Apollo 11
Onboard Voice Transcription

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
APOLLO 11
ONBOARD VOICE TRANSRIPTION
(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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July 16 – 24, 1969

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
July 16th, 1969

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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)

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.
How are we doing on that time, anybody? Neil, are you sort of master of ceremonies on time, yet? Well, I didn't ...

Okay, your DRINKING WATER SUPPLY valve is ON. How about this ... circuit configuration? GLYCOL RESERVOIR BYPASS valve OPEN?

(Cough) ... BYPASS is OPEN.

RESERVOIR OUT valve CLOSED?

OUT's CLOSED.

IN valve CLOSED?

IN's CLOSED.

ECS RADIATOR FLOW CONTROL, PRIMARY.

. . .

Hey, Buzz?

Yes.

How would you like the camera?

Okay.

PRIMARY GLYCOL TO RADIATOR valve, NORMAL.

Why don't I leave the dark slide - -

Are we ready for that, you think? What's the time?

30 minutes. . . .

. . . to NORMAL, and check the radiator.

It will take awhile, that's - -

Okay, now, is that normal for the discharge pressure to zap down low and to do that? Do you think, Mike? What's that? I'm sorry, I wasn't listening.

When Neil sends the GLYCOL RADIATORS to NORMAL, temporarily, it - -

It drops?

Yes.

The temperature done that?

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.

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.

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.

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, Tanaanarive 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 that 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?

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

Atria.

Is Atria. You might note that, Buzz, also. 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.

0.1 degree. Probably GDC's off a lot more than that.

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?

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

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.

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

Okay, Buzz, got all that good stuff?

GDC's realigned, okay.

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

And... out there right now... , Buzz?

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

You got your light on.

Yes, look at those bright ones down here.

Lightning! Is that lightning out your window?

No, I haven't seen any lightning.

Hell, that must be lightning. Either that or it's the...

You know, no matter how many times I put these optics eyepieces...

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 -

Yes.

No matter how many times I put these optics eyepieces in their box, it doesn't seem right.
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DAY 1

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 . . .
00 01 04 47 CMP Roger, Bruce. Thank you. 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 CDR 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?
Well, Buzz, I'm going to hold it out that hatch window.

Handhold it?

Yes - yes, yes, handhold it; don't dick with that.

Buzz can hold it, and you're going to run the monitor; have you run . . .?

Yes.

Mike, how about this thing?

REPRESS - let's see, it's supposed to be - 865.

Go ahead.

And it - it kind of varies - not 865, but it's - 830.

. . .

Well, I don't know how - that ought to . . .

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

Maybe the . . . this son of a bitch is working or not.

You got the power switches turned on up there at the - -

Yes. . . .

Let's get into the Hasselblad . . . get the right settings on it.

Okay.

Is Goldstone the only station that's going to get this?

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

That must be doing something.

Yes.

How long - -

You got it on infinity for one thing; let me put it down here.

- - how long is it supposed to take to - -

. . ?

No, no, it's the one with the . . .

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

Yes.
DAY 1

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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?

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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.

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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?
Okay, go ahead and talk.

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 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.

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.

I think that - that's going to do it.

Yes.

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.

Yes, that looks good. I don't see how that can miss.

Jesus Christ, look at that horizon!

Isn't that something?

Get a picture of that.

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.

Now, what do we have - Is that all the -

You had the switch down - inside. . . . automatic light control features.

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?

Got mine. Is it ballpoint, or is it . . .?

. . . much embarrassed to say they've lost a Hasselblad. I seem to be prone to that.

And we're about 7 minutes away, so we got about 7 minutes of practice time.

I've looked - I've looked everywhere over here for that Hasselblad, and I just don't see it.

You can go to your . . .

It's too late for sunrise, anyway.
I know; but I'm worried about - -

But you want to get it before TLI.

- - I know it. That's what I'm worried about.

Neil, could you look around over there?

Yes, I'll look.

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

No, the switches are all thrown.

. . . under you.

Buzz, you don't see the Hasselblad anywhere down below?

Let me go on a little expedition here. Has somebody . . .?

I've looked already.

Ah! Here it is.

Find it?

Yes.

Beautiful.

It was floating in the aft bulkhead.

On your side?

I got a way on it - of keeping it.

I got a little horizon. Man, look at that!

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

How's the monitor, working okay for you? Anything I can do to help?

I found a spot that really . . . my window.

Yes, it looks like . . . I got my - -

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.

Yes, go ahead and take a picture. Keep your . . . down.

Beautiful low pressure.

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?
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  . . .
Now, we want a GDC align.

Yes.

Now, let's see - -

Minus 19.9.

That's alright - minus 0.1 to - can you write that one down?

It's real close.

Yes.

That's just about perfect.

Alright. EMS MODE, STANDBY.

STANDBY.

And EMS FUNCTION, DELTA-V, set. Set DELTA-VC. You got the number?

Yes. 10 4256.

4256? How about 4356?

That's right, 4356.

And how about ORDEAL? Does that go back, Buzz?

Yes.

I guess we got all of those -

Where did all those numbers come from?

Yes; much better.

They give us a new state vector?

Yes.

Yes, they did.

They did, yes.

No, that's VERB 66. . . . apogee - perigee.

I'll just put a question mark here about - not show our ignorance.

Well, looks like we're picking up a little. That sound reasonable? 1166?

the time, is that right?

The S-IVB?

Yes, 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 TLI.
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 01 00  LMP  10 435.6. Alright, go to EMS FUNCTION, DELTA-V.
00 02 01 01  CMP  DELTA-V.
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?
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?

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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 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.
Okay. We've got the VERB 48 in, VERB 83, ORDEAL set, and SEQUENCE PYRO ARM.

Okay. Stand by for a blast. One's ON. Two's ON.

Houston, Apollo 11. We have the pyros armed.

Okay.

This is Houston. Roger; out.

TRANSACTION POWER's ON. ROT CONTROL POWER, NORMAL, two, AC/DC.

They're all up.

DIRECT? MAIN A/MAIN B.

DIRECT.

S-II/S-IVB.

Check.

GUIDANCE, IU?

IU, yes.

Circuit breakers, DIRECT ULLAGE, two, CLOSED.

Okay.

And the event timer's set.

Now, why don't you - why don't you put ORDEAL on 200/LUNAR?

Alright.

Maybe you can start figuring out what the hell that ought to be.

I guess - leave them on INERTIAL for the time being.

Beyond my ability to - compute here right now.

...?

You're not worried now on that thing.

When the motor lights up, he's worried.

... 190, 110 degrees.

Got a long way around, yet.

