
00 01 28 48 CMP Now, the next big thing we got to do is, after the attitude reference check, is extend the docking probe. No big thing. Copy down a bunch of pads and then you got your RCS hotfire.  
00 01 29 08 CMP That booster, when that thing - -

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00 01 29 09 CC Apollo 11, this is Houston through Guaymas. Over.  
00 01 29 14 CDR Roger, Houston. Reading you loud and clear.

00 01 29 16 CC Reading you the same. Coming up on AOS Goldstone.

00 01 29 19 CDR Roger.

00 01 29 21 CDR It should be right now, Buzz.

00 01 29 27 LMP Cecil B. De Aldrin is standing by for instructions.

00 01 29 32 CC Houston. Roger.

00 01 29 40 CDR Okay, and I got pads, need to extend the probe, and do an SM RCS hotfire.

00 01 29 49 CMP That's right, that's the same way I read it. I don't know what this is, coming up.

00 01 29 53 CDR When you - when you come up on this SECS LOGIC - and MSFN GO for pyro arm, don't forget to get an okay from them before you send the . . . out.

00 01 30 09 LMP Wow, I hope they get that; that's pretty.

00 01 30 11 CDR With the sun glaring like it is, you're - you're correct on the f:22, I'm sure. It might be part of the - -

00 01 53 56 CC - - and the launch - vehicle guidance are both looking to be in good shape. We estimate you have better than a 99-percent probability of a guidance cut-off on the launch vehicle. So, things are apparently holding in very well. For your information, MLA received approximately 1 minute of a usable TV picture; so, apparently the system is working. You're a little over a minute from LOS at Canary; AOS Tananarive is 2 hours 9 minutes and 18 seconds. Over.

00 01 54 34 CMP Roger. We like those 99 numbers. Thank you.

00 01 54 38 CC Roger. Out.

00 01 54 39 CDR Okay.

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00 01 54 40 CMP Now, let's see. We want to go to the suit circuit - -

00 01 54 44 LMP Yes, I'll get the suit circuit if I can find that valve.

00 01 54 50 CMP Okay, let's see, that's the EDS POWER, ON.

00 01 54 54 LMP Oh, that thing is hard.

00 01 54 59 CMP What - what do we want here - -

00 01 55 00 LMP Suit's closed.

00 01 55 01 CMP - - on that VERB 48?

00 01 55 10 CDR Ready for EDS POWER, ON, you think?

00 01 55 13 CMP EDS POWER, up and ON, yes.

00 01 55 17 CDR Okay, it's ON.

00 01 55 20 CMP EMS FUNCTION, OFF, verify.

00 01 55 22 CDR EMS FUNCTION, OFF.

00 01 55 23 CMP MODE, STANDBY - EMS MODE, STANDBY.

00 01 55 28 CDR Okay, it's at STANDBY.

00 01 55 30 CMP EMS FUNCTION, DELTA-V; set range VHF A.

00 01 55 32 CDR Okay.

00 01 55 33 CMP Set for 1586.8.

00 01 55 34 CDR Okay.

00 01 55 38 CMP Then go to NORMAL. Anybody know what we're doing with VERB 48 up there?

00 01 55 54 CMP What are we supposed to be putting in there?

00 01 55 58 CDR . . .

00 01 56 08 LMP I wonder what the hell that is?

00 01 56 22 CMP Just verify you got a 3 there?

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00 01 56 25 LMP I guess so, that's what you need.

00 01 56 30 CMP That's all you need.

00 01 56 31 LMP Yes.

00 01 56 32 CMP I don't know what that entry is in the checklist.

00 01 56 33 CDR It doesn't matter what the other numbers are.

00 01 56 36 CMP No, I mean any - any other weights or anything?

00 01 56 38 LMP No.

00 01 56 39 CMP Doesn't seem to me, for the pad we got, we - we want to load in any - -

00 01 56 43 LMP No.

00 01 56 44 CMP - - any of this - stuff. That's what we got in there, anyway.

00 01 56 45 CDR Yes.

00 01 56 46 CMP Maybe we can change the weight, but that's TLI plus 90; we got plenty of time.

00 01 56 56 CDR We don't want to do that.

00 01 56 57 LMP No.

00 01 56 58 CMP It's almost the same anyway.

00 01 57 00 CDR It's about the same anyway, yes.

00 01 57 06 LMP Okay. You ready for the - your EMS MODE, NORMAL?

00 01 57 11 CDR NORMAL.

00 01 57 12 LMP EMS FUNCTION to DELTA-V TEST.

00 01 57 15 CDR That's good; that light enough.

00 01 57 20 LMP . . .

00 01 57 21 CMP Now, we want a GDC align.

00 01 57 24 CDR Yes.

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00 01 57 25 CMP Now, let's see - -

00 01 57 27 CDR Minus 19.9.

00 01 57 29 CMP That's alright - minus 0.1 to - can you write that one down?

00 01 57 34 CDR It's real close.

00 01 57 37 CMP Yes.

00 01 57 41 CDR That's just about perfect.

00 01 57 44 LMP Alright. EMS MODE, STANDBY.

00 01 57 48 CDR STANDBY.

00 01 57 51 LMP And EMS FUNCTION, DELTA-V, set. Set DELTA-VC. You got the number?

00 01 58 03 CMP Yes. 10 4256.

00 01 58 10 CDR 4256? How about 4356?

00 01 58 16 LMP That's right, 4356.

00 01 58 25 CDR And how about ORDEAL? Does that go back, Buzz?

00 01 58 28 LMP Yes.

00 01 58 35 CDR I guess we got all of those -

00 01 58 49 CMP Where did all those numbers come from?

00 01 58 54 CDR Yes; much better.

00 01 58 57 CMP They give us a new state vector?

00 01 59 00 CDR Yes.

00 01 59 02 LMP Yes, they did.

00 01 59 03 CDR They did, yes.

00 01 59 04 CMP No, that's VERB 66. . . . apogee - perigee.

00 01 59 25 LMP I'll just put a question mark here about - not show our ignorance.

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00 01 59 32CMPWell, looks like we're picking up a little. That sound reasonable? 1166?

00 01 59 40CDR . . . the time, is that right?

00 01 59 41LMPThe S-IVB?

00 01 59 45CMPYes, you add about 4 or 5 miles to your orbit - apogee - perigee.

00 01 59 49 CDR Yes.

00 01 59 51 LMP Yes, that's too much.

00 01 59 54 CDR We're up to 6 . . .

00 02 00 00 LMP That thing . . . now, that may not be now; that may be at TLL.

00 02 00 18 LMP I don't have any reason not to believe it.

00 02 00 21 CDR No.

00 02 00 25 CMP If it isn't any good, we'll need another one anyway, huh? So, there isn't any point in saving the other one.

00 02 00 32 CDR Okay.

00 02 00 33 CMP VERB 66.

00 02 00 39 CDR Okay. 10 435.6.

00 02 00 52 LMP 10 435.6. Alright, go to EMS FUNCTION, DELTA-V.

00 02 01 00 CMP DELTA-V.

00 02 01 01 LMP GDC align is at - What's this "D"?

00 02 01 12 CDR Huh?

00 02 01 13 CMP That means . . .

00 02 01 15 LMP Oh.

00 02 01 16 CMP Won't get them on S-band.

00 02 01 17 LMP S what?

## Page 29

00 02 01 19 CMP VHF.

00 02 01 20 LMP Okay. A SIMPLEX, it should be on.

00 02 01 23 CMP Set ORDEAL? Do something with it, anyway.

00 02 01 28 LMP Let's see, ORDEAL is - -

00 02 01 29 CMP What happened to that card that was here?

00 02 01 30 LMP I already fired it.

00 02 01 32 CDR What was that?

00 02 01 33 CMP Um hum.

00 02 01 34 CDR Saturn boost? This was a boost card.

00 02 01 38 LMP Okay.

00 02 01 39 CMP You can't have that.

00 02 01 42 LMP You don't want that one, do you?

00 02 01 43 CMP No.

00 02 01 44 LMP Trade it - for a good one.

00 02 01 55 CMP How about some LM pointing angles?

00 02 02 03 LMP Okay, let's do one more. We're going first opportunity, you think?

00 02 02 22 CMP Burn time is 05 plus 47.

00 02 02 24 CDR Yes.

00 02 02 27 CMP And emergency shutdown, Neil, is plus 10 seconds; 10 minus 40 on the DELTA-VC, is that right?

00 02 02 32 LMP Plus 6 seconds - plus 6.

00 02 02 39 CMP And - no - no, I'm sure about that minus.

00 02 02 43 LMP No, no, it's not; it's only . . .

00 02 02 45 CMP No, it's plus 6 seconds and VI on the DSKY at G&N.

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00 02 02 58 CDR I think that's going to show up here, isn't it?

00 02 03 01 LMP What?

00 02 03 03 CDR TLI?

00 02 03 04 CMP The roll?

00 02 03 05 CDR Burn . . .

00 02 03 06 CMP They're in the damn flight plan; I don't think they're in the checklist.

00 02 03 27 LMP Alright. You got ORDEAL set in some way?

00 02 03 30 CDR ORDEAL is okay.

00 02 03 33 LMP Well, do you want to get ahead on a few things?

00 02 03 38 CDR Well, give me an example.

00 02 03 44 LMP We don't need the sequence pyro arm yet, huh?

00 02 03 47 CDR No. Don't want to do that until -

00 02 03 52 LMP TRANS CONTROL POWER, ON?

00 02 03 54 CDR It's ON.

00 02 03 55 LMP ROT CONTROL POWER, NORMAL, two of them, AC/DC?

00 02 03 58 CDR There you go.

00 02 03 59 LMP DIRECT, two, MAIN A/MAIN B?

00 02 04 04 CDR Okay.

00 02 04 12 LMP LAUNCH VEHICLE indicators: GPI to S-II/S-IVB. GUIDANCE to IU.

00 02 04 24 LMP That IU?  
00 02 04 26 CDR Yes.  
00 02 04 27 CMP Have we got pyros armed?  
00 02 04 28 CDR No.

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00 02 04 29 LMP No.  
00 02 04 30 CMP Okay.  
00 02 04 33 LMP CB, DIRECT ULLAGE, two of them, CLOSED.  
00 02 04 38 CDR Better wait awhile on that.  
00 02 04 44 LMP Okay, how about cranking the event timer to 51:00, then?  
00 02 04 52 CDR What's burn time? Ignition time? 2 what?  
00 02 04 59 CMP 35, 30 minutes.  
00 02 05 03 LMP Well, that's going to be . . .  
00 02 05 08 CDR Okay, I'll set up the event timer.  
00 02 05 47 CDR Burn time is 05:20.  
00 02 06 07 CMP DELTA-VI - going to be . . .  
00 02 06 45 CMP Sure you got - you got your checklist here, haven't you? Yes.  
00 02 06 48 LMP Yes, they put all this TLI crap in my checklist; even though I took it out, they put it back in.  
00 02 06 52 CMP Well, Mattingly assured me that I was going to have a circular velocity versus altitude, you know, when they get me at 100 miles on the other side?  
00 02 07 02 LMP It's not in here, either, I looked.  
00 02 07 04 CMP Where would it be? It'd be right in here -  
00 02 07 06 LMP I finally gave it to . . .  
00 02 07 16 CMP Hey, that's - you know what the numbers are, roughly.  
00 02 07 24 CDR 25 - 25 550 at a 100 miles - something like that, it changes, probably - -  
00 02 07 31 CMP Yes, but this was to be - What do you have on this side to give you that on the other side?

## Page 32

00 02 07 49 LMP I'm running a little bit on the warm side; how are you guys . . . along?  
00 02 07 53 CDR Probably a tad on the warm side.  
00 02 07 59 LMP Suit and cabin pressures both look - I guess we should be cool.  
00 02 08 06 CDR Should be about 100 . . . - okay -

00 02 08 10 LMP Water - boiling - . . . potable . . .

00 02 08 18 CMP Fuel cells . . . water. It goes to potable tank first and then we - we get it.

00 02 08 24 LMP Oh - stop there?

00 02 08 25 CMP Yes.

00 02 08 26 CDR Coming into the terminator.

00 02 08 46 CMP Gee, I'm really disappointed over those optics; that telescope is horrible. Maybe it'll get better with practice - or adaptation, or what have you.

00 02 09 38 CDR Gee, I almost went to sleep then.

00 02 09 40 CMP Me, too; I'm taking a little rest.

00 02 09 48 LMP It's going to be a long day.

00 02 10 03 LMP How'd the - is this the first part of the attitude comparison check or the second part?

00 02 10 10 CDR I haven't done the second GDC align yet; it comes up on the next page. About now, I guess.

00 02 10 25 CMP Well, we should have Tananarive. How about going - pressing ahead with the sequence pyro arm?

00 02 10 31 CDR Okay, let me align the GDC.

00 02 10 46 CDR Well, they cleverly do this on - just on opposite sides of the world so you always have to pitch - run all the thumbwheels the maximum amount.

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00 02 10 56 CC Apollo 11, Apollo 11, this is Houston standing by through Tananarive. Over.

00 02 11 03 CDR Houston, Apollo 11. Roger.

00 02 11 05 CC Roger. Reading you loud and clear.

00 02 11 10 LMP You get the pyro armed?

00 02 11 12 CDR No, I haven't. Just a second, I'll be right with you.

00 02 11 24 LMP Get 51 on the event timer?

00 02 11 34 CMP We stopped boiling water.

00 02 11 37 LMP That's good.

00 02 11 41 CDR Old son of a gun.

00 02 11 46 LMP Okay on the temperatures.

00 02 11 50 CMP Looks like the setting on the AUTO thing is such that it just runs a little cold.

00 02 11 56 CDR Yes, that's right. That's - that's what I think, too.

00 02 12 05 CMP . . . have a feeling I have a ball in here.

00 02 12 09 CDR Okay, the GDC is - is aligned. Ready to proceed.

00 02 12 15 LMP Okay. We've got the VERB 48 in, VERB 83, ORDEAL set, and SEQUENCE PYRO ARM.

00 02 12 26 CDR Okay. Stand by for a blast. One's ON. Two's ON.

00 02 12 35 LMP Houston, Apollo 11. We have the pyros armed.

00 02 12 39 CDR Okay.

00 02 12 40 CC This is Houston. Roger; out.

00 02 12 41 LMP TRANS CONTROL POWER's ON. ROT CONTROL POWER, NORMAL, two, AC/DC.

00 02 12 45 CDR They're all up.

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00 02 12 46 LMP DIRECT? MAIN A/MAIN B.

00 02 12 49 CDR DIRECT.

00 02 12 50 LMP S-II/S-IVB.

00 02 12 52 CDR Check.

00 02 12 53 LMP GUIDANCE, IU?

00 02 12 54 CDR IU, yes.

00 02 12 55 LMP Circuit breakers, DIRECT ULLAGE, two, CLOSED.

00 02 13 01 CDR Okay.

00 02 13 02 LMP And the event timer's set.

00 02 13 06 CMP Now, why don't you - why don't you put ORDEAL on 200/LUNAR?

00 02 13 15 CDR Alright.

00 02 13 17 CMP Maybe you can start figuring out what the hell that ought to be.

00 02 13 32 CMP I guess - leave them on INERTIAL for the time being.

00 02 13 45 CDR Beyond my ability to - compute here right now.

00 02 14 10 CDR . . . ?

00 02 14 27 LMP You're not worried now on that thing.

00 02 14 29 CMP When the motor lights up, he's worried.

00 02 14 38 CDR . . . 190, 110 degrees.

00 02 14 50 CMP Got a long way around, yet.

00 02 15 23 CC Apollo 11, this is Houston. 1 minute to LOS Tananarive; A0S at Carnarvon, 02:25:30.

00 02 15 35 LMP Roger.

00 02 15 36 CDR 02:25:30.

00 02 15 37 LMP Yes. 02:25. . . .

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00 02 15 58 CMP Why did they do that? That should be up here, before 02:35.

00 02 16 10 LMP I don't know. It's screwed up in here anyway.

00 02 16 29 CDR Well, weren't they giving us two abort pads before?

00 02 16 33 CMP No, TLI plus 90 and TLI plus 4 hours. And now the TLI plus 4 hours is TLI plus 5 hours, P37.

00 02 16 44 CDR Oh, is that right?

00 02 16 45 CMP Yes. Got them on the same page.

00 02 16 49 CDR Yes, they're on the same page.

00 02 16 50 CMP Yes, I was expecting them to get something in.

00 02 17 29 CMP Going to have to break your . . . here, I mean - yourLMPhandhold.

00 02 17 35 LMP Oh, my G&N handhold; don't do that. . . . managed to hang on to it, . . . up there.

00 02 17 44 CMP Holding against the . . . - the couch.

00 02 18 13 CMP Well, let's see . . .

00 02 18 35 CMP Think I was that slow punching the clock?

00 02 18 39 LMP Huh?

00 02 18 40 CMP I wonder if I was that slow getting everything going? I ought to have given them a second or . . .

00 02 18 56 LMP It didn't seem to me as though there was a tremendous cue; there's no doubt that you were moving, but to say exactly what the precise time was when you started to move, I think you'd call it whenever the thing started vibrating.

00 02 19 12 CMP Yes, I didn't know when the hell we were airborne; I just took his word for it. It was sure shaking, rattling, and rolling, son of a bitch!

00 02 19 46 LMP Wake me up at TLI, somebody.

00 02 19 50 CDR Another 15 minutes, just time to sleep.

## Page 36

00 02 19 52 CMP You need to get out the alarm clock.

00 02 20 06 CDR I don't know, I think I'll just put my window guard up.

00 02 20 12 CMP Yes.

00 02 20 32 CMP Whopseedoo, we picked up an S-band. No noise.

00 02 20 45 CDR What's VERB 85 going to tell me - if I call that up, Mike?

00 02 20 50 CMP It tells you range - range rate in C, which is the angle between your - optics line of sight and the horizon, depending on what - -

00 02 21 03 CDR What's that little bump in the . . . somebody?  
00 02 21 06 CMP That's me; I - I'm thrashing around over here a little bit.  
00 02 21 08 LMP I - if you wonder, I stuffed my launch checklist and - in the little gap between the -  
00 02 21 19 CMP You don't have a launch checklist.  
00 02 21 22 LMP My cue card.  
00 02 21 23 CMP Oh.  
00 02 21 24 LMP In between the - the Y-Y strut and the wall over here, to keep it from bouncing around.  
00 02 21 31 CMP Oh.  
00 02 21 32 LMP . . .  
00 02 21 34 CMP Yes, that says 58-1/2 degrees, huh?  
00 02 21 40 CDR Yes.  
00 02 21 42 CMP . . . 57-1/2 isn't that something like that? Now wait a minute.  
00 02 21 50 CDR Yes, 57-1/2 degrees.  
00 02 21 52 CMP I guess they're . . . about on the horizon anyway. Yes, okay.

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00 02 21 55 CDR Huh?  
00 02 21 56 CMP Buzz, I put 39.5 volts over here; that's a reminder on the battery check - real good on the wall. Okay, Neil, now TLI - I'm going to write on the wall here - TLI - nominal is 05 plus 47; and 6 seconds later, it's 05 plus 53. And you want me to let you know when that is; I'll yell "cut-off" at that time.  
00 02 22 27 CDR Okay.  
00 02 22 38 CMP Now, we want to get what that time's going to be up there. Is that alright, Neil?  
00 02 22 43 CDR Yes, that's right. 05:53, I want it yelled.  
00 02 22 45 CMP Okay. I'll yell "cut-off," huh?  
00 02 22 57 CDR Yes, I guess. And I'll cut off if the G&N says - -  
00 02 23 04 CMP Agreed.  
00 02 23 05 CDR - - we're overburned.  
00 02 23 06 LMP That's right.  
00 02 23 39 CMP You got that TRANSLUNAR switched to INJECT, huh?  
00 02 23 41 CDR Yes, to INJECT.  
00 02 23 47 LMP EDS POWER, you got ON?  
00 02 23 49 CDR EDS POWER is ON.

00 02 23 53 LMP PYROs are ARMED?  
00 02 23 55 CDR PYROs are - four breakers are in, and switches are up.  
00 02 24 06 LMP Okay, on this thing here, we should be reading 02:41:01, shutdown, and - -  
00 02 24 14 CDR Add 6 seconds to it?  
00 02 24 15 LMP Yes. At 07, cut-off.  
00 02 24 48 LMP BLOCK, BLOCK. SPACECRAFT CONTROL to SCS?

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00 02 24 53 CDR It is.  
00 02 24 57 LMP Tank pressures looking alright?  
00 02 25 02 CDR Tank pressures are looking good.  
00 02 43 18 CC Apollo 11, this is Houston. Slightly less than 1 minute to ignition, and everything is GO.  
00 02 43 42 CDR Okay, 59:25 - and this light will go off at 42 -  
00 02 43 53 CMP Time is based on tracking data; let me know when you start it up.  
00 02 43 54 LMP Okay.  
00 02 43 59 CDR When you feel it, that's when it is.  
00 02 44 01 LMP Okay, this light is out - know any of it any more.  
00 02 44 09 CDR Okay, we're operate - 59:59.  
00 02 44 16 LMP There we go; thrust.  
00 02 44 18 CDR IGNITION. Call it at 15.  
00 02 44 22 CMP Okay.  
00 02 44 26 CDR Whew!  
00 02 44 27 CC We confirm ignition, and the thrust is GO.  
00 02 44 33 CDR Pressures look good.  
00 02 44 37 CMP Flashes out window number 5.  
00 02 44 38 MS . . .  
00 02 44 40 CMP I'm not sure whether that's - it could be lightning, or it could be something to do with the engine -  
00 02 44 59 CMP Continual flashes . . .  
00 02 45 09 LMP About 2 degrees off in the pitch . . .  
00 02 45 12 CDR Yes, wouldn't worry too much about that.

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00 02 45 14 CC Apollo 11, this is Houston. At 1 minute, trajectory and guidance look good, and the stage is good. Over.

00 02 45 21 CDR Apollo 11. Roger.

00 02 45 50 CMP Don't look out window 1. If you're - if it looks like what I see out window 5, you don't want to look at it (laughter).

00 02 45 55 CDR I don't see anything.

00 02 45 56 LMP Why?

00 02 45 57 CMP These flashes out here - -

00 02 45 58 CDR Oh, I see a little flashing out there, yes.

00 02 46 03 CMP You see that? Buzz is usually looking - just watch window 5 for a second. See it?

00 02 46 10 LMP Yes, yes. Damn, everything's - just kind of sparks flying out there.

00 02 46 14 CMP Yes, that's - Oopsedo.

00 02 46 16 CDR Man, that really - -

00 02 46 18 CMP That's PU shift?

00 02 46 19 CDR I don't know, but it sure put a little blip in there at 2 minutes; I think it increased in thrust.

00 02 46 24 CMP Think it's the PU shift?

00 02 46 26 CC Apollo 11, this is Houston. Thrust is good; everything's still looking good.

00 02 46 32 CMP That's about like a pitch change rather than an acceleration increase. Did it feel that way to you?

00 02 46 38 CDR Okay. We got a lighted horizon at 2-1/2 minutes. Pretty horizon.

00 02 46 48 LMP A fairly smooth ride, you know; it's just a little tiny bit rattly, but nothing like Stafford's - H-dot looks great. Don't bet you could do any better.

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00 02 46 58 CMP I'm sure I couldn't. I'd do worse because I'd be a - a full degree off from where it is right now.

00 02 47 14 LMP Don't sweat that. 3 minutes.

00 02 47 16 CMP 3 minutes. What we got, about one g, Neil?

00 02 47 24 LMP Pressures are good - -

00 02 47 25 CMP Yes, we've got 3 feet per second - -

00 02 47 26 CDR Just under one g.

00 02 47 27 LMP Mike, we're within 3 feet per second on the card H-dot.

00 02 47 32 CMP Fantastic. And it's shaking everything a little bit.

00 02 47 34 LMP Shaking at 3 minutes.

00 02 47 35 CDR Okay.

00 02 47 36 LMP I hope that camera doesn't fall on your face.

00 02 47 38 CMP I checked it; it's locked in there pretty well. Won't hurt this visor -

00 02 47 43 CDR 03:30 coming up - Should be 5.5, and it is 5.5.

00 02 47 53 CMP Nice ride.

00 02 47 54 CC Apollo 11, this is Houston. At 3-1/2 minutes, you're still looking good. Your predicted cut-off is right on the nominal.

00 02 48 04 CDR Roger. Apollo 11's GO.

00 02 48 07 CMP I see a bright star out there, must be Venus. Forgot to memorize John Mayer's views out the window well enough to say that's Venus or not, but it's sure bright.

00 02 48 17 LMP What would you do about it?

00 02 48 18 CMP Nothing.

00 02 48 19 CDR 4 minutes -

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00 02 48 20 CMP Tell you what - that's Venus.

00 02 48 22 LMP 10 feet per second off on H-dot -

00 02 48 25 CMP . . . , that's about where it is.

00 02 48 27 LMP Here comes the old sun.

00 02 48 29 CMP Gee, that's going to be bright.

00 02 48 31 CDR Glad I got my card up.

00 02 48 32 CMP I'm glad you had - you do too, Neil; that was a good idea, a hell of a good idea. I can't see - well, my tapes are . . . I can't . . . see very much.

00 02 48 42 CDR Coming up on 04:30. How you look, Buzz?

00 02 48 49 LMP Looks good. Oh, about 14 feet per second right now. The altitude's very good. We ought to get a real good 5-minute cut at the . . .

00 02 49 12 LMP You guys agree with my mark; we'll be 5 minutes?

00 02 49 14 CMP Okay.

00 02 49 15 CDR Just a second.

00 02 49 16 CMP 5 minutes.

00 02 49 17 LMP MARK.

00 02 49 18 CC Apollo 11, this is Houston. You are GO at 5 minutes.

00 02 49 21 CDR Roger. We're GO.

00 02 49 23 LMP Okay, we're just a little bit low on time.

00 02 49 25 CMP Right on it.

00 02 49 27 CDR . . . yaw.  
00 02 49 33 CMP . . . do that?  
00 02 49 34 CDR Yes, we better do that.  
00 02 49 37 CMP 5 - 5 seconds -

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00 02 49 40 LMP What kind of g we pulling?  
00 02 49 42 CDR We got a 1.2 or 3 - 1.3, maybe.  
00 02 49 46 CMP Gee, feels a lot more than that already.  
00 02 49 51 LMP Okay, 6 - okay, about 5 seconds to nominal.  
00 02 50 03 CMP/LMP Here we go -  
00 02 50 06 CDR We have cut-off.  
00 02 50 09 LMP 3.3 on the DELTA - -  
00 02 50 12 CDR The DELTA-VC on the EMS: 3.3.  
00 02 50 14 CMP Beautiful. EMS FUNCTION, OFF.  
00 02 50 17 CDR OFF.  
00 02 50 19 CMP SECS PYRO ARM, two, SAFE.  
00 02 50 22 CDR I got out - I got out of kilter here; let's go back and let Buzz pick up on it. You're just a little bit ahead of yourself on the checklist.  
00 02 50 29 CMP Okay.  
00 02 50 30 CDR Okay, Houston, you read 11?  
00 02 50 35 CMP Buzz, forget I read anything in the checklist.  
00 02 50 38 LMP Yes - -  
00 02 50 39 CDR Not getting any answer -  
00 02 50 41 CMP Okay, let's go to IU ACCEPT here. Now, . . .  
00 02 50 56 CMP Why don't you try to get up high - -  
00 02 50 59 CDR SCS TVC SERV0 POWER 1, OFF.  
00 02 51 00 LMP Okay.  
00 02 51 01 CDR You want to get Houston on the radio if you can?  
00 02 51 02 LMP Yes.

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00 02 51 03 CDR PCM BIT RATE, LOW.  
00 02 51 04 CMP PCM BIT RATE is LOW - -

00 03 16 27 LMP - - two, ARMED.  
00 03 16 28 CMP Two, ARMED.  
00 03 16 29 LMP CMC MODE, AUTO.  
00 03 16 30 CMP AUTO.  
00 03 16 31 LMP Start the digital event timer.  
00 03 16 33 CMP Okay, start.  
00 03 16 36 LMP And we're going to translate plus X and hold.  
00 03 16 37 CMP Yes.  
00 03 16 38 LMP CM/LAUNCH VEHICLE SEP pushbutton?  
00 03 16 39 CMP Yes.  
00 03 16 40 LMP Watch the tank pressure and the engine light.  
00 03 16 43 CMP Are you on tank pressures? You are.  
00 03 16 47 LMP And you're going to go to 100.8?  
00 03 16 49 CMP Yes.  
00 03 16 53 LMP You want to -  
00 03 16 54 CMP Here we go.  
00 03 16 55 CDR Okay, Houston; we're about to SEP.  
00 03 16 58 CMP Thrusting -  
00 03 16 59 CC This is Houston. We copy.  
00 03 17 00 CDR SEP.  
00 03 17 03 LMP Look at that trash.  
00 03 17 05 CDR SEP complete.

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00 03 17 07 LMP Got DELTA-V?  
00 03 17 08 CMP Okay, got 0.7; I'm going to stop there and - -  
00 03 17 11 LMP . . . go to RELEASE; DELTA-V indicator minus 100.8 - -  
00 03 17 14 CMP Okay.  
00 03 17 15 LMP - - SERVICE MODULE RCS PROPELLANT, verify eight of them gray.  
00 03 17 18 CMP Okay, you got problems there. Get the . . . - there you go.  
00 03 17 22 CDR I'll get them.  
00 03 17 23 LMP Okay, okay.  
00 03 17 26 CMP What else? Did - -

00 03 17 27 LMP CM - -

00 03 17 28 CDR PRIMARY and SECONDARY PROPELLANT B went barber pole at SEP.

00 03 17 36 CC That was SECONDARY PROPELLANT on quad - quad Bravo?

00 03 17 41 CDR Quad Bravo, yes; both the PRIMARY and SECONDARY talkbacks went barber pole.

00 03 17 45 CMP . . . , three, OPEN.

00 03 17 47 LMP Okay, your - -

00 03 17 50 CC Roger; we copy.

00 03 17 51 LMP - - . . . This is the one that . . . 0.5, right? Is it - Mike, you key a VERB 62?

00 03 17 57 CMP Yes.

00 03 17 58 LMP PROCEED and you're pitching?

00 03 18 00 CDR She's pitching.

00 03 18 02 CMP Trying - to turn itself off again; look at this.

00 03 18 05 CDR Is it holding it this time?

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00 03 18 06 CMP Watch, it'll probably go back to RATE COMMAND.

00 03 18 10 CDR That slows it down?

00 03 18 11 CMP . . . keeps pitching.

00 03 18 15 LMP Your MAN ATT, PITCH, to ACCEL COMMAND?

00 03 18 19 CDR It went to RATE - Okay, I see a SLA panel going out.

00 03 18 23 LMP Okay, you got to get a pitch rate in there -

00 03 18 30 CDR See that SLA panel?

00 03 18 35 LMP Is it flying - yet?

00 03 18 37 CMP It's alright. She's darn well unbelievable - something.

00 03 18 47 CDR I see it . . .

00 03 18 50 LMP Do I need some circuit breaker in to get - -

00 03 18 52 CDR I see another - No, that's alright.

00 03 18 54 LMP - - to get this camera going? Mike?

00 03 18 57 CMP No, you need the power on over there, though.

00 03 19 00 LMP I turned it on.

00 03 19 01 CDR I got it. . . . beautiful.

00 03 19 02 CMP You sure you have the right power switch on?

00 03 19 03 CDR Boy, that's - -  
00 03 19 04 LMP Yes.  
00 03 19 05 CMP You got him?  
00 03 19 06 CDR Yes, Mike.  
00 03 19 06 LMP No, I don't.  
00 03 19 07 CMP To the right over here.  
00 03 19 08 CDR Can you see him?

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00 03 19 09 LMP No, I don't see - -  
00 03 19 10 CDR He's a little bit to our right.  
00 03 19 11 LMP Okay, I see him.  
00 03 19 12 CDR We need about a 5-degree right, and we need to stop our - -  
00 03 19 16 CMP Okay. We'll stop here.  
00 03 19 18 CDR - - . . . and we're pretty far away from him, too.  
00 03 19 25 CMP Okay, watch it, we should be stopping here.  
00 03 19 40 LMP How long do we want to run this film?  
00 03 19 46 CDR How does he look, Mike?  
00 03 19 47 CMP He's - he's fine.  
00 03 19 52 CDR Okay, you got 100.4 now.  
00 03 19 54 CMP Yes, I know; those numbers don't mean anything. They were 99-something when we turned around; don't ask me why. I thrust toward him quite a bit, and I don't know why those numbers were screwed up, but they were.  
00 03 20 13 CDR Buzz, how does he look to you; looks like he's getting closer to me.  
00 03 20 15 CMP . . . get the BMAG?  
00 03 20 18 LMP Okay.  
00 03 20 19 CDR Yes, it looks like he's drifting down just a tad, and he's supposed to be.  
00 03 20 22 CMP How are our eight gray talkbacks; they still good?  
00 03 20 29 CDR Very good.  
00 03 20 43 CMP Flies like a spacecraft instead of a simulator. Hope that's good.  
00 03 20 52 CDR Sure beautiful. I hope you got some pictures, Buzz.

## Page 47

00 03 20 55 LMP I got the 16 millimeter going - -

00 03 20 56 CDR Is it going?

00 03 20 57 LMP - - 16 frames at f:8 - -

00 03 20 58 CDR Good.

00 03 21 01 LMP - - 70, 1/250th, . . .

00 03 21 03 CDR Beautiful.

00 03 21 05 LMP It really looks nice, doesn't it?

00 03 21 08 CMP Hey, we're closing in a leisurely fashion.

00 03 21 12 LMP Hey, how long does this . . .?

00 03 21 16 CMP It's on the - it's printed - -

00 03 21 18 CDR Yes.

00 03 21 19 CMP - - yes, it's six frames at 15; I suggest toward the end you probably goose it up a little bit.

00 03 21 23 LMP You want to get the whole thing?

00 03 21 24 CDR I don't care - . . . tell by looking at . . .

00 03 21 32 LMP The thing is, with this sitting there, I can't get much with the Hasselblad. That window's no good, I'm afraid.

00 03 21 46 CDR Can I hold something for you?

00 03 21 49 LMP Take a couple of . . .

00 03 21 54 CMP Yes, you might look - if you're looking for something to do, you might just look over my panel 1 and 8 and all that and make sure all the switches are - to your liking.

00 03 22 05 CDR I'll do it.

00 03 22 06 LMP . . .

00 03 22 15 CDR Be sure that your RCS is working anyway.

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00 03 22 23 LMP How far out are you, Mike?

00 03 22 25 CMP I'm still quite a ways. That's definitely a SLA panel - there's no doubt about that. Sure looks like . . . panel. That stuff's hitting from the S-IVB from us. Gees, look it - that one thing just hit the - gyro package on the S-band antenna.

00 03 22 46 LMP Yes, things occasionally come scooting out.

00 03 22 52 CMP . . .

00 03 22 53 LMP And, occasionally, you know, a little piece of something hits the - what do you call that - covering? The whole LM quivers every so often. All - all the surface of it, Neil, you know, just kind of shakes like that.

00 03 23 12 CDR Yes?

00 03 23 13 LMP Just in one spot; it's not being hit. I hope it doesn't come in . . . - -

00 03 23 17 CMP Stand by; we're getting pretty close.

00 03 23 20 CDR Just from the APS firing, you think?

00 03 23 25 CMP Stand by; we're closing.

00 03 24 40 LMP Okay - -

00 03 24 41 CDR We don't have too much - -

00 03 24 43 LMP - - BMAG MODE, three - You should stabilize and align CM - BMAG MODE, three, to ATT 1/RATE 2?

00 03 24 49 CMP Okay.

00 03 24 50 LMP And we're - translated plus X. That CAPTURE PROBE, EXTEND/RELEASE, you've done that; CMC MODE, FREE?

00 03 24 54 CDR Yes, sir.

00 03 24 55 CMP Yes.

00 03 24 57 LMP Allow probe to damp spacecraft oscillations?

00 03 24 58 CDR We did that.

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00 03 24 59 LMP Yes, you've done that. DOCKING PROBE, RETRACT, PRIMARY 1?

00 03 25 01 CMP We did that.

00 03 25 03 LMP Alright, after dock - -

00 03 25 20 LMP - - EXTEND/RELEASE, to OFF?

00 03 25 21 CDR DOCKING PROBE, EXTEND/RELEASE, to OFF, I did that. DOCKING PROBE, RETRACT, . . . to OFF.

00 03 25 27 LMP Okay, DOCKING PROBE, RETRACT, two of them, OFF?

00 03 25 30 CDR No, no, wait a minute. It says "DOCKING PROBE, EXTEND/RELEASE, to OFF," huh?

00 03 25 34 LMP Yes.

00 03 25 35 CDR Okay.

00 03 25 36 LMP Alright, let's go. DOCKING PROBE, RETRACT, two of them, OFF?

00 03 25 38 CDR/CMP Yes, they're OFF.

00 03 25 40 LMP Alright. Circuit breakers: DOCKING PROBE, two, OPEN.

00 03 25 45 CDR DOCKING PROBE, two, OPEN.

00 03 25 47 LMP Okay, PCM BIT RATE is LOW. Postdocking: it says RATE, HIGH; ATT DEADBAND, MAX.

00 03 25 56 CMP RATE, HIGH; ATT DEADBAND, MAX.

00 03 25 58 LMP COAS POWER, OFF.

00 03 25 59 CMP COAS POWER, OFF.  
00 03 26 01 CDR . . . get this to stop . . .  
00 03 26 05 LMP Yes, that wasn't the smoothest docking I've ever done.  
00 03 26 08 CDR Well, it felt good from here.

