Apollo 11
Onboard Voice Transcription
(U)
Recorded on the Command Module
Onboard Recorder
Data Storage Equipment (DSE)
August 1969

GROUP 4
Downgraded at 3 year intervals
Declassified after 12 years

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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 speakers (simultaneous)

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.
DAY 1

00 00 28 53 LMP How are we doing on that time, anybody? Neil, are you sort of master of ceremonies on time, yet?
00 00 29 00 CDR Well, I didn't ...
00 00 29 22 LMP (Singing) Okay, your DRINKING WATER SUPPLY valve is ON.
00 00 29 27 CMP How about this ... circuit configuration? GLYCOL RESERVOIR BYPASS valve OPEN?
00 00 29 33 CDR (Cough) ... BYPASS is OPEN.
00 00 29 38 CMP RESERVOIR OUT valve CLOSED?
00 00 29 40 CDR OUT's CLOSED.
00 00 29 41 CMP IN valve CLOSED?
00 00 29 42 CDR IN's CLOSED.
00 00 29 43 CMP ECS RADIATOR FLOW CONTROL, PRIMARY.
00 00 29 48 LMP ...
00 00 29 51 CMP Hey, Buzz?
00 00 29 52 LMP Yes.
00 00 29 53 CMP How would you like the camera?
00 00 29 55 LMP Okay.
00 00 29 56 CMP PRIMARY GLYCOL TO RADIATOR valve, NORMAL.
00 00 29 59 LMP Why don't I leave the dark slide --
00 00 30 01 CDR Are we ready for that, you think? What's the time?
00 00 30 04 LMP 30 minutes. ...
00 00 30 08 CDR ... to NORMAL, and check the radiator.
00 00 30 13 CMP It will take awhile, that's --
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.

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

Yes, it goes back up.

Alright, Buzz, here's one Hasselblad for you.

Coming around the right-hand couch.

That seems okay.

Buzz?

Yes, just a second.

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.

Okay.

Just leave the dark slide with it?

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.

Well, I know there's an orange dot on this ... somewhere.
That looks just a couple of degrees still above the -
Buzz, did you ever get that camera?
Yes.
Okay.
Now, look.
Yes, I guess it's 5 minutes after you do this before ...
It's coming down, but it's -
Is it?
-- as I said before, that's -
It looks like that's about equal to the limit pressure.
Yes, they're about - they're just about the same now.
Not getting much out of the radiator.
Okay, Buzz, are you ready for 16 millimeter?
Yes. How about a bracket?
Let - Neil will give you the bracket.
And the bracket - bracket slide -
Okay, Buzz, I'm going to have to do something about your couch. You mind sliding over to mine?
No, that's fine.
Could you --
Can you work on that strap?
Oh, yes, I will. Sure will. The - the one that your strut's off ... instrument panel.
Day 1

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 ON; 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.
Okay.

Now, Buzz, this item here at Canaries. LOS, 23:36; POTABLE WATER HEATER, MAIN A --

Yes, I got that.

-- PCM BIT RATE, LOW --

I got that.

-- You got all that, okay. Okay, when was the --

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

Okay.

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

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.

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

4-B, okay.

What are you reading?

I'm reading 3.50.

... our attitude quantities ...

Houston, Apollo 11.

Hello, Houston; Apollo 11.

OPTICS ZERO is OFF. I'm going to jettison the ... cover --

Apollo 11, Apollo 11; this is Houston through Tananarive. Over.
Hello, Houston; Apollo 11. Go ahead.

Houston. Apollo 11, read you on VHF A SIMPLEX. How do you read? Over.

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

Beautiful.

We concur.

Well, we're just coming into the terminator, here.

I jettisoned the optics; I hope they went. Did you see them go?

I heard a little something, but I --

Don't want to miss that.

No.

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 -

... a double blind on this?

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

That's right, plus.

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

Got A and B down.

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

Give me that little circular job.
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.

You say you had about 3-point-something volts up there?

Yes. ... and on the ...

3.4?

3.45, something like that --

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

Okay, 4-A is 3.8. Okay.

No, 4-A.

4-A?

Yes.

And 3.8.

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

Apollo 11, Roger.

52:15.

You want some of these lights down further, Mark - Mike?

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

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

Okay.