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

Roger.
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 - your LMP handhold.

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.

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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.

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.
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.

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 SERVO 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?
Boy, that's - -

Yes.

You got him?

Yes, Mike.

No, I don't.

To the right over here.

Can you see him?

No, I don't see - -

He's a little bit to our right.

Okay, I see him.

We need about a 5-degree right, and we need to stop our - -

Okay. We'll stop here.

- - ... and we're pretty far away from him, too.

Okay, watch it, we should be stopping here.

How long do we want to run this film?

How does he look, Mike?

He's - he's fine.

Okay, you got 100.4 now.

Yes, I know; those numbers don't mean anything. They were 99-something when we turned around; don't ask me why. I thrusted toward him quite a bit, and I don't know why those numbers were screwed up, but they were.

Buzz, how does he look to you; looks like he's getting closer to me.

... get the BMAG?

Okay.

Yes, it looks like he's drifting down just a tad, and he's supposed to be.

How are our eight gray talkbacks; they still good?

Very good.

Flies like a spacecraft instead of a simulator. Hope that's good.

Sure beautiful. I hope you got some pictures, Buzz.
CDR  Is it going?
LMP  - - 16 frames at f:8 - -
CDR  Good.
LMP  - - 70, 1/250th, . . .
CDR  Beautiful.
LMP  It really looks nice, doesn't it?
LMP  Hey, how long does this . . .?
CDM  Hey, we're closing in a leisurely fashion.
CDM  It's on the - it's printed - -
CDR  Yes.
CDM  - - yes, it's six frames at 15; I suggest toward the end you probably goose it up a little bit.
LMP  You want to get the whole thing?
CDR  I don't care - . . . tell by looking at . . .
LMP  The thing is, with this sitting there, I can't get much with the Hasselblad. That window's no good, I'm afraid.
CDR  Can I hold something for you?
LMP  Take a couple of . . .
CDM  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.
CDR  I'll do it.
LMP  . . .
CDR  Be sure that your RCS is working anyway.

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LMP  How far out are you, Mike?
CM  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.
LMP  Yes, things occasionally come scooting out.
CM  . . .
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.
CDR  Yes?
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 sqaggy, 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 -
Whatever you do, take some pictures.

That should be on wide beam or . . . ?

Wide.

Okay.

Hey, if you're through there, give me that VERB 64.

What? Okay.

I'm amazed how it just wanders around for a given setting; you notice that?

There - it sounds like we got it now. There's your VERB 64.

We got signal strength.

Okay. You have to really be on MANUAL for those things to be indicating correctly.

He was but - -

Okay.

- - this one was just kind of wandering around there - with no - -

As soon as I went down to HIGH GAIN was when the signal strength came up.

Okay, . . . man.

Apollo 11 - -
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 - -

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.
Hey, are you - are you on your INTERCOM switch? INTERCOM/PUSH-TO-TALK and all that?

Yes, yes.

Okay. Alright. TRANSLATIONAL CONTROLLER's - - going TVC.

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

PITCH 2, MARK.

Got it.

YAW 2, MARK.

Got it.

Okay.

Set GPI trim.

Plus - -

Okay, it's set.

- - 1.0, minus 0.2.

Yes, it's set. Verify MTVC.

Verified.

THC, NEUTRAL.

NEUTRAL.

Verify GPI return to zero, zero.

Verified.

ROT CONTROL POWER, NORMAL, number 2, to AC/DC.

AC/DC.

SPACECRAFT CONTROL, CMC, verify.

CMC.

Okay. Now you got an option of trimming or bypassing.

Let's bypass.

Alright. BMAG MODE, three, to ATT 1/RATE 2.

Okay, 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.
APOLLO 11 - Onboard Voice Transcription

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 . . .

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 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.
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?

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?
That was the - that's the VGX residual at - before you spin.

Okay.

So just read the . . . . A.

Alright.

That was a beautiful burn.

God damn, I guess.

Whoo! Well, I have to vote with the 10 crew, that thing is brown.

Yes.

Sure is.

Looks tan to me.

But when I first saw it, at the other sun angle - -

Yes?

It looked gray.

- - it really looked gray.

Yes.

More - more sun angle you get - -

It got more - more brown - with increasing sun angle.

Okay.

It's a long ways off.

Alright, let's - Okay, now we've got some things to do -

Okay, let's do them.

We got to do a VERB 66.

Hey, wait a minute - alright.

Buzz will want to do a VERB 82; now, I don't know what comes first here.

Yes, VERB 82.

Well, I don't know if we're 60 miles or not, but at least we haven't hit that mother.

Look at that! Look at that! 169.6 by 60.9.

Beautiful, beautiful, beautiful, beautiful!

What - what'd it say - -

You want to write that down or something?

- - 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?

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)
Well, we're going to roll over and pitch down so we're looking out the front windows, down at the - -
Oh, yes, okay.
Okay?
We can pitch down - - - - picture - -
- - can we take a picture - -
- - - - pitch attitude.
Yes.
Now, we're going to have high gain, and then we're - -
How would you - -
- - going to be able to - -
- - like it with the - -
- - look at the moon ahead of us, coming out the window right now.
Can we see the earth horizon from here?
Well, we - - - -
We should be able to - -
- - - - precise. What was the time we got on it, Neil?
Yes, we can - -
Neil?
What's that?
What was the time we got on it?
Burn time?
No, no - -
Burn time or what?
We want the big camera, huh? Big lens or small one?
Oh, it doesn't really matter.
80 millimeter will probably be as good for - -
For the earth coming up?
No, for the earth - -
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?
I’ll do that.

Now, what else we got?

Coming up there.

... Eyeballing and chattering. We got the burn status report? That’s all?

Ready to go.

Okay, that looks good. Give me a VERB - 64.

What happened?

Ought to wash this window over here - -

You have a map so we can look at ...

Anybody got a - -

Yes, it - -

- - anybody got a Kleenex?

Yes, I think I’ve got one. Here you go.

Here’s one; it’s a little moist, though.

... Well, one more ... burn.

Two more.

You got two more.

Yes, ... got a few more.

Look at those craters in a row. You see them right - going right out there?

... Look at that line of them.

... Look at that guy, Neil?

Something really peppered that one. There’s a lot less variation in color than I would have thought, you know, looking down?

Yes, but when you look down, you say it’s brownish color?

Sure.

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.
What a spectacular view!

God, look at that moon!

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

See that real big - -

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

... Isn't that a huge one?

Look at the ... Did you get some pictures of that?

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

That's kind of a foggy window.

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?

You could.

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

Yes, there's a big mother over here, too.

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

It sure looks like a lot of them have slumped down.