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00 03 26 10 LMP I mean the - I mean the whole - I mean the gas consumption would be a lot more than I would have guessed, you know? I thought I could about equal the simulator in . . . and I didn't - I bet you I used - I hate to quote a number, but I've been down around 30-some pounds in the simulator, and I'll bet this was 50, 60 pounds, something like that. Hate to quote a number.  
00 03 26 31 CMP How do the - Speaking of that, how do the service module RCS quantities look?  
00 03 26 35 CDR Well, Buzz is fooling around with that - Let me just - -  
00 03 26 38 LMP They - they're all 90 except B, which is above 90.  
00 03 26 42 CDR Should be. Can't ever tell on 3 -  
00 03 26 46 LMP No, C and D are . . . 3, anyway.  
00 03 26 52 CDR Okay -  
00 03 26 55 CMP Well, I got to go in there and dick - -  
00 03 26 57 LMP I'm not sure that we're getting - -  
00 03 27 00 CDR Well, Buzz is getting COMM right now.  
00 03 27 02 CMP Yes, let Buzz do his high-gain thing, and I'll get ready to go dick with the tunnel.  
00 03 27 18 LMP Sure is squiggly, isn't it? It really wanders all over, doesn't it?  
00 03 27 33 CMP Neil, where do you put this guy - usually?  
00 03 27 35 CDR I - clip it to that - clip up there beside the COAS - you see - -  
00 03 27 38 CMP Okay.  
00 03 27 39 CDR - - see those clips up there, one of those. It's got a snap right here that's pretty good.  
00 03 27 48 CMP I think I can get it now - . . .  
00 03 28 10 CMP Okay, Buzz, how am I doing on the checklist?

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00 03 28 18 LMP Well, I'm trying to - -  
00 03 28 19 CDR You're at the high gain - -  
00 03 28 20 LMP - - you're at postdocking; I'm trying to get the high gain going - and I'm having a little trouble - . . . trouble.  
00 03 28 29 CDR That's MANUAL -

00 03 28 33 CMP Whatever you do, take some pictures.

00 03 28 35 CDR That should be on wide beam or . . . ?

00 03 28 38 LMP Wide.

00 03 28 40 CDR Okay.

00 03 28 42 LMP Hey, if you're through there, give me that VERB 64.

00 03 28 47 CMP What? Okay.

00 03 28 48 CDR I'm amazed how it just wanders around for a given setting; you notice that?

00 03 28 55 CMP There - it sounds like we got it now. There's your VERB 64.

00 03 28 58 CDR We got signal strength.

00 03 29 00 CMP Okay. You have to really be on MANUAL for those things to be indicating correctly.

00 03 29 05 CDR He was but - -

00 03 29 06 CMP Okay.

00 03 29 07 CDR - - this one was just kind of wandering around there - with no - -

00 03 29 13 LMP As soon as I went down to HIGH GAIN was when the signal strength came up.

00 03 29 16 CMP Okay, . . . man.

00 03 29 21 CC Apollo 11 - -





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03 03 39 38 CC . . .

03 03 40 17 CMP Optics . . . are up?

03 03 40 19 CDR Yes.

03 03 40 25 LMP Okay, 41:23; 1 minute to LOS. Mark that.

03 03 40 33 CC Apollo 11, this is Houston. . . .

03 03 40 40 CDR Roger. Everything looks okay up here.

03 03 40 48 LMP How much time have we got, Mike?

03 03 40 51 CMP 9 minutes.

03 03 41 13 LMP Well, let's let them look at the main bus ties coming on, alright?

03 03 41 17 CMP Sure.

03 03 41 19 LMP What time is it?

03 03 41 20 CMP 8-1/2 minutes.

03 03 41 23 LMP How soon are we going to - -

03 03 41 24 CDR . . . take 2.

03 03 41 25 LMP 1 second early. Okay. MAIN BUS TIES - -

03 03 41 28 CDR Okay.

03 03 41 29 CMP I'm going to turn my S-BAND VOLUME down, so you can . . .

03 03 41 33 CDR DOWN VOICE BACKUP.

03 03 41 39 LMP MAIN BUS TIE A coming ON. Have you got TVC GIMBAL DRIVE - PITCH and YAW, to AUTO, huh?

03 03 41 46 CMP TVC GIMBAL DRIVE, PITCH and YAW, to AUTO.

03 03 41 55 LMP Okay, TVC - -

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03 03 41 57 CMP He's not going to have the sun in your eyes - I mean, on this thing, why don't we . . .?

03 03 42 00 LMP Is that right?

03 03 42 01 CDR Now, you may have the sun in your eyes coming around the corner; now, you've got your patch ready in case you want it?

03 03 42 05 CMP Got it right here.

03 03 42 08 LMP Okay, TVC SERVO POWER 1, to AC 1,

03 03 42 11 CMP TVC SERVO POWER 1, to AC 1.

03 03 42 15 LMP 2 to AC 2.

03 03 42 16 CDR Look the other way.

03 03 42 18 CMP 2 to AC 2.

03 03 42 20 LMP TRANSLATIONAL CONTROL POWER, ON.

03 03 42 24 CMP TRANSLATIONAL CONTROL POWER is ON.

03 03 42 27 LMP ROTATION CONTROL POWER, NORMAL, number 2, to AC.

03 03 42 33 CMP Okay, stand by. ROTATIONAL CONTROL POWER is NORMAL, number 2, to AC.

03 03 42 47 LMP ROTATION HAND CONTROLLER, number 2, ARMED.

03 03 43 01 CMP ROTATIONAL HAND CONTROLLER, number 2, is ARMED.

03 03 43 07 LMP It's going to have to get up pretty high to . . . Alright, time check.

03 03 43 14 CDR Okay, we've got 6-1/2.

03 03 43 21 CMP MARK it -

03 03 43 22 CMP 6-1/2.

03 03 44 05 LMP 10-minutes difference whether we . . . , huh? That's a lot of time.

03 03 44 10 CMP Yes.

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03 03 44 16 LMP Now, what do we do? Turn up - Where did the noise come from?

03 03 44 20 CDR VHF or the S-band?

03 03 44 23 LMP I don't know.

03 03 44 24 CMP VHF, I think. It's a woo-woo noise.

03 03 44 28 LMP Woo-oo, what time is it?

03 03 44 29 CMP I turned my S-BAND VOLUME down to get rid of that background noise; now don't forget for us to turn it back up on the other side.

03 03 44 36 LMP What time you got?

03 03 44 37 CMP It's coming up on 5 minutes to TIG; I'll give you a mark.

03 03 44 41 LMP Alright. Start giving me PITCH 1, YAW 1.

03 03 44 44 CMP Okay, here comes PITCH 1.

03 03 44 46 LMP Got it.

03 03 44 47 CMP Here comes YAW 1.

03 03 44 49 LMP Got it.

03 03 44 50 CMP MARK -

03 03 44 51 CMP 5 minutes to TIG.

03 03 44 52 LMP Alright. TRANSLATION HAND CONTROLLER's counterclock - clockwise.

03 03 44 57 CMP Hey, are you - are you on your INTERCOM switch?  
INTERCOM/PUSH-TO-TALK and all that?

03 03 45 03 LMP Yes, yes.

03 03 45 04 CMP Okay. Alright. TRANSLATIONAL CONTROLLER's - -

03 03 45 07 LMP . . . going TVC.

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03 03 45 09 CMP - - clockwise - that's verified. Alright, secondary TVC check; GIMBAL MOTORS,  
PITCH 2, YAW 2, ON.

03 03 45 18 CDR PITCH 2, MARK.

03 03 45 19 CMP Got it.

03 03 45 20 CDR YAW 2, MARK.

03 03 45 22 CMP Got it.

03 03 45 23 CDR Okay.

03 03 45 24 CMP Set GPI trim.

03 03 45 25 CDR Plus - -

03 03 45 26 CMP Okay, it's set.

03 03 45 27 CDR - - 1.0, minus 0.2.

03 03 45 31 CMP Yes, it's set. Verify MTVC.

03 03 45 38 CDR Verified.

03 03 45 41 CMP THC, NEUTRAL.

03 03 45 43 CDR NEUTRAL.

03 03 45 45 CMP Verify GPI return to zero, zero.

03 03 45 47 CDR Verified.

03 03 45 48 CMP ROT CONTROL POWER, NORMAL, number 2, to AC/DC.

03 03 45 52 CDR AC/DC.

03 03 45 54 CMP SPACECRAFT CONTROL, CMC, verify.

03 03 45 55 CDR CMC.

03 03 45 57 CMP Okay. Now you got an option of trimming or bypassing.

03 03 46 01 CDR Let's bypass.

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03 03 46 02 CMP Alright. BMAG MODE, three, to ATT 1/RATE 2.

03 03 46 06 CDROkay, we're going to - Did you say after ENTER?

03 03 46 08 CMP Before ENTER.

03 03 46 10 CDR Okay, ATT 1/RATE 2; BMAG's in shape.

03 03 46 13 CMP ENTER.

03 03 46 15 CDR ENTER.

03 03 46 17 CMP Verify SPACECRAFT CONTROL, CMC.

03 03 46 20 CDR CMC.

03 03 46 22 CMP Accept this with a PROCEED.

03 03 46 24 CDR PROCEED. You ready to go?

03 03 46 26 CMP Yes. Up, down, zero. Up, down, zero. . . . OFF and the . . . OFF.

03 03 46 46 CDR 3 minutes. 3 - -

03 03 46 48 CMP ROTATIONAL CONTROL POWER, DIRECT, two of them, to MAIN A/MAIN B.

03 03 46 52 CDR ROTATIONAL CONTROL POWER, DIRECT, MAIN A/MAIN B.

03 03 46 56 CMP Okay. SPS HELIUM VALVES, verified AUTO, barber pole; LIMIT CYCLE, OFF.

03 03 47 00 CDR Okay.

03 03 47 03 CMP FDAI scale, 50/15.

03 03 47 05 CDR Alright.

03 03 47 07 CMP Stand by for 2 minutes; then we'll have DELTA-V THRUST B, ON, okay?

03 03 47 11 CDR That's right. Guess we want to turn it on at 2 minutes - Want to wait awhile?

03 03 47 19 CMP You already asked them that and they said turn it on at 2 minutes.

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03 03 47 21 CDR I never saw any lights, so they never saw a signal so everything looks good. Put it on 2 minutes and be ready to turn it off.

03 03 47 27 CMP Okay. I'll be ready. Coming up on 2 minutes.

03 03 47 50 CMP MARK -

03 03 47 52 CMP Go on, nothing happened.

03 03 47 56 LMP TRANSLATION CONTROLLER, ARMED.

03 03 47 59 CMP Okay.

03 03 48 00 LMP ROTATION CONTROLLER, ARMED.

03 03 48 02 CMP Okay.

03 03 48 03 LMP TAPE RECORDER . . . RESET it - -

03 03 48 04 MS . . .

03 03 48 21 CMP Tape recorder's running, right?  
03 03 48 22 LMP Tape recorder is running. You verify the EMS set up to 81, is it, huh?  
03 03 48 30 CMP Yes, I got to go to horizontal at 35.  
03 03 48 31 MS . . .  
03 03 48 32 LMP - - 35, 30 seconds, yes.  
03 03 48 37 CMP I'll proceed on the 99.  
03 03 48 39 LMP Alright. 60 -  
03 03 48 59 CMP You're going to watch the - go gray - -  
03 03 49 00 LMP Right.  
03 03 49 02 CMP - - and the ball valve.  
03 03 49 03 LMP Right.  
03 03 49 14 CDR 35 seconds; DSKY's blank, EMS MODE, NORMAL. Okay.

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03 03 49 26 CMP Yes, the moon is there, boy - in all its splendor.  
03 03 49 30 CDR Man, it's a - -  
03 03 49 32 CMP Plaster of paris gray to me.  
03 03 49 34 LMP Man, look at it.  
03 03 49 35 CDR Don't look at it; here we come up - -  
03 03 49 36 CMP Okay.  
03 03 49 37 CDR - - . . . to TIG.  
03 03 49 42 LMP 8 seconds.  
03 03 49 45 CMP 99 -  
03 03 49 46 CDR/CMP PROCEED.  
03 03 49 48 CMP Stand by for TIG.  
03 03 49 50 CMP Got B mode - -  
03 03 49 51 CDR Burning; we're looking good.  
03 03 49 54 CMP - - A, here comes B - B, I mean, THRUST A -  
03 03 49 56 CMPMARK.  
03 03 49 57 LMP Got them.  
03 03 49 58 CMP Got them both? Okay, now what's your - read your chamber pressure?  
03 03 50 00 LMP It's good. 95, 95.  
03 03 50 03 CDR PUGS is oscillating around. Okay, we're steering.

03 03 50 15 LMP 95 seconds in, it says go DECREASE, and we're . . .

03 03 50 21 CMP You're in pretty good; your gimbals are working a little bit more busily than I would have guessed, but everything's looking good.

03 03 50 34 CDR EMS and G&N CALS together.

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03 03 50 36 LMP Okay.

03 03 50 38 CMP Pitch trim is up at 1.5 degrees, cycling about that, which is a little bit off the SIM value. Yaw trim is cycling about zero. Chamber pressure - -

03 03 50 49 LMP . . .

03 03 50 50 CMP - - is 95.

03 03 50 51 LMP Right, going INCREASE.

03 03 50 54 CMP Yes, you're into - a minute into it. Yes.

03 03 50 56 CDR Well, it's still below zero, I just - -

03 03 50 59 CMP I'll bet you we're never going to catch up. Let's do it and see what happens.

03 03 51 09 CDR Okay, that should be gray -

03 03 51 13 CMP g feels sort of pleasant, doesn't it? We're measuring just a shadow over zero g on the g-meter.

03 03 51 19 LMP Tank pressures are good.

03 03 51 20 CMP Okay. The chamber pressure is holding steady as a rock. It's holding - it's building up a little bit, actually; it's up around 96 now. Gimbals are sure a little bit busier than I would have guessed.

03 03 51 36 CDR That's a little more chamber pressure than they were predicting.

03 03 51 42 CMP Yes, they're all plus 95.

03 03 51 44 CDR We may - -

03 03 51 45 CMP Shut down a little early.

03 03 51 46 CDR - - shut down a little early.

03 03 51 48 LMP What do you think about this crazy g-scale?

03 03 51 56 CDR All your . . . look okay over there, Buzz?

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03 03 51 58 LMP Man, I'm not going to look at them.

03 03 52 00 CDR Alright, probably a good rule.

03 03 52 15 CMP How about that? It's running a couple up.

03 03 52 16 CDR 35 more seconds, and we'll be out of mode 2.

03 03 52 29 LMP Well, it's more than just - -

03 03 52 31 CMP Chamber pressure continuing; it's up to about 97 - 98 percent.

03 03 52 35 LMP - - more than just gray.

03 03 52 36 CMP Yes, there's a little pinging in there. That might have jammed; keep your arms off the cockpit, . . . all day to look at that thing.

03 03 52 42 LMP Look at that thing; that's just where I want it. What do you think about that? A tad low. We're not going to - match it - . . . creep up. Okay? Pressure is on INCREASE - -

03 03 53 04 CDR Tank pressures are still good.

03 03 53 05 LMP - - . . . at the beginning.

03 03 53 07 CMP Chamber pressure - -

03 03 53 08 LMP Take a look at this.

03 03 53 09 CMP - - is holding. Wandering off a little bit in roll; that's to be expected. Coming back.

03 03 53 22 LMP Okay - -

03 03 53 23 CDR We're well into mode 3.

03 03 53 24 LMP - - it's going to be about 3 seconds early - cutoff.

03 03 53 30 CMP Alright, cut-off nominal at 06:02; expect cut-off around 6 minutes even then, huh?

03 03 53 36 LMP . . .

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03 03 53 42 CMP Okay, the rates. We're . . . all three axes are about 0.1 degree per second. APS is punting back and forth.

03 03 53 52 CDR I'm predicting 05:58.

03 03 53 55 CMP Okay.

03 03 53 56 CDR 4 seconds early.

03 03 53 58 CMP Right now.

03 03 53 59 CDR May be - might be 5 by the time I get my . . .

03 03 54 05 CMP Okay, she's steering like a champ; chamber pressure sneaking up to 100.

03 03 54 10 CDR Look at the . . .

03 03 54 11 CMP . . ., didn't recognize it . . .

03 03 54 23 CMP Pitch trim is holding a little over 2; it's oscillating between 2 and 2.4, roughly. Yaw trim is oscillating between minus 0.5 and zero. It's just sort of aimlessly wandering back and forth between those values. Rates are still wandering; they're deadbanding the rates in all three axes; they're plus or minus 0.1 a degree.

03 03 54 53 CDR We're now predicting 5 seconds early, 05:57.

03 03 54 57 CMP Chamber pressure is 100 psi even.

03 03 55 11 CMP Ball number 1 and ball number 2 both right on value. Roll zero, pitch 225, roughly, and yaw 348; and hold.

03 03 55 29 LMP Okay, going to get the DELTA-V switches OFF right at shutdown?

03 03 55 34 CMP Shutdown, I'll get both DELTA-V THRUST, NORMAL switches, OFF.

03 03 55 38 CDR 10 seconds.

03 03 55 40 CMP Okay. 9, 8, 7, 6, 5, 4, 3, - -

03 03 55 48 MS . . .

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03 03 55 49 CDR SHUTDOWN.

03 03 55 50 CMP Okay, now.

03 03 55 51 LMP Ball valves closed - -

03 03 55 52 CMP 50 seconds.

03 03 55 53 LMP - - barber poles - -

03 03 55 54 CMP Okay.

03 03 55 55 LMP All four. Standing by for the gimbal motors.

03 03 55 56 CMP Alright. PITCH 1 - OFF.

03 03 55 57 LMP Got it.

03 03 55 58 CMP YAW 1, OFF.

03 03 55 59 LMP Got it.

03 03 56 00 CMP PITCH 2, OFF.

03 03 56 02 LMP Got it.

03 03 56 03 CMP YAW 2, OFF.

03 03 56 04 LMP Got it.

03 03 56 05 CMP Okay. TVC SERVO POWER 1 and 2, OFF.

03 03 56 08 LMP 1, OFF; 2, OFF.

03 03 56 10 CMP MAIN BUS TIE is OFF.

03 03 56 11 LMP Okay.

03 03 56 12 CMP 1, OFF; 2, OFF.

03 03 56 14 LMP Man, man!

03 03 56 15 CMP Alright.

03 03 56 16 CDR Understand.

03 03 56 17 LMP Look at the residuals. PROCEED.

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03 03 56 20 CMP PROCEED? Copy them down; we're not going to trim them.

03 03 56 22 MS . . .

03 03 56 23 CMP . . . minus 1, minus 1, plus 1. Jesus!

03 03 56 27 LMP Got them.

03 03 56 29 CMP I take back any bad things I ever said about M.I.T. - which I never have.

03 03 56 34 CDR Okay, will you just leave them, now? They vary around.

03 03 56 35 LMP Alright, get the EMS, too.

03 03 56 37 CMP Okay, EMS says minus 6.8.

03 03 56 39 LMP Got it. You got them on the . . . switches?

03 03 56 43 CMP Minus 6.8 to the DELTA-V to B.

03 03 56 45 CDR . . . flight plan.

03 03 56 47 LMP Alright, no nulling residuals. EMS FUNCTION to OFF, we got that . . .?

03 03 56 51 CMP 1 minute - Neil's got it. We got it, minus 6.8. Okay, stand by on OFF on EMS. What else you got, Buzz, in the way of a checklist?

03 03 57 02 LMP The EMS MODE, STANDBY?

03 03 57 04 CMP STANDBY.

03 03 57 05 LMP BMAG MODE, three, to RATE 2?

03 03 57 06 CMP Three to RATE 2.

03 03 57 07 LMP ATT DEADBAND, MAX?

03 03 57 08 CMP ATT DEADBAND, MAX.

03 03 57 09 LMP PCM BIT RATE, LOW?

03 03 57 13 LMP ROTATION CONTROL POWER, DIRECT, two of them, OFF?

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03 03 57 14 CMP DIRECT, two, is OFF.

03 03 57 15 LMP Circuit breakers - PITCH 1, PITCH 2, YAW 1, YAW 2, OPEN.

03 03 57 17 CMP PITCH 1, PITCH 2, YAW 1, YAW 2, OPEN. Proceed.

03 03 57 21 LMP Okay, proceed. Okay, VERB 82 in there. Go to P00. Well, that isn't what it says, but -

03 03 57 30 CMP Well, it's good.

03 03 57 45 CDR I think we're going to have to - Well, we'll leave this here anyway . . . magazine . . .

03 03 57 48 CMP What goes in this VGX column?

03 03 57 53 LMP That was the - that's the VGX residual at - before you spin.  
03 03 58 00 CMP Okay.  
03 03 58 02 LMP So just read the . . . A.  
03 03 58 04 CMP Alright.  
03 03 58 10 CDR That was a beautiful burn.  
03 03 58 12 CMP God damn, I guess.  
03 03 58 14 LMP Whoo! Well, I have to vote with the 10 crew, that thing is brown.  
03 03 58 19 CDR Yes.  
03 03 58 20 CMP Sure is.  
03 03 58 21 CDR Looks tan to me.  
03 03 58 23 LMP But when I first saw it, at the other sun angle - -  
03 03 58 24 CDR Yes?  
03 03 58 25 CMP It looked gray.  
03 03 58 26 LMP - - it really looked gray.

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03 03 58 27 CDR Yes.  
03 03 58 28 CMP More - more sun angle you get - -  
03 03 58 29 LMP It got more - more brown - with increasing sun angle.  
03 03 58 35 CMP Okay.  
03 03 58 36 LMP It's a long ways off.  
03 03 58 37 CDR Alright, let's - Okay, now we've got some things to do -  
03 03 58 43 LMP Okay, let's do them.  
03 03 58 48 CDR We got to do a VERB 66.  
03 03 58 51 LMP Hey, wait a minute - alright.  
03 03 58 53 CMP Buzz will want to do a VERB 82; now, I don't know what comes first here.  
03 03 58 55 LMP Yes, VERB 82.  
03 03 59 08 CMP Well, I don't know if we're 60 miles or not, but at least we haven't hit that mother.  
03 03 59 11 LMP Look at that! Look at that! 169.6 by 60.9.  
03 03 59 15 CMP Beautiful, beautiful, beautiful, beautiful!  
03 03 59 17 LMP What - what'd it say - -  
03 03 59 18 CMP You want to write that down or something?  
03 03 59 19 LMP - - 60.2.

03 03 59 20 CMP Write it down just for the hell of it. 170 by 60, like gangbusters.  
03 03 59 28 LMP We only missed by a couple of tenths of a mile.  
03 03 59 36 CMP Hello, Moon; how's the old back side?  
03 03 59 41 LMP Well, it's - -  
03 03 59 42 CDR VERB 66, alright?

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03 03 59 43 LMP VERB 66.  
03 03 59 47 CDR We won't need that other vector ever again.  
03 03 59 49 LMP Now, we're - PCM, LOW, and we want to turn the TAPE RECORDER, OFF?  
03 03 59 52 CMP Yes, why - I don't care.  
03 03 59 53 LMP Okay.  
03 03 59 54 CMP Why don't you go PCM, LOW, and don't worry about the tape recorder; it's got 2 hours.  
03 03 59 57 LMP Okay.  
03 03 59 58 CDR Okay, we'll look at service module RCS - and SCS -  
03 04 00 07 CMP I want to look at the DAP again and enter a VERB 48, ENTER.  
03 04 00 14 LMP What was our . . . ?  
03 04 00 16 CDR 1500.  
03 04 00 24 CMP Okay.  
03 04 00 26 LMP You got all your things logged now?  
03 04 00 30 CMP Yes, sir, I'm all logged.  
03 04 00 31 LMP Okay.  
03 04 00 34 CDR Now, it says what we do is roll 180 and pitch down 70.  
03 04 00 39 LMP That do it? Alrighty, let's go to SCS and do it.  
03 04 00 45 CDR And -  
03 04 00 53 LMP Don't waste all the gas, now.  
03 04 00 55 CMP . . . When I get around there, I'll pitch down 70, huh? What are we pitching down for, what, what, what - -  
03 04 01 01 CDR We're going to - what we're - -

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03 04 01 02 CMP I don't even know what we're doing.  
03 04 01 04 CMP/LMP (Laughter)

03 04 01 05 CDR Well, we're going to roll over and pitch down so we're looking out the front windows, down at the - -

03 04 01 10 CMP Oh, yes, okay.

03 04 01 11 CDR Okay?

03 04 01 12 CMP We can pitch down - . . . picture - -

03 04 01 13 LMP . . . - -

03 04 01 14 CMP - - can we take a picture - -

03 04 01 15 LMP - - . . . pitch attitude.

03 04 01 16 CMP Yes.

03 04 01 17 CDR Now, we're going to have high gain, and then we're - -

03 04 01 18 CMP How would you - -

03 04 01 19 CDR - - going to be able to - -

03 04 01 20 CMP - - like it with the - -

03 04 01 21 CDR - - look at the moon ahead of us, coming out the window right now.

03 04 01 22 CMP Can we see the earth horizon from here?

03 04 01 23 LMP Well, we . . . - -

03 04 01 24 CDR We should be able to . . .

03 04 01 25 LMP - - . . . precise. What was the time we got on it, Neil?

03 04 01 28 CDR Yes, we can - -

03 04 01 29 LMP Neil?

03 04 01 31 CDR What's that?

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03 04 01 32 LMP What was the time we got on it?

03 04 01 34 CDR Burn time?

03 04 01 38 LMP No, no - -

03 04 01 39 CDR Burn time or what?

03 04 01 41 CMP We want the big camera, huh? Big lens or small one?

03 04 01 46 CDR Oh, it doesn't really matter.

03 04 01 48 LMP 80 millimeter will probably be as good for - -

03 04 01 50 CMP For the earth coming up?

03 04 01 51 CDR No, for the earth - -

03 04 01 52 LMP No, for the earth coming up, we want 250. Might take some - -

03 04 01 54 CDR - - not sure we can get the earth coming up - -

03 04 01 55 LMP - - might take some - some luck to get that, but - -

03 04 01 59 CMP Here, you want -

03 04 02 03 CDR Tape recorder still running?

03 04 02 04 LMP Yes.

03 04 02 06 CMP It doesn't matter, we've got 2 hours on that tape, and they don't care if you run out. As long as you're on BIT RATE, LOW.

03 04 02 18 LMP Okay, infinity, at f:11 - and 1/250th, huh?

03 04 02 28 CMP Okay, let me get my - let me get my gouge out here. I got my gouge - -

03 04 02 30 CDR You might want to back off a half stop to get the earth -

03 04 02 33 CMP Are you - you black and white or color?

03 04 02 35 LMP Color.

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03 04 02 37 CMP Alrighty.

03 04 02 38 LMP Moon . . . , 5.6; earth . . . , 11; . . . terminator, 1.8 - -

03 04 02 44 CDR You think it's on your - your spotmeter reading for the earth?

03 04 02 54 CMP Which way are you maneuvering now, friend?

03 04 02 58 LMP 5.6 at - 5.6 at 1/250th is probably - -

03 04 03 01 CMP Are you rolling?

03 04 03 02 CDR Rolling?

03 04 03 03 CMP You are, aren't you?

03 04 03 04 CDR I'm rolling right.

03 04 03 07 CMP Boy, they rate some rough country over there.

03 04 03 09 CDR You might get it coming sideways here; stand by in case it does. What's the AOS time?

03 04 03 15 LMP It was 15 with the burn. 15:23, something like that.

03 04 03 23 CMP Just be with you in 10 seconds, Neil; I just want to get my - -

03 04 03 27 LMP We ought to be able to get it - -

03 04 03 28 CMP - - book put back together here.

03 04 03 29 LMP - - a couple of good shots.

03 04 03 33 CMP The earth's going to be over here?

03 04 03 35 CDR AOS, 76:15. That's exact - -

03 04 03 38 LMP Can you verify that you got the state vectors transferred with the VERB 83?

03 04 03 41 CDR I'll do that.  
03 04 03 47 LMP Now, what else we got?

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03 04 03 49 CDR Coming up there.  
03 04 03 53 LMP . . . Eyeballing and chattering. We got the burn status report? That's all?  
03 04 04 02 CMP Ready to go.  
03 04 04 05 LMP Okay, that looks good. Give me a VERB - 64.  
03 04 04 12 CDR What happened?  
03 04 04 27 LMP Ought to wash this window over here - -  
03 04 04 28 CDR You have a map so we can look at . . .  
03 04 04 30 LMP Anybody got a - -  
03 04 04 31 CMP Yes, it - -  
03 04 04 32 LMP - - anybody got a Kleenex?  
03 04 04 33 CDR Yes, I think I've got one. Here you go.  
03 04 04 40 CMP Here's one; it's a little moist, though.  
03 04 04 43 LMP . . .  
03 04 04 49 CMP Well, one more . . . burn.  
03 04 04 53 LMP Two more.  
03 04 04 57 CDR You got two more.  
03 04 04 59 LMP Yes, . . . got a few more.  
03 04 05 05 CMP Look at those craters in a row. You see them right - going right out there?  
03 04 05 07 CDR . . .  
03 04 05 08 CMP Look at that line of them.  
03 04 05 10 CDR . . .  
03 04 05 13 LMP . . .

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03 04 05 15 CMP Something really peppered that one. There's a lot less variation in color than I would have thought, you know, looking down?  
03 04 05 26 LMP Yes, but when you look down, you say it's brownish color?  
03 04 05 29 CMP Sure.  
03 04 05 32 LMP Oh, golly, let me have that camera back. There's a huge, magnificent crater over here. I wish we had the other lens on, but God, that's a big beauty. You want to look at that guy, Neil?

03 04 05 43 CDR Yes, I see him.

03 04 05 45 LMP He's coming your way.

03 04 05 48 CDR That dark spot.

03 04 05 50 LMP Oh, let me - here, let me - -

03 04 05 53 CMP Well, there's no doubt that this is a little smaller than the earth - -

03 04 05 57 LMP Look at that one.

03 04 05 58 CMP - - would you look at that curvature?

03 04 06 01 LMP Where is that dark spot?

03 04 06 02 CDR The dark spot's right up here. You want to get the other lens on?

03 04 06 06 LMP Yes.

03 04 06 07 CMP Don't you want to get the earth coming up? It's going to be 9 minutes.

03 04 06 11 LMP Yes, let's take some pictures here, first.

03 04 06 15 CMP Well, don't miss that first one.

03 04 06 16 LMP See how am I doing. Yes, you're right.

03 04 06 21 CDR We'll need - we need to catch it about 10.

03 04 06 27 CMP Shoot, you're going to have plenty of passes.

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03 04 06 30 LMP Yes, right.

03 04 06 33 CMP Plenty of earthrises, I guess.

03 04 06 37 CDR Yes, we are.

03 04 06 38 CMP Are we about there?

03 04 06 40 CDR Boy, look at that . . . crater. You can probably see him right there.

03 04 06 44 CMP Yes, that's what I was talking about just a minute ago. It's kind of hard to believe that that's volcanic and formed by some faulting, isn't it? I don't believe that - but it's such a perfect straight line.

03 04 07 05 CMP Hope none of those meteors come by right now.

03 04 07 18 CMP Let me look through the sextant, Neil.

03 04 07 41 CMP Well, where's the freaking earth going to be now? I'm confused.

03 04 07 46 LMP In plane, I hope.

03 04 07 50 CDR How are you doing on your roll there?

03 04 07 52 LMP Well, we got about another 60 degrees to go. When's AOS?

03 04 08 00 CDR 15 - we're 7 minutes away.

03 04 08 03 LMP Okay.

03 04 08 37 CDR What a spectacular view!

03 04 08 48 CMP God, look at that moon!

03 04 09 20 CMP Fantastic. Look back there behind us, sure looks like a gigantic crater; look at the mountains going around it. My gosh, they're monsters.

03 04 09 58 CDR See that real big - -

03 04 10 01 CMP Yes, there's a moose down here you just wouldn't believe. There's the biggest one yet. God, it's

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huge! It is enormous! It's so big I can't even get it in the window. You want to look at that? That's the biggest one you ever seen in your life. Neil? God, look at this central mountain peak.

03 04 10 23 MS . . .

03 04 10 24 CMP Isn't that a huge one?

03 04 10 26 CDR Look at the . . . Did you get some pictures of that?

03 04 10 29 CMP Yes, I just took one. Can take another one here when he gets around a little better. It's fantastic!

03 04 10 35 CDR That's kind of a foggy window.

03 04 10 37 CMP That's a horrible window. It's too bad we have to shoot through this one, but - Oh, boy, you could spend a lifetime just geologizing that one crater alone, you know that?

03 04 10 51 CDR You could.

03 04 10 53 CMP That's not how I'd like to spend my lifetime, but - picture that. Beautiful!

03 04 11 01 LMP Yes, there's a big mother over here, too.

03 04 11 07 CMP Come on now, Buzz, don't refer to them as big mothers; give them some scientific name.

03 04 11 17 LMP It sure looks like a lot of them have slumped down.

03 04 11 20 CMP A slumping big mother. Well, you see those every once in a while.

03 04 11 26 LMP Most of them are slumping. The bigger they are, the more they slump - that's a truism, isn't it?

03 04 11 41 LMP That is, the older they get.

03 04 11 50 CDR Well, we're at 180 degrees, and now we're going to want to stop that and start a slow pitchdown. We want to go - -

03 04 11 59 LMP We're not going to see the earth come up over the horizon.

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03 04 12 02 CDR - - about 70 degrees.

03 04 12 03 CMP It says pitchdown or pitchup?

03 04 12 04 CDR Pitchdown, so we're looking forward.

03 04 12 06 CMP Pitchdown, so we're looking forward, alright. I wonder what kind of a rate we ought to - -

03 04 12 11 LMP We got 4 minutes to get down.

03 04 12 13 CMP Alright.

03 04 12 14 LMP Never make it. There's a couple of new craters.

03 04 12 25 CDR There's a good view of that -

03 04 12 29 LMP Look warm down there, Neil?

03 04 12 32 CDR I sure can't tell.

03 04 12 35 LMP Looks hotter than hell to me. Boy, look at the size of that one.

03 04 12 47 CMP Golly! Whoo! Get another picture of that big fellow.

03 04 12 51 CDR Yes. I'm going to take one out here of him.

03 04 12 59 LMP I've got an Easter egg coming up, gentlemen.

03 04 13 02 CDR That's good. Gosh, it's 1 o'clock already.

03 04 13 07 LMP Hey, you know, we got a TV show at -

03 04 13 14 MS . . .

03 04 13 15 CMP Huh?

03 04 13 16 CDR The next REV around, that is.

03 04 13 18 LMP Before LOI 2.

03 04 13 20 CDR Yes.

03 04 13 24 CMP Could you give me a gimbal angle to pitch to?

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03 04 13 26 CDR What are you going to do on that one?

03 04 13 29 CMP Oh, I guess - get 10 pictures of the moon.

03 04 13 36 LMP What did you want, Mike?

03 04 13 39 CMP A gimbal angle to pitch to - if it's pitchdown 70 - why, let's see, from 226, that's 70, that's 296?

03 04 13 54 LMP Yes, you were at 2 -

03 04 13 58 CMP 296, I would guess. How many minutes we got - to AOS?

03 04 14 08 CDR About another minute and a half.

03 04 14 09 LMP (Coughing)

03 04 14 17 CMP I rolled to slow - doubt that we'll make it. Oh, look what I got. . . .

03 04 14 32 CMP Golly damn! A geologist up here would just go crazy.

03 04 14 40 LMP You want the flight plan?  
03 04 14 43 CDR Yes, please.  
03 04 14 57 CMP Okay, we shouldn't take any more pictures on this roll until earth comes, I don't think; this is - -  
03 04 15 01 CDR About out?  
03 04 15 02 CMP - - just about out and it's on our last color roll, so we'll switch to black and white as soon as we get to earth.  
03 04 15 07 CDR We might make it in time.  
03 04 15 09 CMP Yes.  
03 04 15 13 LMP There it is, it's coming up!  
03 04 15 15 CMP What?  
03 04 15 16 LMP The earth. See it?

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03 04 15 17 CMP Yes. Beautiful.  
03 04 15 21 LMP It's halfway up.  
03 04 15 23 CDR We ought to have AOS now.  
03 04 15 25 CMP You got your - -  
03 04 15 26 LMP Right over the LM.  
03 04 15 28 CDR Are you set up?  
03 04 15 30 LMP Just about to be cut off by the LM. Boy, does that ever look beautiful in the sextant.  
03 04 15 36 CMP Have you got - -  
03 04 15 37 CDR Okay, how about MSFN -  
03 04 15 39 CMP/LMP You got them.  
03 04 15 42 CDR We're in OMNI - -  
03 04 15 45 LMP DOWN VOICE BACKUP.  
03 04 15 46 CDR - - Bravo.  
03 04 15 48 CC Apollo 11, Apollo 11, this is Houston. Do you read? Over.  
03 04 15 52 LMP Yes, we sure do, Houston. The LOI 1 burn just nominal as all getout, and everything's looking good.  
03 04 16 00 CC Apollo 11, Apollo 11 - -  
03 05 41 15 CMP That's why I'm trying to get it out.  
03 05 42 16 CDR No alignment this REV, huh?  
03 05 43 02 LMP Mike, I guess the name of the game is to go back to - B OMNI?

03 05 43 10 CMP Huh?  
 03 05 43 12 LMP Go back to B in OMNI?

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03 05 43 17 CMP Well, let's see - when we come over the hill next time, we're supposed to have them on the high gain, I think.  
 03 05 43 25 CDR Not sure of that.  
 03 05 43 29 CMP . . .  
 03 05 43 31 LMP Did you use this thing?  
 03 05 43 33 CDR No.  
 03 05 43 34 LMP Well, let's get rid of it then; I can't see a crapping . . .  
 03 05 44 26 LMP 77:44 - okay, - LOS is right on schedule.  
 03 05 44 35 CMP 77:50, we'll be at the prime meridian; now, I can set that map up so it'll tell us where we are.  
 03 05 44 43 CDR Okay.  
 03 05 44 45 LMP We - we're ahead on this eat period - we're behind on the last eat period or something. We got a . . .  
 03 05 45 15 CMP I think, Buzz, if you put - put the HIGH GAIN to MANUAL and go pitch 20 - yaw 360 - pitch minus 20, I guess - -  
 03 05 45 26 LMP Minus 20; yes, that would be better.  
 03 05 45 28 CMP - - and yaw 360 - -  
 03 05 45 29 LMP That's okay assuming I'm at the right attitude, but I ain't going to be at the right attitude - not without wasting a lot of gas. Put -  
 03 05 45 36 CMP That's fine, but -  
 03 05 45 42 CDR If you did, it would be very interesting that way.  
 03 05 45 46 LMP Yes. Oh, crap.  
 03 05 45 55 CDR We get HIGH GAIN and we get TV at the same time - -  
 03 05 45 58 CMP Well, I better start maneuvering then; doggone it, I've been yawed out of plane somehow. Let's see,

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we're pitched down - we want to pitch back up - pitched down, doggone it. ACCEL COMMAND, pitch down.  
 03 05 46 17 CDR Okay, well - are we going to unlock the camera store and get all that claptrap put together?  
 03 05 46 23 LMP Yes.  
 03 05 46 24 CDR Okay.