It's greater than 1.5; that vent - vent -
Well, we haven't even done it yet.

... 

Yes.

Man, we are in the dark, now.

You got any reading off that REPRESS $O_2$ to be greater than 8 ... 

We got - No, not quite that much. That's that crazy gage.

Okay, can I have the ... now?

Yes, you got it. ... 50 degrees ... 

... here is your acid test.

Okay, what did he say 52 -

52 ... percent, about.

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

It's - Menkent.

... ball on that pad - it's maintaining about 39 degrees, Mike.

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.

Menkent - God, what a star.

Nobody in their right --

Menkent's good --

-- nobody in their right mind would pick that one.
Menkent's a good star.

Hey, I sure wish you'd get out that - that star chart.

Can't see a thing, huh?

No. It's in the -

Did you look in the telescope?

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

Okay.

I believe it's at the angle we have to mark on it.

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

Feels comfortable to me.

--- would you like it a little warmer, anybody?

I don't think so; I think it's a little on the ---

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

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

No, that's ---

--- is Nunki. What?

Okay. Hey, Buzz?

What?

Did you write down any marks on 30 and on 37?

I was going to mark on 37, and that's Nunki; 30 and 37?
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 - 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 --

34?

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

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 flood-lights down here.

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

It's ...

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.

0.01, God damn it! Now that's enough to piss a body off.

... that time.

S-band noise.

We're about to get - 10 seconds until acquisition.

Okay.

Okay, and my optics eyepieces are stowed.

You want me to take your checklist, Mike, and kind of skim through it?

It says here, coming up on Carnarvon LOS at --

Let - let me tell them about the TV ...
Roger, Bruce. Thank you. We expect TV. We've got it all hooked up. We have not yet turned it on; we're ready to do that now.

Okay, you think we can do that?

That's fine with us.

This one here?

Tell them that we've got nothing to do here but recheck it here for the next 20 minutes or so.

Okay. I'm ready to turn the TV on. Play with it. ... flashlight ... hook it up ...

Want a - ...? Mike?

No.

Yes, I'd love one, Neil; thank you. I just stuck it in my pocket.

Can I give you the wrapping back?

(Laughing) Now that is a problem, trying to find --

It's a gooey one. Gooey when the paper doesn't want to come off, but thanks anyway.

What was you doing? (Laughter)

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).

Is that right?

Yes.

Have we got any daylight? I can't see outside at all.

Nothing yet, ...
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.
00 01 09 44  LMP  That must be doing something.
00 01 09 46  CMP  Yes.
00 01 09 47  CDR  How long --
00 01 09 48  CMP  You got it on infinity for one thing; let me put it down here.
00 01 09 52  CDR  -- how long is it supposed to take to --
00 01 09 53  CMP  ...
00 01 09 54  CDR  No, no, it's the one with the ...
00 01 09 59  LMP  Okay, it's - it's working somewhat; it's just the question of not enough light in here when I get it.
00 01 10 06  CDR  Yes.
00 01 10 07  LMP  ... It's, I think, working okay.
00 01 10 10  CDR  We ought to be coming out into the daylight here in a little bit. Get it all shaped up?
00 01 10 22  LMP  I think it's fine. Now the one thing I forget about this is this zoom.
00 01 10 30  CMP  Do we want to write on this what - what we're taking pictures of? 0.5 millimeter.
00 01 10 46  LMP  Who knows about zoom lenses? This lens goes from 12.5 millimeters to 75; I assume that's the same nomenclature as on a camera. Right, 75 is zoom --
00 01 10 58  CDR  I would think so.
00 01 10 59  LMP  -- and 12.5 is wide angle. The only thing that confuses me is that it says for vehicle to vehicle - We want to be zoom on 12.5. I guess they just want to make sure you got the other vehicle in view. Probably ... telephoto.
00 01 11 15  CMP  Okay, well, then, I'll put the zoom on 12.5.
00 01 11 18  LMP  Okay. You didn't touch this lighting?
No, I didn't ... Minimum ...

I've got bright.

Focus, I'll put at infinity, and the f-stop for vehicle to vehicle is --

Not much light in here.

-- f:2.8.

What?

Okay. I - I'll show what it looks like inside of the cabin.

Okay, this looks alright, I think.

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?

...

Yes. You want to see the monitor?