A slumping big mother. Well, you see those every once in a while.

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

That is, the older they get.

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 - -

We're not going to see the earth come up over the horizon.

- - about 70 degrees.

It says pitchdown or pitchup?
Pitchdown, so we're looking forward.

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

We got 4 minutes to get down.

Alright.

Never make it. There's a couple of new craters.

There's a good view of that -

Look warm down there, Neil?

I sure can't tell.

Looks hotter than hell to me. Boy, look at the size of that one.

Golly! Whoo! Get another picture of that big fellow.

Yes. I'm going to take one out here of him.

I've got an Easter egg coming up, gentlemen.

That's good. Gosh, it's 1 o'clock already.

Hey, you know, we got a TV show at -

. . .

Huh?

The next REV around, that is.

Before LOI 2.

Yes.

Could you give me a gimbal angle to pitch to?

What are you going to do on that one?

Oh, I guess - get 10 pictures of the moon.

What did you want, Mike?

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

Yes, you were at 2 -

296, I would guess. How many minutes we got - to AOS?

About another minute and a half.

(Coughing)

I rolled to slow - doubt that we'll make it. Oh, look what I got. . . .

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 CDR 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 L.M.
03 04 15 28 CDR Are you set up?
03 04 15 30 LMP Just about to be cut off by the L.M. 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.
LMP 16 degrees.

CMP Yes, Shaffer screwed up - got to get his eccentric orbit.

CMP We is there.

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.

CMP Beautiful! Fantastic!

LMP Let's burn.

CDR That's MANUAL and ZERO - ZERO and MANUAL.

CMP We done paid our debt to society; we done made a star check. 79:50 -

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.

LMP Yes.

CMP Okay, we got the OPTICS, ZERO?

LMP Yes, I'm sure it is.

CMP And we're not going to do any VERB 41, NOUN 91, any of that stuff - -

LMP No . . .

CDR - - so you can - enter on this one.

CDR Okay. OPTICS, ZERO, ZERO, huh?

CDR Alright.

CMP Align spacecraft roll, GDC ALIGN.

CMD Yes, here we go - - - doesn't look bad.

CMP No, I just got through aligning it a little while ago.

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 LM?
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 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 - . . .
... all those characters back there.

8 minutes until TIG.

Boy, there's a crater right in the side of the wall.

It's a much bigger crater, and I'll be damned if it doesn't look like it just went in sideways.

Okay, 7 minutes. Okay?

... going to do it -

Buzz, you want to read us that checklist; we'll use my panel chart. Which checklist would you like?

Alright, MAIN BUS TIES coming ON.

Okay. 7 minutes -

MARK.

AC's ON - DC's ON.

TVC SERVO POWER, number 1, AC 1.

AC 1.

TVC 2, AC 2.

AC 2.

TRANS CONTROL POWER, ON.

TRANSLATION CONTROL POWER.

ROTATION CONTROL POWER, NORMAL, number 2, to AC.

AC.

ROTATIONAL HAND CONTROLLER, number 2, ARMED.

Number 2, ARMED.

Oh, I see those current - current ... went down on the fuel cells. ... right down here.

The batteries are carrying the -

6 minutes.

About ready for a gimbal motor or two?

Alright. Let's try - PITCH 1, YAW 1.

Here comes PITCH 1 -

MARK it.

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.

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.

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 48  CMP     Which way's it shaking, can you tell? Pitch and yaw?
08 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 46  LMP     I like the neat way he's got his - safety belt on - . . . should be about in the right place.
03 08 09 05  CDR     . . . 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.
DELTA-V THRUST, NORMAL, A, is ON.

TRANSLATION CONTROL, ARMED.

ARMED.

ROTATION CONTROL, ARMED?

TAPE RECORDER - COMMAND RESET.

- BIT RATE, FORWARD.

Okay, 19 seconds ullage this time.

Okay, stand by for...

EMS MODE to NORMAL?

EMS MODE, NORMAL. Stand by for ullage...

20, 19...

Ullage.

You got the ullage?

Yes.

Okay...

Yes. Whoops...

You want this...? Alright.

... and THRUST B.

A?

A, open.

She's holding - she's holding... looks good.

She's all over.

Okay, stand by for shutdown.

SHUTDOWN.

Shutdown, two valves, closed; two, barber pole.

Okay, DELTA-V THRUST, NORMAL, A, is OFF; stand by for the GIMBAL MOTORS, OFF.

PITCH 1, OFF.

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.
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 - -

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 pass through 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.
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.

And that must be big . . . right down there.

I haven't heard any woo-woo's.

Is there something we should be woo-wooing about?

Wait until we get the VHF on, then we'll hear the woo-wooing.

Okay.

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.

How's our roll doing, Neil?

Oh, you got about 30 degrees to go.

Oh, boy!

Okay.

How far you going to roll?

Over and over.

Got that DIRECT O2 . . . , didn't you?

Yes, just a tiny bit.

Okay.

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?

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.

Sure looks like it.

It's going straight out there through. That's real funny.

Son of a gun, that one's got a little - little curve on it.

Would you believe that, Neil? One went out and curved around like that. Can you explain that?

I guess it just glanced off another particle or something.

Oh, no, no, no, no; if it's curved.

It had a little bubble in it that came to the surface and went kapoom and - -

No - -

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 -

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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.

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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 . . .

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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.
Well, you might save that for some earth shots.

Wow!

You got it, huh?

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.

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.

. . . that one . . . into the LM.

Here is the earth. Hey, I got the view over here.

I guess I'd better get the high gain off, hadn't I?

Did it just come up?

Yes.

We need that . . .

Do we still got high gain?

Yes.

It's says minus 67 and zero.

Minus 67 and zero.

And zero.

Okay, MANUAL - and - AUTO - medium. There we go. Can't make up his mind between zero and - 360. Okay, we got them.

Okay.

Apollo 11, Houston. . . .

Do you want to talk to them?

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 - -

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?
Then we only have to decide what - what's supposed to go here.

I . . . two of them.

Both of those - those things are in here.

. . . worry about nothing goes in there . . .

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.

Sounds good, Houston.

I need that film now.

Okay.

. . .

Okay, want to get film. It's a long trip to the film container.

You want something?

Oh, shoot. I'm going to have trouble getting in there.

How's it going, Neil? You getting any?

. . .

Well - Buzz, the 70-millimeter container's only got one black and white and one color in it - Isn't it supposed to . . .

That's - that's not - that's mine.

You've got the wrong one.

No, that's not the right one.

The one - -

The one you want, Neil, is way over here in - R-13.

No, it's not in there; it was on my girth shelf.