03 05 46 42 LMP Which window you want to operate out of, so I can figure out how to put the monitor on?

03 05 46 48 CDR Well, I suppose the best one would be the center window, don't you think?

03 05 46 57 LMP Probably, I don't know; wait until we get into attitude.

03 05 47 01 CDR Get into attitude - see what we think.

03 05 48 19 CMP Oh, shit; this pitch here is no good; 32, huh? Pitch 315 I want to be at, huh? Alright. They keep - all they do is they say ORB rate and that little attitude right there and right there applies to the rest of this page, all of that page, and over to this page.

03 05 48 46 CDR Okay, so that's the one we'll do.

03 05 48 50 CMP Okay, that's the way I'm rolling.

03 05 48 51 CDR And we'll take the - we'll have HIGH GAIN - -

03 05 48 54 CMP Yes.

03 05 48 55 CDR - - and we'll get the camera out of the center window, if that looks reasonable.

03 05 49 02 CMP Okay.

03 05 49 06 CDR We'll have to give them pictures of the moon.

03 05 49 07 CMP . . . I've been plotting on them . . . 50:05.

03 05 49 14 CDR We'll have a gouge as to where we are.

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03 05 49 22 CMP 55 -

03 05 50 35 LMP Outside, huh? Alright, the switch is set for outside.

03 05 50 41 CMP Could I have that map that y'all were looking at before, that lunar map? Thank you.

03 05 51 03 CDR Hmm - here comes the moon.

03 05 51 16 LMP Really beautiful.

03 05 51 29 CDR Hey, you - -

03 05 51 30 CMP I wonder where we are.

03 05 51 31 CDR - - we're going to stop here pretty soon, right?

03 05 51 33 CMP Yes, at 315.

03 05 51 41 SC (Whistling)

03 05 51 56 CMP Man, that's really -

03 05 51 58 CDR It really looks gray to me now.

03 05 52 07 CDR . . .?

03 05 52 10 LMP . . . right down toward the ground here.

03 06 22 10 CDR - - and you could be busy getting up supplies if you . . .

03 06 22 16 CMP About a minute from AOS.

03 06 22 19 LMP Okay, let's get out of this; let me get VERB 62. Okay, Mike?

03 06 22 22 CMP Oh, I really need these . . ., Buzz; I really need these goddam . . .

03 06 22 26 LMP Well, we're not going to have much of a TV unless we get high gain.

03 06 22 30 CMP Alright.

03 06 22 32 LMP I'll give it back to you - . . .

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03 06 22 50 CDR You got yourself some rates going about like what you want?

03 06 22 55 LMP You got - you got high gain right now, I mean the angles, right now.

03 06 23 00 CMP And we're 23 - we're 30 seconds from AOS, so those angles should be okay. You reading them?

03 06 23 08 CDR Minus 30 pitch - -

03 06 23 10 CMP Yes.

03 06 23 11 CDR - - 150 yaw, okay.

03 06 23 12 LMP No, that's not 150 - that's 15. Isn't it?

03 06 23 14 CDR Just a second. Yes, minus - I'm sorry, minus 31 and plus 15. Right. You got it?

03 06 23 27 CMP Yes.

03 06 23 34 CDR I don't know what f-stop I ought to be at - Well - See what it's doing, Mike?

03 06 23 42 CMP . . .

03 06 23 44 CDR The flicker I don't know about, the white dot is - -

03 06 23 47 LMP Yes, the flicker - -

03 06 23 48 CDR - - the flicker is what I'm - Nothing I can - -

03 06 23 50 CMP Okay, we got it solid.

03 06 23 52 CDR - - nothing you can do about the flicker.

03 06 23 55 CMP Got it solid on AUTO.

03 06 24 07 LMP Houston, Apollo 11. Are you picking up our signal okay?

03 07 48 01 CMP Another 5 minutes, Neil babe.

03 07 48 05 CDR Okay.

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03 07 48 20 LMP This pitch angle is quite a bit off nominal; 196 instead of 212.

03 07 48 24 CMP Umm.

03 07 48 26 LMP 16 degrees.

03 07 48 28 CMP Yes, Shaffer screwed up - got to get his eccentric orbit.

03 07 49 21 CMP We is there.

03 07 49 27 CDR Okay, I think I got Denebola in sight; let me look at the - Sure enough, I do. And it's good enough in the telescope; let me check it through the sextant. It's even in the sextant.

03 07 49 41 CMP Beautiful! Fantastic!

03 07 49 44 LMP Let's burn.

03 07 49 45 CDR That's MANUAL and ZERO - ZERO and MANUAL.

03 07 49 51 CMP We done paid our debt to society; we done made a star check. 79:50 -

03 07 49 58 CDR It used to be that you couldn't get control on LOI 2; that any burn, any attitude you made was safer than the regular attitude, but that isn't true any more.

03 07 50 07 LMP Yes.

03 07 50 09 CMP Okay, we got the OPTICS, ZERO?

03 07 50 14 LMP Yes, I'm sure it is.

03 07 50 16 CMP And we're not going to do any VERB 41, NOUN 91, any of that stuff - -

03 07 50 20 LMP No . . .

03 07 50 21 CMP - - so you can - enter on this one.

03 07 50 26 CDR Okay. OPTICS, ZERO, ZERO, huh?

03 07 50 29 CMP No!

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03 07 50 31 CDR Supposed to be 0.7.

03 07 50 32 CMP Oh.

03 07 50 33 CDR Okay?

03 07 50 35 CMP VERB 37, ENTER; 40, ENTER.

03 07 50 46 CMP How does that look?

03 07 50 48 CDR Looks beautiful. You enter on it, huh?

03 07 50 51 CMP No. Leave it there.

03 07 50 52 CDR Alright.

03 07 50 56 CMP Align spacecraft roll, GDC ALIGN.

03 07 51 06 CDR Yes, here we go - . . . doesn't look bad.

03 07 51 10 CMP No, I just got through aligning it a little while ago.

03 07 51 42 CMP Okay, GDC's aligned.

03 07 51 46 CDR OkaY.  
03 07 51 48 LMP Check the circuit breakers.  
03 07 51 50 CMP Alright. I got - -  
03 07 51 54 LMP SCS circuit breakers.  
03 07 51 56 CMP SCS; they're all in.  
03 07 51 58 LMP SPS, 12, closed.  
03 07 52 00 CMP SPS, 12 of them.  
03 07 52 02 LMP ATT DEADBAND, MINIMUM.  
03 07 52 04 CMP MINIMUM.  
03 07 52 05 LMP RATE, LOW?  
03 07 52 06 CMP RATE, LOW.  
03 07 52 07 LMP LIMIT CYCLE, ON?

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03 07 52 08 CMP ON.  
03 07 52 11 LMP MAN ATT, three, to RATE COMMAND.  
03 07 52 14 CMP Okay, MANUAL ATTITUDE, three, RATE COMMAND. And - sunrise.  
03 07 52 23 LMP Sunrise's going to be 52:10 - and I missed . . .  
03 07 52 31 LMP MAN ATT, three, to RATE COMMAND, you got that?  
03 07 52 33 CMP Three, RATE COMMAND.  
03 07 52 34 LMP BMAG MODE, three of them, to RATE 2.  
03 07 52 35 CMP Three to RATE 2.  
03 07 52 36 LMP ROT CONTROL POWER, DIRECT, two of them, OFF.  
03 07 52 38 CMP OFF - OFF.  
03 07 52 41 LMP SCS TVC, two, to RATE COMMAND.  
03 07 52 44 CMP Two to RATE COMMAND.  
03 07 52 45 LMP TVC GIMBAL DRIVE, PITCH and YAW, AUTO.  
03 07 52 49 CMP PITCH and YAW, AUTO.  
03 07 52 52 LMP Okay, what time do you have?  
03 07 52 54 CMP Okay, we've got - 18 minutes, roughly.  
03 07 53 04 LMP That TVC gimbal drive's taking up the power?  
03 07 53 09 CMP TVC - -  
03 07 53 10 LMP Putting out?

03 07 53 11 CMP - - SERVO POWER?  
03 07 53 12 LMP No. The TVC GIMBAL DRIVE, PITCH and YAW, to AUTO. That didn't do anything, did it?  
03 07 53 19 CMP No. No, that didn't do a thing; servo power's what takes it.  
03 07 53 28 CDR You know not to leave them on too long.

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03 07 53 42 LMP 19 seconds to ullage; two jets.  
03 07 53 45 CMP Okay, 19 seconds, two jets.  
03 07 53 50 LMP A valves only.  
03 07 53 52 CMP Okay.  
03 07 54 06 LMP What did you get out of P30 as far as HA and HP?  
03 07 54 10 CDR I got the right numbers.  
03 07 54 12 LMP 65.7, 53.7?  
03 07 54 16 CDR You got these?  
03 07 54 23 LMP Yes. 65.6, 54.6. . . . should get those up.  
03 07 54 29 CDR . . .  
03 07 56 21 LMP Now, let's see, we can take off the 16-millimeter magazines and the 70-millimeter magazines.  
03 07 56 44 CMP I've got your stopwatch.  
03 07 57 46 CDR Okay, burn time is - -  
03 07 57 49 CMP Light the motor.  
03 07 57 50 CDR - - 17 and 1 second overburn, almost . . . minutes.  
03 07 57 57 CMP Do it right here.  
03 07 58 07 LMP When's TIG?  
03 07 58 09 CMP 11.  
03 07 58 10 CDR 80:11:36.  
03 07 58 22 CMP 17 seconds - 17 plus 1, huh?  
03 07 58 49 LMP Those little - fluorescent things on there must be from the heat and transfer.  
03 07 58 54 CDR Where are they? On the command module?  
03 07 58 56 LMP No.

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03 07 58 57 CDR On the LMP

03 07 58 58 LMP No.

03 07 58 59 CDR I don't know, but the command modul's got about . . .

03 07 59 01 LMP Little fluorescent - circles?

03 07 59 04 CDR There's one of them.

03 07 59 07 LMP There's some in a lot of failures.

03 07 59 10 CMP The only thing is all the engineering that went into those damn things, too. There's a lot of time and money down the pipe.

03 07 59 15 LMP I mean, this big monstrosity out here, it fails -

03 07 59 17 CDR Hey, we're coming up - You can see the horizon -

03 07 59 38 CMP See if that looks pretty good - through the sextant and see if that doesn't come up.

03 07 59 47 CMP Zap.

03 07 59 56 LMP Sure has been . . . back here.

03 08 00 05 CMP Poor old LM is contaminated; it's got urine particles all over it; and, the way the light's shining here, they look yellow. You know, those little - I guess it probably is a little - solid now, the - everything else has boiled off and it's left a little solid.

03 08 00 23 CDR . . ., huh?

03 08 00 26 LMP . . . solid urine particles are . . .

03 08 00 29 CDR I guess.

03 08 00 34 LMP Wait until the back contam - forward contamination people hear about that.

03 08 00 38 CDR Yes.

03 08 00 41 LMP No more urine dumps on the way to the moon. Put it all in a nice little bag and -

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03 08 00 58 CMP You're not - you've got plenty of black and white film, don't you?

03 08 01 01 CDR Yes, plenty of black and white film.

03 08 01 04 LMP . . . terminator, 4.

03 08 01 07 CMP Use as much as you want of anything you want. 80 millimeter, 250, it's all good.

03 08 01 20 CMP We got 20 minutes until TIG. Oh, excuse me, 10 minutes - 10 minutes until TIG, excuse me. A little over 10 - 80:11 - -

03 08 01 31 LMP Give me a call at about 7 minutes to go.

03 08 01 35 CMP Okay, right now -

03 08 01 36 CMP MARK it.

03 08 01 41 LMP Yes, siree; that there is rough - rough terrain.

03 08 01 54 LMP I've got kind of an idea that I'm going to be getting a picture of that - . . .

03 08 02 44 LMP . . . all those characters back there.

03 08 03 16 CMP 8 minutes until TIG.

03 08 03 48 LMP Boy, there's a crater right in the side of the wall.

03 08 03 54 CMP It's a much bigger crater, and I'll be damned if it doesn't look like it just went in sideways.

03 08 04 02 CDR Okay, 7 minutes. Okay?

03 08 04 13 LMP . . . going to do it -

03 08 04 18 CMP Buzz, you want to read us that checklist; we'll use my panel chart. Which checklist would you like?

03 08 04 32 LMP Alright, MAIN BUS TIES coming ON.

03 08 04 34 CMP Okay. 7 minutes -

03 08 04 37 CMP MARK.

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03 08 04 40 CMP AC's ON - DC's ON.

03 08 04 46 LMP TVC SERVO POWER, number 1, AC 1.

03 08 04 48 CMP AC 1.

03 08 04 50 LMP TVC 2, AC 2.

03 08 04 51 CMP AC 2.

03 08 04 52 LMP TRANS CONTROL POWER, ON.

03 08 04 54 CMP TRANSLATION CONTROL POWER.

03 08 04 56 LMP ROTATION CONTROL POWER, NORMAL, number 2, to AC.

03 08 04 58 CMP AC.

03 08 04 59 LMP ROTATIONAL HAND CONTROLLER, number 2, ARMED.

03 08 05 01 CMP Number 2, ARMED.

03 08 05 16 LMP Oh, I see those current - current . . . went down on the fuel cells. . . . right down here.

03 08 05 24 CMP The batteries are carrying the -

03 08 05 34 CDR 6 minutes.

03 08 05 52 CMP About ready for a gimbal motor or two?

03 08 05 55 LMP Alright. Let's try - PITCH 1, YAW 1.

03 08 05 58 CMP Here comes PITCH 1 -

03 08 05 59 CMP MARK it.

03 08 06 00 LMP Got it.

03 08 06 01 CMP YAW 1 -  
03 08 06 02 CMP MARK it.  
03 08 06 03 LMP Got it.  
03 08 06 04 CMP Okay.

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03 08 06 05 LMP TRANSLATION CONTROLLER, clockwise.  
03 08 06 06 CMP Clockwise.  
03 08 06 07 LMP Verify no MTVC.  
03 08 06 11 CMP Verified.  
03 08 06 12 LMP Alright.  
03 08 06 14 CMP GIMBAL MOTORS, PITCH 2 and YAW 2, ON. PITCH 2 -  
03 08 06 17 CMP MARK it.  
03 08 06 18 LMP Got it.  
03 08 06 19 CMP YAW 2 -  
03 08 06 20 CMP MARK it.  
03 08 06 21 LMP Got it.  
03 08 06 23 CMP Set GPI trim.  
03 08 06 26 CMP Okay, what numbers do we use?  
03 08 06 31 CDR 166 - and let me see - and minus 0.81.  
03 08 06 43 CMP Plus 166 and minus 0.81?  
03 08 06 47 CDR Yes.  
03 08 06 48 CMP Verify MTVC. Okay, there's trim set -  
03 08 06 53 CDR See if we nulled residuals and all that. . . . --  
03 08 06 55 CMP MTVC is verified.  
03 08 06 58 CDR -- . . . time on it - what? Okay.  
03 08 07 01 LMP Alright, TRANSLATION CONTROLLER, NEUTRAL.  
03 08 07 04 CMP NEUTRAL.  
03 08 07 06 LMP Verify GPI returns to zero, zero.  
03 08 07 08 CMP Verified.

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03 08 07 09 LMP ROT CONTROL POWER, number 2 - ROT CONTROL POWER, NORMAL,  
number 2, to AC/DC.

03 08 07 14 CMP AC/DC.

03 08 07 15 LMP SPACECRAFT CONTROL, CMC, verify.

03 08 07 17 CMP CMC verified. How are the needles, Buzz? Showing up good?

03 08 07 21 LMP No, we don't need it yet. Alright, BMAG MODE, three of them, to ATT 1/RATE 2.

03 08 07 24 CMP ATT 1/RATE 2.

03 08 07 26 LMP ENTER.

03 08 07 28 CMP ENTER.

03 08 07 29 LMP You got a 204?

03 08 07 30 CMP Yes.

03 08 07 31 LMP SPACECRAFT CONTROL, CMC and AUTO, huh?

03 08 07 33 CMP Yes.

03 08 07 34 LMP Alright.

03 08 07 35 CMP And we got 4 minutes until TIG.

03 08 07 38 CDR Okay, go. Up - down - zero. It really shakes. Up - down - zero.

03 08 07 48 CMP Which way's it shaking, can you tell? Pitch and yaw?

03 08 07 54 CDR I don't know; it goes up more on the yaw needle than the pitch needle, but I'm not sure that's indicative of anything except needle sensitivity.

03 08 08 01 CMP Okay, did it go to . . . ?

03 08 08 02 CDR Yes, it did. . . . OFF and the . . . OFF.

03 08 08 12 LMP ROTATION CONTROL POWER, DIRECT, two of them, to MAIN A/MAIN B.

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03 08 08 17 CMP MAIN A/MAIN B.

03 08 08 20 LMP SPS HELIUM VALUES, verified AUTO; LIMIT CYCLE, OFF.

03 08 08 26 CMP LIMIT CYCLE, OFF.

03 08 08 27 LMP FDAI SCALE, 50/15.

03 08 08 28 CMP Okay.

03 08 08 30 LMP At 2 minutes, A is coming on - DELTA-V THRUST, A.

03 08 08 33 CMP Okay. And that's all we use is A. 3 minutes to go.

03 08 08 46LMPI like the neat way he's got his - safety belt on - . . . should be about in the right place.

03 08 09 05CDR . . . belt for transposition and docking . . .

03 08 09 11 CMP Okay, coming up on 2 minutes; I'll get DELTA-V THRUST, NORMAL, A, ON, and that's the only bank we'll use.

03 08 09 38 CMP DELTA-V THRUST, NORMAL, A, is ON.  
 03 08 09 41 LMP TRANSLATION CONTROL, ARMED.  
 03 08 09 42 CMP ARMED.  
 03 08 09 44 LMP ROTATION CONTROL, ARMED?  
 03 08 09 45 CMP ARMED.  
 03 08 09 48 LMP TAPE RECORDER - COMMAND RESET.  
 03 08 10 01 LMP - - BIT RATE, FORWARD.  
 03 08 10 05 CMP Okay, 19 seconds ullage this time.  
 03 08 10 55 CMP Okay, stand by for . . .  
 03 08 11 03 MS . . .  
 03 08 11 07 LMP EMS MODE to NORMAL?  
 03 08 11 08 CMP EMS MODE, NORMAL. Stand by for ullage. . . .

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03 08 11 17 LMP 20, 19 -  
 03 08 11 19 CMP Ullage.  
 03 08 11 21 LMP You got the ullage?  
 03 08 11 22 CMP Yes.  
 03 08 11 23 LMP Okay. . . . ?  
 03 08 11 27 CMP Yes. Whoops -  
 03 08 11 29 LMP You want this . . . ? Alright.  
 03 08 11 32 CMP . . . and THRUST B.  
 03 08 11 37 LMP A?  
 03 08 11 39 CMP A, open.  
 03 08 11 44 CDR She's holding - she's holding - . . . looks good.  
 03 08 11 50 CMP She's all over.  
 03 08 11 51 CDR Okay, stand by for shutdown -  
 03 08 11 53 CDR SHUTDOWN.  
 03 08 11 54 LMP Shutdown, two valves, closed; two, barber pole.  
 03 08 11 56 CDR Okay, DELTA-V THRUST, NORMAL, A, is OFF; stand by for the GIMBAL MOTORS, OFF.  
 03 08 12 00 CMP PITCH 1, OFF -  
 03 08 12 01 CMP MARK.

03 08 12 02 LMP Got it.  
03 08 12 03 CMP YAW 1, OFF -  
03 08 12 04 LMP MARK.  
03 08 12 05 LMP Got it.  
03 08 12 06 CMP PITCH 2, OFF -  
03 08 12 07 CMP MARK.

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03 08 12 08 LMP Got it.  
03 08 12 09 CMP YAW 2, OFF -  
03 08 12 10 CMP MARK.  
03 08 12 11 LMP Got it.  
03 08 12 12 CMP Four GIMBAL MOTORS, OFF.  
03 08 12 13 CMP/LMP TVC SERVO POWER, OFF.  
03 08 12 14 CMP Both OFF.  
03 08 12 15 CDR MAIN BUS TIES; AC, OFF - DC, OFF.  
03 08 12 18 LMP Verified.  
03 08 12 20 CMP Proceed - and look at these -  
03 08 12 28 CDR ...?  
03 08 12 29 LMP No, we don't need that.  
03 08 12 33 CDR Pretty nice-looking engine. ...  
03 08 12 40 CMP 0.3 zero, and zero is ...  
03 08 12 43 LMP Alright. Get the EMS FUNCTION, OFF - How about going  
ATT DEADBAND, MAX?  
03 08 12 47 CMP Okay, we're - we're in DAP control.  
03 08 12 52 LMP Alright, EMS FUNCTION, OFF; you got the DELTA-VC?  
03 08 12 55 CDR Yes - ...  
03 08 12 56 LMP EMS MODE, STAND BY?  
03 08 12 57 CMP Okay.  
03 08 12 58 LMP BMAG MODE, three, to RATE 2?  
03 08 12 59 CMP Three to RATE 2.  
03 08 13 00 LMP ATT DEADBAND, MAX?  
03 08 13 01 CMP MAX.

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03 08 13 02 LMP PCM BIT RATE going to LOW. ROT CONTROL POWER, DIRECT, two of them, OFF.

03 08 13 04 CMP OFF.

03 08 13 05 LMP Circuit breakers, PITCH 1, YAW 1, PITCH 2, YAW 2, OPEN? Proceed and go to VERB 82. No!

03 08 13 21 CMP Why not?

03 08 13 22 LMP That isn't what it says - it says . . . and go to P00 - -

03 08 13 25 CDR You get this -

03 08 13 28 LMP - - I want to get the circuit breakers -

03 08 13 32 CMP Up to . . ., and I want to get AVERAGE g off, there we go, it's in P00 - VERB 82.

03 08 13 42 LMP All those listening to the tape, please report that - we need a change in the checklist.

03 08 13 47 CDR 66.1 by 54.4; now you can't beat that.

03 08 13 51 LMP No, this is about - -

03 08 13 52 CMP That's right downtown.

03 08 13 55 LMP - - this is 65.7 - -

03 08 13 57 CMP By 54 point - -

03 08 14 00 LMP We're more elliptic now, huh?

03 08 14 05 CMP That's about as close as you're going to get.

03 08 14 07 LMP Yes, I bet we never get circular.

03 08 14 10 CDR Hey, have you got any more circuit breakers - I mean any more switches for me?

03 08 14 14 LMP No. When everybody likes this one, why don't you try VERB 83 or a VERB 66 or a - suit yourself. See how much . . . you put in.

03 08 14 33 CMP 158.

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03 08 14 36 LMP 15.8, huh?

03 08 14 37 CDR 158.

03 08 14 40 LMP Or 158, that's about right. Okay.

03 08 14 43 CMP Everybody happy with that?

03 08 14 44 LMP That's reasonable.

03 08 14 46 CMP VERB 66; want to have a vote on VERB 66?

03 08 14 49 CDR No!

03 08 14 50 CMP Everybody in favor of VERB 66 raise their right arm.

03 08 14 51 LMP Yes, yes.

03 08 14 57 LMP Okay, check it again. . . . Well, let's see; we didn't gain any on the old PUGS that time; we're still 0.2 behind.

03 08 15 14 CDR Oh, I suspect you're right; we probably never will.

03 08 15 17 LMP No. Ne should have wrapped that thing up during . . .

03 08 15 24 CDR Check the increase that time?

03 08 15 26 LMP Huh?

03 08 15 27 CDR Did you check the increase that time?

03 08 15 29 LMP If it increased, it's going to stay increased from now on.

03 08 15 33 CDR Okay.

03 08 15 34 LMP But I waited for it to start an upward trend on the first burn.

03 08 15 37 CDR Understand; that's alright.

03 08 15 41 CMP Alright - back to the flight plan.

03 08 15 45 CDR . . . 33, as I remember it - the right number - -

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03 08 15 52 LMP . . .

03 08 15 56 CMP Yes, roll 180, pitch down 81, ORB rate. God damn, here comes the draft again.

03 08 16 11 CDR Okay, we're supposed to start charging battery A.

03 08 16 18 CMP Charge battery A, huh?

03 08 16 22 CDR Let's see what we have; SPS monitor check - -

03 08 16 30 CMP Two breakers out there; two breakers out there - BAT B, BAT B. BAT A, you say - Neil?

03 08 16 42 CDR BAT A, yes - if you please. Charging BAT A, then on to - -

03 08 16 48 LMP Then roll 180, and then we'll talk about this pitchdown, alright?

03 08 16 52 CDR Then you might as well go to your - 293 INERTIAL, I guess.

03 08 17 05 CMP Man, that's a gas waster. Soon as I get around here, I'll start it. We'll pass through ORB rate at some point. Takes forever and a day to get around here.

03 08 17 31 LMP It's going to be a long time before that battery gets back up to 39-1/2 volts.

03 08 17 45 LMP We done plumb tuckered that one out.

03 08 17 49 CDR LOI 1 could've got to it, I imagine.

03 08 17 52 CMP Yes.

03 08 18 14 LMP Are you going to maintain ORB rate?

03 08 18 17 CMP Yes, I guess so. It's going to be sort of a passthrough ORB rate kind of thing because, see if I whip - do it in a hurry, why I got to pitch down 80 degrees, stop the pitch, or stop almost all of it, except for the ORB rate amount. That's going to waste a hell of a lot of gas.

03 08 18 32 LMP Do we have to do anything - to the O2 to pressurize the LM?

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03 08 18 39 CDR No, we haven't - small enough - DELTA-P -

03 08 18 46 LMP That's 0.9.

03 08 18 48 CDR 0.9?

03 08 18 49 LMP Yes.

03 08 18 50 CMP Yes, we have to build up pressure a little bit.

03 08 18 55 CDR Build up that cabin pressure just a little bit, and I'll start the DIRECT O2 valve, OPEN.

03 08 18 57 LMP It says observe the lunar surface.

03 08 19 02 CMP That's what it says you ought to supposed to be doing.

03 08 19 14 LMP It's brown; it's brown.

03 08 19 17 CMP Brown all around. There's no doubt which way that - little crater hit.

03 08 19 42 LMP Here's that same one going by again, Neil, remember? That bright Job?

03 08 19 51 CDR Yes.

03 08 20 03 LMP Man, there's white stuff all over - and it's black right around the rim.

03 08 20 10 CMP Hey, well, I'm - while this thing's rolling over, I'm going to take a pee; I'm going to go pee.

03 08 20 16 CDR 180, if you don't mind.

03 08 20 18 LMP That's a spectacular crater.

03 08 20 23 CDR Did you shoot some pictures while you were over there?

03 08 20 25 CMP No, it's just going by - we'd better get it later; there will be better times. If the damn antenna isn't in the way -

03 08 20 42 CMP Boy, there must be nothing more desolate than to be inside some of these small craters, these conical ones.

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03 08 20 50 CDR People that live in there probably never get out.

03 08 20 54 CMP Yes, I think you're right. Boy, you can really see the slumping, though. Most of the - You can see where it's all gathered down in the bottom in the corner; you know, on the edge - where a lot of the white stuff has dribbled on down - and evidently it gets covered over after a while with a - a darker layer. There's always a certain amount of the white stuff right in the edges. Pretty characteristic of all of these - white conical ones.

03 08 21 50 CMP Yes, you know, you can change the color of what you're looking at by moving your head to a different spot in the window - and looking in a different direction.

03 08 22 25 LMP And that must be big . . . right down there.

03 08 22 45 CMP I haven't heard any woo-woo's.

03 08 22 49 CDR Is there something we should be woo-wooing about?

03 08 22 56 CMP Wait until we get the VHF on, then we'll hear the woo-wooing.

03 08 22 59 CDR Okay.

03 08 23 18 LMP Man, I sure hate to say it based on looking through this monocular, but there's a white spot that's just like a crater - looks like an awful lot under these small fresh ones in the bottom of this rather old crater, but right in the center of it, it looks like instead of there being a crater, looks like it's a rock. . . . My eyes deceiving me.

03 08 23 51 CMP How's our roll doing, Neil?

03 08 23 53 CDR Oh, you got about 30 degrees to go.

03 08 23 55 CMP Oh, boy!

03 08 23 56 CDR Okay.

03 08 23 58 LMP How far you going to roll?

## Page 98

03 08 24 00 CMP Over and over.

03 08 24 30 CDR Got that DIRECT O2 . . ., didn't you?

03 08 24 33 CMP Yes, just a tiny bit.

03 08 24 34 CDR Okay.

03 08 24 42 CMP It'd be kind of interesting to see some of this dump go on straight from polar orbit. Wonder how long it's going to take before it impacts?

03 08 24 53 CDR It obviously - is not really in polar orbit if it's going off - going off that way. Yes, it's inclined to the small angle.

03 08 25 03 CMP Sure looks like it.

03 08 25 04 CDR It's going straight out there through. That's real funny.

03 08 25 13 LMP Son of a gun, that one's got a little - little curve on it.

03 08 25 23 CMP Would you believe that, Neil? One went out and curved around like that. Can you explain that?

03 08 25 32 CDR I guess it just glanced off another particle or something.

03 08 25 35 CMP Oh, no, no, no, no; if it's curved.

03 08 25 40 CDR It had a little bubble in it that came to the surface and went kapoom and - -

03 08 25 43 LMP No - -

03 08 25 44 CMP There's atmospheric drag up here.

03 08 25 47 CDR - - departed it with a little DELTA-V.  
03 08 25 49 LMP I think what's really happening is - we're rolling and - it's changing the angle that I'm looking out the window.  
03 08 25 55 CMP Let's see, I want to pitch down 80 degrees to - - . . . 293, down 293, I believe that, I wonder what rate would be reasonable -

## Page 99

03 08 26 10 CDR Okay, it's about 7 minutes until AOS.  
03 08 26 17 CMP Down 80 degrees in 7 minutes, that's - let's see, about 10 degrees per minute, 10 degrees per minute is -  
03 08 26 31 CDR . . . floating up here -  
03 08 26 33 CMP 61 . . .  
03 08 26 38 LMP Well, Mike probably let him out.  
03 08 26 45 CMP Okay, that ought to almost get it there and, damn, I don't want to see any more than that.  
03 08 26 58 LMP You can open the battery . . . pad.  
03 08 27 11 CMP That ought to be enough.  
03 08 27 31 LMP . . .  
03 08 28 02 CMP Alright, where are we? We're pitching down. Gee, it's too bad we can't stop right here and observe the earth come up. You know, we ought to get that picture one time.  
03 08 28 20 CDR We probably can do it. You could stop it right here if you wanted to spend the gas.  
03 08 28 25 CMP Yes. That's the only trouble, the doggone gas. What are you on?  
03 08 28 42 CMP A picture looking out over the LM as well.  
03 08 28 45 CDR Yes.  
03 08 28 46 LMP Shouldn't be a bad picture. Why don't we stop it?  
03 08 28 48 CMP Okay.  
03 08 28 56 CDR We ought to be able to get high gain from this attitude, shouldn't we?  
03 08 29 10 CDR Think we ought to get the long lens on, Mike?  
03 08 29 12 CMP Yes, we ought to get the 250 - we ought to do it at 250.

## Page 100

03 08 29 14 CDR You've got 4 minutes; that's plenty, Now, we're going to want to - -  
03 08 29 22 CMP Are we at a good enough attitude? I hope so. We are out this window, babe, but we're not out that one. If the earth is right there, that's where it's coming up, huh? Better be.  
03 08 29 34 CDR You want color?

03 08 29 35 CMP Ah - -

03 08 29 37 CDR We better have color.

03 08 29 38 CMP Yes, we want color.

03 08 29 49 LMP I got a clean window over here so don't sweat that one too much.

03 08 29 53 CMP 250 - hand me your camera, Neil, and I'll change it.

03 08 29 59 CDR Who's got the Hasselblad?

03 08 30 07 LMP Probably over there on the shelf.

03 08 30 09 CDR We got it. First quad is in - back is - -

03 08 30 14 LMP That wall of that crater looks pasty through the sextant. Great big chunks of white stuff that just slumped down.

03 08 30 29 CDR Did you get - . . .? If you get too far over here, we may have to watch our pitch angle. We're good right now.

03 08 30 40 LMP . . .

03 08 30 41 CDR ORB rate -

03 08 30 45 CMP No, we're not ORB rate.

03 08 30 48 CDR The earth's going to be coming ORB rate at us.

03 08 30 53 CMP . . .

03 08 31 01 CDR Okay. Let's see, I've got to pitch up a tad then . . .

## Page 101

03 08 31 06 CMP Okay, I've still got f:8 and . . .

03 08 31 10 CDR 250th at f:8, I think we can do it, and infinity.

03 08 31 16 CMP I don't know; what's the matter with where you had it?

03 08 31 19 CDR Oh, son of a gun! (Laughter) We're going backwards. Oh, well.

03 08 31 28 LMP Oh dear. Dumbkopf!

03 08 31 32 CMP That's it, I think, there, Neil - so pitch down.

03 08 31 36 LMP Prior planning prevents poor performance.

03 08 31 38 CDR Thank you. Is that right, Buzz?

03 08 31 40 CMP All that - Where'd you ever hear that one, Buzz?

03 08 31 45 LMP I can't think.

03 08 32 12 LMP Oh, that's a bright one; I got to get that one . . .

03 08 32 16 CMP No lie!

03 08 32 25 CDR 150 - you don't want to take too many on this.

03 08 32 30 CMP No. Might as well put the other one back on.

03 08 32 35 CDR Well, you might save that for some earth shots.

03 08 32 49 LMP Wow!

03 08 32 53 CDR . . .

03 08 32 55 CMP You got it, huh?

03 08 33 04 LMP I think it focused the second one a little bit better. I think it's beautiful. Just fabulous. Not really sure what you're looking at - but there's some mighty big fresh rocks down in that crater.

03 08 33 37 LMP The walls actually look pockmarked. Sure enough, and they're not filled in. Pockmarked and it looks like somebody's painted white paint vertically down the edges and then it's been eaten away.

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03 08 34 15 LMP . . . that one . . . into the LM.

03 08 34 38 CMP Here is the earth. Hey, I got the view over here.

03 08 34 44 LMP I guess I'd better get the high gain off, hadn't I?

03 08 34 49 CDR Did it just come up?

03 08 34 50 CMP Yes.

03 08 34 53 LMP We need that . . .

03 08 34 56 CMP Do we still got high gain?

03 08 34 58 CDR Yes.

03 08 35 01 CMP It's says minus 67 and zero.

03 08 35 06 LMP Minus 67 and zero.

03 08 35 09 CMP And zero.

03 08 35 10 LMP Okay, MANUAL - and - AUTO - medium. There we go. Can't make up his mind between zero and - 360. Okay, we got them.

03 08 35 30 CDR Okay.

03 08 35 31 CC Apollo 11, Houston. . . .

03 08 35 35 CDR Do you want to talk to them?

03 08 35 39 CDR . . . Roger, Houston. Burn status report follows: DELTA-TIG zero; burn time, 17; angle through the pad values, DELTA-VGX was plus 0.3; VGY, minus 0.0; VGZ minus 0.1; DELTA-VC, minus 5.2; fuel, 362; OX, 364; unbalance, plus 50, and a postburn NOUN 94, 66.1 by - -

03 09 40 25 LMP Well, they look like they were made to go - That's - that's it, isn't it? Weren't they made to put here so you stow them by putting them on here instead of the way we do it?

03 09 40 40 CDR . . .

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03 09 40 50 CMP Then we only have to decide what - what's supposed to go here.

03 09 40 55 LMP I . . . two of them.

03 09 41 01 CMP Both of those - those things are in here.

03 09 41 05 CDR . . . worry about nothing goes in there . . .

03 09 41 22 CC 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 the limited amount of tracking at 65.4 by a 53.9. Over.

03 09 41 39 CDR Sounds good, Houston.

03 09 41 41 LMP I need that film now.

03 09 41 44 CDR Okay.

03 09 41 46 LMP . . .

03 09 41 58 CDR Okay, want to get film. It's a long trip to the film container.

03 09 42 32 CMP You want something?

03 09 42 33 CDR Oh, shoot. I'm going to have trouble getting in there.

03 09 43 39 CMP How's it going, Neil? You getting any?

03 09 43 41 CDR . . .

03 09 43 59 CDR Well - Buzz, the 70-millimeter container's only got one black and white and one color in it - Isn't it supposed to - -

03 09 44 16 CMP That's - that's not - that's mine.

03 09 44 19 LMP You've got the wrong one.

03 09 44 20 CMP No, that's not the right one.

03 09 44 23 CDR The one - -

03 09 44 24 CMP The one you want, Neil, is way over here in - R-13.

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03 09 44 32 LMP No, it's not in there; it was on my girth shelf.

03 09 44 34 CMP Okay.

03 09 44 35 CDR Oh, okay, there it is. Did you get that one put back?

03 09 44 39 CMP No, but I will.

03 09 44 41 CDR Okay, appreciate it. I had it in my mind that - our - -

03 09 44 47 CMP You want to do something to the polarizing filter, Neil?

03 09 44 59 CDR Uh - -

03 09 45 00 CMP I'll stick it up there on the ceiling. There's a - -

03 09 45 02 CDR - - not really.

03 09 45 03 CMP - - we got room for it up there.

03 09 45 29 CMP You want the 16-millimeter while you're down here, Neil?

03 09 45 31 CDR Yes.

03 09 45 32 CMP The 16-millimeter bag as well?

03 09 45 33 CDR Yes, I'll take that one, too.

03 09 45 36 LMP Okay.

03 09 45 59 CMP Well, that - damn stuff won't stick. Haven't got a piece of Velcro on there yet.

03 09 46 10 CDR You're not . . .

03 09 47 34 CMP Man, can't you stop some of that racket up there?

03 09 47 38 LMP Huh?

03 09 47 52 CMP That's the S-band - you turn your volumes down.

03 09 48 06 SC (Coughing)

## Page 105

03 09 48 17 CMP Is that better on the S-band?

03 09 48 19 CDR Yes.

03 09 48 20 LMP Yes.

03 09 48 21 CMP Okay.

03 09 48 50 SC (Sneeze)

03 09 48 51 LMP There's one that's got mission rules in it - but I can't place - at the moment, put my hands on it. . . .

03 09 50 10 LMP It's a NO-GO - GO/NO-GO - the one one I'm looking for. Hey, that's beautiful.

03 09 50 28 CDR Like this?

03 09 50 31 LMP Yes.

03 09 50 33 CDR That's the one we made the changes in, right?

03 09 50 37 LMP Right.

03 09 50 40 CDR It may be up in the - in the command module, huh? Have you got another clip?

03 09 50 49 LMP For the window?

03 09 50 51 CDR I thought we might just stick my - activation checklist right - right there, and we'll be all ready coming in.

03 09 50 56 LMP Right here?

03 09 50 57 CDR Yes. . . .

03 09 51 02 LMP We may be ending up with one more than we're authorized - one, two, three, four, five. Yes, one of these will be changed over to - As a matter of fact, I stole one from Mike - but one of them we'll change over to the - -

03 09 51 18 CDR I'll go check around up here.

03 09 51 20 LMP Oh, wait a minute, here it is. I got it.

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03 09 51 24 CDR I don't think the - -

03 09 51 25 LMP This other one got changed.

03 09 51 28 CDR No, it didn't.

03 09 51 31 LMP You want to do that?

03 09 51 32 CDR Yes, I can do that.

03 09 51 50 LMP And in the meantime - Let's see, where'd the film go?

03 09 52 19 LMP Now, the thing that would be nice to find out is if - how well - go - the 80-millimeter - with the film pack on it - in color.

03 09 53 20 LMP You do put these in with this dark slide in, don't you? Is that right?

03 09 53 24 CDR Which one you got? 60? 60 you do, and the 80 you - . . .

03 09 53 40 LMP . . .

03 09 53 42 CDR Yes, dark slide in.

03 09 53 55 CDR It'll lock it the other way. That - that side - it'll pull it closed.

03 09 53 59 LMP Alright. . . . for telling me.

03 09 54 10 LMP Boy, that thing goes all over, doesn't it? Maybe we ought to - do these the other way around.

03 09 55 33 LMP Neil, we got two magazines, two color, A . . . - one of them is R and the other is S.

03 09 55 42 CDR Yes.

03 09 55 43 LMP I'm going to put the R in the reserve camera.

03 09 55 46 CDR Okay.

03 09 55 47 LMP And the S in the surface camera.

03 09 55 48 CDR Good idea.

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03 09 55 49 LMP Even though we're going to use them the other way.

03 09 56 33 CDR Do you want to try it out in there?

03 09 56 36 LMP I guess we could open the window here, just as well.

03 09 56 59 LMP The window's all - frosted over.

03 09 57 04 CDR Is it?

03 09 57 06 LMP Well, I hate to stick my finger on it; I'm not sure which side it's on.

03 09 57 09 CDR We'll have to - have to turn the heaters on tomorrow.

03 09 57 16 LMP No, I think when the sun gets on them, it'll - . . . them. Yes, the one on your side is . . .

03 09 58 08 CDR The black and white is magazine 2.

03 10 02 05 LMP I don't guess there's any need to tape that up now.

03 10 02 18 LMP We're on the back side now, right?

03 10 02 20 CDR Yes, just come into - we're just coming into sunlight.

03 10 02 22 LMP And we don't get the - contrast . . .

03 10 02 31 CDR What's the mission time, Mike?

03 10 02 35 CMP Just a second. About 82 hours even.

03 10 02 39 CDR/CMP . . .

03 10 02 40 CMP 82:02.

03 10 02 42 LMP Okay, when do you get your tracking?

03 10 02 44 CMP In a little while.

03 10 02 47 LMP About what time?

03 10 02 52 CMP About another half hour.

03 10 02 56 LMP Before 83 hours?

## Page 108

03 10 03 06 CDR Wasn't like this yesterday - must be because the sun was on it.

03 10 03 24 LMP Boy, look at that big mother coming up there. Looks like we're heading for - . . . over the horizon.

03 10 04 22 LMP I don't think there's any place except in the - in here, that it says anything about 16-millimeter footage -

03 10 04 33 CDR In the card, right?

03 10 04 35 LMP No, I'm thinking about for the descent. Here we are; 16 millimeter, HC-EX, f:4, 500, infinity, 6 frames per second. Okay.

03 10 05 14 CDR You got the flight plan handy, Mike?

03 10 05 16 CMP Yes, I have; just a second.

03 10 05 19 CDR I don't want it up here; I just want you to - when you get a chance, to read off the items that are on there, make sure we got them.

03 10 05 26 CMP It says perform housekeeping chores, stow helmets, stowage bags; unstow mirror, checklist, and disposal assembly. Stow interim stowage assembly, unstow and configure for use 16 millimeter, HC-EX, f:4, 500, infinity, 6 frames per second. That's all it says - on that page. That's where we are now. The next thing is an hour from now when we transfer to LM power and activate the COMM.

03 10 06 04 LMP 12 feet per second - half an hour.

03 10 06 15 CMP Did you say something about taking pictures right now?

03 10 06 18 CDR No, no; stop the camera.

03 10 06 21 CMP Yes, I know, I don't think it'd take a very good picture right now.

03 10 06 29 LMP One thing, when you get way up here, you can - see a lot more of that secondary strut.

03 10 06 39 CMP No, that thing - that's holding up those damn baffles.

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03 10 06 51 LMP Well, if we could get a towel, we could get us a couple of fair-to-middling pictures out of here.

03 10 06 59 CDR Alright. You want one?

03 10 07 01 LMP Yes. Maybe - Some of it will come off, anyway.

03 10 09 05 LMP Hand me a towel when you get a chance.

03 10 09 14 CDR . . . left window . . .

03 10 09 49 CDR This one's getting pretty well cleared off over here on the left.

03 10 10 03 LMP You want the COAS in the forward window for undocking, huh? And you don't want the filter attached? I stuck it up here.

03 10 11 03 LMP All that'll do is warm it up.

03 10 11 42 LMP When do we have AOS?

03 10 11 50 CDR Well, we - we should have AOS in - oh - 16 - 18 - in about another 20 minutes.

03 10 12 44 LMP Alright, then, I think - the way we're sitting, why, we're going to be able to get a picture - of the earth coming right up there. What do you think about that?

03 10 14 07 CMP Unique feature - photography (laughter). . . . on the top of it.

03 10 14 34 LMP What have you been using, 5.6 at 1/250th?

03 10 14 52 CMP Yes. . . .

03 10 15 10 LMP What do you know, it works!

03 10 15 18 CDR I could sure get the stop watch, huh?

03 10 15 22 LMP Yes, you have the exact time to AOS - because I don't have my watch - set up for that.

03 10 15 29 CDR . . .

03 10 15 30 LMP . . .

## Page 110

03 10 15 32 CMP I'm just fooling around; what do you need - AOS time? AOS is going to be - well, let's see - 82:30 - about 15 minutes from now.

03 10 15 50 LMP Okay. I'll get another good picture of what comes along. Well, hell, I guess we might as well load the other camera and make sure it works, too, huh?

03 10 16 00 CDR Adjust the - chronometer and put the cables in it, huh?

03 10 16 05 LMP Yes.

03 10 16 06 CMP Well, look, if we load this one - if I put the film on this one, and take a picture or two, well, I'll have to take it back off again; that's the only trouble. I won't have to, but it doesn't stow as neatly. If you don't mind doing - powered descent with the camera in there, I think that's probably alright. Well, wait a minute, I bet I could put this one loaded where the other one goes -

03 10 16 47 CDR Where have you hid the shaving cream, Mike?

03 10 18 12 CDR No wonder - . . .

03 10 18 20 CMP Uh, . . .

03 10 18 25 CDR . . . that's the reason - -

03 10 18 26 CMP No, I don't think you know; I don't think you know; I don't see how you know.

03 10 18 30 LMP Hey, Neil, you see any need for keeping this thing?

03 10 18 33 CDR What's that?

03 10 18 34 LMP In the LM, this cover for the camera. Think about that for a while - I got it loaded, and I don't see any need to ever change it. If it works now - I guess if it quits before we actually went EVA, why there might be some reason to. 5.6 at 250th, huh?

03 10 20 01 LMP Now, a few pictures of that and one of earthrise and - and then we'll stow it.

## Page 111

03 10 21 45 LMP Well, I can't do anything until we transfer to LM power.

03 10 22 10 CDR Do you know where the shaving cream is?

03 10 22 13 CMP Shaving cream?

03 10 22 17 CDR Yes.

03 10 22 18 CMP Yes, I sure do; it's - -

03 10 22 19 LMP In the penlight.

03 10 22 21 CMP - - in the penlight compartment, huh?

03 10 22 53 LMP How about this thing; you see any need to - to keep that in the LM?

03 10 23 07 LMP Neil, what did you do with the - . . . camera back sight?

03 10 23 12 CDR I haven't had it.

03 10 23 13 LMP Okay. What do you think about that?

03 10 23 16 CDR I can't think of any reason why we might use it.

03 10 23 18 LMP Well, there's a COAS - dust cover that I think fits in the same category, don't you? The thing that you got to move out to put the COAS in?

03 10 24 05 CMP He's shaving.

03 10 24 36 CMP I'm through with the flight plan, Neil, if you want it.

03 10 24 41 CDR . . .

03 10 24 56 CDR . . . razor?

03 10 24 58 CMP The razor should be in there with the shaving cream, isn't it?

03 10 25 01 CDR No - -

03 10 25 02 CMP It wasn't?

03 10 25 03 CDR - - . . . shaving cream.

## Page 112

03 10 25 04 CMP The razor wasn't in there?

03 10 25 06 CDR The razor's in here, and I think the shaving cream was when I pulled it out, but - -

03 10 25 11 LMP How much time to AOS, Mike?

03 10 25 15 CMP 82:30 - about 5 minutes.

03 10 28 42 LMP Don't know what I'm doing with VHF B on.

03 10 28 52 LMP Hey, Mike?

03 10 28 53 CMP Yes.

03 10 28 57 LMP You got VHF B available?

03 10 28 59 CMP What? Say again?

03 10 29 05 LMP I don't know. According to this lousy thing, I'm powering up VHF B - T/R.

03 10 29 11 CMP Not right now, not for another half hour or so.

03 10 29 13 LMP No, I know, but - Are you going to have your VHF on?

03 10 29 21 CMP If I'm going to record your data, I am.

03 10 29 30 LMP Well, it doesn't say doodly squat about recording data.

03 10 30 30 LMP . . . coming up now.

03 10 31 54 CDR Did you get them?

03 10 31 56 LMP No, sure didn't.

03 10 32 05 CDR Yes.

03 10 32 07 LMP But I can't see . . . - I see the earth, but it's a lousy picture.

03 10 32 27 CMP Could you wait just 1? I'm right in the middle of the event-timer setting.

03 10 32 41 CMP Okay, Houston. We'll be doing P22 in just a couple of minutes here.

## Page 113

03 10 32 46 LMP You want to come in, Neil? Going in?

03 10 33 59 LMP Want back up?

03 10 34 00 CDR No.

03 10 34 01 LMP Here's your shaving cream.

03 10 34 03 CMP My only problem is I'm going to come over here and grab a switch and arm this hand controller.

03 10 34 07 CDR Alright. I'll be out of your way.

03 10 34 08 CMP Okeydoke. I'll tell you what you could do, if you're not doing anything else, is - supposed to take five marks 30 seconds apart. When I take the first one, you can take a hack and see - -

03 10 34 26 CDR Okay.

03 10 34 27 CMP - - whether I'm spaced properly or not, you know what I mean?

03 10 34 28 CDR Yes.

03 10 34 29 CMP Coach me along on when to take mark number 2, mark number 3, 4, 5.

03 10 34 51 CMP And could you give me a hack on the MDC mission timer? It's going up to 35 minutes. Ready -

03 10 35 00 CMP MARK it.

03 10 35 05 CDR 35 minutes.

03 10 35 06 CMP Okay, that's good. That program alarm is normal; it will reach that when the trunnion gets down below 50 degrees.

03 10 35 21 CDR Okay.

03 10 35 23 CMP All I'm doing is waiting for - the time; everything else is done.

03 10 35 46 CDR You holding inertial, Mike?

03 10 35 47 CMP Yes.

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03 10 35 50 LMP No wonder the earth isn't moving.

03 10 36 06 CMP Ho-hum, ho-hum. I only got set up for this thing about an hour early (laughter). Better late than never; better early than late.

03 10 37 04 CMP . . . should be coming over the horizon here pretty soon.

03 10 37 08 LMP What should be?

03 10 37 14 CMP 01d A-1. 0ld A-1.

03 10 37 20 CMP Now, we'll see if you can find something that looks like A-1.

03 10 37 23 LMP I got the earth down by the strut.

03 10 37 56 LMP The problem with this window is, Neil, I think it's too cold in here.

03 10 37 59 CMP Neil, I'm going to get up here and get pitch - MANUAL ATTITUDE PITCH to ACCEL COMMAND. Those hand controllers are armed, so beware.

03 10 38 02 CDR Okay.

03 10 41 25 CMP If I'd known you were going to be here, I'd of incorporated you into the procedures.

03 10 41 30 CDR Keep looking through the periscope, then.

03 10 41 32 CMP What I need is - 0.3 to 0.5 on this thing, closer to 3. I'd get it, but you - -

03 10 41 40 CDR I'll watch.

03 10 41 41 CMP - - just as a doublecheck - -

03 10 41 42 CDR I'll watch.

03 10 42 11 CMP The preflight - . . .

03 10 42 55 CDR That . . . is working.

03 10 42 56 CMP Okay, fine.

03 10 43 31 CMP Okay, MARK it -

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03 10 43 32 CMP Number 1. They're 30-second marks.

03 10 43 35 CDR Check.

03 10 43 47 CDR 15.

03 10 43 50 CMP How many?

03 10 43 51 CDR 15 - 20 - 25 - 30 -

03 10 44 02 CMP MARK it -

03 10 44 03 CMP Number 2.

03 10 44 04 CDR Okay.

03 10 44 05 CMP I have a feeling somehow I got to do these . . .

03 10 44 16 CDR 15 -

03 10 44 17 CMP Okay.

03 10 44 26 CDR 25 -

03 10 44 31 CMP MARK it -

03 10 44 32 CMP Number 3.

03 10 44 33 CDR Okay.

03 10 44 46 CDR 15 - 20 - 25 -

03 10 45 00 CMP MARK it -  
 03 10 45 01 CMP Number 4.  
 03 10 45 02 CDR Okay.  
 03 10 45 16 CDR 15 - 20 - 25 -  
 03 10 45 29 CMP MARK it -  
 03 10 45 30 CMP Number 5.  
 03 10 45 32 CDR Okay.  
 03 10 45 33 CMP . . .

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03 10 45 43 CMP . . .  
 03 10 45 50 CDR Check.  
 03 10 45 51 CMP Checklist says - You're going to go blind doing this - . . . 06 71 - confirm 7000;  
 06 89 confirm . . . 320 7000 . . . -  
 03 10 46 08 CDR Just leave it; keep pitching?  
 03 10 46 10 CMP Yes. But I don't know why we're getting that thrust rate there, maybe the . . .  
 getting unhappy - -  
 03 10 46 16 CDR . . . look at that roll and stuff . . . that yaw . . .  
 03 10 46 21 CMP Yes. It's Just like the simulator, remember that?  
 03 10 46 24 CDR Yes.  
 03 10 46 26 CMP It's . . .  
 03 10 46 27 CDR We're yawing pretty good. 0.4, I'd say - -  
 03 10 46 31 CMP We're going to have to check that out.  
 03 10 46 34 CDR - - towards gimbal lock.  
 03 10 46 35 CMP Toward gimbal lock?  
 03 10 46 37 CDR It's only gone 10 degrees towards gimbal lock.  
 03 10 46 40 CMP Well, that's a pretty good error. I don't know why in the hell it does that.  
 03 10 46 48 CMP Would you like to control the . . .? I'd say we're going to keep pitching for quite a  
 while.  
 03 10 46 59 CMP Houston, Apollo 11.  
 03 10 47 05 CMP Roger. Are you copying NOUN 129 on your downlink? If you've had enough  
 time, I'll proceed.  
 03 10 47 35 CMP Look, what gimbal angle was that when - on the pitch - when that activity started,  
 just out of curiosity?  
 03 10 47 40 CDR Oh, must have been around - 210.

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03 10 47 50 CMP Just like the simulator.

03 10 48 00 CMP Okay, now, the flight plan says where we want to stop . . . , that says so right here - pitch 229 is where we want to stop.

03 10 48 07 CDR Okay, we've gone by that, however, quite a ways.

03 10 48 10 CMP I'm sorry, let's stop, then.

03 10 48 12 LMP Is that local vertical?

03 10 48 14 CMP No.

03 10 48 21 CDR Okay. And after those pictures, . . . lunar surface.

03 10 48 26 CMP You want to go back to 229 or what?

03 10 48 29 CDR Let me see the flight plan just a second. Yes.

03 10 48 41 CMP Might as well just - just let it stop itself, Neil.

03 10 48 47 CDR I've got to - look at the - -

03 10 48 50 CMP Yes, go ahead.

03 10 48 52 CDR - - the . . . . . like - gangbusters?

03 10 48 57 CMP . . . 225 is . . .

03 10 49 12 CMP MARK -

03 10 49 13 CMP 02009.

03 10 49 23 CMP MARK -

03 10 49 24 CMP 22590. Minus 00177.

03 10 50 00 CMP Okay. So much for that.

03 10 50 28 LMP A beautiful view out here, Neil.

03 10 50 34 CDR . . .

03 10 50 51 LMP What's the GET?

03 10 50 55 CMP It's 82:51.

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03 10 51 35 CMP There's Mount Marilyn.

03 10 51 36 CDR Yes.

03 10 51 55 CMP Okay, we didn't waste any gas by doing what we did, but what we wasted gas by was that goddamn DAP activity; I don't understand that. just like the simulator.

03 10 52 09 CDR Sure enough.

03 10 52 13 CMP You got a good view there, Neil?

03 10 52 15 CDR Yes, I sure do.

03 10 52 18 CMP Houston, Apollo 11.

03 10 52 25 CMP All that procedure for P22 seemed to work very well. The only thing that was a little odd is that there was some DAP thruster activity. I had pitch in ACCEL COMMAND, and roll and yaw in RATE COMMAND, and somehow roll and yaw got excited, and DAP went into a flurry of thruster firing. We've noticed the same thing in the CMS and had just written it off as a CMS peculiarity.

03 10 53 02 CMP Okay.

03 10 53 34 CMP Well, one P22 out of the way. Ho, ho, ho!

03 10 53 40 CDR What were the results?

03 10 53 42 CMP Well - -

03 10 53 43 CDR Or could you tell?

03 10 53 44 CMP - - they're sort of inconclusive because I marked - see, they gave me -

03 10 53 52 CMP That's in work, Houston. Hey, how about holding this for just a little bit?

03 10 53 55 CDR Yes, let's hold this attitude a little bit; I want to look at the - -

03 10 54 00 CMP Boy, that's beautiful out there, isn't it?

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03 10 54 01 CDR - - TPI approach. Man, this is really something; you ought to look at this. You want to watch our approach into the landing site; you got to watch right through this window. We're coming over - we just passed Mount Marilyn. We're coming up on Maskelyne series here - straight out ahead, coming into the landing area.

03 10 54 21 CMP Houston, we're holding inertial a little while to study the approach to the landing zone.

03 10 54 39 CDR See the monocular -

03 10 54 41 CMP I don't either, . . .

03 10 54 44 CDR Is there one?

03 10 54 50 LMP Well, a crater - -

03 10 54 51 CMP There go Sidewinder and Diamondback. God, if you ever saw checkpoints in your life, those are it.

03 10 54 56 CDR But . . . we don't get to see them.

03 10 54 58 CMP You don't?

03 10 54 59 CDR No, we roll over right here at this little - well, you see Boot Hill coming up right here?

03 10 55 06 CMP Yes, yes, yes.

03 10 55 07 CDR And just beyond it that's - that crater right on track there, the big one?

03 10 55 11 CMP That's Mount Marilyn? Past Boot Hill?

03 10 55 13 LMP No, Duke Hill.

03 10 55 14 CMP Duke Hill?

03 10 55 15 LMP No, I'm sorry . . . that's - -  
03 10 55 17 CDR Duke Island, Duke Island.  
03 10 55 20 CMP Oh God, look at that Moltke; he's my favorite . . . Look at that son of a bitch.  
You see all those roads - triangular roads leading right past him?

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03 10 55 29 CDR Yes.  
03 10 55 30 CMP That's US 1, I guess, huh?  
03 10 55 31 CDR Yes.  
03 10 55 33 CMP There's crater 130 over there although I can't quite see - see 129, but I can't quite see 130.  
03 10 56 12 CMP Can you see . . ., Neil?  
03 10 56 20 CDR I'm not sure.  
03 10 56 25 LMP I think I can see it, for sure. Yes, I got it beautiful - I can - I got the whole landing site here.  
03 10 56 35 CDR That far?  
03 10 56 40 LMP The one that's shorter there?  
03 10 56 49 LMP Houston, this is Apollo LM in the Eagle - Apollo 11 in the Eagle, and I got a beautiful view of the whole landing area.  
03 10 57 08 LMP Roger. I can see the entire landing area from the position I'm in looking out the left window in the LM.  
03 10 57 20 CMP . . .  
03 10 57 26 LMP That's right.  
03 10 58 05 LMP Boy, that sure is eerie looking.  
03 10 58 06 CDR Isn't that something?  
03 10 58 08 MS . . .  
03 10 58 10 CMP . . . enough of a shot down there, but you can't find a single spot on the surface that doesn't look . . . 1-degree sun angle, that's - that's just a lousy sun angle.  
03 10 58 28 CDR That's spectacular out there - Looks like you're flying right into the side of a mountain, doesn't it?

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03 10 58 32 CMP Yes, sure does.  
03 10 58 34 LMP I missed taking a picture of it, . . .  
03 10 58 49 CMP Well, that was good . . . Shall we go to maneuver, I mean to sleep attitude - anybody object to doin that?  
03 10 58 59 CDR That'd be alright.

03 10 59 05 LMP Okay, I'm ready for you cats to transfer to LM power. What time GET you got?

03 10 59 13 CMP 80 - -

03 10 59 15 CDR Get the . . ., Buzz.

03 10 59 17 CMP - - 83 hours. You ready to do it?

03 10 59 20 LMP . . .

03 10 59 22 CMP You ready to do it?

03 10 59 23 LMP Stand by. Yes, go ahead and do it.

03 10 59 32 CMP Okay.

03 10 59 33 LMP You got 83 hours right now, huh?

03 10 59 35 CMP Yes, 83 hours, and we're on LM power.

03 11 00 26 LMP Glycol pump.

03 11 00 28 CMP Houston, Apollo 11. How do you read on high gain? Over.

03 11 00 37 CMP Okay. You want wide beam, for some reason?

03 11 00 39 LMP Will you cut my SUIT POWER and AUDIO, OFF, please?

03 11 00 43 CMP Yes.

03 11 00 51 LMP Okay, fine.

03 11 00 53 CDR Okay, going OFF now.

03 11 00 54 CMP We're starting our maneuver to sleep attitude; roll 82, pitch 229, yaw zero.

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03 11 01 11 CMP About ready to maneuver?

03 11 01 14 LMP Go ahead.

03 11 01 16 CMP Okay.

03 11 02 52 CDR Yes?

03 11 03 08 CDR You're past step 4?

03 11 03 41 CDR Houston, 11.

03 11 03 45 CDR What's the page?

03 11 03 48 CDR Okay. We're on page - activation 12, 13, at step 4, verify descent talkbacks - gray, and they're barber pole.

03 11 04 20 CDR Stand by. We've got it. We've just had - one circuit breaker out of position. We have them gray now.

03 11 05 18 CMP Watch that.

03 11 05 20 CDR Don't we want it dark?

03 11 05 24 CMP I thought the lights were going out. Man, that voltage is really falling off.

03 11 05 43 LMP Hey, Mike.  
03 11 05 44 CMP Yes.  
03 11 05 45 LMP . . . VHF . . . circuit breaker . . .  
03 11 05 50 CMP I can't hear you, Buzz.  
03 11 05 52 CDR He says, "Why don't you turn on VHF B, just for kicks."  
03 11 05 55 CMP Alright, I'll do it. You going to send me some data?  
03 11 06 00 LMP Yes, I'll get right to it.  
03 11 06 02 CMP Huh?

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03 11 06 03 LMP I'll get right to it.  
03 11 06 04 CMP Alright.  
03 11 06 07 LMP Soon as I get some COMM first.  
03 11 06 09 CMP Yes, because when I - because when I record your data, I'm on SIMPLEX A.  
03 11 06 17 LMP Yes, well, that's when you're talking at the same time.  
03 11 06 20 CMP Yes, okay. You want me just to turn up B now?  
03 11 06 22 CDR There's signal strength.  
03 11 06 50 LMP Hello, Houston, hello, Houston; this is Apollo 11, Eagle. Over.  
03 11 07 22 CDR A lot of static - on the command module S-band.  
03 11 07 27 CMP Well, we - we should still have him.  
03 11 07 39 CDR Houston, Apollo 11. Radio check on S-band.  
03 11 08 04 CDR I'm not getting them on -  
03 11 08 08 CMP Well, we're almost at sleep attitude; just stand by 1, and, as soon as we get there, I'll find out where they are. I'm going to dick with the DAP right now.  
03 11 09 16 CDR I've got nothing but static.  
03 11 09 31 CMP Houston, Apollo 11. Over.  
03 11 09 52 LMP Hey, Mike, you transmitting on B?  
03 11 10 00 CDR Mike, what are you transmitting on up there?  
03 11 10 04 CMP Say again.  
03 11 10 06 CDR What are you transmitting on up there?  
03 11 10 08 CMP I'm transmitting right now on OMNI A, but I'm about to get new high-gain angles; just 1 second. Okay, we're there.

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03 11 10 16 CDR How come I - he don't hear you on INTERCOM?

03 11 10 21 CMP You should hear - -

03 11 10 22 LMP Houston, Apollo 11; Apollo 11, Eagle. Over.

03 11 10 33 LMP Roger. I read you about 4 by 4. Could you give me a short count, please?

03 11 10 37 CDR Gees, I don't hear him.

03 11 10 43 CDR We don't read them, Buzz.

03 11 10 46 CMP He's - he's on LM S-band, Neil, apparently.

03 11 10 49 CDR Oh.

03 11 10 50 CMP Yes.

03 11 10 53 LMP Roger. Are you copying my LOW BIT RATE? Over.

03 11 11 07 LMP Roger. I'm all ready to switch to HIGH BIT RATE, if that's okay with you.

03 11 11 21 LMP Standing by.

03 11 11 31 LMP Houston, Eagle. Go ahead with the camera checkout. I'm still on low taps, and I assume there's no problem doing that. Over.

03 11 11 53 CMP Houston, Columbia. How do you read on the high gain?

03 11 12 01 CMP Blap.

03 11 12 07 CDR Did you hear him answer?

03 11 12 09 CMP No.

03 11 12 10 CDR I didn't either. Buzz is reading him, though.

03 11 13 04 CMP Houston, Columbia. How do you read on the high gain? Over.

03 11 13 18 CMP Hey, how about asking them if they can hear me calling?

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03 11 13 22 LMP I don't believe they can hear you, Mike, . . . sleep attitude.

03 11 13 26 CMP Well, we're in sleep attitude, and I got the high-gain angles, and they should be good angles. And I'm locked on and I got about a half signal strength, and they can't hear me.

03 11 13 40 LMP Houston, Eagle. . . . high gain . . .

03 11 14 11 CDR No go.

03 11 14 12 CMP What'd he say?

03 11 14 13 CDR COMMAND RESET.

03 11 14 14 CMP Okay.

03 11 14 36 LMP . . . try him again.

03 11 14 39    CMP        Houston, Columbia. Reading you loud and clear.

03 11 43 24    CMP        Armstrong says it's the hatch and - if we leave the probe and drogue there, we'll save us some time tomorrow; I don't know if it's tolerable sleeping or not. I think what previous crews have been doing is reinstalling all that claptrap up in there.

03 11 43 40    CDR        Yes.

03 11 43 42    CMP        But -

03 11 43 47    LMP        . . .

03 11 43 50    CMP        What?

03 11 43 51    LMP        . . .

03 11 43 59    CMP        Yes, forward's okay.

03 11 44 15    CDR        I don't think that would be too horrible sleeping down there.

03 11 44 28    CDR        It's for sure it's not going anywhere; this one's bolted down two places - and this one is - -

03 11 44 35    CMP        You can try it. If we could find a place to put our legs back in there, it'll be alright.

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03 11 45 13    CMP        See - it's going to be hard to get into that - sampler there.

03 11 45 19    CDR        No - no, that's alright. That's the place for it.

03 11 46 30    CDR        (Sneeze)

03 11 46 34    CMP        Okay, lights went out - except for all those radioactive ones in there.

03 11 47 12    LMP        Well, COMM's good. Son of a bitch might work.

03 11 47 21    CMP        Sure it'll work. Anything in a pretty cockpit like that is bound to work.

03 11 47 38    CMP        Well, I propose leaving the probe and drogue in here overnight. Save all - doing all that claptrap in the morning.

03 11 47 48    CDR        It's okay with me.

03 11 47 49    LMP        Fine.

03 11 47 50    CMP        You through in the LM?

03 11 47 54    LMP        How's that going to affect - -

03 11 47 57    CMP        Sleeping!

03 11 47 58    LMP        - - sleeping?

03 11 47 59    CMP        I'll be glad to sleep over there, alright? I don't think it'll affect that; I'd rather sleep, I'd rather sleep with the probe and drogue than have to dick with it in the morning.

03 11 48 06    LMP        Alright, that's fine; I can have it there. I don't know how I'd get out, but - (laughter).

03 11 48 13    CDR        . . .

03 11 48 15 CMP That's . . . , alright.  
03 11 48 25 LMP Hey, you don't want to bring this one back? You on a weight-saving kick for the command module?  
03 11 48 35 CDR You want it?

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03 11 48 37 LMP Sure, you - -  
03 11 48 38 CDR There's room for the Hasselblad.  
03 11 48 39 LMP - - you got stowage space?  
03 11 48 42 CDR You can have it if you want it.  
03 11 48 45 LMP You got a place to fix things that rattle around?  
03 11 48 50 CMP Sure. Like hatches? . . . if you'll take time to get out of the hallway.  
03 11 49 01 LMP Let's get some music.  
03 11 49 03 CMP Get out of my damn hallway, Aldrin, so I can put my hatch in and then we can all - -  
03 11 49 06 LMP How about these tapes?  
03 11 49 09 CMP Okay.  
03 11 49 37 LMP Okay, 95:50 IVT to the LM. What time is it now?  
03 11 49 44 CMP 83:53.  
03 11 49 50 LMP I figure that as being 12 hours. About time for a Lomotil, huh? Well, not quite.  
03 11 50 37 LMP How about the systems stuff - to put the machine to bed.  
03 11 51 01 CMP You go to REACQ and NARROW?  
03 11 51 02 CDR Yes.  
03 11 51 05 CMP So I guess the COMM's pretty well taken care of?  
03 11 51 08 CDR Yes.  
03 11 51 09 CMP Have you got the waste water dump?  
03 11 51 10 CDR No, I haven't done that, but I will.  
03 11 51 12 CMP Let's see, I imagine we want to go out of VOICE? Or not?  
03 11 51 17 CDR Very, very - -

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03 11 51 18 LMP The whole bit they said.  
03 11 51 24 CMP Okay.  
03 11 51 57 CMP Lunar orbit asleep; (cough) S-BAND SQUELCH, ENABLE?

03 11 51 58 LMP I did it.

03 11 51 59 CMP Got that, huh?

03 11 52 00 LMP Yes.

03 11 52 01 CMP HIGH GAIN, REACQ, NARROW; antenna pitch angle - -

03 11 52 06 LMP Yes, I did that.

03 11 52 07 CMP - - that's all it says.

03 11 52 08 LMP Okay.

03 11 52 10 CMP Plus the normal configuration.

03 11 52 13 LMP Doesn't it say anything about DOWN VOICE BACKUP - or any of that stuff?

03 11 52 16 CMP (Cough)

03 11 52 31 CMP No.

03 11 52 33 LMP Okay.

03 11 52 37 CDR Waste water dump, we'll wait until 84 hours; they may have the vent modeled or some crazy thing like that, so I want to be at the right time.

03 11 52 45 LMP Alright.

03 11 52 47 CMP Well, let's see, normal lunar configuration. Well, it is DOWN VOICE BACKUP.

03 11 52 52 LMP Yes.

03 11 52 54 CMP Well, let's get going here. PRIMARY, PRIMARY, HIGH, VOICE, (cough) PCM, RANGE, DOWN VOICE BACKUP, AUX TAPE, OFF; TELEMETRY to DATA; and UP TIM COMMAND to NORMAL; VHF A and B, OFF; RECEIVE only, . . . ;

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PCM/ANALOG, RECORD, FORWARD, NORMAL, NORMAL - that's okay, LOW - PRIMARY, REACQ, and NARROW. Well, COMM's set.

03 11 53 56 LMP Good.

03 11 53 57 CDR I got to vacuum up some water and dump the waste water tank, and we're about set.

03 11 54 05 CMP Hey, I got a fuel cell - O2 - -

03 11 54 09 CDR Hey, our water's about all gone.

03 11 54 10 CMP Did they say anything about the O2 purge?

03 11 54 13 CDR Must have gone into the LM.

03 11 54 14 CMP Yes, I think it did; it went on the windows. They didn't say anything about it, huh?

03 11 54 17 LMP No.

03 11 54 18 CMP Well, I guess we'll do it then. Anybody get my - Well, heck, I guess we're really not through with them yet, are we?

03 11 54 36 CDR I updated the LOS time in your -

03 11 54 39 CMP Yes. I think I'll wait until we get them back again before doing the purge. Okay? Because, I don't know, maybe they want all that stuff done on the back side.

03 11 55 11 LMP Well, I propose to give myself a little bit of a - a bath, but not to put that damn LCG on tonight. You never did ask them about the - about the . . . , huh? I sure haven't found them.

03 11 55 40 CMP I think we ought to do that.

03 11 56 00 CMP Neil, you still got that tissue dispenser, the empty one?

03 11 56 06 CMP Thank you.

03 11 56 27 LMP What's baseline altitude? . . . the altitude - descent altitude settings?

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03 11 57 01 LMP That's the - that's the last meal we eat before descent, huh?

03 11 57 12 LMP Sure is.

03 11 57 26 CMP Wowee!

03 11 57 27 LMP 95 - that's - 7 - got 10 hours. Whew!

03 11 57 44 LMP Might whip out that piece of bread in there.

03 11 58 43 LMP Through in the tunnel, Mike?

03 11 58 46 CMP Through, yes.

03 11 58 47 LMP Okay, I want to get the lights out then.

03 11 58 48 CMP Okay, . . .

03 11 59 29 LMP What are your dosimeters reading?

03 11 59 38 CMP . . . up a little bit.

03 11 59 41 CDR Mine says - 11012.

03 11 59 50 CMP I can't read this little fart. Says 10013.

03 12 00 03 LMP I think they all started out at even thousands. They had them each different so they could tell which was which.

03 12 01 13 LMP Well, I don't know about you, but I think I'll raid the pantry for some bite-size stuff.

03 12 01 24 LMP I don't know when we'll get a chance to use it maybe some time - -

03 12 01 26 CMP Monoculars?

03 12 01 30 LMP - - during the maneuvers.

03 12 01 32 CMP Found it, huh?

03 12 01 34 CDR We're going to take that into the LM.

03 12 01 36 CMP Yes. Sure can.

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03 12 01 55 CDR . . .

03 12 01 58 CMP . . . - . . . novel and earn a million dollars.

03 12 02 19 CMP Amazing how quickly you adapt - Why, it doesn't seem weird at all to me to look out there and see the moon going by, you know?

03 12 02 25 SC (Laughter)

03 12 02 27 LMP Oh, that is weird - that crazy moon out there again, huh? Funny-looking thing.

03 12 03 12 CMP Buzz, this crazy bracket goes right here. It's probably right the hell in your way, isn't it?

03 12 03 17 LMP No, no.

03 12 03 18 CMP Not in your way?

03 12 03 19 LMP No, I can survive with that.

03 12 03 21 CMP Alright, let me put it up there; it'll be one less thing to do in the morning. It's in backwards, but I don't think -

03 12 03 33 CMP Well, if I don't need this thing anymore, I think It'll stow that one away. Systems are yours tomorrow?

03 12 03 44 CDR Yes.

03 12 03 45 CMP I don't know as we've got much to do; there's a purge.

03 12 03 50 CDR Is it 84 hours yet? Yes, it is; I'm going to dump the waste water.

03 12 04 36 CMP You dumping?

03 12 04 37 CDR Yes.

03 12 04 42 LMP (Cough) Boy, it's a dusty vehicle in here. Man! But that view approaching the landing site is just fantastic right out - right smack out the window, you know that?

## Page 132

03 12 04 52 CDR Yes.

03 12 04 53 LMP Except there's such a big shadow being cast by everything - -

03 12 05 01 CMP 1 or 2 degrees, Neil?

03 12 05 02 LMP - - that I really couldn't - -

03 12 05 04 CDR I think . . . - -

03 12 05 05 LMP - - I could identify the Cat's Paw and I could identify the pair of craters right at the end, but I couldn't really make out the backward V nor the three little curved ones on one side - -

03 12 05 17 CMP I didn't see the backwards either.

03 12 05 18 LMP - - but I could see the area where it all was, you know, and - -

03 12 05 19 CMP Yes, yes.

03 12 05 21 LMP - - it didn't go any farther back than this, and it didn't really go any farther forward than that - it really didn't. You know, it was rougher than a cob (laughter).

03 12 05 27 CMP Rougher than a cob, but I didn't see . . .

03 12 05 31 LMP Well, when you compare it with the surrounding areas, why it's - it's pretty reasonable.

03 12 07 21 CDR You want this somewhere?

03 12 07 23 CMP . . .

03 12 07 42 CDR If you don't mind, I'll put it on this big piece of Velcro over here by the fuel cell.

03 12 07 52 CMP Yes, that's a good place for it.

03 12 09 46 LMP Anybody for a barf bag?

03 12 11 08 LMP Can you think of any use for a slide rule in the LM, Neil?

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03 12 11 19 LMP Huh?

03 12 11 27 CDR I can't think of any use for two of them.

03 12 11 31 LMP Okay.

03 12 15 24 LMP That COMM was so good I don't think I'd need those damn things . . .

03 12 16 29 CMP Anybody say anything about terminating battery current?

03 12 16 33 LMP No.

03 12 16 45 CMP You remember anything about that, Neil?

03 12 16 48 CDR No.

03 12 18 12 CMP Somebody's blue towels? Did I dislodge those by mistake or did you have those?