Okay.

Oh, okay, there it is. Did you get that one put back?

No, but I will.

Okay, appreciate it. I had it in my mind that - our - -

You want to do something to the polarizing filter, Neil?

Uh - -

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)

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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. . .
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 - -

I'll go check around up here.

Oh, wait a minute, here it is. I got it.

I don't think the - -

This other one got changed.

No, it didn't.

You want to do that?

Yes, I can do that.

And in the meantime - Let's see, where'd the film go?

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.

You do put these in with this dark slide in, don't you? Is that right?

Which one you got? 60? 60 you do, and the 80 you - . . .

. . .

Yes, dark slide in.

It'll lock it the other way. That - that side - it'll pull it closed.

Alright. . . . for telling me.

Boy, that thing goes all over, doesn't it? Maybe we ought to - do these the other way around.

Neil, we got two magazines, two color, A . . . - one of them is R and the other is S.

Yes.

I'm going to put the R in the reserve camera.

Okay.

And the S in the surface camera.

Good idea.

Even though we're going to use them the other way.

Do you want to try it out in there?

I guess we could open the window here, just as well.

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?

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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, f4, 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.
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.

12 feet per second - half an hour.

Did you say something about taking pictures right now?

No, no; stop the camera.

Yes, I know, I don't think it'd take a very good picture right now.

One thing, when you get way up here, you can - see a lot more of that secondary strut.

No, that thing - that's holding up those damn baffles.

Well, if we could get a towel, we could get us a couple of fair-to-middling pictures out of here.

Alright. You want one?

Yes. Maybe - Some of it will come off, anyway.

Hand me a towel when you get a chance.

... left window ...

This one's getting pretty well cleared off over here on the left.

You want the COAS in the forward window for undocking, huh? And you don't want the filter attached? I stuck it up here.

All that'll do is warm it up.

When do we have AOS?

Well, we - we should have AOS in - oh - 16 - 18 - in about another 20 minutes.

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?

Unique feature - photography (laughter). ... on the top of it.

What have you been using, 5.6 at 1/250th?

Yes. ...
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.

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?
I can’t think of any reason why we might use it.

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?

He’s shaving.

I’m through with the flight plan, Neil, if you want it.

... razor?

The razor should be in there with the shaving cream, isn’t it?

No - -

It wasn’t?

- - shaving cream.

The razor wasn’t in there?

The razor’s in here, and I think the shaving cream was when I pulled it out, but - -

How much time to AOS, Mike?

82:30 - about 5 minutes.

Don’t know what I’m doing with VHF B on.

Hey, Mike?

Yes.

You got VHF B available?

What? Say again?

I don’t know. According to this lousy thing, I’m powering up VHF B - T/R.

Not right now, not for another half hour or so.

No, I know, but - Are you going to have your VHF on?

If I’m going to record your data, I am.

Well, it doesn’t say doodly squat about recording data.

... coming up now.

Did you get them?

No, sure didn’t.

Yes.

But I can’t see - - I see the earth, but it’s a lousy picture.

Could you wait just 1? I’m right in the middle of the event-timer setting.
Okay, Houston. We'll be doing P22 in just a couple of minutes here.

You want to come in, Neil? Going in?

Want back up?

No.

Here's your shaving cream.

My only problem is I'm going to come over here and grab a switch and arm this hand controller.

Alright. I'll be out of your way.

Okay. 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 -

Alright. I'll be out of your way.

Okay. I only got set up for this thing about an hour early (laughter). Better late than never; better early than late.

No wonder the earth isn't moving.

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.

. . . should be coming over the horizon here pretty soon.

What should be?

01d A-1. 0ld A-1.

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 -
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 . . .
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.
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?
No, I'm sorry . . . that's - -


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?

Yes.

That's US 1, I guess, huh?

Yes.

There's crater 130 over there although I can't quite see - see 129, but I can't quite see 130.

Can you see . . ., Neil?

I'm not sure.

I think I can see it, for sure. Yes, I got it beautiful - I can - I got the whole landing site here.

That far?

The one that's shorter there?

Houston, this is Apollo LM in the Eagle - Apollo 11 in the Eagle, and I got a beautiful view of the whole landing area.

Roger. I can see the entire landing area from the position I'm in looking out the left window in the LM.

That's right.

Boy, that sure is eerie looking.

Isn't that something?

. . .

. . . 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.

That's spectacular out there - Looks like you're flying right into the side of a mountain, doesn't it?

Yes, sure does.

I missed taking a picture of it, . . .

Well, that was good . . . Shall we go to maneuver, I mean to sleep attitude - anybody object to doin that?

That'd be alright.
Okay, I'm ready for you cats to transfer to LM power. What time GET you got?

80 - -

Get the . . ., Buzz.

- - 83 hours. You ready to do it?

. . .

You ready to do it?

Stand by. Yes, go ahead and do it.

Okay.

You got 83 hours right now, huh?

Yes, 83 hours, and we're on LM power.

Glycol pump.

Houston, Apollo 11. How do you read on high gain? Over.

Okay. You want wide beam, for some reason?

Will you cut my SUIT POWER and AUDIO, OFF, please?

Yes.

Okay, fine.

Okay, going OFF now.

We're starting our maneuver to sleep attitude; roll 82, pitch 229, yaw zero.

About ready to maneuver?

Go ahead.

Okay.

Yes?

You're past step 4?

Houston, 11.

What's the page?

Okay. We're on page - activation 12, 13, at step 4, verify descent talkbacks - gray, and they're barber pole.

Stand by. We've got it. We've just had - one circuit breaker out of position. We have them gray now.

Watch that.

Don't we want it dark?

I thought the lights were going out. Man, that voltage is really falling off.
Hey, Mike.

Yes.

. . . VHF . . . circuit breaker . . .

I can't hear you, Buzz.

He says, "Why don't you turn on VHF B, just for kicks."

Alright, I'll do it. You going to send me some data?

Yes, I'll get right to it.

Huh?

I'll get right to it.

Alright.

Soon as I get some COMM first.

Yes, because when I - because when I record your data, I'm on SIMPLEX A.

Yes, well, that's when you're talking at the same time.

Yes, okay. You want me just to turn up B now?

There's signal strength.

Hello, Houston, hello, Houston; this is Apollo 11, Eagle. Over.

A lot of static - on the command module S-band.

Well, we - we should still have him.

Houston, Apollo 11. Radio check on S-band.

I'm not getting them on -

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.

I've got nothing but static.

Houston, Apollo 11. Over.

Hey, Mike, you transmitting on B?

Mike, what are you transmitting on up there?

Say again.