03 12 18 18 CDR No, don't believe I had them.

03 12 18 20 LMP I had them out, kind of floating around back here.

03 12 18 38 LMP Everything I think you could dislodge, they forgot to put Velcro on the damn thing.

03 12 19 31 CMP Could you - maybe reach back and - hand me that wrench right quick?

03 12 19 40 CDR Yes, I sure could. Sure could . . .

03 12 19 54 CMP You want me to swap one?

03 12 20 00 CDR No, I think I'll keep one for tonight.

03 12 20 03 CMP Okay.

03 12 20 26 CDR Thank you.

03 12 20 27 CMP You're welcome.

03 12 21 56 CMP You like this?

03 12 21 58 CDR Not much.

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03 12 22 04 CMP ...?  
03 12 22 27 LMP Want one?  
03 12 22 29 CDR Yes.  
03 12 22 30 LMP He's getting a ... of that, huh?  
03 12 22 34 CMP Well, I just want to make sure I'm through with the roll; I think I am.  
03 12 22 42 CDR Can't figure out how you tell when one's gone. I think that was it.  
03 12 22 50 CMP Oh, it stopped!  
03 12 23 49 LMP It's a bear to get in and out of here.  
03 12 23 54 CDR Think maybe it'd be easier if you ... them right here.  
03 13 12 01 CMP I have a bit of fruitcake left over from somewhere; if anybody wants some, here it is. ...  
03 13 12 25 CMP Let's have a little chewing gum. Anybody like some chewing gum?  
03 13 12 39 CMP 40 - and 250.  
03 13 12 54 SC 43 ...  
03 13 17 03 CDR - - 1000 pounds - ...  
03 13 17 07 CMP That'll bring some more junk back here.  
03 13 18 46 CDR Couldn't have done better myself.  
03 13 39 47 CMP It may be raunchy later.  
03 13 39 56 LMP It may be? There's no doubt about it!  
03 13 40 02 CDR Oh, I'll take a couple small ones.  
03 13 40 05 CC Apollo 11, Houston. We have LOS coming up in 2 minutes now, and AOS will be at 86 plus 28 plus 15. Over.

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03 13 40 17 CDR We'll see you on the other side.  
03 13 40 45 LMP Anybody have one?  
03 13 40 47 CDR I'll have a little one.  
03 13 40 48 LMP Okay. Here you are.  
03 13 41 28 CMP Yes.  
03 13 41 29 CDR Okay.  
03 13 41 47 CMP I guess what I'm doing I should do with the paper towels.

03 13 42 56 CDR Everybody through with the water?

03 13 43 00 LMP Yes, go ahead.

03 13 44 08 LMP Ever find your box?

03 13 44 11 CMP No. Gosh, you remember when they told us about - about putting buttons on the seat of these pants?

03 13 44 27 CDR No, I don't remember.

03 13 44 33 LMP Yes, they were working out - this elaborate scheme.

03 13 44 38 CMP Yes, . . . had a choice between . . . and Velcro.

03 13 44 52 CDR What's its use? I mean, don't keep me hanging in suspense.

03 13 44 55 CMP Well, whatever I tell them, they didn't give me.

03 13 44 57 CDR Shouldn't have anything.

03 13 44 59 LMP Nothing in it.

03 13 45 01 CDR Good grief, man!

03 13 45 02 CMP They tell me you got to use Velcro on there. Maybe on the other side.

03 13 45 08 CDR Use -

03 13 45 12 CMP I got a - pair of jockey shorts. Now cut - cut the lights off - lights off.

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03 13 45 28 CMP Very good, very good.

03 13 48 14 CMP How'd you sleep last night, Buzz, up on top?

03 13 51 59 LMP You open up the outer one, and you put the inner one in there and squeeze it and it breaks, then you got to take the . . . and insert it and mush it all up - to get that stuff evenly distributed through it.

03 13 52 25 LMP Why don't you guys sleep underneath tonight? I'll sleep top deck.

03 13 52 34 CDR Oh, you're going to sleep downstairs tonight, aren't you?

03 13 52 36 LMP Yes, that's right; I remember . . .

03 13 52 40 CMP Unless you'd rather sleep up top, Buzz; I like - you guys ought to get a good night's sleep, going in that damn LM - How about - which would you prefer? Is that probe and drogue going to be in your way over there?

03 13 52 51 LMP No, I don't think so.

03 13 52 54 CMP Well, take your druthers, whichever you prefer.

03 13 55 57 LMP Anybody . . . goes right up here?

03 13 56 01 CDR I've just been kind of looking around for it myself.

03 13 57 16 CMP . . ., Buzz?

03 14 01 11 LMP . . .

03 14 01 15 CDR What?  
03 14 01 17 LMP I . . . you.  
03 14 01 18 CDR Oh.  
03 14 01 19 LMP ...?  
03 14 01 20 CDR Yes, yes.  
03 14 01 50 LMP Yes, I . . .

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03 14 02 08 CMP Well, I thought today went pretty well. If tomorrow and the next day are like today, we'll be safe.  
03 14 08 12 CDR You got a crater coming up, Buzz? Right through here. I don't know if you can see it or not. If not, let me get a picture of it because it's really - got big . . . on the bottom of it. It don't look good.  
03 14 08 29 CMP It's out this way.  
03 14 08 30 CDR Go ahead, go ahead, go ahead, go ahead.  
03 14 08 31 LMP Shoot . . . here.  
03 14 08 32 CMP I'm not sure we should be shooting this - what we're shooting at or 1 point set; I guess you're alright - in this light stuff, I guess you're alright.  
03 14 08 46 CDR Okay, thank you.  
03 14 08 49 LMP Oops! . . .  
03 14 13 39 CMP What time is it, Neil, 88 hours, something like that?  
03 14 13 42 CDR 86:13.  
03 14 15 54 CDR Doesn't it look like some of these crater walls had scallops inside like a design in a fan - like feathers.  
03 14 16 05 LMP Seashells.  
03 14 16 06 CDR Yes.  
03 14 16 07 LMP Like seashells - very pretty, very symmetrical.  
03 14 17 37 CDR Take along one of those craters.  
03 14 17 57 CDR I took overlapping pictures of all that . . .  
03 14 18 03 LMP Tomorrow, take - we're going to have to carry a lot of film to take as many pictures as they want.

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03 14 18 56 CMP I'll tell you what we ought to do, . . .  
03 14 18 59 LMP Oh, okay, let me go do that.  
03 14 19 51 LMP Anybody know when AOS is?

03 14 20 07 CMP When is AOS?

03 14 20 09 LMP Yes. When is AOS . . . ?

03 14 20 18 LMP 86:38?

03 14 20 21 CMP I think it's . . .

03 14 20 24 LMP Okay.

03 14 20 37 CDR . . . along in here.

03 14 20 41 LMP Yes.

03 14 24 48 CMP Where the hell is the horizon with the world coming over it? I guess it's behind us, huh?

03 14 24 58 CDR Up there? We should be getting earthshine - earthrise features - should be coming up pretty soon.

03 14 25 10 CMP Black and white.

03 14 25 12 CDR There's a colored one right in there - I didn't think we put it there. . . .

03 14 25 17 CMP Alright.

03 14 25 35 CDR There's this one - where's - -

03 14 25 39 CMP The dark slide I think is right over there in the girth shelf.

03 14 25 42 CDR Oh, yes, I got it.

03 14 26 59 LMP That's - that's the one.

03 14 27 41 LMP Are we going to keep the . . . lens on?

03 14 27 45 CMP . . . getting earlier in time. Yes, that's best - better.

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03 14 28 14 CMP . . .

03 14 28 23 CDR Got a MASTER ALARM coming on here.

03 14 28 48 CMP Your f:8 is 250 - at infinity?

03 14 28 52 LMP Yes.

03 14 28 53 CMP Good deal. Keep working, you got a lot of film.

03 14 29 36 CMP Well, it's . . .

03 14 29 49 LMP And I was . . .

03 14 29 52 CMP Good deal.

03 14 29 54 LMP . . .

03 14 29 56 CMP Glad to hear it.

03 14 29 59 CDR Through?

03 14 30 01 LMP Yes - . . .

03 14 30 04 CMP It's good . . .

03 14 30 06 LMP Yes, I guess so. Nothing like filming your . . .

03 14 30 22 LMP . . . this field of view, it's mostly just blues - I keep getting mostly black and blue.

03 14 30 36 CMP Houston, Apollo 11. Over.

03 14 30 43 CMP Okay. We just appeared to get a solid lock for the last - oh, about a minute, the TUNE FOR MAX needles have 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 filling - finishing up our fuel cell purge. Hydrogen on number 3 is the last to go off, and it'll be coming off in just a second.

03 14 31 15 LMP Huh? Is that right? Really should have looked.

03 14 31 51 CDR . . . flow?

03 14 31 59 CMP RATE to HIGH, Neil.

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03 23 32 37 LMP I'll need to holler across to you to get the mission timers on. Do we want to check and get our two mission timers SYNC'd? What's this one read now? 82:50?

03 23 32 51 CDR 51, 52, 53, 54, 55, 56 - -

03 23 32 56 LMP Okay, this one is 1 second slow down in the LEB.

03 23 33 28 LMP Let's see, these things come in the command module don't they, those umbilicals?

03 23 33 34 CMP . . .

03 23 33 43 LMP Well, we don't want them.

03 23 33 50 CMP . . .

03 23 34 01 CDR Anyway, it compares.

03 23 34 04 CMP . . .

03 23 34 13 LMP Well, we couldn't do that without switching - well, you can have them in here all the time.

03 23 34 18 CMP . . . there's no way for me . . . probe and drogue . . . docking . . .

03 23 34 32 CDR No, I can't think that that'd be of significance between them - because why would you ever care to whether you'd hook them up again, if you came back and docked?

03 23 35 29 LMP Here's this LCG check. "Verify . . . stick visible in red or green band."

03 23 35 40 CDR Yes. Not . . . as it should be.

03 23 35 47 LMP The red one comes out this far, and the green one's out further than that. The whole thing is only about that long. It's got to be in one or the other or you can't see it.

03 23 36 24 CDR Having any luck there, Michael?

03 23 36 27 CMP . . .

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03 23 36 40 LMP You don't need to take - you're not taking your scissors over there?

03 23 36 43 CDR No.

03 23 36 44 CMP I've got . . .

03 23 36 49 LMP . . . pad; I'm going to have to take a leak here.

03 23 38 50 LMP Yes, I guess I'd better take that pocket - and the purse. Tell you what - How about putting those tissues in that box that's got that spare camera in it?

03 23 39 16 CDR Okay.

03 23 39 17 LMP It'll be right handy on your side over there. Now where did the tissue box go?

03 23 39 39 CDR You want to see if the computer agrees with that mission timer?

03 23 39 42 LMP I did already.

03 23 39 44 CDR Okay.

03 23 41 20 LMP Can you hand me that purse and the - that bag of mine - and the checklist?

03 23 42 06 LMP And if you'll take me off of suit power.

03 23 42 10 CDR Okay. SUIT POWER is OFF; AUDIO is OFF. Whoops - Sorry.

03 23 44 21 CMP . . .

03 23 44 26 CDR Good.

03 23 45 07 CDR About ready for a little help? . . . that.

03 23 46 00 CDR What's that?

03 23 46 04 CMP . . . I only have one . . . left.

03 23 46 13 CDR Okay. Oh, let's see, one smell - blah.

03 23 47 15 CDR (Humming)

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03 23 48 12 CDR Okay.

03 23 48 58 CDR You want one?

03 23 48 59 CMP . . .

03 23 49 00 CDR Yes.

03 23 49 02 CMP . . .

03 23 49 43 CDR We've got a roll rate in; 0.3-degree roll rate. Now it's taking it out; now it's taking it back out the other way.

03 23 50 34 LMP . . . Now, let's see.

03 23 50 41 CDR I'll keep an eye on . . . for you.

03 23 51 04 CDR . . . on here.

03 23 51 06 LMP Okay, I'm going on.

03 23 51 08 CDR Okay.

03 23 53 30 CDR What's that?

03 23 53 34 LMP Did you repress, huh?

03 23 54 24 LMP How come you don't . . . LM power?

03 23 54 26 CMP Okay. Stand by. You're on LM power. What?

03 23 54 38 CDR What did he say?

03 23 54 39 LMP . . .

03 23 54 41 CMP Oh, what time is it? It's 95:54.

03 23 55 12 CMP Now, switch from RATE, HIGH, to RATE, LOW. But that might make it better and maybe a little bit worse.

03 23 55 21 LMP . . .

03 23 55 35 CMP I guess that's right then, Neil; it rattles across the deadband at a fairly high rate.

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03 23 55 44 LMP . . .

03 23 55 46 CMP Alright.

03 23 56 31 LMP . . .

03 23 56 34 CMP Sure as hell is.

03 23 56 50 CMP I can't get that . . .

03 23 56 53 CDR This one - this one? That won't hurt it. . . .

03 23 59 09 CMP Stand by for some MASTER ALARMS; I'm purging.



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04 00 00 28 LMP . . .

04 00 00 30 CDR Oh, . . ., Mike.

04 00 00 34 CMP It's 96 hours even. 96 even and coming up on 40 seconds. Ready -

04 00 00 40 CMP MARK it.

04 00 00 48 LMP . . .

04 00 00 50 CMP Okay, 96:01 - 5, 4, 3, 2, 1 -

04 00 01 00 CMP MARK -

04 00 01 01 CMP 96:01.

04 00 01 03 LMP 3, 4, 5.

04 00 01 06 CMP Good.

04 00 02 01 CMP Okay, stand by for more thruster firing here.

04 00 04 06 CDR Is this - -

04 00 04 09 CMP No, this one's yours. You going to wear this for - -

04 00 04 11 CDR . . .

04 00 04 12 CMP Okay, I'm going to . . . camera out of its way.

04 00 04 33 LMP . . .

04 00 04 40 CMP Okay, I wouldn't be surprised . . . all over this goddam stuff.

04 00 05 00 CMP A three-ring circus. I got a fuel cell purge in progress and trying to set up cameras and brackets, watch an AUTO maneuver, and -

04 00 05 22 CMP Jesus Christ!

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04 00 07 58 CMP NORMAL, NORMAL.

04 00 09 19 CMP Another MASTER ALARM coming.

04 00 10 52 CMP Stand by for MASTER ALARM.

04 00 12 54 CMP Neil, where's the voice tape recorder, you know?

04 00 12 59 CDR Might be in the . . .

04 00 13 01 CMP Okay. Oh, you son of a bitch, you! Gah!

04 00 13 10 CDR . . .

04 00 16 17 CDR . . .?

04 00 16 18 CMP Can't get it . . . ; it's behind the . . .

04 00 16 27 CDR Yes.

04 00 16 28 CMP . . . hard time getting anything down here . . .

04 00 16 37 CDR Okay.

04 00 16 38 CMP You got some things up there.

04 00 16 41 CMP Neil, all this food and stuff up here, you going to take with you, or drink, or eat?

04 00 17 47 CDR No, I'll take . . .

04 00 17 54 CMP Okay. Chewing gum, you want any of that?

04 00 18 07 CDR . . . concerned . . .

04 00 18 12 LMP . . .

04 00 18 19 CMP Neil, I hate to bother you; could you get my solo book out of R-1 there?

04 00 18 23 CDR What?

04 00 18 24 CMP My solo book out of R-1.

04 00 18 28 CDR Solo book?

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04 00 18 29 CMP Yes. Look - -

04 00 18 30 CDR R-1?

04 00 18 31 CMP Yes, it should be in R-1. Big frapping book, with a bunch of updates on the cover. Thank you, that's it. Appreciate it.

04 00 20 10 CMP Neil, do you recall the highest rate you saw during this recent thruster activity? Did you say 0.4 or thereabouts?

04 00 20 19 CDR What?

04 00 20 20 CMP Do you recall the - any kind of body rates that you saw during that thruster activity? Didn't you say something about 0.4? Maybe - remember when the SCS was acting up?

04 00 20 30 CDR Ah - -

04 00 23 02 CMP Houston, Columbia. Over.

04 00 23 08 CC - - this is Houston. You can turn on the IMU. Over.

04 00 23 20 CMP Houston, this is Columbia. Over.

04 00 23 32 CC Columbia, this is Houston. How do you read? Over.

04 00 23 35 CMP Houston, Columbia. Reading you loud and clear. How me? Over.

04 00 24 00 CMP Hey, Buzz? How about - -

04 01 30 22 CC Eagle, Houston. We'd like aft now and forward at AOS. Over.

04 01 30 25 LMP Roger.

04 01 31 06 CC Apollo 11, Houston. 30 seconds to LOS. Both spacecraft looking good going over the hill. Out.

04 01 34 43 CMP Eagle, Columbia.

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04 01 34 46 CDR Go ahead.

04 01 34 47 CMP Roger. I'm getting ready to preload the probe. I'm going to disable all my roll thrusters. Would you please monitor my roll, your yaw?

04 01 34 54 CDR Roger.

04 01 36 41 CMP Eagle, Columbia.

04 01 36 43 CDR Go ahead.

04 01 36 45 CMP I got another "Verify capture latches engaged" on my checklist. I've already preloaded the probe; it's sort of silly, but sort of your option whether you want to verify they're engaged or not.

04 01 36 56 LMP Okay, we got the hatch all latched up now, and we're getting ready for pressure-integrity check; so, why don't you go ahead?

04 01 37 04 CMP Okay.

04 01 39 57 LMP Mike, let us know how you're coming up there now and then.

04 01 40 01 CMP I'm doing just fine. I've cocked eight out of the 12 docking latches, and everything is going nominally.

04 01 40 07 LMP Okay.

04 01 41 14 CMP All 12 docking latches are cocked.

04 01 41 17 LMP Okay.

04 01 41 21 CMP And I'm ready to button up the hatch.

04 01 46 46 LMP Hey, Mike. Have you got the - got to the tunnel vent step yet?

04 01 46 52 CMP I'm just coming to that. What can I do for you?

04 01 46 55 LMP Well, we're waiting on you.

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04 01 46 56 CMP Okay.

04 01 46 59 LMP We're still ahead of the timeline, so take your time.

04 01 47 03 CMP Okay.

04 01 47 14 CMP Okay, I'm ready to go to LM tunnel vent.

04 01 48 13 LMP You got it all vented now?

04 01 48 17 CMP Negative, it's a slow process. I'm on VENT, but - it's just going to take a little while here.

04 01 48 22 LMP Roger. Just give us a call. We're pressing on with some other stuff.

04 01 48 26 CMP Okay.

04 01 51 39 CMP How's our attitude holding?

04 01 51 42 CDR Looks good.

04 01 51 43 CMP Okay, this - this thing's supposed to take about 8 minutes; we've got about 3 of them gone, so in about another 5 minutes, I should be able to turn my thrusters back on.

04 02 01 03 LMP Moving in.

04 02 01 04 CDR How you doing, Mike?

04 02 01 06 CMP Doing just fine. The - Stand by, I'll give you the DELTA-P reading - 3.0; I need 3.5 before I can turn my thrusters back on.

04 02 01 16 LMP Okay.

04 02 04 59 CMP I've got a 3.5 psid now; I'm going to start a maneuver here in a few minutes to depressurize it.

04 02 05 05 LMP Okay.

04 02 05 12 CMP How you - how you guys doing?

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04 02 05 15 LMP Okay. We're doing our regulator checks now.

04 02 05 21 CMP So I heard.

04 02 07 21 CMP I'm starting the maneuver.

04 02 12 08 LMP How long you got - to end this maneuver, Mike?

04 02 12 12 CMP Oh, about another 2 or 3 minutes we should be there - no, less than that.

04 02 14 02 CMP We're there; we're at the new attitude.

04 02 14 07 CDR Okay, we're going to put our gear down.

04 02 14 29 LMP . . . MASTER ARM - -

04 02 14 34 CDR Okay.

04 02 14 35 LMP LANDING GEAR DEPLOY, FIRE.

04 02 14 37 CDR Here we go, Mike.

04 02 14 46 LMP Bam, it's out. Ain't no doubt about that.

04 02 14 50 CDR And it's gray.

04 02 14 52 LMP Alright. Your ED LOGIC POWER A, CLOSED.

04 02 14 57 CDR LOGIC POWER A, CLOSED.

04 02 15 00 LMP Alright, fire it again.

04 02 15 03 CDR Okay.

04 02 15 05 LMP Nothing happened, huh?

04 02 15 06 CDR Right.

04 02 15 07 LMP Okay, now - -  
04 02 15 08 CDR I heard it click.  
04 02 15 09 LMP Yes, so did I.  
04 02 15 10 CDR That relay, I suppose.

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04 02 15 12 LMP MASTER ARM, OFF.  
04 02 15 13 CDR It's OFF.  
04 02 15 14 LMP CB(11), ED LANDING GEAR FLAG, OPEN.  
04 02 15 23 CDR The gear went down okay, Mike.  
04 02 15 26 CMP Good deal.  
04 02 18 40 CDR Columbia -  
04 02 19 13 LMP Loud and clear.  
04 02 19 45 CDR Columbia, do you read Eagle?  
04 02 19 47 CMP Eagle, do you read Columbia?  
04 02 19 51 LMP Yes, I'm working on the high gain right now.  
04 02 19 54 CMP Okay, I'm reading him loud and clear.  
04 02 20 14 LMP You in the right attitude, Mike?  
04 02 20 17 CMP That's affirm.  
04 02 20 29 CMP Houston, Columbia. You're loud and clear.  
04 02 21 51 LMP Houston, Eagle. Over.  
04 02 22 08 CMP Buzz, you on the forward OMNI?  
04 02 22 10 LMP Houston, Eagle. Over.  
04 02 22 15 CMP Buzz, are you on the forward OMNI?  
04 02 22 17 LMP Roger. I am.  
04 02 22 20 CMP Houston, Columbia. Eagle is on the forward OMNI.  
04 02 22 39 LMP Columbia, go ahead.  
04 02 23 13 LMP Houston, Eagle. Go ahead.  
04 02 23 19 LMP Roger. I got you now. I fed in those angles for the S-band, and I couldn't get a lockon; it

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appears as though the antenna would have to be looking through the LM in order to reach the earth. Over.

04 02 24 03 LMP Roger. Ready to copy.

04 02 24 32 LMP Roger. LM weight, 33627; CSM weight, 36651; pitch trim, 00470; roll trim, 00589. Over.

04 02 25 02 LMP Roger. Understand.

04 02 25 12 CMP Houston, Columbia. Do you read?

04 02 25 29 CMP Roger. S-BAND VOICE to VOICE. How do you read now?

04 02 25 45 CMP Houston, Columbia. Over.

04 02 25 53 CMP Houston, Columbia in DOWN VOICE BACKUP. Do you read?

04 02 26 04 CMP Affirmative. Columbia in DOWN VOICE BACKUP. How do you read me?

04 02 26 20 LMP Roger. Eagle's in VOICE mode. How do you read? Over.

04 02 26 34 CMP Houston, Columbia's in OMNI C, Charlie, DOWN VOICE BACKUP and, when you get a chance, could you look up the coordinates of 130 for me, please? I have conflicting information between my cue card and my flight plan. I'd like to know which coordinates you want me to use.

04 02 27 04 LMP Houston, Eagle. Completed gear extension okay.

04 02 27 54 CMP Thank you, Houston.

04 02 29 14 CMP Yes, I had the coordinates loaded off the cue card which is - for crater 130.

04 02 31 29 CMP Roger. Thank you.

04 02 33 11 LMP Roger. We're just sitting around waiting for something to do. We need a state vector, a REFSMMAT before we can proceed on with the AGS,

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and we need you to watch our DAP data load, gimbal drive check, and throttle test. Over.

04 02 33 54 LMP Roger. We'll go ahead with the DAP and the throttle check since we don't have a gimbal drive test, okay?

04 02 35 31 CMP Houston, Columbia. Those T1 and T2 times are still good, aren't they?

04 02 35 40 CMP I say, the T1 and T2 times remain unchanged, affirmative?

04 02 35 53 CMP Thank you.

04 02 37 56 LMP Houston, Eagle.

04 02 38 03 LMP Roger. In accordance with the - page 47, step 1, we had the guidance control in PGNS and MODE CONTROL, PGNS, 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 - why, we got an RCS TCA light, and we've got four out of the eight other bright-colored red flags. I think that this is explained by the fact that we are in - PGNS and AUTO and just unable to fire the thrusters. Over.

04 02 39 21 LMP Roger.

04 02 40 00 CDR Houston, Eagle. Are you going to need the high gain before you can look at our GDA position indicators?

04 02 40 35 CDR I can go to a high . . .

04 02 40 41 LMP I can give you HIGH BIT RATE on the OMNI's if that will help you any.

04 02 40 59 CDR Roger. Understand.

04 02 41 39 CMP Boy, you just can't miss those checkpoints - those Diamondback and Sidewinder.

04 02 42 21 CMP AUTO optics is pointed just a little bit north of crater 130; pointing north.

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04 02 44 13 LMP Houston, Eagle. We're ready to pressurize the RCS. Over.

04 02 44 50 LMP Roger.

04 02 44 57 LMP That's affirmative; the landing gear is out and gray.

04 02 45 53 CMP Houston, Columbia. I've completed my marks. I've gone ACCEL COMMAND in all three axes to prevent that thruster firing that last time.

04 02 46 47 CMP Houston, Columbia. As soon as you have the necessary data on the downlink, let me know and I'll proceed.

04 02 46 59 CMP Stand by, please.

04 02 47 02 CMP I will.

04 02 47 21 CMP Roger.

04 02 47 47 LMP Roger. Looks good.

04 02 47 59 LMP Ready to copy.

04 02 48 33 LMP Roger. 224, plus 60267; 225, plus 58148; 226, plus 70312; 227, minus 50031. Over.

04 02 49 16 CMP Eagle, Columbia. My P22 is complete. I'm continuing this maneuver to AGS CAL attitude.

04 02 49 26 LMP Roger.

04 02 49 45 LMP Roger. Columbia, Eagle. Have you about maneuvered there, yet?

04 02 49 52 CMP Negative.

04 02 49 59 LMP Houston, Eagle. Are those angles for after the maneuver that Columbia is going to make or are they for right now? Over.

04 02 50 14 CMP We have about another 120 degrees to go, Buzz.

04 02 51 10 LMP Houston, Eagle. I believe I've got you on the high-gain antenna now in HIGH BIT RATE. Over.

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04 02 52 30 CMP You've got P00 and DATA.

04 02 52 40 LMP Columbia.

04 03 29 11 CMP Columbia, out.

04 03 29 16 CMP All Columbia systems looking good.

04 03 31 42 CMP It's nice and quiet over here, isn't it?

04 03 31 56 CMP Eagle, you read Columbia?

04 03 31 58 LMP Roger. Loud and clear.

04 03 32 03 CMP Okay, everything's going well. Everything's quiet over on this side.

04 03 32 07 LMP You bet.

04 03 32 09 CMP Okay. I'm standing by to record your data anytime it's convenient for you; angles coming up in another 2 minutes.

04 03 32 31 LMP Okay, I'm ready to go to B DATA now.

04 03 32 35 CMP Roger and out.

04 03 33 00 LMP Columbia, Eagle. How do you read?

04 03 33 04 CMP Read you loud and clear, Buzz.

04 03 33 06 LMP Very good.

04 03 33 10 CMP . . .

04 03 34 48 LMP Mike, are you in AGS CAL attitude now?

04 03 34 54 CMP That's affirm. I'm holding you there with the DAP, getting the deadband. When you get ready to do the AGS CAL, I will sort of quiet down the thruster firing and then hope to stop it altogether, but I don't even think that'll get it.

04 03 35 09 LMP Okay. Well, I'm just about ready to do that. Whenever you're ready to let it go free, why just tell me.

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04 03 35 40 CMP Okay, it looks real quiet now; I'm ready to go right now.

04 03 36 00 CMP Buzz, you copy?

04 03 36 10 CMP Buzz, you copy?

04 03 36 13 LMP Okay, Mike. Thanks.

04 03 36 17 CMP Now, . . . might check me on this, I - it's - I'm ready to go anytime you're ready.

04 03 36 24 LMP Roger. We'll be ready to go in just a minute.

04 03 37 46 LMP Okay, I'm starting my 5-minute rate - right now.

04 03 40 00 CMP As a matter of interest, I appear to be drifting in my roll; I'm holding my pitch and yaw pretty constant, and I'm staying a good 15 degrees late in the program.

04 03 40 15 LMP Roger.

04 03 40 17 CMP Looks like a . . .

04 03 40 31 CMP Halfway through it, it looks like I have . . . degrees in roll is about all.

04 03 40 39 LMP Yes, those look like good ones right now.

04 03 41 22 LMP Mike, what's your SEP time?

04 03 41 26 CMP A few minutes.

04 03 41 49 CMP GET of the separation burn is 100:39:50 even.

04 03 42 01 CMP I haven't gotten the updates for undocking time; I'm still carrying 100 hours 15 minutes, I guess, . . .

04 03 42 23 CMP I'm surprised they didn't update it by 3 or 4 minutes to, you know, make that DELTA-V be in the same position that they wanted.

04 03 42 33 LMP Yes, I agree.

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04 03 42 38 CMP So we're about 3 minutes ahead of the printed flight plan; it might be wise to try to SEP about 3 minutes early, and we can give them a GET of SEP that's precise whenever they want it.

04 03 43 06 CMP I have 5 minutes and 15 seconds since we started. Attitude is holding very well.

04 03 43 21 LMP Roger, Mike. Just hold it a little bit longer.

04 03 43 25 CMP No sweat, I can hold it all day. Take your sweet time. How's the Czar over there? He's so quiet.

04 03 43 45 CDR Just hanging on - and punching.

04 03 43 49 CMP I didn't know . . . radio. . . . I've ever seen a radio. All I can say is, "Beware the revolution."

04 03 46 21 CMP You cats take it easy on the lunar surface; if I hear you huffing and puffing, I'm going to start bitching at you.

04 03 46 28 LMP Okay, Mike.

04 03 46 37 CDR I just pressurized the DPS. . . . looks okay, Mike.

04 03 46 40 CMP Roger that.

04 03 49 19 LMP Hey, Mike, can you see where our radar's pointing now?

04 03 49 29 CMP Well, it looks like it's pointed right at my head; that's hard south; so's your radio beacon.

04 03 49 34 LMP Okay. It should really - it should be pointing from the - you know, our forward axis? It should be pointing up at 40 degrees and, you know -

04 03 49 48 CMP Okay. We've wandered back over the bellyband now - let me assure that AGS CAL.

04 03 49 54 LMP . . .

04 03 50 19 CMP How'd the AGS CAL work out?

04 03 50 23 LMP Oh, it danced around a little bit, but seemed to go right back to the original numbers.

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04 03 50 33 CMP Okay. I'm going to start a maneuver now to our undocking attitude.

04 03 51 21 CMP Now the undock attitude and the SEP attitude ought to be the same, so I'm going to go to what they gave me for the updated separation-burn attitude. That's just about 7 degrees off, but it's in your flight plan for the undock attitude.

04 03 51 38 LMP Okay.

04 03 53 12 CMP When your rendezvous radar self-test is complete, let me know and I'll check out my transponder.

04 03 53 30 LMP Excuse me, Mike, what did you say?

04 03 53 33 CMP I say, when your rendezvous radar self-test is complete, let me know and I'll check out my transponder.

04 03 53 38 LMP Yes, we're through with that now.

04 03 53 41 CMP Thank you. I'm maneuvering the . . .

04 03 58 44 CMP That transponder checked out. I hope they've got a nice, big, strong . . . for you.

04 03 58 49 LMP Very good.

04 03 59 56 LMP Hey, Mike, what would you recommend as a good setting on the 16 millimeter?

04 04 00 02 CMP Well, what they recommend for you is f:8 at 1/250th and put it not on infinity, but on 7 feet, which covers all the way from infinity down to a very short distance to keep it in focus, and 6 frames per second, I guess.

04 04 00 25 LMP Yes, what you say, f:8 at 1/250th?

04 04 00 28 CMP Yes, f:8 at 1/250th. And after you get it all set up, check that f-stop again because it slides and slips off with very little twist.

04 04 03 53 CMP How about using, as an undocking time, 100 hours and 12 minutes? That suit your fancy?

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04 04 03 59 CDR That'll be fine.

04 04 04 05 CMP Okay.

04 04 04 11 CDR What have you got for AOS, Mike?

04 04 04 14 CMP I have 100 hours and 16 minutes.

04 04 04 20 CDR Okay.

04 04 10 44 CMP We got just about a minute to go; you guys all set?

04 04 10 48 CDR Yes, I think we're about ready.

04 04 11 47 CDR We're all set when you are, Mike.

04 04 11 51 CMP 15 seconds.

04 04 12 03 CMP Okay, there you go. Beautiful!

04 04 12 06 CDR . . .

04 04 12 10 LMP Looks like a good SEP.

04 04 12 19 CMP Looks good to me.

04 04 12 59 CDR Okay. I've killed my rate, Mike, so you drift out to the distance you like and then stop your rate.

04 04 13 13 CDR Starting my yaw.

04 04 13 30 CDR There's sure a better visual in the simulator.

04 04 13 38 CMP Okay. I picked up a little roll; I'm going to get rid of it.

04 04 14 22 CDR Okay with you if I start my pitch, or you think you're not far enough away yet, Mike?

04 04 14 31 CMP I'd prefer you stand by just a couple of seconds, Neil.

04 04 14 34 CDR Okay. I'll wait for when you're ready - when you think you've got your rates killed perfectly.

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04 04 14 39 CMP Okay. I'm still holding . . .

04 04 14 41 CDR . . .

04 04 15 26 CMP Okay, looks pretty good to me now.

04 04 15 30 CDR Okay.

04 04 16 34 CMP Just like in the simulator, you're drifting off to one side and down below a little bit.

04 04 16 39 CDR Yes.

04 04 17 06 CMP The gear are looking good; I've seen three of them.

04 04 17 11 CDR The MESA is not down, right?

04 04 17 14 CMP Say again.

04 04 17 15 CDR The MESA's still up?

04 04 17 19 CMP Yes,

04 04 17 20 CDR Good.

04 04 17 49 CMP Now, you're looking good.

04 04 17 59 LMP Roger. Eagle's undocked. The Eagle has wings. Looking good.

04 04 18 18 CMP Okay. You've got it, P00 and DATA.

04 04 18 39 CDR You check our tracking light, Mike?

04 04 18 44 CMP It came on.

04 04 18 56 CMP Camera's working beautifully.

04 04 19 00 CDR Track off?

04 04 19 04 CMP It's off.

04 04 19 05 CDR I'm ready to start my yaw maneuver if it suits you, Mike.

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04 04 20 04 CDR Does it look like you're going to be able to do this without firing any thrusters, Mike?

04 04 20 11 CMP I'd have to fire laterally once or twice.

04 04 20 22 CMP Very small.

04 04 20 26 LMP Go ahead, Houston. Eagle is ready to copy.

04 04 21 49 LMP Go ahead.

04 04 21 59 LMP That's affirmative. Go ahead with the PDI.

04 04 24 46 LMP Roger. Back to BLOCK and DOI: 101:36:14.07; minus 0075.8, plus all zeros, plus 0009.8; 0057.2, plus 0008.5, 0076.4, 0:30; 000, 293; minus 0075.9, plus all zeros, plus 0009.0; NA. Over.

04 04 25 39 LMP Okay, PDI pad: 102:33:04.36; 09:50; minus 0002.1; 182, 287, 000; plus 56919. PDI less than 10: 105:12:30.00. PDI abort greater than 10: 103:40:00.00, 107:11:30.00. No PDI plus 12 abort: 102:44:37.00; plus 0122.3, minus all zeros, plus 0188.9; 0152.0, plus 0011.0, 0225.0, 0:46; 000, 190; plus 0118.7, plus 0000.0, plus 0191.1; 103:31:07.00; 105:12:30.00. Over.

04 04 29 00 CMP Neil, I'm maneuvering in roll.

04 04 29 03 CDR Roger. I see.

04 04 29 08 LMP Houston, Eagle. Are you copying the fairly large numbers for range and range rate in - VERB 83? And did you - you just give us a state vector that changed one of the two vehicles? Over.

04 04 29 38 LMP Okay. That explains the difference.

04 04 31 03 CDR You want him to go to HIGH GAIN, YAW, zero or - say again the numbers.

04 04 31 17 CDR Okay. YAW, zero; PITCH, minus 20, on the HIGH GAIN. Columbia.

04 04 31 24 CMP Yes, I copy that, and I'll do it just as soon as I get to it.

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04 04 31 27 CDR Okay, he says he'll do that as soon as he gets around there.

04 04 31 38 CMP Okay, Neil, I'm all set for the SEP burn, and we're looking good on this phasing.

04 04 31 42 CDR Okay.

04 04 32 38 CMP Columbia, read you loud and clear. Houston, how me?

04 05 26 54 LMP Burn time, 30 seconds.

04 05 28 44 LMP Okay, state vector looks relatively good. . . .

04 05 29 01 CDR Mike, how do you read?

04 05 29 10 LMP Columbia, Eagle. How do you read?

04 05 29 12 CMP Very good. How do you read me?

04 05 29 13 LMP Very good. If you are ready, give the mark and we'll go to B DATA. Over.

04 05 29 19 CMP Stand by 1. I'm . . .

04 05 29 22 LMP Are you ...?

04 05 29 27 CDR 63.

04 05 29 56 CMP . . .; they look good.

04 05 29 59 LMP Okay, let's switch to B DATA now.

04 05 30 02 CMP Okay.

04 05 30 25 CMP Eagle, Columbia.

04 05 30 29 LMP Go ahead.

04 05 30 31 CMP Columbia's . . .

04 05 37 45 CMP Eagle, Columbia. How's it going?

04 05 37 47 CDR Mike, the burn's complete; it was on time - residuals are nulled, and AGS's free.

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04 05 37 55 CMP Beautiful.

04 05 42 58 CMP Eagle, Columbia.

04 05 42 59 LMP Go ahead.

04 05 43 02 CMP Roger. I'm ready to go back to VHF RANGING configuration. Be alright?

04 05 43 08 LMP Roger. Let's go now to VHF RANGING.

04 05 43 11 CMP Over and out.

04 05 43 20 CMP Okay.

04 05 43 24 LMP And you got VERB 76 in?

04 05 43 27 CMP Yes, 76 is in . . . locked up.

04 05 43 47 CMP And we're . . . 7.5 . . .

04 05 43 52 LMP Roger. That's just what we got, 7.6.

04 05 43 55 CMP Okay.

04 05 43 59 CDR P00?

04 05 44 10 CDR 8 minutes - -

04 05 44 11 LMP We're in good shape - -

04 05 44 12 CDR - - coming up on 8 minutes.

04 05 44 13 LMP - - for . . . - -

04 05 44 15 CDR HIGH BIT, 8 minutes.

04 05 44 17 LMP You don't have an 8-minute mark.

04 05 44 18 CDR 67 feet per second. Go ahead with the . . .  
04 05 44 23 LMP Can't beat that. Okay, through with that?  
04 05 44 26 CDR Yes. I like it.  
04 05 44 31 LMP Hold on to the . . . below.

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04 05 44 35 CDR Okay. And I'll pull the breakers - think we can . . . roll.  
04 05 44 51 LMP Yes.  
04 05 45 03 LMP Got them both?  
04 05 45 05 CDR What?  
04 05 45 06 LMP Got them both?  
04 05 45 07 CDR Yes. . . .  
04 05 45 34 LMP Okay, it . . .  
04 05 45 42 CDR Going to load the PDI plus 12, right?  
04 05 45 52 LMP Right.  
04 05 45 54 CDR Okay. I'm going to start pitching down to 125.  
04 05 46 15 LMP No PDI plus 12.  
04 05 46 34 CMP I have you right down . . . 65 feet per second.  
04 05 46 38 CDR Sounds good.  
04 05 47 03 LMP Okay, the camera is set. And ought to be ready to do the P52.  
04 05 47 13 CDR Yes.  
04 05 47 15 LMP Not going to be much of a drift check.  
04 05 47 23 CDR It - it torques them late enough to ensure that - . . . the drift check.  
04 05 47 32 LMP Sure seems like we're going the wrong way.  
04 05 47 42 LMP How much do we got to go to pick it up?  
04 05 47 46 CDR Got to go - oh, half the moon to go, I guess.  
04 05 48 05 CDR Coming down already.  
04 05 48 06 LMP Okay. It's got us 152; it's 151; there's . . ., okay? . . .

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04 05 48 44 LMP There's 52.  
04 05 48 54 CDR Got 8 minutes . . .  
04 05 48 59 LMP Now we can let us take - let it take us there.

04 05 49 03 CDR No, wait; don't do that.

04 05 49 05 LMP Why not?

04 05 49 06 CDR I have to roll.

04 05 49 09 LMP Yes, that's right.

04 05 49 11 CDR In 2 more minutes.

04 05 49 32 LMP Well, I did . . . attitude.

04 05 49 37 CDR Yes, you'll have to roll over; well, I guess I might as well do that.

04 05 49 45 LMP Where's your watch? Got your stopwatch?

04 05 49 48 CDR Got it in my pocket.

04 05 50 03 LMP Well, the . . . us over, huh?

04 05 50 06 CDR . . .

04 05 50 16 CDR And, one thing I'd appreciate if you could - see if you could - find the -

04 05 50 30 LMP What?

04 05 50 34 CDR The map.

04 05 50 36 LMP Yes. Which one do you want? I've got - -

04 05 50 37 CDR . . .

04 05 50 40 LMP That it? Where do you want it?

04 05 50 52 LMP Trade you that for a piece of gum. There it is.

04 05 50 59 CDR . . .

04 05 51 17 CDR When do we have to get these? Alright, go on.

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04 05 51 40 LMP What do you mean by bringing - bringing CSM trash in here?

04 05 51 42 CDR Well, that's stuff I had left over in my pocket.

04 05 53 30 CDR You want ...?

04 05 53 44 CDR Screen . . .

04 05 53 53 CDR You in AUTO?

04 05 53 54 LMP No, I'm not AUTO; I'll be there in just a minute.

04 05 54 09 CDR 312, it likes.

04 05 54 13 LMP Well, we ought to proceed on that for a while.

04 05 54 18 CDR Okay.

04 05 54 27 LMP These clocks you can't move like you can some. Let me try and get that clock set for PDI. . . . 33 . . .

04 05 54 38 CMP . . . updates . . .

04 05 54 47 CDR Yes, we're keeping busy down here.

04 05 54 52 CMP Okay.

04 05 55 54 LMP Can't change this thing, once it gets going; like in the middle of a - -

04 05 56 00 CDR You can't?

04 05 56 01 LMP No.

04 05 56 08 CDR PGNS MODE CONTROL in AUTO.

04 05 56 34 CDR Okay. Well, I can . . . - the radar antenna.

04 05 56 46 LMP No, that's the wrong circuit - that's . . .

04 05 56 53 CDR There's the sun in the COAS.

04 05 56 57 LMP In the COAS?

04 05 56 59 CDR In the - I mean, in the reticle.

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04 05 57 02 LMP Alright, let me - let me do my rain dance with the DSKY here.

04 05 57 08 CDR Okay.

04 05 57 09 LMP Got it on?

04 05 57 14 CDR Now I need a VERB 76. I'm right on in pitch.

04 05 57 21 LMP You want a VERB 76? Okay, you got it.

04 05 57 33 CDR Hmm.

04 05 57 40 CDR How are you doing - you going to be about ready to mark?

04 05 57 46 LMP Yes.

04 05 57 55 LMP Say, how about you remembering the number that I read to you; don't have to write it down. Roll right just a little.

04 05 58 08 CDR Just about ready to mark.

04 05 58 10 LMP Go ahead.

04 05 58 12 CDR Oh, this cottonpicking - thought I was.

04 05 58 20 LMP Give me a . . . check.

04 05 58 29 LMP Ready?

04 05 58 31 CDR Getting close.

04 05 58 33 LMP Okay.

04 05 58 42 CDR Ready?

04 05 58 43 LMP Yes.

04 05 58 45 CDR MARK it.  
04 05 58 46 LMP 124 19, 124 19. Well, it should have been - 124 00.  
04 05 59 05 CDR Do another one?

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04 05 59 06 LMP Yes.  
04 05 59 12 CDR Okay. I'm about ready.  
04 05 59 21 LMP Tell me when.  
04 05 59 31 CDR Ready -  
04 05 59 33 CDR MARK it.  
04 05 59 34 LMP Okay. 134 17; KEY RELEASE; PROCEED. . . . it should have been - 124 01.  
One more. Getting closer.  
04 06 00 18 LMP Ready whenever you are.  
04 06 00 29 CDR Stand by. How's our roll?  
04 06 00 36 LMP Okay.  
04 06 00 43 CDR MARK it.  
04 06 00 44 LMP . . . - 13; KEY RELEASE; PROCEED. 4 13 - . . . it should have been -  
closer yet.  
04 06 01 00 CDR Okay, Mike, we passed the star check. Foxtrot.  
04 06 01 04 CMP Very good. . . .  
04 06 01 16 CDR Very good. Okay? . . .  
04 06 01 29 LMP Alright, let's go to - pitch to 180, 285, and zero.  
04 06 01 47 CDR Okay. We'll . . .  
04 06 02 11 CDR Cottonpicker just won't stay - try it!  
04 06 02 16 LMP Well, wait until we lose that descent stage, man.  
04 06 02 19 CDR We'd better take - a - piece of tape; hold that down.  
04 06 02 25 LMP How about if you get the bottom in the - get the bottom underneath this cover?  
That help?

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04 06 02 34 CDR Well, it - it's still not; I've had it in there real good couple of times.  
04 06 02 42 LMP Your - hoses were tearing hell out of my board.  
04 06 02 47 CDR Sorry.  
04 06 02 50 LMP You got INVERTER 1 circuit breaker in, right?  
04 06 02 53 CDR Checked in.

04 06 02 54 LMP Okay. I'm going to check INVERTER 1. INVERTER 2 is good; and INVERTER 1 is good, and we're on INVERTER.

04 06 03 05 CDR . . . look good.

04 06 03 16 LMP Okay, get your AELD circuit breaker in and ABORT STAGE circuit breaker in.

04 06 03 19 CDR AELD is in; ABORT STAGE is in.

04 06 03 24 LMP Cycle the CWEA? No, we must have lost one.

04 06 03 28 CDR Yes. That cottonpicker may be trouble.

04 06 03 35 LMP Well, we'll have to tell them about that. I don't know when it - when it went out, because we didn't get any light that I saw, did you?

04 06 03 45 CDR I think it's just a switch. I . . . if it doesn't trigger a light -

04 06 03 50 LMP Something - -

04 06 03 51 CDR Oh, we're in PULSE, and we're not commanding any firing - -

04 06 03 55 LMP I don't know; that could have come under DOI, but I doubt it.

04 06 04 02 CDR I just think that's one of those sticky flags. . . . got a good engine.

04 06 04 11 LMP Alright, let's see.

04 06 04 12 CDR . . .

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04 06 04 18 LMP ENGINE STOP button was reset?

04 06 04 24 CDR ENGINE STOP button is START, but it is going to be now.

04 06 04 31 LMP Alright. Window bars; THROTTLE CONTROL to AUTO.

04 06 04 39 CDR Okay. THROTTLE CONTROL to AUTO.

04 06 04 42 LMP Alright, TTCA - -

04 06 04 44 CDR THROTTLE on MINIMUM.

04 06 04 45 LMP - - ENABLE - ENABLE - THROTTLE in MINIMUM. Okay, in 35 minutes, we'll get the BAT feeds ON and - -

04 06 04 56 CDR That's the wrong time, right?

04 06 04 57 LMP No, no, no.

04 06 04 59 CDR ...? PDI?

04 06 05 00 LMP It's - oh - about - probably maybe a second, right here, . . . 32. Okay?

04 06 05 09 CDR Yes, it's about a second off.

04 06 05 13 LMP If it's fast, I'll stop it; if it isn't, why, forget it.

04 06 05 50 LMP You want this one over there?

04 06 05 51 CDR I need this out. Burn in 46 minutes.

04 06 05 57 LMP You want this one?  
04 06 06 00 CDR Yes. I don't - think - it'll be helpful, but I'll stick it here and pull it out if I need it.  
04 06 06 20 LMP Let's see; we haven't got P20 going yet, have we?  
04 06 06 23 CDR No.  
04 06 06 24 LMP Let's do that. Let's get the RENDEZVOUS RADAR circuit breaker in.

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04 06 06 27 CDR Okay.  
04 06 06 34 LMP IN. Might look at the DPS.  
04 06 06 51 CDR What do you hear?  
04 06 07 00 LMP . . . glycol pumps.  
04 06 07 03 CDR Alright.  
04 06 07 10 CDR Look at that. Oh, that must have been - . . .  
04 06 07 20 LMP Okay, ascent - tank pressure - temperature's up, changed to - I don't know.  
04 06 07 28 CDR DPS's good -  
04 06 07 30 LMP Look at all that RCS we got.  
04 06 07 35 CDR That's more than we've ever had in the simulator, isn't it?  
04 06 07 38 LMP Yes.  
04 06 07 51 CDR Got your camera rigged?  
04 06 07 54 LMP The other circuit breaker? Camera's all set to go. I hope the others just don't fall out. Got them both in?  
04 06 08 01 CDR Yes.  
04 06 08 17 LMP Well, let's hope he's in mode 2.  
04 06 08 33 LMP Okay, I'm going to get the ASCENT BATS, ON. BATTERY 5, ON; looks good. BATTERY 6, ON; that's good.  
04 06 09 08 CDR Yes, we've lost it.  
04 06 09 14 LMP Well, did it go to mode 2? That's where I want it to go.  
04 06 09 22 CDR No - I can't tell.  
04 06 09 26 LMP Yes, it's going to mode 2. Hasn't it?

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04 06 09 33 CDR Yes.  
04 06 09 34 LMP Yes. There we are. Beautiful.  
04 06 09 38 CDR Go to AUTO TRACK?

04 06 09 39 LMP No, not yet - wait until the light goes out. Did that thing want to - Hey, I didn't know that could do that. You don't hear that, huh? (Laughter)

04 06 10 01 LMP Hear that, too, huh?

04 06 10 06 CDR Sounds like wind whipping around the trees.

04 06 10 16 LMP Okay, AUTO TRACK.

04 06 10 32 LMP Okay, we ready to go to P63?

04 06 10 36 CDR Yes.

04 06 11 07 LMP Okay, get a - get a - Need to compare a TIG time. 09:50. That's right.

04 06 11 25 CDR See that Big Dipper there?

04 06 11 27 LMP That's a big out of plane, but I don't know which way it is.

04 06 11 33 CDR I believe minus - but they were expecting it.

04 06 11 36 LMP Okay, four -

04 06 11 38 CDR That's within 7 . . . seconds. Okay?

04 06 11 53 LMP Okay. These should not be in AUTO, right?

04 06 11 57 CDR Yes. Remember that one.

04 06 12 13 LMP 180, 287, 0. Here goes.

04 06 12 46 CMP Give me - -

04 06 12 47 CDR You'll get them before we will.

04 06 12 50 CMP Ready to give them a status report? DOI?

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04 06 12 54 LMP Well, I hope it's on the right page.

04 06 13 24 LMP Okay, I'm going to get DESCENT QUANTITY, ON, . . . ON.

04 06 14 19 CDR Okay, you want to give it - Okay, we've lost it. In AUTO now.

04 06 14 42 LMP . . . RANGE RATE.

04 06 14 59 CDR How about that?

04 06 30 47 CDR VERB 77 and a VERB 62.

04 06 31 04 LMP Okay, sequence camera coming on.

04 06 31 22 CDR Should be a little . . .

04 06 31 43 LMP Roger. I think I've got you on high gain now.

04 06 31 47 CDR Okay. Hear anything about that?

04 06 32 02 CDR Say again the angles, though.

04 06 32 04 LMP I'll set them in to use them before we yaw around.

04 06 32 15 LMP Copy.  
04 06 32 19 CDR Okay. What else is left to do here?  
04 06 32 22 LMP ENGINE ARM, DESCENT. 40 seconds.  
04 06 32 30 CDR Is your camera running?  
04 06 32 31 LMP Camera's running.  
04 06 32 42 LMP Okay, . . .  
04 06 32 46 CDR Okay, the OVERRIDE at 5 seconds.  
04 06 32 54 CDR DESCENT, ARMED.  
04 06 32 58 LMP ALTITUDE lights, ON? . . . proceed?  
04 06 33 02 CDR Proceed. 1, 0 -

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04 06 33 07 CDR IGNITION. 10 percent.  
04 06 33 14 LMP Just about on time.  
04 06 33 18 CDR You got the OVERRIDES ON?  
04 06 33 21 LMP OVERRIDE is ON. 24. FLASH. THROTTLE, up.  
04 06 33 34 CDR Good. Okay.  
04 06 33 42 LMP PGNS holding.  
04 06 33 59 LMP Okay, we're reading your relay to us, Mike? I'll leave it in SLEW. Relay it to us. See if they got me now; I got good signal strength on SLEW.  
04 06 34 21 LMP Okay, rate of descent looks good.  
04 06 34 27 LMP Roger. Copy.  
04 06 34 44 LMP Copy.  
04 06 34 49 CDR Okay. Coming up on 2 minutes; going good. AGS's good?  
04 06 34 57 LMP AGS and PGNS agree very closely.  
04 06 34 59 CDR RCS is good; no flag. DPS pressure is good. 1 minute.  
04 06 35 11 LMP 30 feet per second. Light's on. Altitude's a little high.  
04 06 35 21 CDR Okay, we want a 10. Let's get - You want to get rid of this radar?  
04 06 35 30 LMP Yes.  
04 06 35 31 CDR To SLEW?  
04 06 35 32 LMP SLEW.  
04 06 35 43 LMP Houston, I'm getting a little fluctuation in the - AC voltage now. Just the meter, maybe, huh?

04 06 36 03 CDR Okay, we went by the 3-minute point early. A little off.

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04 06 36 11 LMP Rate of descent looks real good. Altitude - right about on.

04 06 36 16 CDR Our position checks downrange show us to be a little off. AGS - AGS is showing about 2-feet-per-second greater rate of descent.

04 06 36 34 CDR MARK.

04 06 36 35 CDR Show us to be about - Stand by. Maybe have to stop that.

04 06 36 41 LMP Altitude rate looks right down the groove.

04 06 36 44 CDR Roger. About 2 seconds off - rolling over.

04 06 36 54 CDR Okay, now watch that signal strength because -

04 06 36 58 LMP Yes, I think it's going to drop.

04 06 37 01 CDR Boy, I tell you, this is much harder to do than it was -

04 06 37 09 LMP Keep it going.

04 06 37 16 LMP Houston, before we leave you, the ED BATS are GO at 4 minutes.

04 06 37 28 LMP Roger.

04 06 37 44 CDR How you look over there? Okay?

04 06 38 02 LMP Okay. You got good lockon.

04 06 38 05 CDR We got a lockon?

04 06 38 06 LMP Yes. Altitude light's out.

04 06 38 08 CDR Okay.

04 06 38 12 LMP DELTA-H is minus 2900. We got the earth right out our front window.

04 06 38 20 CDR Sure enough.

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04 06 38 22 LMP Houston, you're looking at our DELTA-H. Program alarm.

04 06 38 29 CDR 1202; 1202.

04 06 38 40 CDR What is it?

04 06 38 42 LMP That's in core . . .

04 06 38 46 CDR Give us a reading on the 1202 program alarm.

04 06 38 57 LMP Roger. 330. Okay, looks like about 820. Roger. Copy. 6 foot . . .

04 06 39 12 LMP Same alarm and it appears to come up when we have a 16 68 up.

04 06 39 19 CDR Were we - were - was it coming down?

04 06 39 22 LMP Yes, it's coming down beautifully.

04 06 39 26 CDR Roger; it looks good now.

04 06 39 32 LMP THROTTLE, DOWN.

04 06 39 33 CDR THROTTLE, DOWN, on time.

04 06 39 35 LMP You can feel it in here when the throttle's down; better than the simulator.

04 06 39 46 LMP AGS and PGNS look real close.

04 06 39 48 CDR Okay. No flags. RCS is GO; DPS is GO; pressure is - okay.

04 06 40 11 LMP Okay, I'm still on SLEW, so we may tend to lose as we gradually pitch over; let me try AUTO again now, and see what happens. Okay, looks like it's holding.

04 06 40 25 CDR Okay. 07:30 coming up. Should be . . .

04 06 40 36 LMP . . .

04 06 40 45 CDR And I have the window. I have that - view - out the window - Going to . . .

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04 06 40 56 CDR Coming up on 8 minutes.

04 06 41 00 LMP Could you give us an estimated switchover time, please, Houston?

04 06 41 08 LMP Okay, 7000, . . . Looks good.

04 06 41 16 LMP Roger.

04 06 41 33 LMP P64.

04 06 41 40 CDR . . . over. Okay. 5000, 100 feet per second is good, and I'm going to check my attitude control.

04 06 42 01 CDR Attitude control is good - manual attitude control is good. Okay, 3070.

04 06 42 15 LMP Roger; understand. Go for landing, 3000 feet. Program alarm - 1201.

04 06 42 22 CDR 1201. Okay. 2050.

04 06 42 29 LMP 2000 feet; 2000 feet.

04 06 42 30 CDR Give me an LPD.

04 06 42 32 LMP Into the AGS, 47 degrees.

04 06 42 33 CDR Give me an LPD.

04 06 42 35 LMP 47 degrees.

04 06 42 37 CDR 47.

04 06 42 38 CDR That's not a bad-looking area. Okay.

04 06 42 51 CDR 1030 is good.

04 06 42 55 CDR What's LPD?

04 06 42 58 LMP 35 degrees, 35 degrees; 750, . . . coming down to 23.

04 06 43 05 CDR Okay.

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04 06 43 06 LMP 700, 21 down, 33 degrees.

04 06 43 08 CDR Pretty rocky area.

04 06 43 10 LMP 600 feet, down to 19; 540 feet, down to 30, down to 15.

04 06 43 24 CDR Okay.

04 06 43 25 LMP Okay, 400 feet, down to 9, 58 forward.

04 06 43 29 CDR . . .

04 06 43 31 LMP 350 feet, down at 4 - 330 - 6-1/2 down. We're pegged on . . . velocity.

04 06 43 44 LMP 300 feet down, 3-1/2, 47 forward. Coming up - 1 a minute, 1-1/2 down. Moving out.

04 06 43 55 LMP 270.

04 06 43 57 CDR Okay, how's the fuel?

04 06 43 59 LMP Wait just a minute.

04 06 44 00 CDR Okay, Ed, this looks like a good area here.

04 06 44 03 LMP I got the shadow out there. 250, down at 2-1/2, 19 forward.

04 06 44 11 LMP Altitude velocity light, 3-1/2 down, 220 feet; 13 forward, 11 forward, coming down nicely. 200 feet - -

04 06 44 23 CDR . . . - -

04 06 44 25 LMP 5-1/2 down, 5-1/2 down.

04 06 44 27 CDR I got to get . . .

04 06 44 30 LMP 160 feet, 6-1/2 down - 5-1/2 down, 9 forward. Still looks good. 120 feet.

04 06 44 43 LMP 100 feet, 3-1/2 down, 9 forward. 5 percent - . . .

04 06 44 50 CDR Okay.

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04 06 44 53 LMP Okay, 75 feet. And it's looking good; down a half. 6 forward; light's on. 6 - 60 feet down, 2-1/2, 2 forward, 2 forward.

04 06 45 13 LMP Looks good. 40 feet down, 2-1/2. Picking up some dust. 30 feet, 2-1/2 down - straight down; 4 forward, 4 forward, drifting to the right a little.

04 06 45 26 LMP 20 feet, down a half; drifting forward just a little bit. Good. Okay.

04 06 45 41 CDR SHUTDOWN.

04 06 45 42 LMP Okay. ENGINE STOP; ACA out of DETENT.

04 06 45 43 CDR Out of DETENT.

04 06 45 45 LMP AUTO MODE CONTROL, both AUTO; DESCENT ENGINE COMMAND  
OVERRIDE, OFF; ENGINE ARM, OFF; 413 is in.

04 06 45 52 CDR ENGINE ARM is OFF.

04 06 45 58 CDR Houston - Tranquility Base here. THE EAGLE HAS LANDED.

04 06 46 14 CDR Thank you.

04 06 46 17 CDR Okay. Let's go on. Okay, we're going to be busy for a minute.

04 06 46 23 LMP Alright, MASTER ARM, ON. Take care of the descent vent.

04 06 46 25 CDR MASTER ARM coming OFF.

04 06 46 27 LMP I'll get the pressure vent.

04 06 46 28 CDR Okay.

04 06 46 36 LMP Very smooth touchdown.

04 06 46 49 CDR I didn't hear that vent going - -

04 06 46 51 LMP . . . oxidizer.

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04 06 46 55 CDR . . . vent.

04 06 48 12 CMP Houston, how do you read Columbia on the high gain?

04 08 32 56 LMP Okay, Houston. On DESCENT 1, the fuel and oxidizer are reading 10 psi; on  
DESCENT 2, fuel is reading 10 psi; oxidizer, 11 psi.

04 08 34 02 CDR Okay, going back to OFF.

04 08 34 40 CDR . . . is OPEN. Yes, . . .

04 08 34 46 LMP Alright, we need the -

04 08 34 52 LMP Houston, Tranquility Base is ready to go through the powerdown and terminate  
the simulated countdown.

04 08 35 08 CDR Hope he is, too.

04 08 35 10 LMP OPEN.

04 08 35 13 CDR Okay, the operations HEATER circuit breaker is OPEN.

04 08 35 21 LMP Roger. It's in progress. Anytime, take your helmet off.

04 08 35 45 LMP Roger. Couldn't have had better treatment from all of you back there.

04 08 40 55 CMP Houston, Columbia. Copy NOUN 49?

04 08 41 02 CMP Roger.

04 08 41 44 CMP Yes, stand by 1, Charlie, for the next . . .

04 08 41 56 CMP Well, the area looks smooth, but I was unable to see them. I just picked out a  
distinguishable crater nearby and marked on it.

04 08 42 12 CMP It looks like a nice area, though.

04 08 42 46 CMP Houston, Columbia. I say again: I did not see them. AUTO optics pointed at a spot very close to the coordinates which you gave me, so I picked

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out a tiny crater in that area and marked on it, so that I'll be able to have repeatable data, but I was still unable to see them.

04 10 36 14 CMP Houston, Columbia. I'm coming up on my time for the first pass when I may be able to see the LM. Do you have any topographical cue that might help me out here on - AUTO optics is tracking between two craters. One of them, as the LM sees it, would be long at 11 o'clock; the other would be short and behind him at 5 o'clock. They're great big old craters - depressions.

04 10 38 40 CMP Roger, Houston. Columbia . . . up. I kept my eyes glued to the sextant that time, hoping I'd get a flash of reflected light off the LM, but I wasn't able to see any of my scan areas that you suggested.

04 10 39 17 CMP It's going past now, Bruce, but I scanned that area that you are talking about very closely, and no, I did not see them.

04 10 40 26 CMP Go ahead.

04 10 40 57 CMP Stand by 1.

04 10 49 03 CMP Houston, Columbia. Over.

04 10 49 21 CMP Houston, Columbia. Over.

04 10 50 09 CMP Houston, Columbia. Over.

04 10 53 21 CMP Okay.

04 11 05 13 CMP Houston, Columbia on the high gain.

04 11 05 23 CMP Read you loud and clear, Bruce. What's new?

04 11 05 39 CMP Ready to copy.

04 13 19 44 CMP Columbia.

04 14 08 54 CMP Houston, Columbia on the high gain. Over.

04 14 09 01 CMP I'm reading you loud and clear. How's it going?

04 15 18 29 CMP Columbia. Roger.

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04 15 18 49 CMP Negative that.

04 16 05 58 CMP Houston, Columbia on . . . How do you read?

04 16 06 10 CMP Roger; Columbia OMNI Charlie. How do you read?

04 16 06 34 CMP Hallelujah.

04 16 06 57 CMP Roger, understand. You want a option 1 - P52, option 1?

04 16 09 09 CMP P52.

04 16 14 51 CMP Roger, Houston. Columbia's reading you.

04 16 15 20    CMP        Roger. Stand by.

04 16 15 46    CMP        Ready to copy.

04 16 17 37    CMP        Houston, Columbia.

04 16 18 07    CMP        Negative, Bruce. Just give me your latitude - longitude over 2, altitude, and the grid squares. Never mind the other; you're broken up.

04 16 18 28    CMP        Well, that is, if you have the new information; otherwise, I'll just use the old numbers.

04 16 18 37    CMP        Okay.

04 16 22 17    CMP        Houston, Columbia. You got the new coordinates?

04 16 22 31    CMP        Roger. Have you got the new coordinates for me?

04 16 23 13    CMP        Roger. Thank you.

04 16 23 43    CMP        Okay.

04 16 23 56    CMP        Okay. I read back plus 00692, plus 11713, and minus 00144. And you have a grid square for me?

04 16 24 36    CMP        Kilo 0.9 and 6.3. Thank you. One of these grid squares is about as much as you can scan on a single pass.

04 16 25 38    CMP        Roger.

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04 16 25 51    CMP        Okay.

04 16 33 57    CMP        Houston, Columbia . . .

04 16 34 10    CMP        Roger. I can't see them.

04 16 34 21    CMP        Roger. . . .

04 16 34 43    CMP        Roger. I need a very precise position because I can only do a decent Job of scanning maybe one of those grid squares at a time. The area that we've been sweeping covers 10's and 20's and 30's of them.

04 16 35 10    CMP        Roger. How's the fuel coming?

04 16 35 29    CMP        Roger. Well, I'll continue this maneuver then to roll 82, pitch 218, yaw zero, if that's okay with you, and do a P52 in that attitude. And that'll be a . . .





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05 03 08 00 CDR Thank you kindly, Jim.

05 03 08 06 CDR Glad to have all you big roomful of people looking over our shoulder.

05 03 55 17 CMP Houston, Columbia on OMNI D, Delta. Over.

05 03 55 33 CMP Go ahead.

05 04 16 24 LMP BAT 2 and 4 coming OFF.

05 04 16 29 CDR Okay, OFF.

05 04 16 43 LMP DEAD FACE, barber pole. Okay, on 11, DESCENT ECA and DESCENT ECA CONTROL circuit breakers, OPEN. Just the descent.

05 04 16 54 CDR DESCENT ECA and DESCENT ECA CONTROL, OPEN.

05 04 16 58 LMP Right. Okay, let's . . . and check the APS card.

05 04 17 03 CDR Okay.

05 04 17 04 LMP STABILIZATION CONTROL circuit breakers, all CLOSED.

05 04 17 08 CDR All except APS - no, . . .

05 04 17 15 LMP RATE SCALE, 25.

05 04 17 17 CDR 25.

05 04 17 18 LMP ATT/TRANSLATION, 4 JETS.

05 04 17 19 CDR 4 JETS.

05 04 17 21 LMP BALANCE COUPLE, ON, . . .

05 04 17 22 CDR BALANCE COUPLE, ON.

05 04 17 23 LMP TTCA, JETS.

05 04 17 24 CDR Check.

05 04 17 32 LMP DEADBAND, MINIMUM.

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05 04 17 33 CDR MIN.

05 04 17 34 LMP ATT CONTROL, MODE CONTROL.

05 04 17 37 CDR Okay.

05 04 17 38 LMP MODE CONTROL, AUTO.

05 04 17 41 CDR Both AUTO, AUTO.

05 04 17 47 LMP Okay, I'm standing by for 2 minutes to - for the guidance steering in the AGS.

05 04 18 03 CDR . . . ON, right?

05 04 18 04 LMP Right.

05 04 18 27 CDR Roger.

05 04 19 24 LMP Got 26.9 . . .

05 04 20 03 LMP Roger. Guidance steering in the AGS.

05 04 20 56 LMP Okay, MASTER ARM, ON?

05 04 20 59 CDR MASTER ARM is ON.

05 04 21 14 CDR At 5 seconds, I'm going to get ABORT STAGE and ENGINE ARM. When I get it, proceed.

05 04 21 18 LMP Right.

05 04 21 20 CDR . . .

05 04 21 26 LMP . . .?

05 04 21 27 CDR Yes.

05 04 21 28 LMP Okay.

05 04 21 31 CDR DSKY blanks.

05 04 21 42 LMP Got that ascent card?

05 04 21 44 CDR This one? Place to put it?

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05 04 21 50 LMP Yes. 9, 8, 7, 6, 5 - ABORT STAGE; ENGINE ARM, ASCENT - Proceed.

05 04 22 01 CDR We're off; look at that stuff go all over the place.

05 04 22 05 LMP Look at that shadow. Beautiful 26 - 36 feet per second up - -

05 04 22 10 CDR The Eagle is - -

05 04 22 11 LMP - - Be advised of the pitchover - -

05 04 22 12 CDR - - pitching over. BALANCE COUPLE, OFF.

05 04 22 16 LMP BALANCE COUPLE, OFF. Very quiet ride. There's that . . . sticking out now.

05 04 22 25 CDR . . . See if you can see the - Cat's Paw.

05 04 22 35 CDR It's all the way out in front of us in that -

05 04 22 46 LMP Roger. Can't see it.

05 04 22 52 CDR Do you see the Cat's Paw?

05 04 22 53 LMP No.

05 04 23 03 LMP This might be it.

05 04 23 08 CDR Roger. Yes, I think it is.

05 04 23 18 LMP It's a very quiet ride, just a little bit of slow wallowing back and forth - not very much thruster activity.

05 04 23 35 LMP 700, 150 up; beautiful. 9000. PGNS and AGS agree within a foot per second.

05 04 23 58 CDR Pressures are good.  
05 04 24 03 LMP 2 minutes the time; 170 is beautiful, 14 000.  
05 04 24 12 LMP Within a foot per second again, AGS to PGNS.  
05 04 24 30 LMP S-band looks like it's holding good - 1500, 182.

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05 04 25 05 CDR Roger.  
05 04 25 15 LMP Right on H-dot. Coming up here - -  
05 04 25 19 CDR Looks like the velocity is sort of - -  
05 04 25 20 LMP - - this is H-DOT MAX now.  
05 04 25 21 CDR - - . . . right here. Okay.  
05 04 25 31 CDR Going right down - going right down U.S. 1.  
05 04 26 02 CDR T minus 4 minutes - . . . a little fast - we got altitude rate - -  
05 04 26 11 LMP Now we got - got Sabine off to our right, now.  
05 04 26 28 CDR Coming up on Schmidt here pretty soon, huh?  
05 04 26 32 LMP 02:40 to go.  
05 04 26 52 CDR Everything's fine.  
05 04 26 54 LMP Okay, there's Ritter out there. See him, there it is, right there - and there's Schmidt. Man, that's impressive looking, isn't it?  
05 04 27 03 CDR I can't see it. Oh, yes, now I can just get a glimpse.  
05 04 27 09 LMP 5 minutes, 33 - G&N, 54 -  
05 04 27 15 CDR Looking good here. It's a spectacular ride.  
05 04 27 39 LMP . . . off to the right.  
05 04 27 46 CDR 6 minutes.  
05 04 28 00 CDR Looks like . . . off a little here.  
05 04 28 07 LMP Roger. Good agreement in DELTA-V to go in both AGS and PGNS.  
05 04 28 30 CDR . . . three . . .  
05 04 28 33 LMP Alright, 800 to go.

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05 04 28 36 CDR Okay.  
05 04 28 40 LMP 700 to go. Okay, now open up the main shutoff.  
05 04 28 54 LMP ASCENT FEED's, CLOSED, pressure's holding good; CROSS FEED, ON.  
05 04 28 59 CDR 350 to go, right?

05 04 29 00 LMP 350 to go. Stand by on the ENGINE ARM.  
05 04 29 11 CDR Okay, I'm getting ready for ARM, OFF.  
05 04 29 13 LMP Ready?  
05 04 29 14 CDR ARM, OFF.  
05 04 29 15 LMP OFF. 50 -  
05 04 29 16 CDR/LMP SHUTDOWN.  
05 04 29 21 LMP We got 5337.3 and 32.8 feet per second, 60 666.  
05 04 29 33 CDR . . . up?  
05 04 29 34 LMP And we got - we got our residuals.  
05 04 29 39 CDR Okay - take those out, right?  
05 04 29 43 LMP Yes, take -  
05 04 29 51 CDR . . .  
05 04 30 12 LMP We're working on it.  
05 04 30 39 CDR I can't check that - residual.  
05 04 30 42 LMP That's good.  
05 04 30 52 LMP Okay, that sounds a little - little on the high side.  
05 04 30 57 CDR Okay.  
05 04 30 58 LMP Okay, Houston, we show 47.3 by 9.5.  
05 04 31 12 LMP The AGS has 9.5 - 46.6.

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05 04 31 25 CDR Okay.  
05 04 31 33 CDR . . .  
05 04 31 51 LMP Roger.  
05 04 32 16 LMP You want to try . . . ?  
05 04 32 20 CDR Yes.  
05 04 32 23 LMP Circuit breakers in - or do you want to go to align?  
05 04 32 28 CDR Maybe we'd better get an alignment - . . .  
05 04 32 31 LMP Okay. . . .  
05 04 32 40 CDR Yes.  
05 04 32 52 CDR Roger, Houston. The Eagle is back in orbit, having left Tranquility Base and leaving behind a replica from our Apollo 11 patch and the olive branch.  
05 04 33 24 CDR We had a lot of help down there.

05 04 33 27 LMP We're going to have to have our rendezvous radar circuit breakers in anyway to get onto your link.

05 04 33 30 CDR Yes.

05 04 33 45 LMP Okay.

05 04 34 05 CDR Okay.

05 04 34 09 LMP INVERTER 2, INVERTER 1, circuit breaker open?

05 04 34 11 CDR I got INVERTER 1.

05 04 34 28 LMP Close the AOT LAMP circuit breaker -

05 04 34 44 CDR Going to TRACK here.

05 04 34 50 LMP Yes.

05 04 34 52 CDR That right?

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05 04 34 53 LMP Right.

05 04 35 19 CDR You know, I didn't see a lot of dust in the cockpit, did you?

05 04 35 22 LMP No, there was a fair amount. What did you get, 283?

05 04 35 31 CDR Yes.

05 05 06 58 LMP . . .

05 05 07 08 CDR Okay.

05 05 07 39 CDR No. We'll wait until CDH.

05 05 08 17 CDR Okay, thank you.

05 05 08 37 CDR Okay.

05 05 09 31 CDR No, I didn't; go ahead, Mike.

05 05 09 39 CDR I think we are now, finally, and I think I have you in sight.

05 05 09 57 CDR We have 51 5.

05 05 10 19 CDR Well, the ground's got 51 5, and we got 51 5. Yes. First time we've ever agreed on anything.

05 05 10 41 LMP Want these . . . first?

05 05 10 43 CDR Not yet.

05 05 10 45 LMP I don't know why.

05 05 11 17 LMP I had to turn my S-band off so I could hear him - my S-band switch on the audio panel. Woo-woo!

05 05 11 31 CDR Yes, that works good.

05 05 11 51 LMP Not at this point, no.

05 05 12 42 CDR Okay.  
05 05 13 11 LMP . . . Hey, Mike, how do you read me?

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05 05 13 24 LMP Okay, let's go to B DATA on your command.  
05 05 13 59 CMP Eagle, Columbia.  
05 05 14 06 LMP Loud and clear.  
05 05 14 10 LMP Affirmative; we're at the burn attitude, too.  
05 05 15 10 CMP Eagle, Columbia. When you get a chance, could you give me the - the CSI P76 pad and your NOUN 84 and your NOUN 33?  
05 05 15 21 LMP Yes, we'll do that in a minute.  
05 05 15 25 CMP Alright.  
05 05 15 50 LMP Okay, Mike, you want the burn time and the NOUN 81; is that right?  
05 05 16 00 LMP Okay, the burn time is 125:19:34.7, and the burn is 51.5, zero, and zero.  
05 05 16 16 CMP Okay, I understand. Plus 51.5, zeros, and zeros, and you're using 125:19:34.70. Thank you kindly.  
05 05 18 45 CMP I'm in maneuver attitude, all set to burn if necessary. I've got about 45 minutes to TIG - 45 seconds to TIG.  
05 05 18 51 LMP Okay.  
05 05 19 46 LMP We're burning, Mike.  
05 05 21 36 LMP Burn complete, Mike.  
05 05 21 39 CMP Good show.  
05 05 22 59 LMP Okay, Mike, our CDH time is 126:17:45.58. Over.  
05 05 23 12 CMP Roger; copy. CDH, 126:17:45.58.  
05 05 23 21 LMP Affirmative.  
05 05 28 33 CMP Eagle, Columbia. I have you in an orbit 49.5 by 46.1.  
05 05 28 43 LMP Okay, thank you.