What are you transmitting on up there?

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.
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.
Houston, Columbia. Reading you loud and clear.

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.

Yes.

But -

...

What?

...

Yes, forward's okay.

I don't think that would be too horrible sleeping down there.

It's for sure it's not going anywhere; this one's bolted down two places - and this one is - -

You can try it. If we could find a place to put our legs back in there, it'll be alright.

See - it's going to be hard to get into that - sampler there.

No - no, that's alright. That's the place for it.

(Sneeze)

Okay, lights went out - except for all those radioactive ones in there.

Well, COMM's good. Son of a bitch might work.

Sure it'll work. Anything in a pretty cockpit like that is bound to work.

Well, I propose leaving the probe and drogue in here overnight. Save all - doing all that claptrap in the morning.

It's okay with me.

Fine.

You through in the LM?

How's that going to affect - -

Sleeping!

- - sleeping?

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.

Alright, that's fine; I can have it there. I don't know how I'd get out, but - (laughter).

...
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 L.M. 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?
I did it.

Got that, huh?

Yes.

HIGH GAIN, REACQ, NARROW; antenna pitch angle - -

Yes, I did that.

- - that's all it says.

Okay.

Plus the normal configuration.

Doesn't it say anything about DOWN VOICE BACKUP - or any of that stuff?

(Cough)

No.

Okay.

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.

Alright.

Well, let's see, normal lunar configuration. Well, it is DOWN VOICE BACKUP.

Yes.

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, . . .;

PCM/ANALOG, RECORD, FORWARD, NORMAL, NORMAL - that's okay, LOW - PRIMARY, REACQ, and NARROW. Well, COMM's set.

Good.

I got to vacuum up some water and dump the waste water tank, and we're about set.

Hey, I got a fuel cell - O2 - -

Hey, our water's about all gone.

Did they say anything about the O2 purge?

Must have gone into the LM.

Yes, I think it did; it went on the windows. They didn't say anything about it, huh?

No.

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.
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 I'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?

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 that 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 12  CMP  I got a - pair of jockey shorts. Now cut - cut the lights off - lights off.

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 A0S . . .?
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 IEB.
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 . . .
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.
<table>
<thead>
<tr>
<th>Time</th>
<th>Caller</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>03 23 51 06</td>
<td>LMP</td>
<td>Okay, I'm going on.</td>
</tr>
<tr>
<td>03 23 51 08</td>
<td>CDR</td>
<td>Okay.</td>
</tr>
<tr>
<td>03 23 53 30</td>
<td>CDR</td>
<td>What's that?</td>
</tr>
<tr>
<td>03 23 53 34</td>
<td>LMP</td>
<td>Did you repress, huh?</td>
</tr>
<tr>
<td>03 23 54 24</td>
<td>LMP</td>
<td>How come you don't . . . LM power?</td>
</tr>
<tr>
<td>03 23 54 26</td>
<td>CMP</td>
<td>Okay. Stand by. You're on LM power. What?</td>
</tr>
<tr>
<td>03 23 54 38</td>
<td>CDR</td>
<td>What did he say?</td>
</tr>
<tr>
<td>03 23 54 39</td>
<td>LMP</td>
<td>. . .</td>
</tr>
<tr>
<td>03 23 54 41</td>
<td>CMP</td>
<td>Oh, what time is it? It's 95:54.</td>
</tr>
<tr>
<td>03 23 55 12</td>
<td>CMP</td>
<td>Now, switch from RATE, HIGH, to RATE, LOW. But that might make it better and maybe a little bit worse.</td>
</tr>
<tr>
<td>03 23 55 21</td>
<td>LMP</td>
<td>. . .</td>
</tr>
<tr>
<td>03 23 55 35</td>
<td>CMP</td>
<td>I guess that's right then, Neil; it rattles across the deadband at a fairly high rate.</td>
</tr>
<tr>
<td>03 23 55 44</td>
<td>LMP</td>
<td>. . .</td>
</tr>
<tr>
<td>03 23 55 46</td>
<td>CMP</td>
<td>Alright.</td>
</tr>
<tr>
<td>03 23 56 31</td>
<td>LMP</td>
<td>. . .</td>
</tr>
<tr>
<td>03 23 56 34</td>
<td>CMP</td>
<td>Sure as hell is.</td>
</tr>
<tr>
<td>03 23 56 50</td>
<td>CMP</td>
<td>I can't get that . . .</td>
</tr>
<tr>
<td>03 23 56 53</td>
<td>CDR</td>
<td>This one - this one? That won't hurt it. . . .</td>
</tr>
<tr>
<td>03 23 59 09</td>
<td>CMP</td>
<td>Stand by for some MASTER ALARMS; I'm purging.</td>
</tr>
</tbody>
</table>
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 24  CDR  What?
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.

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 lock on; it

appears as though the antenna would have to be looking through the LM in order to reach the earth. Over.
Roger. Ready to copy.

Roger. LM weight, 33627; CSM weight, 36651; pitch trim, 00470; roll trim, 00589. Over.

Roger. Understand.

Houston, Columbia. Do you read?

Roger. S-BAND VOICE to VOICE. How do you read now?

Houston, Columbia. Over.

Houston, Columbia in DOWN VOICE BACKUP. Do you read?

Affirmative. Columbia in DOWN VOICE BACKUP. How do you read me?


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.

Houston, Eagle. Completed gear extension okay.

Thank you, Houston.

Yes, I had the coordinates loaded off the cue card which is - for crater 130.

Roger. Thank you.

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, and we need you to watch our DAP data load, gimbal drive check, and throttle test. Over.

Roger. We'll go ahead with the DAP and the throttle check since we don't have a gimbal drive test, okay?

Houston, Columbia. Those T1 and T2 times are still good, aren't they?

I say, the T1 and T2 times remain unchanged, affirmative?

Thank you.

Houston, Eagle.

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.

Roger.

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?
A few minutes.

GET of the separation burn is 100:39:50 even.

I haven't gotten the updates for undocking time; I'm still carrying 100 hours 15 minutes, I guess, . . .

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.

Yes, I agree.

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.

I have 5 minutes and 15 seconds since we started. Attitude is holding very well.

Roger, Mike. Just hold it a little bit longer.

No sweat, I can hold it all day. Take your sweet time. How's the Czar over there? He's so quiet.

Just hanging on - and punching.

I didn't know . . . radio. . . . I've ever seen a radio. All I can say is, "Beware the revolution."

You cats take it easy on the lunar surface; if I hear you huffing and puffing, I'm going to start bitching at you.

Okay, Mike.

I just pressurized the DPS. . . . looks okay, Mike.