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05 05 29 09 CMP Eagle, Columbia. I'd like to go back to VHF RANGING configuration, please, on your mark.  
05 05 29 15 LMP Roger. On my mark -  
05 05 29 17 LMP MARK, VHF RANGING.  
05 05 30 37 LMP . . .  
05 05 30 40 CDR Well, which way did I go?

05 05 30 42 LMP . . . out of plane.

05 05 30 45 CDR What?

05 05 30 46 LMP Did you hear that?

05 05 30 57 LMP Why you don't hear these 3 - 3500-pound rocket engines when you're sitting on them, I'll never know.

05 05 31 03 CDR Yes.

05 05 31 08 LMP . . . structure somehow.

05 05 31 31 LMP 3.5, Neil.

05 05 32 44 LMP Woo-woos is on VHF B -

05 05 32 48 CDR . . . B?

05 05 32 50 LMP Not on A.

05 05 32 58 CDR (Laughter) That's your story, huh?

05 05 33 25 CDR That's rugged country.

05 05 34 15 LMP Yes, that perigee we're on . . .

05 05 34 20 CDR . . . alright, isn't it?

05 05 34 31 LMP I got 4 feet forward and I got back 7 . . .

05 05 34 38 CDR Boy, this water separator sure isn't working worth a darn. Maybe we ought to try the other one - . . . water. Oh boy, this thing is just really spitting it.

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05 05 34 53 LMP I sure do; it's been on - yes, we do - it's been on all the time.

05 05 35 06 CDR We should see the tracking light now - That's it - Doesn't look . . . but it's not - turned off.

05 05 35 16 LMP Okay, let's try and get a Y-dot, or an R-dot, at 30 seconds.

05 05 35 21 CDR It'll be the first time we've ever done it.

05 05 35 30 LMP No, let me get COMM.

05 05 35 48 LMP We're really going to be crying.

05 05 35 50 CDR [Simulated crying]

05 05 35 54 CDR My - top thruster over here has got a lot of brown holes in it - in the exit nozzle.

05 05 36 05 CDR See it?

05 05 36 06 LMP Yes.

05 05 36 13 LMP You know, these thrusters aren't used much over here. Well, maybe . . . or something.

05 05 36 31 CDR See it?

05 05 36 34 LMP No.

05 05 36 46 LMP When we get the sun behind us, we might be able to.  
05 05 37 04 LMP Hey, I got to recycle. Then after . . .  
05 05 37 28 LMP It's all over me.  
05 05 37 38 LMP Coming out of that vent back of my neck, isn't it? That where it's coming out?  
05 05 38 44 LMP Give us the CSI state vector - navigation difference - no updating CSI . . .  
05 05 39 02 LMP Through AGS.  
05 05 39 21 LMP . . .

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05 05 39 45 LMP Thinking about it.  
05 05 39 51 CDR You going to come up with a solution for us?  
05 05 40 33 CDR Range rate?  
05 05 40 35 LMP Range rate.  
05 05 40 45 LMP A lot of trouble having our . . . up.  
05 05 41 08 LMP Range/range rate is . . .  
05 05 41 23 LMP Yaw, damn it!  
05 05 42 24 CMP . . .  
05 05 42 28 CMP . . . is up.  
05 05 42 30 LMP 125:47:45.58.  
05 05 42 42 CMP . . .  
05 05 43 17 LMP . . . feet per second.  
05 05 43 19 CDR Both tanks were pressurized, weren't they?  
05 05 43 21 LMP Yes.  
05 05 43 22 CDR Sure shook them up. I remember that Gene said theirs didn't drop a bit - remember that - when they pressurized? Don't think theirs dropped at all.  
05 05 44 37 LMP Okay.  
05 05 44 43 CDR We're getting minus 2.9.  
05 05 44 48 LMP Going AGS all the way, huh?  
05 05 44 50 CDR Yes, forget it.  
05 05 44 54 LMP Get more tracking if we forget.  
05 05 45 01 CDR No, we'll just - we'll just wait until CDH.  
05 05 46 19 CDR You got a lot of film left in there?

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05 05 46 23 LMP About half.

05 05 46 26 CDR You could run it some here. Oh, you just - you want to leave some for docking, huh?

05 05 46 50 CDR . . . Got that cockpit all cleaned up so that we got places for all our trash, Mike?

05 05 47 02 CMP . . .

05 05 47 21 CDR Yes, we got them all over us - look like chimney sweeps.

05 05 47 36 CDR You bet you. Nice to get home.

05 05 48 06 LMP . . . up tracking -

05 05 48 22 LMP Got that?

05 05 48 24 CDR What do you need?

05 05 48 27 LMP That right-angle bracket, the right-angle bracket, need that -

05 05 48 44 CDR It's not over here. Well, that's a good day not to throw in some failures. See if we can run the nominal one time.

05 05 52 58 LMP CO2.

05 05 53 12 CDR I don't think so, Mike, we got to - . . .

05 05 53 24 LMP . . . want to go to that - . . .

05 05 53 26 CMP Stand by for . . .

05 05 53 32 CDR Right, that's what we've got.

05 05 53 39 LMP . . .

05 07 02 31 CMP Coming up on 1 minute to TIG. Neil, how's it looking?

05 07 02 36 CDR Pretty good.

05 07 02 41 LMP That last out of plane was in the AGS, not the radar.

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05 07 02 45 CMP Alright.

05 07 03 05 LMP . . .

05 07 03 07 CDR Okay.

05 07 03 47 CDR Ready to burn?

05 07 03 48 LMP Okay.

05 07 03 50 CDR We're burning.

05 07 04 32 CDR Okay, that's it.

05 07 04 34 CMP Burn complete?

05 07 04 35 CDR Burn's complete. Did you read? Burn's complete.

05 07 04 40 CMP Thank you.

05 07 04 43 CC Eagle, Houston. Aft 0MNI, LOW BIT RATE, and we'll see you at 127 plus 51.

05 07 05 07 LMP Okay, . . . . . 5, huh?

05 07 06 10 CDR Well - say when . . . . Oh, wait a minute.

05 07 06 50 LMP Chart at 26/7 forward for -

05 07 06 55 CDR Pretty reasonable.

05 07 06 59 LMP AGS had these residuals after its completion after the burn.

05 07 07 39 CDR I can't see you, Michael.

05 07 07 44 CMP . . . moving in at . . .

05 07 07 50 CDR Okay. I got good radar; I just can't see you.

05 07 08 03 CMP . . .

05 07 08 49 LMP Do you think that pressure dropped?

05 07 08 51 CDR Yes.

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05 07 08 54 LMP It doesn't show up in the . . . books. I don't see any reason why we don't take them all back. All that we've got - -

05 07 09 00 CDR All got data.

05 07 09 02 LMP We all got something . . .

05 07 10 20 LMP Okay, you try getting it - . . . ?

05 07 10 25 CDR No, I haven't been; do you want me to?

05 07 10 27 LMP No, I got to keep the chart.

05 07 10 58 CDR . . . can take this update for them.

05 07 12 00 LMP On the track about, huh?

05 07 12 21 LMP Boy, my shoulders sure hurt.

05 07 12 23 CDR Mine are, too.

05 07 12 26 LMP Last night I couldn't get this far from the . . .

05 07 12 30 CDR I was the same way.

05 07 13 00 LMP Use all the green tape, did you?

05 07 14 31 CDR I got it in sight now, Mike.

05 07 14 34 CMP . . .

05 07 15 33 LMP . . .

05 07 15 39 CDR Okay.  
05 07 16 08 SC (Yawn)  
05 07 16 12 CMP ...  
05 07 16 18 LMP Yes, so do we.  
05 07 16 19 CDR A hundred and what?  
05 07 16 33 CMP ...  
05 07 16 37 LMP Okay, NOUN 81, minus 0, plus 0.4, plus 0.9.  
05 07 16 49 CMP And now, plus 0.4, plus 0.9. ...

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05 07 16 58 LMP And 15 minutes after TPI, I've got - -  
05 07 17 03 CMP ...  
05 07 17 35 CDR M-1.  
05 07 17 36 LMP ...  
05 07 17 53 LMP ... your burn's a little late.  
05 07 18 04 CDR ... be burning - ...  
05 07 18 12 LMP Okay, ... the ... on? There it is.  
05 07 18 28 LMP Neil, I guarantee you that the burn is precise, okay?  
05 07 18 31 CDR ...  
05 07 18 33 LMP Good.  
05 07 18 39 CMP ... good burn ...  
05 07 18 43 CDR No, it's not going to be late. Maybe 5 seconds.  
05 07 19 17 CDR Burn complete.  
05 07 19 19 CMP Thank you.  
05 07 20 13 CDR Well, it's all over but the docking.  
05 07 20 26 CDR Check the start out there.  
05 07 20 32 LMP Okay.  
05 07 20 41 CDR ...  
05 07 20 51 LMP You still got him?  
05 07 20 55 CDR Yes. I probably won't when the sun gets in my telescope.  
05 07 21 06 LMP ... hold the ...  
05 07 21 11 CMP Now I can't see - -  
05 07 21 13 CDR The what?

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05 07 21 14 LMP Won't hold the . . .

05 07 21 19 CMP . . . going right down the . . . and it sure has been nice.

05 07 21 23 CDR Okay. I just got sight of you in the sunlight here.

05 07 21 27 CMP Okay.

05 07 21 29 LMP Oh, I've got him.

05 07 21 43 LMP . . .

05 07 21 51 CDR I've got him now, too.

05 07 22 00 LMP Sure enough.

05 07 22 11 CMP Well, I see you don't have any landing gear.

05 07 22 15 CDR That's good.

05 07 22 19 CMP . . .

05 07 22 27 CDR You're not confused on which end to dock with, are you?

05 07 22 34 CMP . . .

05 07 22 58 CDR Okay, Mike, if there's some data bags around there - I may have one or two in my temporary stowage - why, we may want them in addition to the other regular bags, so we can put some of this data back in it.

05 07 23 13 CMP In the data bags?

05 07 23 16 CDR Yes, there are a couple of different LM bags that I left in there.

05 07 23 21 CMP Okay, well, why don't we . . . back over there and . . .?

05 07 23 26 CDR Right.

05 07 23 39 CMP . . . bring the bag . . .

05 07 23 45 CDR Could be.

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05 07 23 47 CMP Alright.

05 07 24 13 CMP Okay, . . . have a plastic one and a . . .

05 07 24 23 CMP Bring the . . . back.

05 07 24 40 CDR I think we'll make it (laughter).

05 07 24 44 LMP Don't tell that to poor . . ., though (laughter).

05 07 24 47 CMP . . .

05 07 24 56 CDR We'll see you at . . .

05 07 25 02 CDR Okay.

05 07 25 31 CDR One of those two bright spots is bound to be Mike.

05 07 25 36 LMP How about picking the closest one?

05 07 25 44 CDR Good idea.

05 07 26 17 LMP . . . this light?

05 07 26 21 CDR Is that alright?

05 07 26 37 CDR Okay, at 49 000 feet, we're supposed to be 65 feet per second - our little old chart says. And our LOS rate's supposed to be about 0.1; it's about point - -

05 07 26 51 CMP . . .

05 07 26 55 LMP Okay.

05 07 27 08 CMP . . .

05 07 27 16 CDR Right - that's . . .

05 07 27 26 LMP 12 on here, right?

05 07 27 29 CDR Not exactly.

05 07 27 30 LMP Not exactly?

05 07 27 32 CDR You're a little less. You're 10 seconds less in . . . About that . . .

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05 07 28 23 CDR Look's like you're making a high . . . on us, Michael.

05 07 28 27 CMP Yes, . . .

05 07 29 26 CMP . . . let me move in just a . . .

05 07 29 31 CDR No, we aren't that - confident.

05 07 30 08 CDR . . .?

05 07 30 12 LMP We've got about 54.

05 07 30 47 CDR You got . . . to . . .?

05 07 30 49 LMP Huh?

05 07 30 50 CDR The . . .?

05 07 30 51 LMP Yes. . . .

05 07 31 05 CDR Let's try this midcourse out.

05 07 31 08 LMP Right. Okay, it's . . .

05 07 31 37 LMP . . .

05 07 31 40 CDR Is that right, I hope?

05 07 31 42 LMP Yes.

05 07 31 59 CDR It should be 70.

05 07 32 25 LMP Okay, I can see the shape of your vehicle now, Mike.

05 07 32 42 CDR Oh, yes - got your high gain in sight; your tracking light - whole vehicle shows. I see that you're pointed at me. Now, you're turning a little bit - great.

05 07 33 39 CMP ...

05 07 33 49 CMP Are you burning yet?

05 07 33 50 CDR We're burning.

05 07 33 51 CMP ...

## Page 201

05 07 34 15 LMP Good enough.

05 07 34 21 CDR Seems like when you get down to around 110, you just keep chasing him. You put it in - stick it in one axis, and it goes through - out of another, especially when ... stays about the same.

05 07 34 30 LMP If it's ..., it's definite.

05 07 34 43 LMP Okay, now, let's see; we want to change the DAP - that what we want to do?

05 07 34 48 CDR Yes.

05 07 34 49 CMP I need a P76 now, Buzz.

05 07 34 54 LMP Okay, you got the time for the burn; NOUN 81 was plus 0.1, plus 1.2, plus 0.5.

05 07 35 05 CMP ...

05 07 35 23 LMP ... plus ...

05 07 35 38 CDR Okay. ... 45 -

05 07 36 14 CDR 8.2 miles, 40 feet per second.

05 07 36 26 LMP You can have your place now.

05 07 36 49 CMP ...

05 07 36 52 CDR Okay.

05 07 37 01 LMP Can you see our tracking light, now?

05 07 37 04 CMP ... but you're in between my sextant and my COAS.

05 07 38 33 LMP Where'd you put the ...?

05 07 38 35 CDR My what?

05 07 38 36 LMP Your ... for ...

05 07 38 39 CDR It's in the bottom over ...

05 07 39 30 CMP ... pick me up ...

05 07 39 33 CDR I got you.

## Page 202

05 07 39 34 CMP Okay. Don't ... other spacecraft.

05 07 39 40 LMP No, I'm not going to lose you, brother.

05 07 39 49 CMP What have you got for . . .? . . . I have 6.8 and 9 miles, . . . out. Oh, that checks.

05 07 40 06 CDR Got . . . up? I thought I made it pretty clear.

05 07 40 20 LMP Not as sporty a . . . as we thought, huh?

05 07 40 25 CDR That wasn't - bad at all; the alignment was - pretty dicey.

05 07 40 31 LMP Yes, sir.

05 07 40 34 CDR That was just luck (laughter).

05 07 40 39 LMP I hope you . . .

05 07 40 49 LMP I'll be glad to get to the . . .

05 07 40 52 CDR Yes, but I hate to . . .; will you get . . .?

05 07 40 57 LMP Okay.

05 07 41 02 CDR Oh, it'll come off, I guess - . . .

05 07 41 07 LMP These screws here - -

05 07 41 08 CDR Alright, there's a couple of bolts - -

05 07 41 10 LMP - - these screws here might do it.

05 07 41 13 CDR - - there's a couple of bolts down there that have come loose - if I remember. . . . I'll get them.

05 07 41 21 CMP I'm slowly closing at 32 feet per second and a mile and a half.

05 07 41 25 CDR Okay, I've got a mile and a half and 32-1/2.

05 07 41 28 CMP . . .

05 07 41 40 LMP Take . . .

05 07 41 43 CDR Yes, I guess it'll take us another - 6 minutes or something like that.

## Page 203

05 07 41 47 LMP Yes.

05 07 41 48 CMP . . . we got 15 . . .

05 07 41 57 CMP . . .

05 07 42 01 CDR Okay.

05 07 42 23 LMP That's going to hit the braking gate right on the schedule.

05 07 42 30 CDR Yes.

05 07 43 02 CDR Okay, let's put P47 in.

05 07 43 22 CDR I don't know why I lost my - I'm at - oh, did you - you lost your transponder, Mike - I think.

05 07 43 33 CMP . . . pitch up a bit.  
05 07 43 36 CDR I wish you would.  
05 07 43 43 CMP I have 0.7 mile and I got you at 31 feet per second, . . . look good.  
05 07 43 50 LMP Okay, . . .  
05 07 43 53 CMP . . .?  
05 07 43 57 LMP Okay, we're getting it.  
05 07 43 59 CMP . . . -  
05 07 44 12 CMP Are you . . . forward now?  
05 07 44 15 LMP Yes - yes, we're in good shape, Mike; we're braking.  
05 07 44 17 CMP Okay.  
05 07 44 52 CMP . . .  
05 07 44 53 CDR Flying all over us.  
05 07 46 13 CDR Okay, we're about 11 feet a second coming in at you  
05 07 46 17 CMP . . .

## Page 204

05 07 46 43 CMP That's good. What . . . are you in?  
05 07 47 05 LMP Hope we're not going to get a pitch straight down.  
05 07 47 16 CDR We've got a - pitchdown and then a yaw to do - . . .  
05 07 47 55 CMP . . .  
05 07 47 59 CDR Looks good.  
05 07 49 06 CMP I'm sure you're going to get . . ., I'll tell you that.  
05 07 49 11 CDR It flies good, though.  
05 07 49 16 CMP . . .?  
05 07 49 50 CDR Okay, now, if I pitch over, I'm going to be looking right into the sun.  
05 07 50 00 CMP . . .  
05 07 50 09 LMP Hope you know how to roll.  
05 07 50 11 CMP Yes, I do. I . . .  
05 07 50 23 LMP You want to end up with that window - opposite his right window so you don't want to roll right. Right?  
05 07 50 32 CDR Yes.  
05 07 50 34 LMP The only trouble is, it's towards - towards 90, isn't it?  
05 07 50 56 LMP You could - you -

05 07 50 58 CDR If I roll 120 - it'll roll left  
 05 07 51 06 LMP 90, huh? . . . 60?  
 05 07 51 21 CDR Well, why don't I start to roll - -  
 05 07 51 24 LMP Yes, I think if you roll up 60 -

## Page 205

05 07 51 29 CDR I'll be looking into his left window when I pitch up.  
 05 07 51 32 LMP I don't think so. If you did it right now you'd - -  
 05 07 51 36 CMP . . . I got the earth coming up already; it's fantastic!  
 05 07 51 40 CDR Okay, you got me.  
 05 07 52 00 CC Eagle and Columbia, Houston. Standing by.  
 05 07 52 05 CDR Roger; we're stationkeeping.  
 05 07 52 08 CC Roger.  
 05 07 52 24 LMP Pitch up . . . pass right up just a little, you got a better view - bottom side -  
 . . . - move back.  
 05 07 52 45 CMP . . . - that's right.  
 05 07 53 08 CDR Okay. I'm getting about into the right attitude, I think. . . .  
 05 07 53 18 LMP Yes.  
 05 07 53 21 CDR That roll's pretty far; I don't know just how much - so that's - Oh, it's going to go  
 BLOCK!  
 05 07 53 28 LMP That's it - going to AGS?  
 05 07 53 32 CDR Yes, . . . ATT DEADBAND.  
 05 07 54 11 CDR Okay, Mike, I'll get - try to get in position here, and then you got it.  
 05 07 54 18 CMP Okay.  
 05 07 54 37 CDR How does the roll attitude look?  
 05 07 54 41 CMP . . .  
 05 07 54 47 CDR Let's see how the DSKY thinks it looks.  
 05 07 54 52 CMP Have you stopped rolling yet?

## Page 206

05 07 54 54 CDR I'll stop. Matter of fact, I can stop right here, if you like that.  
 05 07 54 59 CMP Need a little bit more. That's the way; keep it going. Need a little more . . .  
 That's the way, keep going - go a little bit more - go ahead - go ahead - okay, stop.  
 Okay, I got it now.  
 05 07 55 27 LMP You got the . . . in . . .?

05 07 55 36 CDR Yes. Right there. Okay, . . . 1 -

05 07 55 55 LMP Well, we might need to at least have a platform . . .

05 07 56 01 CDR Yes.

05 07 56 27 CMP Okay, now, Neil, when you feel us contact, you're going to turn . . . seconds, is that right?

05 07 56 33 LMP That's right.

05 07 56 34 CMP Okay, Buzz.

05 07 57 12 LMP We got a platform to make.

05 07 57 13 CDR Okay.

05 07 57 32 CDR I'm not going to do a thing, Mike; I'm just letting her hold in ATTITUDE HOLD.

05 07 57 38 CMP Okay.

05 07 57 55 CDR I think we ought to be at 4 JETS for this, . . . AGS.

05 07 58 04 LMP HOLD.

05 07 58 13 CDR . . .

05 07 58 42 CDR He's about 15 feet out now.

05 07 58 45 LMP Okay, I'd better try out the radar.

05 07 58 52 CDR Don't you want to beef up that radar?

05 07 58 59 LMP Yes.

## Page 207

05 07 59 00 CDR Good.

05 07 59 06 CDR Ready to pull the circuit breakers?

05 07 59 08 LMP Okay. You ready?

05 07 59 10 CDR Yes.

05 07 59 12 LMP They're pulled.

05 07 59 14 CDR He's 10 feet. About 5 feet, I guess.

05 07 59 23 CDR Looks good, Mike.

05 07 59 35 LMP Okay, they're pulled.

05 07 59 39 CDR Pull it out.

05 07 59 40 LMP Okay. Circuit breakers - -

05 09 04 08 LMP Now, here are a couple of bags - and I think it's self-explanatory what goes in them.

05 09 04 14 CDR Yes.

05 09 04 18 LMP . . . water.

05 09 04 41 LMP Now, where are those things?  
05 09 04 44 CDR They're at the over . . .  
05 09 04 55 LMP Maybe I could slide out of here . . .  
05 09 05 20 LMP Hey, Michael, you all tied up there?  
05 09 05 25 CMP . . .  
05 09 05 27 LMP Get ready for those million-dollar boxes. Got a lot of weight; now, watch it.  
05 09 05 52 CMP You intend to keep . . . ?  
05 09 05 57 CDR Yes.  
05 09 06 14 LMP That's all your input, are you sure?  
05 09 06 17 CMP Yes.

## Page 208

05 09 06 18 LMP Okay.  
05 09 06 32 LMP Use what?  
05 09 06 34 CDR Use lithium hydroxide.  
05 09 07 06 CDR That thing still doesn't fit. No, they didn't fix it.  
05 09 07 10 LMP Huh?  
05 09 07 11 CDR They didn't fix it. I had thought somebody had mentioned it, at least.  
05 09 07 19 LMP . . .  
05 09 07 20 CDR What?  
05 09 07 21 LMP . . .  
05 09 07 24 CDR Get some tape.  
05 09 07 26 LMP Yes.  
05 09 07 29 CDR Still got some here?  
05 09 07 30 LMP Yes.  
05 09 07 31 CMP . . .  
05 09 07 35 CDR Okay.  
05 09 08 54 CDR Do you want to vacuum off any of those - those . . . spills or anything?  
05 09 09 07 LMP Well, that's . . .  
05 09 09 22 CDR Oh, the tape, I guess.  
05 09 09 25 LMP Want tape?  
05 09 09 26 CDR Yes, please.  
05 09 09 27 LMP Here you are.

05 09 10 35 LMP About how many pictures did you take with - the closeup camera?

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05 09 10 39 CDR I don't know; 30 maybe, 40?

05 09 10 56 LMP I hope I took the thing apart correctly.

05 09 11 03 CDR Push the cutter bar down first?

05 09 11 05 LMP Yes.

05 09 11 07 CDR It's all right, then.

05 09 11 29 CDR How are you doing?

05 09 11 32 CMP Can't hear you.

05 09 11 33 CDR (Laughter) Well, that stuff can't . . . tell; think of Bobby . . .

05 09 11 42 LMP Say, you did get a couple of hard ones in there, didn't you?

05 09 11 46 CDR Yes.

05 09 12 15 LMP I guess we leave this here or do you want to take it up?

05 09 12 19 CDR I'd leave that here.

05 09 12 22 LMP That might be a little hard to explain.

05 09 12 24 CDR Yes.

05 09 12 42 CMP Hey, Neil?

05 09 12 43 CDR Yes?

05 09 12 44 CMP . . .

05 09 12 53 CDR Okay.

05 09 12 54 CMP . . . get rid of this . . .

05 09 12 58 CDR Okay. If you want to have a look at what the moon looks like, you can open that up and look. Don't open the bag, though.

05 09 13 26 CMP . . .

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05 09 13 29 CDR You'd never have guessed, huh? (Laughter)

05 09 14 00 CDR What did you do with that checklist?

05 09 14 03 LMP It's back yonder.

05 09 14 05 CDR What?

05 09 14 07 LMP It's behind the hatch.

05 09 14 17 CMP What was that bag . . . ?

05 09 14 20 CDR Contingency sample.

05 09 14 23 CMP Rock?

05 09 14 25 CDR Yes, there's some rocks in it, too. You can feel them, but you can't see them; they're covered with that - graphite.

05 09 14 39 CMP . . . compared to -

05 09 14 45 CDR Looks like powdered graphite to me.

05 09 14 46 LMP Say, you got a screwdriver, Mike?

05 09 14 48 CMP Yes.

05 09 14 50 LMP Yes?

05 09 14 51 CMP Yes, I guess I have; just a second.

05 09 14 53 CDR You know, that - that one's just a bunch of trash that we want to take back - LM parts, odds and ends, and it won't stay closed by itself; we'll have to figure something out for it.

05 09 15 16 LMP Ouch! Alright, here's your checklist.

05 09 16 36 LMP You vacuum all this stuff?

05 09 16 41 CDR Which?

05 09 16 42 LMP Gloves, lunar stuff?

05 09 16 46 CDR . . .

## Page 211

05 09 17 05 LMP Okay. It looks to me like - what we're going to do is vacuum you out and get you out of here. I'll - throw the switches down there.

05 09 17 16 CDR How about the data bag?

05 09 17 18 LMP No, I need this bag.

05 09 17 20 CDR Well, I've got one here. I'll go try to get some more - when I go over. Okay?

05 09 17 26 LMP Okay. Give me the vacuum tube.

05 09 17 38 CDR Let me get my back to you first.

05 09 19 02 LMP Need a PPK.

05 09 19 05 CDR Huh? I guess they're in here. PPK's?

05 09 19 20 LMP I guess they're over here.

05 09 19 51 CDR . . ., you know? (Laughter)

05 09 19 54 LMP Get your circuit breakers pushed, AUDIO control circuit breakers?

05 09 20 06 CMP . . .

05 09 21 13 CMP How are you doing?

05 09 21 16 LMP It's filthy.

05 09 21 18 CMP Does all this stuff come in here?

05 09 22 09 CDR Well, I guess that ought to do it.  
05 09 22 20 LMP Okay.  
05 09 26 13 CDR ...  
05 09 26 14 LMP Yes.  
05 09 26 15 CDR ...  
05 09 26 17 LMP Just a minute.  
05 09 26 36 LMP Say, I need some of those data books.

## Page 212

05 09 27 59 LMP Where did you put the book? Where did you put the first one? In here? Okay.  
05 09 28 28 CDR ...  
05 09 28 33 LMP No, we can leave those two here. No, I don't want either of those two. No, I think the others might be -  
05 09 28 55 CDR ... we leave these bags here.  
05 09 28 59 LMP Okay.  
05 09 29 18 LMP Hey, have you been over it, Mike?  
05 09 29 21 CMP ... really ...  
05 09 29 31 LMP How about calling them and asking them for - if those angles are still good? Right at lock-lock with them?  
05 09 29 43 CMP ... last time ...  
05 09 29 47 LMP Oh, okay. I'm sorry.  
05 11 00 26 CC ...  
05 11 00 34 LMP It's not, but I'll get it off.  
05 11 00 36 CDR Okay.  
05 11 00 41 CC Roger. We were seeing - believe it or not, we were seeing some funnies on the Eagle's rendezvous radar - -  
05 11 00 48 LMP What do you do with it?  
05 11 00 49 CC - - and that was the only theory that we had - it looked like it was a good one.  
05 11 00 52 LMP Hey - what do you do with it?  
05 11 00 54 CMP Just turn it down to off.  
05 11 00 56 LMP This goes off - -  
05 11 00 57 CMP No, no, no, no, that's not the one - it's this switch right next to that IMU - -

## Page 213

05 11 01 00 LMP Oh.

05 11 01 01 CMP - - Buzz. Okay, that one, just turn it to - turn it to position 1 - extreme left; that one. There you go. Thank you.

05 11 01 18 LMP I thought you were going to be doing VHF RANGING on the darn thing because we had it set up for - VHF . . .

05 11 01 24 CMP I don't know where . . . other than that.

05 11 01 31 LMP That was to - -

05 11 01 35 CMP You ought to check the flight plan, it doesn't mention the (laughter) probe or the drogue. It says I remove my hatch, and then I notify you that you're clear to open your hatch.

05 11 01 49 CMP Huh?

05 11 01 58 LMP Oh, no.

05 11 01 59 CMP So, that's just the contingency.

05 11 02 04 LMP No, negative.

05 11 02 06 CMP That's the contingency.

05 11 02 08 LMP We move the drogue there. . . .

05 11 02 11 CMP We've got to reach down and grab that extension handle and all that good stuff.

05 11 02 26 LMP That was alright, we understand.

05 11 02 47 CDR Yes.

05 11 03 09 CMP Damn! My ears hurt from wearing this thing.

05 11 03 15 LMP How are the earpieces - inside . . .

05 11 03 22 CMP . . .

05 11 03 24 LMP . . .

05 11 03 26 CMP Yes, I hate those damn . . .

## Page 214

05 11 03 28 LMP Yes, they're not - . . .

05 11 03 32 CDR Yes. I believe - Did you hear any noise during - you didn't hear any noise during descent, did you? . . .

05 11 03 38 CMP . . .

05 11 03 39 CDR How about during lift-off?

05 11 03 41 CMP . . .

05 11 03 46 CMP How was lift-off? How did lift-off feel?

05 11 03 48 LMP Well, there was a little - little blast - then we started moving; then we could see all those - -

05 11 03 56 CMP . . . were you very stable; I mean, you just sort of floated up or was there a bunch of rattling around?

05 11 04 01 LMP - - The floor came up to meet you. I think it multiplied g by . . . - it was about - at lift-off - maybe - half a g or two-thirds of a g

05 11 04 25 CMP Well, you know, - well, just looking at that one sample, it was - I'm surprised you didn't have a lot more dust. Now you saw dust during descent, I think, around 40 feet, something like that, 30 feet maybe.

05 11 04 38 LMP Yes it was - -

05 11 04 43 CMP But it's pattern is such that it sprays out horizontally, and it doesn't really come up and engulf you, huh?

05 11 04 48 LMP All the stuff looks like very light tan and gray, you know, that's - that's the color of it. When you get right up there to it, when you see it, why that isn't the color at all.

05 11 05 01 CMP Dark - battleship gray, isn't it?

05 11 05 05 LMP Maybe not - I don't know - -

05 11 05 08 CMP Well, what kind of - -

## Page 215

05 11 05 09 LMP - - what stuck to the spacecraft, I think you can see afterwards - -

05 11 05 12 CMP What do you think it is from the - geology standpoint, is it basalt dust?

05 11 05 19 CDR . . .

05 11 05 21 CMP Well, do the rocks - do the rocks all look the same? They're different - good, great; I'm glad to hear it.

05 11 05 28 LMP There's really a tremendous -

05 11 05 42 LMP Little sparkly stuff; quite a bit of it all over.

05 11 05 46 CMP I'll be damned; I'm glad - I'm glad it wasn't just - -

05 11 05 48 MS . . .

05 11 05 50 LMP Yes, is that right?

05 11 05 59 CMP Luckily, you were able to get a little bit of everything. I mean, were the rocks - I mean, how did you - did you go around and - just pick up rocks, put them in - in - -

05 11 06 08 LMP We were kind of rushed, if that's what you mean.

05 11 06 15 CMP Yes.

05 11 06 24 CDR . . .

05 11 06 25 CMP Great, great. Yes, it's - beautiful. Man, that's beautiful. It doesn't make a dip whether . . . and all that, I mean you know, they mapped the area and all that - -

05 11 06 38 LMP Eventually, it does - -

05 11 06 40 CMP Huh?

05 11 06 41 LMP Well, eventually, it does - it shows the . . . - you can see those - . . .

## Page 216

05 11 06 54 CMP That's great; fantastic! That'll keep those geologists jumping for years.

05 11 07 00 LMP Yes, you got to keep . . . No, that's right, you got a 6-foot pole, you just stick  
. . . --

05 11 07 07 CMP Sort of like wet sand --

05 11 07 08 LMP -- about that far.

05 11 07 09 CMP Is that right? I don't know. I'm inclined to . . .

05 11 07 17 CDR . . . Is this yours?

05 11 07 59 CMP You yawed right 13 degrees? What's nominal?

05 11 08 05 CDR Yaw left 13 degrees.

05 11 08 08 CMP Ah so, ah so.

05 11 08 32 CDR I guess the main thing on this stowage is to make sure it's reasonable for the g's  
we'll get during TEI and sometime on the way home we can get everything all  
squared away for . . .

05 11 08 46 CMP No, I'm in no rush. Go ahead - go ahead and get everything all packed away; I  
hate to have - a couple of suits out. If you want to air it for a while, go ahead and  
get the hose to it, and - I'm in no rush. I'll take this thing off after you guys are  
done there.

05 11 09 20 CDR . . .

05 11 09 30 CMP Yes. Is that right?

05 11 09 44 CMP You finally got it level, huh? What was that thing that you said it was supposed to  
be concave but it was convex?

05 11 09 50 LMP . . .

05 11 09 53 CMP Yes, yes.

05 11 10 01 LMP . . . looking down there . . . sure looked like it was convex . . . Neil  
walked back a little later and it was right smack in the middle . . . --

## Page 217

05 11 10 29 CMP But there's all different kinds of rocks, huh, or at least several different kinds?  
Well, how --

05 11 10 32 LMP -- . . .

05 11 10 41 CMP Well, did - when you look - when you're walking around or just looking out the  
window of the LM, did it appear very homogeneous? Everything sort of the same  
color and all, or did it look . . .?

05 11 10 56 LMP . . .

05 11 10 58 CMP It's that dark battleship gray like?

05 11 11 01 LMP When you looked down sun, it's very tan, very tan.

05 11 11 03 CDR . . .

05 11 11 14 CMP When you looked down sun, it looks almost white, just a reflection from the sun.

05 11 11 21 LMP Well, ... as it goes out ... while on earth it gets ... in the atmosphere  
... --

05 11 11 27 CMP Yes.

05 11 11 28 LMP -- ... that might be indicative of why ... --

05 11 11 51 CMP Yes.

05 11 12 03 CMP Neil, when you get a hand, would you push that little goddam valve down to DUMP? Never mind, never mind.

05 11 12 14 CDR ... be sure and get the right one ... --

05 11 12 20 CMP It's the lower valve on the lower panel - lower left; that guy right there. Yes, that guy right there; put him down to DUMP. Dump's easy, fine; set the clock.

05 11 13 08 CDR ...

05 11 13 10 LMP Here's one.

05 11 13 12 CMP ... for the hoses? Well, check the ends of the hoses.

## Page 218

05 11 13 22 CMP Well, why don't you leave the vacuum cleaner; I think you just got ... now the other one --

05 11 13 29 LMP No, this one's got ...

05 11 13 31 CDR Okay. Now the one I got is for my hose over here which doesn't have -

05 11 13 55 CMP How big are the rocks that you just scurried around and picked up with the tongs? Good gravy! Beautiful! Just crack those guys open and get a - you know, virgin interior of them in a vacuum, and they'll have a ball. ...

05 11 14 19 CMP Hey, the Velcro - the Velcro around them sort of ...

05 11 14 35 CMP Huh?

05 11 14 37 CDR I said, this is my field geology ...

05 11 14 40 CMP Right.

05 11 14 49 CDR ...

05 11 15 10 CMP We could move - we could move that bag - it's no big thing, we can move the bag. Don't worry about it; we're going to leave it this way for TEL, right? Might as well.

05 11 15 28 CDR ...

05 11 15 32 CMP Good day, I don't know. It's - I tell you, it's not a bad way to live, with that couch in there - I sort of - oh, yes, I agree; we can put two up and one down - ...

05 11 15 53 LMP ...

05 11 16 08 CMP Yes, we could put the couch up now if you want to do that.

05 11 16 14 LMP Okay.

05 11 16 15 CMP Yes. Maybe it - maybe it would make more sense to put the couch up now. Why don't you let me wrestle with the couch before we do anything more to this damn poor L-shaped bag?

## Page 219

05 11 16 26 LMP ...

05 11 16 29 CMP Alright. And we're - we're LOS here for a while anyway, 131 -

05 11 16 54 CMP Here's about where we are, ... Yes, this is the handiest little thing you've ever seen. ... goes right in the helmet side, won't come out, and you can grab hold of anything you want, and there it is, it won't ...

05 11 17 08 LMP (Laughter) ...

05 11 17 42 SC (Yawn)

05 11 20 23 CMP ... all this little stuff ...

05 11 21 42 LMP ... is this optional - sort of - ...? Huh?

05 11 21 54 CMP No, optional ...

05 11 22 11 CMP No, no, this is - used for the intervalometer?

05 11 22 17 LMP ...

05 11 24 27 CDR ... might have some layers on the wall of that crater. It just occurred to me that - that's got to be the result of ... of some sort ...

05 11 28 02 CDR ... is looking good.

05 11 28 05 LMP Think so.

05 11 28 12 CDR A little more.

05 11 28 26 CMP You got to do what, Neil?

05 11 29 27 CDR I don't think it's harder to ... than it is - at orbital speeds. ... There just isn't any way really of ... altitude - or the size of this thing.

05 11 29 59 CMP We're in INERTIAL, aren't we?

05 11 30 10 CDR No, you want to go to INERTIAL?

05 11 34 35 CMP I wonder if Neil has made any preparations?

## Page 220

05 11 35 29 CDR What's your altitude?

05 11 35 34 CMP ...

05 11 35 52 CDR I guess we could put - ... to ...

05 11 37 25 LMP Hey, Neil, I think this - this does have something ...

05 11 37 30 CDR Alright.

05 11 37 35 LMP ... Now it's on the other side. No, down, down ...

05 11 39 18 LMP What did you have on ...?

05 11 39 24 CMP No, that side. Yes, it was down to 3. He called 30 seconds at one time.

05 11 39 32 LMP Yes, ...

05 11 39 38 CMP Yes, he called 60 seconds; then I heard him call 30 seconds.

05 11 40 15 CMP Yes.

05 11 40 16 LMP ... I got it, thank you.

05 11 40 21 CMP Well, it's held under that forward-velocity unit.

05 11 40 46 CMP How's that?

05 11 41 05 CMP With the ..., I don't see how you can -

05 11 41 19 CDR Leaving on your ... in here?

05 11 41 26 CMP I think - you had that same pair on all the time.

05 11 41 57 CDR Is that the ... - sitting there?

05 11 42 05 CMP Yes, here it is.

05 11 42 06 CDR Let me put it down here. Bring it on down. Over here. Put them all in one place.

05 11 42 30 CDR You ready for your underwear? Mike - you ready for your underwear? You ready for your underwear?

## Page 221

05 11 42 43 CMP Just a minute; yes.

05 11 42 54 LMP ... - put our - LCG.

05 11 42 59 CDR Yes.

05 11 43 10 CMP Somehow we'll figure a way to ...

05 11 45 22 CDR 2 feet per second.

05 11 45 46 LMP You didn't maintain that 3-1/2 feet per second down there.

05 11 45 51 CDR (Laughing)

05 11 45 56 LMP Well, I hope - I hope they have the data that shows just what we did have at contact when they can get photographs ... all the film we got.

05 11 46 14 CDR Yes.

05 11 46 19 LMP Well, I really couldn't put the ... no place, not that I'm sure of it, but my light came on, why, ... hit.

05 11 47 18 CDR Yes, that's sure - the way that thing was working - the way that thing was working and stayed locked on all the way down - Gees, it was a beautiful thing.

05 11 47 44 CDR You mean you didn't ...?

05 11 47 53 LMP Getting all the damn alarms.

05 11 48 06 LMP Boy, I thought for a while there that some of those might get a little . . . - . . .  
I'd reset the program alarm in time for a . . . out of there.

05 12 59 10 CMP Will that one do? . . .

05 12 59 48 LMP Are you staying in this inertial attitude? Let's just leave it in REACQ then; it works  
just like a charm.

05 12 59 55 CMP Yes, that's right.

05 13 00 09 CDR How about that?

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05 13 00 55 CDR Beautiful.

05 13 00 59 CMP 405 and 404 - What's the matter with it? (Laughter)

05 13 01 02 LMP 403 I think we . . .

05 13 01 09 CMP . . . alignment, oops, I got 404 again.

05 13 01 55 CMP How about that, wise asses! Huh?

05 13 01 58 LMP You had a - you had to work though, didn't you?

05 13 03 08 CMP . . . O2 fuel cell's . . .

05 13 03 17 CDR This is not dumping.

05 13 03 19 CMP I figured that.

05 13 03 25 CDR Did you try the other line?

05 13 03 26 CMP Well - no, I haven't tried a whole number of alternatives. In fact, number 1 is not  
dumping. My guess would be that it's something to do with this connection in the  
UCD or something like that. When you try to dump your . . . regular urine bag,  
. . . It's so goddam smelly, I hate to grab it and dick around with it, but I guess I  
got to.

05 13 03 47 CDR Not entirely. I think I'd rather stick around . . .

05 13 04 40 CDR . . .

05 13 05 36 LMP How long does it take to warm up this thing? 3 hours?

05 13 05 38 CMP . . .

05 13 05 46 CDR What state vector is in the LM slot? The LM?

05 13 05 54 LMP . . . minus a few feet per second. . . .

05 13 05 59 CDR Well, we got something in the LM slot . . .

05 13 06 03 CMP Well, that's just an old vectors, because I never did VERB 66, I don't think, after  
. . .

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05 13 06 32 LMP We got 22 feet per second. Almost have to be LM - previous to the SEP burn.

05 13 10 11 CDR Well, when it gets to be light, we got to . . .

05 13 10 19 LMP Well, we probably ought to - . . . TPI.

05 13 10 27 CMP Yes, the maneuver . . . right amount of . . .

05 13 11 24 CDR . . . give me a waste bag . . .

05 13 11 31 CMP Yes, just . . . a lot . . . there.

05 13 12 17 CMP It was back here.

05 13 12 19 LMP Yes.

05 13 13 03 CMP Who took the roll of tape?

05 13 13 08 CDR Isn't it in its place? Closet?

05 13 13 10 CMP No, no, it's not in there. It doesn't have that closet anymore. The last I saw it, it was up on the MDC. I gave it - I handed it to one of you guys to -

05 13 13 17 LMP Yes, I stuck it someplace.

05 13 13 25 CMP Let's invent a new home for it because that old home is full of that smelly old urine bag.

05 13 13 34 CDR The floodlight isn't - hasn't even made the bottom of the package warm yet, fellows.

05 13 13 39 LMP Well, when it goes up there, we'll have to put it up here.

05 13 17 10 CMP I got the tape - right underneath your couch. Okay?

05 13 17 19 LMP Alright.

05 13 17 25 CMP Okay, we need a new home for the tape. Anybody got any good suggestions?

05 13 17 36 CMP Okay?

05 13 17 39 LMP Alright.

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05 13 18 02 CMP We believed you, though.

05 13 19 29 CMP (Yawn)

05 13 19 40 CDR . . .

05 13 20 05 LMP Go ahead.

05 13 21 25 CDR I think we had a . . .

05 13 21 44 CDR Not a burn . . .

05 13 21 55 CMP Oh, God, why . . . (laughter) . . .

05 13 22 10 CDR . . . but right now, I am for a nice beer.

05 13 22 54 CDR . . ., some water here. Mike, do you remember trying to get water into a grapefruit-pineapple drink?

05 13 23 05 CMP No, don't do it.

05 13 23 06 CDR Yes.

05 13 23 07 CMP Don't do it.

05 13 23 13 LMP Couldn't get it in, huh?

05 13 23 15 CDR No.

05 13 23 51 CMP . . . , Buzz?

05 13 23 59 LMP . . . some of that.

05 13 24 59 CMP There's a piece of that great bread that has mold all over it.

05 13 26 45 LMP You got the flight plan?

05 13 26 51 CDR . . .

05 13 27 05 LMP . . .

05 13 27 08 CMP Probably are. I purged them this morning when I woke up, Buzz. Probably did the hydrogen as well.

05 13 27 16 LMP 47, 32, 47?

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05 13 33 37 CMP That was quite a wild gyration for docking.

05 13 33 40 LMP It was.

05 13 33 42 CMP Son-of-a-bitching - -

05 13 33 43 LMP You did a pretty good . . .

05 13 33 49 CMP If I'd known how it was going to develop, I wouldn't have gone as far with the bottle as I did. I was in the habit of it, you know, as soon as contact is made, I look at it. It looks okay, I fire the bottle right away.

05 13 33 56 CDR . . .

05 13 33 57 CMP No, I would.

05 13 33 58 CDR . . .

05 13 33 59 CMP No, no.

05 13 34 00 CDR . . .

05 13 34 01 CMP . . . No sooner than I fired that goddamned bottle, than wow; and away we went.

05 13 34 10 LMP . . .

05 13 34 32 CDR No - they're way down so, I don't know - just . . .

05 13 34 34 CMP Then, when I fired the bottle, and then, just about all that came . . . since the thing started, I went back to CMC, AUTO, . . . bothering me. And just about that time all those . . . , my God, those flashes . . . I thought they were . . . I thought we were . . .

05 13 35 10 CDR . . . I mean later on . . . all those . . .

05 13 37 06 LMP Look at this.

05 13 37 08 CDR Yes.  
05 13 37 09 LMP Figured nobody could see where we were . . . .  
05 13 38 08 CMP Hey, did we decide the . . . back?

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05 13 38 38 CMP No, the data should go to the log . . . . The only good thing there you can say about it is . . . .  
05 13 38 55 LMP . . . you guys. . . . love them . . . .  
05 13 39 51 CMP All that probe and drogue and claptrap works; all that EVA transfer, you can forget about that and all those crazy procedures for taking that probe apart.  
05 13 40 12 LMP At least, we can forget them until the debriefing.  
05 13 40 14 CMP Yes (laughter).  
05 13 40 55 LMP . . . .  
05 13 41 23 CMP This thing . . . . make a great . . . .  
05 13 42 04 CDR Picked up the CSM problem.  
05 13 42 38 CMP I've never thought about it.  
05 13 42 50 CDR . . . ?  
05 13 42 51 CMP No.  
05 13 42 54 LMP All at once.  
05 13 43 19 CDR None of them.  
05 13 44 31 CDR Yes.  
05 13 44 44 CDR . . . long time.  
05 13 44 51 CMP It's . . . ?  
05 13 45 34 CDR You got something . . . ?  
05 13 45 38 CMP Yes. Yes, sir. Purring across the deep. Okay. Look at that.  
05 14 57 22 CDR Yes. We can get VERB 64 before we come over the hill and see what looks good.  
05 14 57 28 LMP Okay. LOS.  
05 14 57 30 CDR Okay. I'm ready to proceed now.

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05 14 57 34 LMP Do it.  
05 14 57 37 CDR Here we go.  
05 14 57 42 CMP Say, you guys, . . . anything you want to do?  
05 14 57 56 CDR I got to make a star check, yet.

05 14 58 07 LMP You're not going to fool around with that camera anymore, are you?

05 14 58 09 CDR No.

05 14 58 11 CMP I'll take care of it for you.

05 14 58 13 CDR Post - we might - after post - after PDI if you can put it somewhere where you can get at it. Going away from the moon. I just didn't want it in my way - -

05 14 58 25 CMP Get all - -

05 14 58 26 CDR Well, yes, pull it - pull it out of the way.

05 14 58 27 LMP Neil, the handle -

05 14 58 29 CDR I have it right here. That durn near has a roll in it - it -

05 14 58 38 CMP I'll bet you . . . likes this.

05 14 58 42 CDR No. I don't care about any - Well, if it's annoying - let me - I can get it if it is. . . .  
. star check . . . I don't care about . . .

05 15 00 00 LMP What's that pad say about horizon on the 100-degree - -

05 15 00 05 CMP 2 minutes prior, 100-degree line,

05 15 00 18 CDR You got double lines?

05 15 00 19 CMP Yes, I got double line on the 30, so I can use that as a head position . . . look down between them.

05 15 00 25 CDR They're not - they're not parallel? Can you see in the one-eye position?

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05 15 00 30 CMP What I'm saying is, on the 30 degree, I have both panes of glass - -

05 15 00 34 LMP Yes.

05 15 00 36 CMP - - and if you line those up then, then is your eye in the right position for all the others?

05 15 00 39 LMP Yes.

05 15 00 40 CMP Okay.

05 15 00 41 CDR What's the shaft and trunnion number?

05 15 00 45 CMP 1511.

05 15 00 47 CDR What? 1511?

05 15 00 52 CMP 151 - -

05 15 00 54 CDR 1511.

05 15 00 55 CMP We're a long way from being there, Neil; we're rolling over at a very slow rate.

05 15 00 58 CDR Okay.

05 15 01 00 CMP You want an extra . . . - we got a lot of gas - -

05 15 01 01 CDR No, no, no.

05 15 01 02 CMP Be happy to zip on around.

05 15 02 16 CMP This thing is taking forever to get around here; we've got 20 minutes to TIG. I think I'll speed it up a bit, if you don't mind.

05 15 02 24 CDR Hey, you got - 1, 0.1, point 1 you mean?

05 15 02 29 CMP Yes.

05 15 02 44 CMP You know, if you hit this hand controller like you do in the simulator, MINIMUM IMPULSE, just bang it, it'll bang over and bang back, and it'll fire two opposing pulses, and you get nothing. You know that?

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05 15 02 53 CDR (Laughter) Yes.

05 15 05 18 CMP Oh, shit. . . . yaw out 14 degrees. Why in the hell didn't I do that? Read that number wrong.

05 15 05 29 CDR Yes, it should have been 1.4 degrees yaw.

05 15 05 37 LMP That "1" gets moved over so far.

05 15 05 40 CMP Yes, the goddam "1" in this computer, you know - trunnion angle, it's there; DELTA-V, it's there; angles, it's there. It's probably over here for something although I can't think for what, but there, there, there, and there, of course - there is four places.

05 15 05 55 LMP Okay, we're there, Neil; by the time you can get down there and get your eyeball out the window - -

05 15 05 59 CDR Hey, what did you do with those numbers again?

05 15 06 01 CMP Oh, we'll crank them in the computer.

05 15 06 03 CDR Oh, I got them.

05 15 06 08 CMP Questioning the accuracy of the computer?

05 15 06 14 CDR . . .

05 15 06 23 CMP Okay, you satisfied with that?

05 15 06 24 LMP ENTER.

05 15 06 27 CMP Give me the numbers.

05 15 06 29 CDR 1519, CMC OPTICS ZERO, OFF, VERB 41, NOUN 91.

05 15 06 37 CMP You mean after I went to all this work of cranking those numbers in you're going to drive back to zero?

05 15 06 43 LMP We got PROGRAM ALARM and an OPERATOR ERROR.

05 15 06 46 MS (Laughter)

05 15 06 47 CMP Christ. Give me the numbers, 1519 and what?

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05 15 06 54 LMP It won't pass with that number.

05 15 06 58 CDR 1511 - 357.  
05 15 07 01 CMP 357, okay.  
05 15 07 15 CMP 357 and 1511. There's supposed to be a star there.  
05 15 07 26 CDR That's right, if you put them in - in the right order. That 151.1 is shaft.  
05 15 07 36 CMP Yes. I got a star in the - in the sextant.  
05 15 07 38 CDR Good, it passes. Let's press on.  
05 15 07 41 CMP I'm not sure it's Gienah.  
05 15 07 43 CDR Good. There'll be no way of telling - You got 16 minutes until TIG. Did it pass?  
05 15 07 51 CMP OPTICS ZERO - -  
05 15 07 52 CDR OPTICS ZERO and MANUAL. The mode is manual already, isn't it? Okay?  
05 15 07 59 LMP Alright. VERB 37, ENTER; 40, ENTER. Okay.  
05 15 08 08 CDR Okay, BMAG MODE, three, to RATE 2.  
05 15 08 13 CMP BMAG MODE, three, to RATE 2.  
05 15 08 15 CDR SPACECRAFT CONTROL, CMC, AUTO.  
05 15 08 19 CMP CMC, AUTO.  
05 15 08 23 CDR Proceed.  
05 15 08 25 CMP I'll proceed with this . . .  
05 15 08 27 LMP Huh? . . . Don't you like this one? Alright.  
05 15 08 33 CMP Let's not proceed.  
05 15 08 35 LMP Alright. Stand by. Align spacecraft in roll. Already there.  
05 15 08 41 CDR GDC align.

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05 15 08 44 CMP Okay, that's a good one. One - standby 1, and I'll get that.  
05 15 09 33 CMP Okay. GDC aligned.  
05 15 09 39 LMP Circuit breakers: STABILIZATION CONTROL, panel 8, CLOSED.  
05 15 09 41 CDR STABILIZATION CONTROL circuit breakers are CLOSED.  
05 15 09 52 LMP Okay. SPS circuit breakers - eight of them, CLOSED. Twelve of them closed.  
05 15 09 57 CDR SPS, 12 of them closed - 2, 4, 6, 8, 10, 12, CLOSED. Okay?  
05 15 10 15 CMP . . .  
05 15 10 20 CDR Say again.  
05 15 10 22 CMP I lost my clip.  
05 15 10 24 LMP ATT DEADBAND, MINIMUM.

05 15 10 26 CMP ATT DEADBAND, MINIMUM.  
05 15 10 27 LMP RATE, LOW.  
05 15 10 28 CMP RATE, LOW.  
05 15 10 29 LMP LIMIT CYCLE, ON.  
05 15 10 30 CMP Okay.  
05 15 10 32 LMP MAN ATT, three - RATE COMMAND.  
05 15 10 34 CMP MANUAL ATTITUDE, three, to RATE COMMAND. They are.  
05 15 10 41 LMP BMAG MO - BMAG MODE, three, to RATE 2.  
05 15 10 46 CMP BMAG MODE, three, to RATE 2.  
05 15 10 51 LMP ROTATIONAL CONTROL POWER, DIRECT, two of them, OFF.  
05 15 10 53 CMP Okay; OFF, OFF.

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05 15 10 55 LMP SCS TVC, two, to RATE COMMAND.  
05 15 10 59 CMP RATE COMMAND, RATE COMMAND.  
05 15 11 02 LMP TVC GIMBAL DRIVE, PITCH and YAW, to AUTO.  
05 15 11 05 CMP AUTO, AUTO.  
05 15 11 09 LMP What's the time?  
05 15 11 11 CMP We have 12 minutes to go.  
05 15 11 54 CMP Got the HELIUM VALVES, AUTO and barber pole?  
05 15 11 58 LMP I'll get those.  
05 15 12 00 CMP Okay. I was just wondering if they were on - not questioning your checklist, just out of curiosity.  
05 15 12 29 LMP You going to pitch up after the burn?  
05 15 12 33 CMP Sounds like a good idea; let's look at the moon after the burn. That'll give us high gain, right?  
05 15 12 41 LMP Check.  
05 15 12 52 CDR Okay, 10 minutes until TIG.  
05 15 12 55 CMP Alright.  
05 15 13 10 CDR It's hot in here, isn't it?  
05 15 13 17 LMP . . . boiling any water.  
05 15 13 21 CDR You do it all?  
05 15 13 22 LMP No. It's not too hot, it's 65.

05 15 13 31 CMP Those temperatures are deceptive. I don't know where they measure it, but the cold point is -

05 15 13 36 CDR Okay. Sunrise, now 10 minutes prior to TIG; I should have the horizon on the 10-degree line, huh?

05 15 13 43 CMP No, 10 degrees - 2 minutes.

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05 15 13 45 CDR 2 minutes; that's more like it, there.

05 15 14 00 CMP . . . this COAS as far as steering and everything goes, it's hopeless.

05 15 14 09 CDR . . .

05 15 14 12 CMP I'm graphically reminded of it at this moment. Yes. I see a horizon. It looks like we are going forward (laughter).

05 15 14 26 CDR Shades of Gemini.

05 15 14 29 CMP It is most important that we be going forward (laughter).

05 15 14 40 CMP There's only one really bad mistake you can make there.

05 15 14 50 LMP Shades of Gemini retrofire, are you sure we're - (laughter) - No, let 's see - the motors point this way and the gases escape that way, therefore imparting a thrust that-a-way.

05 15 15 03 CDR Yes, horizon looks good.

05 15 15 06 LMP Okay, we got 8-1/2 to TIG.

05 15 15 28 CMP Somewhere along the line, I think I'll trim this maneuver just for the hell of it. Would this be a good time to do it, Buzz, at 8 minutes prior? You don't care when I do it, do you?

05 15 15 35 LMP No, it probably would be after we - when the gimbals are out.

05 15 15 38 CMP Oh, yes, alright. Okay.

05 15 15 47 CDR Beautiful looking horizon, it's hard to describe.

05 15 15 50 LMP We can see it if we look through that thing you have.

05 15 15 53 CMP Where's . . .?

05 15 15 55 LMP Here or here? God, it has an eerie look to it. It's not a horizon, it's just a band.

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05 15 16 03 CMP You won't be able to see it, Neil, . . .

05 15 16 07 CDR Which way?

05 15 16 09 CMP This way. Plus X . . .

05 15 16 14 CDR It was really eerie when it first came - -

05 15 16 17 LMP You got to look through the part of the window that isn't -

05 15 16 20 CDR Yes. And the way the terminator is, you don't see the whole moon at all, you just see a - -

05 15 16 24 CMP I know, I was looking at it upside down for a while.

05 15 16 27 CDR Yes, and then that scares you, because that says you're going retrograde, right? Well, let's see, if it's upside down, you're going backwards.

05 15 16 33 LMP Yes.

05 15 16 40 CDR Okay, it looks good, I'll tell you.

05 15 16 44 CMP Alright, we're coming up on bus tie time; we've got a little over 6:50 until TIG.

05 15 17 05 CDR Ready for the bus ties.

05 15 17 07 CMP Yes, sir. Whenever you are; it's about 6 minutes.

05 15 17 10 CDR . . . ON, verified.

05 15 17 15 CMP Okay.

05 15 17 16 CDR . . ., ON. . . . and a half.

05 15 17 22 CMP Alright.

05 15 17 26 CDR Okay. TVC SERVO POWER 1 to AC1.

05 15 17 30 CMP 1 to AC1.

05 15 17 32 CDR 2 to AC2.

05 15 17 33 CMP 2 to AC2.

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05 15 17 34 CDR TRANSLATIONAL CONTROL POWER, ON.

05 15 17 36 CMP ON.

05 15 17 38 CDR ROTATION CONTROL POWER, NORMAL, number 2, AC.

05 15 17 41 CMP AC.

05 15 17 44 CDR Arm ROTATION CONTROLLER, number 2.

05 15 17 46 CMP ARMED. So far, so good.

05 15 17 59 CDR Okay. When do you want the gimbal motors on?

05 15 18 01 CMP Oh, at about 5-1/2 minutes.

05 15 18 04 CDR Okay, that's right now.

05 15 18 05 CMP Right now?

05 15 18 06 CDR Yes.

05 15 18 07 CMP Okay.

05 15 18 08 CDR Here comes PITCH 1, ready?

05 15 18 09 CMP No.

05 15 18 10 CDR Wait a minute. Okay. Go.  
05 15 18 11 CMP PITCH 1.  
05 15 18 12 CDR PITCH 1 -  
05 15 18 13 CDR MARK it.  
05 15 18 15 CMP Got it.  
05 15 18 16 CDR YAW 1 -  
05 15 18 17 CDR MARK it.  
05 15 18 18 CMP Got it.  
05 15 18 19 CDR Okay. TRANSLATION CONTROLLER, clockwise.  
05 15 18 22 CMP Clockwise.

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05 15 18 24 CDR Verify no MTVC.  
05 15 18 28 CMP Verified.  
05 15 18 32 CDR GIMBAL MOTORS, PITCH 2, YAW 2, OFF.  
05 15 18 34 CMP PITCH 2 -  
05 15 18 35 CDR MARK it.  
05 15 18 36 CMP Got it.  
05 15 18 37 CDR YAW 2 -  
05 15 18 38 CDR MARK it.  
05 15 18 39 CMP Got it.  
05 15 18 40 CDR Okay. Set GPI trim.  
05 15 18 43 LMP Alright, where are they on this pad? Let's see, that's plus - -  
05 15 18 46 CDR Minus - on pitch, minus 0.6.  
05 15 18 50 LMP Okay, minus 0.6. Very good.  
05 15 18 52 CDR Plus 66.  
05 15 18 55 LMP And plus 6 - -  
05 15 18 56 CMP 0.6.  
05 15 18 57 LMP Okay, Neil, those look good to you? They look good to me.  
05 15 19 00 LMP/CDR . . . 0.6 - 0.6 - 0.6 . . .  
05 15 19 02 CDR Okay. GPI set. Verify MTVC.  
05 15 19 09 CMP Okay. MTVC verified; I'm on trim now.  
05 15 19 18 CDR Proceed to trim.

05 15 19 20 LMP Does it look to you like the . . . the right way?  
05 15 19 24 CMP Yes.

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05 15 19 27 LMP Alright. . . . we're coming up on . . . out to your right.  
05 15 19 30 CMP Okay.  
05 15 19 33 CDR Okay, verify MTVC.  
05 15 19 36 CMP Verified.  
05 15 19 37 CDR TRANSLATION CONTROLLER, NEUTRAL.  
05 15 19 38 CMP NEUTRAL.  
05 15 19 39 CDR GPI return to zero, zero.  
05 15 19 40 CMP It does.  
05 15 19 41 CDR ROT CONTROL POWER, NORMAL, number 2, to AC/DC.  
05 15 19 44 CMP AC/DC.  
05 15 19 45 CDR SPACECRAFT CONTROL, CMC.  
05 15 19 47 CMP CMC.  
05 15 19 48 LMP Trim.  
05 15 19 49 CMP We did.  
05 15 19 51 CDR Okay. BMAG MODE, three, to ATT 1/RATE 2.  
05 15 19 53 CMP ATT 1/RATE 2.  
05 15 19 55 LMP ENTER.  
05 15 19 56 CMP ENTER.  
05 15 19 58 CDR Verify CMC.  
05 15 19 59 CMP CMC verified; AUTO verified.  
05 15 20 00 LMP Proceed.  
05 15 20 02 CDR Okay, for the GIMBAL DRIVE. Up, down, zero. Up, down, zero. Okay, standing by for P-AX, OFF, and the Y-AX, OFF -

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05 15 20 19 CDR MARK it.  
05 15 20 21 CDR Good trim.  
05 15 20 23 LMP ROTATIONAL CONTROL POWER, DIRECT, two, MAIN A/MAIN B.  
05 15 20 26 CMP MAIN A/MAIN B.  
05 15 20 28 LMP SPS HELIUM VALVES, two of them, verified AUTO; LIMIT CYCLE, OFF.

05 15 20 34 CMP Okay, LIMIT CYCLE's OFF.

05 15 20 36 LMP FDAI SCALE, 50/15.

05 15 20 38 CMP 50/15.

05 15 20 42 LMP Okay, wait for 2 minutes for DELTA-V THRUST A.

05 15 20 46 CDR 2 minutes to get our horizon check at 10 degrees.

05 15 20 48 LMP Yes, and - sneaking up on there, looks pretty darn good. Looks like we're darn near right.

05 15 21 10 CDR Just about midnight in Houston town.

05 15 21 15 CMP Yes.

05 15 21 16 LMP Okay, coming up on 2 minutes, and this damn horizon check is going to be, would you believe, perfect?

05 15 21 23 CDR I hope so.

05 15 21 24 LMP Fantastic. First time we ever got a perfect horizon check. Spent too many hours in the simulator looking for an unreal horizon. Alright, horizon check passes.

05 15 21 37 CMP Beautiful.

05 15 21 38 LMP 2 minutes - -

05 15 21 39 CDR DELTA-V THRUST A - -

05 15 21 40 CMP NORMAL.

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05 15 21 41 CDR - - DELTA-V - -

05 15 21 42 LMP TRANSLATION CONTROLLER, ARMED.

05 15 21 43 CDR - - okay, DELTA-V THRUST A, NORMAL; stand by for a malfunction - it's not there. Very good.

05 15 21 49 CMP Probably get the sun in your window on that burn.

05 15 21 51 CDR Yes, I believe it.

05 15 21 52 CMP The sun - -

05 15 21 53 LMP ROTATIONAL HAND CONTROLLER, number 2, ARMED.

05 15 21 58 CMP ROTATIONAL HAND CONTROLLER, number 2, is ARMED.

05 15 22 01 CDR Alright.

05 15 22 04 CMP Ullage is going to be 16 seconds at 2 JETS.

05 15 22 07 LMP TAPE RECORDER is going to COMMAND RESET on the HIGH BIT RATE.

05 15 22 25 CMP Got to go from STANDBY to NORMAL.

05 15 22 28 LMP I'll do that in 35 seconds.

05 15 22 29 CDR Ullage is 16 seconds, 2 JETS.

05 15 22 30 CMP 16 seconds, 2 JETS, confirmed.  
05 15 22 40 CMP Coming up on 1 minute -  
05 15 22 42 CMP MARK it.  
05 15 23 03 CMP Okay, stand by for 35 seconds.  
05 15 23 07 CMP MARK it -  
05 15 23 08 CMP DSKY blanks; EMS is in NORMAL.  
05 15 23 13 LMP Check.  
05 15 23 17 CMP Coming up on 15 seconds.  
05 15 23 18 CDR Okay, I'll get the 99.

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05 15 23 23 CMP Okay. Stand by - -  
05 15 23 24 CDR . . . valve?  
05 15 23 25 CMP - - stand by for ullage. Ullage.  
05 15 23 28 LMP Got the ullage.  
05 15 23 42 MS . . . 5, 4, 3, 2 -  
05 15 23 44 CMP Burn! A good one. Nice - -  
05 15 23 45 LMP I got two balls - -  
05 15 23 46 CMP - - okay, here comes the other two - -  
05 15 23 47 LMP - - barber pole, gray, the other two are on good.  
05 15 23 51 CMP Man, that feels like g, doesn't it?  
05 15 23 56 LMP I caught up - I caught up for a short while, but . . .  
05 15 24 03 CMP . . . pressures are good. Busy in steering, but it's holding right in there.  
05 15 24 13 LMP How is it, Mike?  
05 15 24 19 CMP It's really busy in roll, but it's holding in its deadband. Looks like it's holding instead of plus or minus 5, more like plus or minus 8 - It's possible that we have a roll-thruster problem, but if we have, it's taking it out. No point in worrying about it. Okay, coming up on 1 minute -  
05 15 24 44 CMP MARK it -  
05 15 24 45 CMP 1 minute. Chamber pressure's holding right on 100.  
05 15 24 46 LMP . . . time looks good.  
05 15 24 48 CMP Gimbals look good; total attitude looks good. Rates are damped out - a little bit. Still a little busy, light . . .  
05 15 25 01 CDR . . . still ahead.

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05 15 25 08 CDR Should I be going . . . ?

05 15 25 11 CMP Follow the needle; follow the needle . . . Take it off. Okay. Looking good.

05 15 25 21 LMP This was . . . - -

05 15 25 22 MS . . .

05 15 25 24 CMP How's that nitrogen pressure? Okay?

05 15 25 25 CDR Yes.

05 15 25 26 CMP Good.

05 15 25 36 CDR . . . pressures are GO.

05 15 25 42 CMP 2 minutes -

05 15 25 43 CMP MARK it -

05 15 25 45 CMP Hits the end of that roll deadband, it really comes crisply back.

05 15 25 55 CMP Okay, chamber pressure's falling off a little bit; now it's going back up; chamber pressure's oscillating just a tad.

05 15 26 04 CDR 10 seconds left, . . . - -

05 15 26 05 CMP We don't care about the chamber pressure, . . . watch yourself for - brace yourself - Standing by for ENGINE, OFF.

05 15 26 11 CDR It should be shutdown now.

05 15 26 15 CMP Okay?

05 15 26 16 CDR SHUTDOWN. 4 -

05 15 26 18 LMP . . . going to gray and barber pole.

05 15 26 21 CMP Okay?

05 15 26 22 LMP Okay.

05 15 26 23 CMP Let's look at what we got. DELTA-V TRRUST A and B are OFF - -

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05 15 26 26 LMP A and B are OFF.

05 15 26 27 CMP - - SPS valves, CLOSED?

05 15 26 29 LMP Okay.

05 15 26 30 CMP Stand by for the GIMBAL MOTORS.

05 15 26 31 LMP Okay.

05 15 26 32 LMP PITCH 1, OFF -

05 15 26 34 LMP YAW 1, OFF.

05 15 26 38 CMP Got it.

05 15 26 39 LMP PITCH 2, OFF.  
05 15 26 41 CMP Got it.  
05 15 26 42 LMP YAW 2, OFF.  
05 15 26 44 CMP Got it. TVC SERVO POWER 1 and 2 are OFF?  
05 15 26 47 LMP OFF, OFF.  
05 15 26 50 CMP MAIN BUS TIE's coming ON - okay.  
05 15 26 55 LMP Proceed.  
05 15 26 59 CMP Beautiful.  
05 15 27 02 CDR X and - 0.2.  
05 15 27 06 CMP X and Z, 0.2 -  
05 15 27 07 CDR X and Z, good.  
05 15 27 08 CMP F. Okay, and Z is down. Okay, then - you want to record those - five balls - -  
05 15 27 23 LMP Let me record them - -  
05 15 27 24 CMP - - five balls, plus 0.0, and I call it 0.8, it was hanging on 0.7 for a while, and it was zeroed and down. I'd give them - it was 0.1 down - plus 0.1. Now it's on zero, shit. Can't read those residuals; they dance all over the place.

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05 15 27 40 CDR Okay, the residuals were 0.1, 3.9, and point - -  
05 15 27 46 LMP Beautiful burn; SPS, I love you; you are a Jewel! Whoosh!  
05 15 27 53 CDR Alright - EMS FUNCTION, OFF.  
05 15 27 54 CMP EMS FUNCTION - -  
05 15 27 55 CDR EMS MODE to STANDBY.  
05 15 27 57 CMP STANDBY.  
05 15 27 58 CDR BMAG MODE, three, to RATE 2. DEADBAND, MAX - -  
05 15 28 01 CMP Three to RATE 2; DEADBAND, MAX - -  
05 15 28 02 LMP . . . OFF, . . . OFF - -  
05 15 28 03 CDR Got the burn time to be about 02:30. You in BIT RATE LOW?  
05 15 28 08 LMP 02:30 or 02:31 - -  
05 15 28 15 CMP Okay. Let's go. ROTATIONAL CONTROL POWER, DIRECT, two of them, OFF?  
05 15 28 23 LMP OFF, OFF. Good show.  
05 15 28 31 CMP We want to pitch over, I guess. Don't know if it matters much which way.  
05 15 28 40 CDR Oh, probably -up will be the best - -

05 15 28 44 LMP Pitch up.

05 15 28 46 CDR - - to keep the moon in sight.

05 15 28 49 CMP Alright, is that ROTATIONAL CONTROL POWER, DIRECT, two of them, OFF?

05 15 28 52 CDR Yes, I do.

05 15 28 53 CMP Circuit breakers - SPS PITCH 1, PITCH 2, YAW 1, YAW 2, OPEN?

05 15 28 56 CDR They're open.

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05 15 28 58 CMP Proceed.

05 15 29 00 CDR I think you did that already.

05 15 29 04 CMP Hey, Neil, you want to proceed on these?

05 15 29 05 CDR Yes.

05 15 29 06 CMP Okay, where do we go, P00? To get the HIGH GAIN?

05 15 29 11 CDR We want - Yes, P00's good - and we want a VERB 48.

05 15 29 16 LMP Yes. Get in P00 and do a VERB 83.

05 15 29 18 CMP I'm going to go to SCS and pitch up in the meantime.

05 15 29 25 LMP Find out where that - other state vector is.

05 15 29 33 CDR Okay, we're in P00, now who wants what, VERB 48?

05 15 29 35 LMP No - yes. VERB - oh, okay.

05 15 29 38 CDR Ah - -

05 15 29 40 LMP I don't know . . . -

05 15 29 41 CDR Well, it says change spacecraft weight.

05 15 29 44 CMP DAP update. Yes - -

05 15 29 45 CDR You've got your - -

05 15 29 46 CMP - - 10101 does change - it has been changed. Okay, we've done that.

05 15 29 52 CDR . . .

05 15 29 53 CMP . . . service module RCS - -

05 15 29 55 LMP I've done that. Done that.

05 15 29 56 CMP Oh. Okay - -

05 15 29 57 CDR VERB 83.

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05 15 29 58 CMP - - RCS monitors checked - (Laughter) Okay, here comes Buzz's baby - VERB 83 - de-dum-de-dum-de-dum. Operator error (laughter).

05 15 30 08 LMP . . . you don't know how to do it.

05 15 30 09 CMP (Laughter)

05 15 30 13 LMP Look at that, would you? Look at that.

05 15 30 14 CMP Isn't that beautiful?

05 15 30 15 CDR Pretty good.

05 15 30 16 CMP A thing of beauty is a joy forever.

05 15 30 22 LMP Alright, now call the VERB 89 in and see which way that - -

05 15 30 25 CMP Oh, come on, you're not serious.

05 15 30 45 LMP . . . know to find out which way the . . . is -

05 15 30 49 CMP Okay.

05 15 30 50 LMP - - you were wrong. . . .

05 15 31 07 CMP Okay, we got to visually acquire moon, take pictures, and then you got a P52 to do.

05 15 31 15 CDR . . . some unknown reason - -

05 15 31 17 LMP We haven't got any damned program ready to call up. . . . It's the only way you can do it. Supposed to do a VERB 66 and then put numbers . . . apogee . . . and then look at altitude and altitude rate - -

05 15 31 34 CDR What are you doing, Mike? What you taking pictures of -

05 15 31 40 CMP Oh, I don't know. Wasting film, I guess.

05 15 31 43 CDR You can take some pretty good pictures out of the hatch, here.

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05 15 31 46 CMP You're right. This crapping thing - . . . set on f:4 or 5.6; that's probably about right.

05 15 31 57 LMP Here's a ring that came from somewhere; I wonder where (singing).

05 15 32 04 CDR You want to take pictures over here? Go ahead, why don't you just set up that - -

05 15 32 07 CMP I'll check window 3.

05 15 32 10 CDR - - set up that tape and let it do its thing; it's still got a long way to go for . . .

05 15 32 15 LMP Alright, now, do we want black and white, color, 250, or 80? I've got all options over here.

05 15 32 19 CDR Oh, we'll probably want - How many cameras you got?

05 15 32 21 LMP Let me have a camera. How many cameras?

05 15 32 23 CMP Well, only one camera, but I've got . . . lenses.

05 15 32 28 LMP You're a poor . . .

05 15 32 29 CDR Well, let's take some color, and -

05 15 32 38 CMP Want the 80, right? On this one?

05 15 32 46 LMP Yes, I think you want to get - -

05 15 32 49 CMP Let me know when I'm in a - in a good attitude to stop this pitch. How about right now?

05 15 32 54 CDR Stop. What are you doing?

05 15 32 56 CMP I'm rolling.

05 15 32 58 LMP What for? What do you want to roll for?

05 15 33 02 CMP I was off in roll; I'm taking it back to where I should have been. This is a pretty good attitude right here, looks to me -

05 15 33 14 LMP Alright, I've seen enough of VERB 83, Mike - -

05 15 33 16 CMP Here you go.

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05 15 33 20 LMP - - unless you want to call a VERB 89.

05 15 33 24 CMP Not me; I'd rather take pictures.

05 15 33 32 CDR What time is AOS?

05 15 33 35 LMP Haven't the foggiest.

05 15 33 36 CMP It's 135:34.

05 15 33 40 CDR That's right now.

05 15 33 42 LMP Give me a VERB 51.

05 15 33 55 CDR Anybody got any choice greetings they want to make to Houston?

05 15 33 58 CMP No, I - the best burn I've ever seen in my life, I'll tell you. I guess you guys have seen two good ones today.

05 15 34 09 LMP Oh, a couple.

05 15 34 11 CMP Yes, more than two. AOS.

05 15 34 34 LMP Yes, we sure as hell have.

05 15 34 38 CDR Get the burn status.

05 15 34 41 LMP Hey, I hope somebody's getting the picture of the earth coming up.

05 15 34 44 CMP . . . Not quite pitched far enough. Well, maybe I can get it out - -

05 15 34 53 CDR I can get around to here.

05 15 34 54 CMP - - your window.

05 15 34 57 CDR Upside down; turn the camera upside down; then it'll look right.