Roger that.

Hey, Mike, can you see where our radar's pointing now?

Well, it looks like it's pointed right at my head; that's hard south; so's your radio beacon.

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 -

Okay. We've wandered back over the bellyband now - let me assure that AGS CAL.

... .

How'd the AGS CAL work out?

Oh, it danced around a little bit, but seemed to go right back to the original numbers.

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.
CDR 67 feet per second. Go ahead with the . . .
LMP Can’t beat that. Okay, through with that?
CDR Yes. I like it.
LMP Hold on to the . . . below.

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CDR Okay. And I’ll pull the breakers - think we can . . . roll.
LMP Yes.
LMP Got them both?
CDR What?
LMP Got them both?
CDR Yes. . . .
LMP Okay, it . . .
CDR Going to load the PDI plus 12, right?
LMP Right.
CDR Okay, I’m going to start pitching down to 125.
LMP No PDI plus 12.
CMP I have you right down . . . 65 feet per second.
CDR Sounds good.
LMP Okay, the camera is set. And ought to be ready to do the P52.
CDR Yes.
LMP Not going to be much of a drift check.
CDR It - it torques them late enough to ensure that - . . . the drift check.
LMP Sure seems like we’re going the wrong way.
LMP How much do we got to go to pick it up?
CDR Got to go - oh, half the moon to go, I guess.
CDR Coming down already.
LMP Okay. It’s got us 152; it’s 151; there’s . . ., okay? . . .

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LMP There’s 52.
CDR Got 8 minutes . . .
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.

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.
CDR  MARK it.
LMP  124 19, 124 19. Well, it should have been - 124 00.
CDR  Do another one?
LMP  124 00. Well, it should have been - 124 00.
CDR  Do another one?
LMP  Yes.
CDR  Okay. I'm about ready.
LMP  Tell me when.
CDR  Ready -
CDR  MARK it.
LMP  Okay. 134 17; KEY RELEASE; PROCEED. ... it should have been - 124 01.
CDR  Okay - 134 17; KEY RELEASE; PROCEED. 4 13 - ... it should have been -
closer yet.
LMP  Ready whenever you are.
CDR  Stand by. How's our roll?
LMP  Okay.
CDR  MARK it.
LMP  . . . - 13; KEY RELEASE; PROCEED. 4 13 - . . . it should have been -
closer yet.
CDR  Okay, Mike, we passed the star check. Foxtrot.
CMP  Very good. . . .
CDR  Very good. Okay? . . .
LMP  Alright, let's go to - pitch to 180, 285, and zero.
CDR  Okay. We'll . . .
CDR  Cottonpicker just won't stay - try it!
LMP  Well, wait until we lose that descent stage, man.
CDR  We'd better take - a - piece of tape; hold that down.
LMP  How about if you get the bottom in the - get the bottom underneath this cover?
  That help?
CDR  Well, it - it's still not; I've had it in there real good couple of times.
LMP  Your - hoses were tearing hell out of my board.
CDR  Sorry.
LMP  You got INVERTER 1 circuit breaker in, right?
CDR  Checked in.
Okay. I'm going to check INVERTER 1. INVERTER 2 is good; and INVERTER 1 is good, and we're on INVERTER.

. . . look good.

Okay, get your AELD circuit breaker in and ABORT STAGE circuit breaker in.

AELD is in; ABORT STAGE is in.

Cycle the CWEA? No, we must have lost one.

Yes. That cottonpicker may be trouble.

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?

I think it's just a switch. I . . . if it doesn't trigger a light -

Something - -

Oh, we're in PULSE, and we're not commanding any firing - -

I don't know; that could have come under DOI, but I doubt it.

I just think that's one of those sticky flags. . . . got a good engine.

Alright, let's see.

ENGINE STOP button was reset?

ENGINE STOP button is START, but it is going to be now.

Alright. Window bars; THROTTLE CONTROL to AUTO.

Okay. THROTTLE CONTROL to AUTO.

Alright, TTCA - -

THROTTLE on MINIMUM.

- - ENABLE - ENABLE - THROTTLE in MINIMUM. Okay, in 35 minutes, we'll get the BAT feeds ON and - -

That's the wrong time, right?

No, no, no.

. . .? PDF?

It's - oh - about - probably maybe a second, right here, . . . 32. Okay?

Yes, it's about a second off.

If it's fast, I'll stop it; if it isn't, why, forget it.

You want this one over there?

I need this out. Burn in 46 minutes.
04 06 06 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?

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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?

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?
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?
Okay, we went by the 3-minute point early. A little off.

Rate of descent looks real good. Altitude - right about on.

Our position checks downrange show us to be a little off. AGS - AGS is showing about 2-feet-per-second greater rate of descent.

MARK.

Show us to be about - Stand by. Maybe have to stop that.

Altitude rate looks right down the groove.

Roger. About 2 seconds off - rolling over.

Okay, now watch that signal strength because -

Yes, I think it's going to drop.

Boy, I tell you, this is much harder to do than it was -

Keep it going.

Houston, before we leave you, the ED BATS are GO at 4 minutes.

Roger.

How you look over there? Okay?

Okay. You got good lockon.

We got a lockon?

Yes. Altitude light's out.

Okay.

DELTA-H is minus 2900. We got the earth right out our front window.

Sure enough.

Houston, you're looking at our DELTA-H. Program alarm.

1202; 1202.

What is it?

That's in core . . .

Give us a reading on the 1202 program alarm.


Same alarm and it appears to come up when we have a 16 68 up.

Were we - were - was it coming down?

Yes, it's coming down beautifully.
Roger; it looks good now.

THROTTLE, DOWN.

THROTTLE, DOWN, on time.

You can feel it in here when the throttle's down; better than the simulator.

AGS and PGNS look real close.

Okay. No flags. RCS is GO; DPS is GO; pressure is - okay.

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.

Okay. 07:30 coming up. Should be...

Okay.

Coming up on 8 minutes.

Could you give us an estimated switchover time, please, Houston?

Okay, 7000, . . . Looks good.

Roger.

P64.

. . . over. Okay. 5000, 100 feet per second is good, and I'm going to check my attitude control.

Attitude control is good - manual attitude control is good. Okay, 3070.

Roger; understand. Go for landing, 3000 feet. Program alarm - 1201.

1201. Okay. 2050.

2000 feet; 2000 feet.

Give me an LPD.

Into the AGS, 47 degrees.

Give me an LPD.

47 degrees.

47.

That's not a bad-looking area. Okay.

1030 is good.

What's LPD?

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.
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

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.

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.

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.

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.

Go ahead.

Stand by 1.

Houston, Columbia. Over.

Houston, Columbia. Over.

Houston, Columbia. Over.

Okay.

Houston, Columbia on the high gain.

Read you loud and clear, Bruce. What's new?

Ready to copy.

Columbia.

Houston, Columbia on the high gain. Over.

I'm reading you loud and clear. How's it going?

Columbia. Roger.

Negative that.

Houston, Columbia on ... How do you read?

Roger; Columbia OMNI Charlie. How do you read?

Hallelujah.

Roger, understand. You want a option 1 - P52, option 1?

P52.

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 . . .
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.

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?
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 21 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?
LMP . . . out of plane.
CDR What?
LMP Did you hear that?
LMP Why you don't hear these 3 - 3500-pound rocket engines when you're sitting on them, I'll never know.
CDR Yes.
LMP . . . structure somehow.
LMP 3.5, Neil.
LMP Woo-woos is on VHF B -
CDR . . . B?
LMP Not on A.
CDR (Laughter) That's your story, huh?
CDR That's rugged country.
LMP Yes, that perigee we're on . . .
CDR . . . alright, isn't it?
LMP I got 4 feet forward and I got back 7 . . .
CDR Boy, this water separator sure isn't working worth a durn. Maybe we ought to try the other one - . . . water. Oh boy, this thing is just really spitting it.

LMP I sure do; it's been on - yes, we do - it's been on all the time.
CDR We should see the tracking light now - That's it - Doesn't look . . . but it's not - turned off.
LMP Okay, let's try and get a Y-dot, or an R-dot, at 30 seconds.
CDR It'll be the first time we've ever done it.
LMP No, let me get COMM.
LMP We're really going to be crying.
CDR [Simulated crying]
CDR My - top thruster over here has got a lot of brown holes in it - in the exit nozzle.
CDR See it?
LMP Yes.
LMP You know, these thrusters aren't used much over here. Well, maybe . . . or something.
CDR See it?
LMP No.
When we get the sun behind us, we might be able to.

Hey, I got to recycle. Then after . . .

It's all over me.

Coming out of that vent back of my neck, isn't it? That where it's coming out?

Give us the CSI state vector - navigation difference - no updating CSI . . .

Through AGS.

Thinking about it.

You going to come up with a solution for us?

Range rate?

Range rate.

A lot of trouble having our . . . up.

Range/range rate is . . .

Yaw, damn it!

. . .

. . . is up.

125:47:45.58.

. . .

. . . feet per second.

Both tanks were pressurized, weren't they?

Yes.

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.

Okay.

We're getting minus 2.9.

Going AGS all the way, huh?

Yes, forget it.

Get more tracking if we forget.

No, we'll just - we'll just wait until CDH.

You got a lot of film left in there?
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.

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?
Burn's complete. Did you read? Burn's complete.

Thank you.

Eagle, Houston. Aft 0MNI, LOW BIT RATE, and we'll see you at 127 plus 51.

Okay, . . . . 5, huh?

Well - say when . . . Oh, wait a minute.

Chart at 26/7 forward for -

Pretty reasonable.

AGS had these residuals after its completion after the burn.

I can't see you, Michael.

. . . moving in at . . .

Okay. I got good radar; I just can't see you.

. . .

Do you think that pressure dropped?

Yes.

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 - -

All got data.

We all got something . . .

Okay, you try getting it - . . .?

No, I haven't been; do you want me to?

No, I got to keep the chart.

. . . can take this update for them.

On the track about, huh?

Boy, my shoulders sure hurt.

Mine are, too.

Last night I couldn't get this far from the . . .

I was the same way.

Use all the green tape, did you?

I got it in sight now, Mike.

. . .
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?
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.

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 . . .

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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.

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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.

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 . . .

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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 -
If I roll 120 - it'll roll left.

90, huh? . . . 60?

Well, why don't I start to roll - -

Yes, I think if you roll up 60 -

I'll be looking into his left window when I pitch up.

I don't think so. If you did it right now you'd - -

... I got the earth coming up already; it's fantastic!

Okay, you got me.

Eagle and Columbia, Houston. Standing by.

Roger; we're stationkeeping.

Roger.

Pitch up . . . pass right up just a little, you got a better view - bottom side - . . . - move back.

. . . - that's right.

Okay. I'm getting about into the right attitude, I think. . . .

Yes.

That roll's pretty far; I don't know just how much - so that's - Oh, it's going to go BLOCK!

That's it - going to AGS?

Yes, . . . ATT DEADBAND.

Okay, Mike, I'll get - try to get in position here, and then you got it.

Okay.

How does the roll attitude look?

. . .

Let's see how the DSKY thinks it looks.

Have you stopped rolling yet?

I'll stop. Matter of fact, I can stop right here, if you like that.

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.

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.

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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.

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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 . . . 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  ...

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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.

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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 - -

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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 . . .

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?
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.

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.

Yes it was - -

But it's pattern is such that it sprays out horizontally, and it doesn't really come up and engulf you, huh?

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.

Dark - battleship gray, isn't it?

Maybe not - I don't know - -

Well, what kind of - -

- - what stuck to the spacecraft, I think you can see afterwards - -

What do you think it is from the - geology standpoint, is it basalt dust?

Well, do the rocks - do the rocks all look the same? They're different - good, great; I'm glad to hear it.

There's really a tremendous -

Little sparkly stuff; quite a bit of it all over.

I'll be damned; I'm glad - I'm glad it wasn't just - -

Yes, is that right?

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 - -

We were kind of rushed, if that's what you mean.

Yes.

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 - -

Eventually, it does - -

Huh?

Well, eventually, it does - it shows the . . . - you can see those - . . .
That's great; fantastic! That'll keep those geologists jumping for years.

Yes, you got to keep... No, that's right, you got a 6-foot pole, you just stick...

Sort of like wet sand...

- - about that far.

Is that right? I don't know. I'm inclined to...

... Is this yours?

You yawed right 13 degrees? What's nominal?

Yes. Is that right?

You finally got it level, huh? What was that thing that you said it was supposed to be concave but it was convex?

Yes, yes.

... looking down there... sure looked like it was convex... Neil walked back a little later and it was right smack in the middle... - -

But there's all different kinds of rocks, huh, or at least several different kinds?

Well, how - -

- -...

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...?

...
When you looked down sun, it looks almost white, just a reflection from the sun.

Well, ... as it goes out ... while on earth it gets ... in the atmosphere ...

Yes.

... that might be indicative of why ... 

Yes.

Neil, when you get a hand, would you push that little goddam valve down to DUMP? Never mind, never mind.

... be sure and get the right one ... 

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.

Here's one.

... for the hoses? Well, check the ends of the hoses.

Well, why don't you leave the vacuum cleaner; I think you just got now the other one ... 

No, this one's got ...

Okay. Now the one I got is for my hose over here which doesn't have -

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. ...

Hey, the Velcro - the Velcro around them sort of ...

Huh?

I said, this is my field geology ...

Right.

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 TEI, right? Might as well.

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 ...

Yes, we could put the couch up now if you want to do that.

Okay.
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?

Alright. And we're - we're LOS here for a while anyway, 131 -

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 . . .

(Laughter) . . .

(Laughter) . . .

. . . all this little stuff . . .

. . . is this optional - sort of - . . .? Huh?

No, optional . . .

No, no, this is - used for the intervalometer?

. . .

. . . 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 . . .

. . . is looking good.

Think so.

A little more.

You got to do what, Neil?

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.

We're in INERTIAL, aren't we?

No, you want to go to INERTIAL?

I wonder if Neil has made any preparations?

What's your altitude?

I guess we could put - . . . to . . .

Hey, Neil, I think this - this does have something . . .

Alright.

. . . Now it's on the other side. No, down, down . . .
What did you have on . . .?
No, that side. Yes, it was down to 3. He called 30 seconds at one time.
Yes, . . .
Yes, he called 60 seconds; then I heard him call 30 seconds.
Yes.
. . . I got it, thank you.
Well, it's held under that forward-velocity unit.
How's that?
With the . . ., I don't see how you can -
Leaving on your . . . in here?
I think - you had that same pair on all the time.
Is that the . . . - sitting there?
Yes, here it is.
Let me put it down here. Bring it on down. Over here. Put them all in one place.
You ready for your underwear? Mike - you ready for your underwear? You ready for your underwear?
Just a minute; yes.
. . . - put our - LCG.
Yes.
Somehow we'll figure a way to . . .
2 feet per second.
You didn't maintain that 3-1/2 feet per second down there.
(Laughing)
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.
Yes.
Well, I really couldn't put the . . . no place, not that I'm sure of it, but my light came on, why, . . . hit.
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.
You mean you didn't . . .?
Getting all the damn alarms.
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.

Will that one do? . . .

Are you staying in this inertial attitude? Let's just leave it in REACQ then; it works just like a charm.

Yes, that's right.

How about that?

Beautiful.

405 and 404 - What's the matter with it? (Laughter)

403 I think we . . .

. . . alignment, oops, I got 404 again.

How about that, wise asses! Huh?

You had a - you had to work though, didn't you?

. . . O2 fuel cell's . . .

This is not dumping.

I figured that.

Did you try the other line?

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.

Not entirely. I think I'd rather stick around . . .

. . .

How long does it take to warm up this thing? 3 hours?

. . .

What state vector is in the LM slot? The LM?

. . . minus a few feet per second. . . .

Well, we got something in the LM slot . . .

Well, that's just an old vectors, because I never did VERB 66, I don't think, after . . .

We got 22 feet per second. Almost have to be LM - previous to the SEP burn.

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.

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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.
Those temperatures are deceptive. I don't know where they measure it, but the cold point is -

Okay. Sunrise, now 10 minutes prior to TIG; I should have the horizon on the 10-degree line, huh?

No, 10 degrees - 2 minutes.

2 minutes; that's more like it, there.

... this COAS as far as steering and everything goes, it's hopeless.

...  

I'm graphically reminded of it at this moment. Yes. I see a horizon. It looks like we are going forward (laughter).

Shades of Gemini.

It is most important that we be going forward (laughter).

There's only one really bad mistake you can make there.

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.

Yes, horizon looks good.

Okay, we got 8-1/2 to TIG.

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?

No, it probably would be after we - when the gimbals are out.

Oh, yes, alright. Okay.

Beautiful looking horizon, it's hard to describe.

We can see it if we look through that thing you have.

Where's . . .?

Here or here? God, it has an eerie look to it. It's not a horizon, it's just a band.

You won't be able to see it, Neil, . . .

Which way?

This way. Plus X . . .

It was really eerie when it first came - -

You got to look through the part of the window that isn't -
Yes. And the way the terminator is, you don't see the whole moon at all, you just see a - -
I know, I was looking at it upside down for a while.
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.

Okay, it looks good, I'll tell you.
Alright, we're coming up on bus tie time; we've got a little over 6:50 until TIG.

. . . ON, verified.
Okay.
. . ., ON. . . . and a half.
Alright.
Okay. TVC SERVO POWER 1 to AC1.
1 to AC1.
2 to AC2.

TRANSLATIONAL CONTROL POWER, ON.
ON.
ROTATION CONTROL POWER, NORMAL, number 2, AC.
AC.
Arm ROTATION CONTROLLER, number 2.
ARMED. So far, so good.
Okay. When do you want the gimbal motors on?
Oh, at about 5-1/2 minutes.
Okay, that's right now.
Right now?
Yes.
Okay.
Here comes PITCH 1, ready?
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.
Okay, LIMIT CYCLE’s OFF.

FDAI SCALE, 50/15.

50/15.

Okay, wait for 2 minutes for DELTA-V THRUST A.

2 minutes to get our horizon check at 10 degrees.

Yes, and - sneaking up on there, looks pretty darn good. Looks like we're darn near right.

Just about midnight in Houston town.

Yes.

Okay, coming up on 2 minutes, and this damn horizon check is going to be, would you believe, perfect?

I hope so.

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.

Beautiful.

2 minutes - -

DELTA-V THRUST A - -

NORMAL.

- - DELTA-V - -

TRANSLATION CONTROLLER, ARMED.

- - okay, DELTA-V THRUST A, NORMAL; stand by for a malfunction - it's not there. Very good.

Probably get the sun in your window on that burn.

Yes, I believe it.

The sun - -

ROTATIONAL HAND CONTROLLER, number 2, ARMED.

ROTATIONAL HAND CONTROLLER, number 2, is ARMED.

Alright.

Ullage is going to be 16 seconds at 2 JETS.

TAPE RECORDER is going to COMMAND RESET on the HIGH BIT RATE.

Got to go from STANDBY to NORMAL.

I'll do that in 35 seconds.

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.
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  Alright, now call the VERB 89 in and see which way that - -

05 15 30 49  CMP  Okay.

05 15 31 07  LMP  Alright, now call the VERB 89 in and see which way that - -

05 15 31 08  CDR  - - set up that tape and let it do its thing; it's still got a long way to go for  ... 

05 15 31 15  LMP  Alright, now, do we want black and white, color, 250, or 80? I've got all options over here.

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.

# # #