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.

Yes.

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.

Okay.

There are two pieces on the back of them ...

You think so, huh?

Yes, over, just a little up toward the ...

Now, ... - It's rolling around, so I can start looking outside, upside down.
I don't know, I think we'd almost be better just by looking at the monitor, Buzz.

Yes, yes, but this way I think I'll know how to know which way to move it.

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

Hey, there's something. How's that window?

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

I was out of my ...

Handkerchief or something ---

Where do we have to go to get a tissue?

All the way down to the ...

How about - using a piece of cloth, like ---

While I'm here, let me ---

What - what - do you want a tissue for?

Hey, that's a good idea. We can get rid of that stuff ---

...

-- that's a good idea; good head.

Brilliant ...

I got your checklist, Mike; you want it back?

Yes, I'll take it back, Neil - Thank you, just put it here.

No, you got Buzz's checklist here. You gave me Buzz's.

Excuse me.
00 01 15 44  CMP  ...  I'd rather have my own.
00 01 15 47  LMP  How does the checklist look to you, Neil? 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?
Outside of it - on the magazine?
Yes.
How does zero g feel? Your head feel funny, anybody, or anything like that?
No, I don't know, it just feels like we're going around upside down.
... I don't know - even feel that.
I feel the horizon coming up.
Oh, yes.
Buzz, are you ready to ---
... 90 degrees the wrong way ---
-- are you ready for this briefing? Buzz?
Yes, let me get this.
Oh! Okay.
Oh, yes, stand by for sunrise.
Say, we got the rookie with us; he hasn't seen so many of those.
(Laughter) Okay. 30 seconds.
Oh, no, there is a possibility.
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.

00 01 19 18 LMP Yes.

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

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

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

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

00 01 19 59 CDR Isn't that something?

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

00 01 20 08 CDR Get a picture of that.

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

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

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

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

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

00 01 21 23 CMP Yes, ballpoint. Here it is. I mean felt tip.
... 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.
00 01 23 30 CDR  On your side?

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

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

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

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

00 01 24 33 CMP  ...

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

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

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

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

00 01 25 15 CMP  Beautiful low pressure.

00 01 25 16 LMF  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 LMF  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 LMF  Sun is bright, isn't it? ... It's a pretty nice camera, to tell you the truth.

CONFIDENTIAL
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 --
Apollo 11, this is Houston through Guaymas. Over.

Roger, Houston. Reading you loud and clear.

Reading you the same. Coming up on AOS Goldstone.

Roger.

It should be right now, Buzz.

Cecil B. De Aldrin is standing by for instructions.

Houston. Roger.

Okay, and I got pads, need to extend the probe, and do an SM RCS hotfire.

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

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.

Wow, I hope they get that; that's pretty.

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 --

-- 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.

Roger. We like those 99 numbers. Thank you.

Roger. Out.

Okay.
Now, let's see. We want to go to the suit circuit --
Yes, I'll get the suit circuit if I can find that valve.
Okay, let's see, that's the EDS POWER, ON.
Oh, that thing is hard.
What - what do we want here - -
Suit's closed.
-- on that VERB 48?
Ready for EDS POWER, ON, you think?
EDS POWER, up and ON, yes.
Okay, it's ON.
EMS FUNCTION, OFF, verify.
EMS FUNCTION, OFF.
MODE, STANDBY - EMS MODE, STANDBY.
Okay, it's at STANDBY.
EMS FUNCTION, DELTA-V; set range VHF A.
Okay.
Set for 1586.8.
Okay.
Then go to NORMAL. Anybody know what we're doing with VERB 48 up there?
What are we supposed to be putting in there?
...
I wonder what the hell that is?
Just verify you got a 3 there?
I guess so, that's what you need.

That's all you need.

Yes.

I don't know what that entry is in the checklist.

It doesn't matter what the other numbers are.

No, I mean any - any other weights or anything?

No.

Doesn't seem to me, for the pad we got, we - we want to load in any --

No.

-- any of this - stuff. That's what we got in there, anyway.

Yes.

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

We don't want to do that.

No.

It's almost the same anyway.

It's about the same anyway, yes.

Okay. You ready for the - your EMS MODE, NORMAL?

NORMAL.

EMS FUNCTION to DELTA-V TEST.

That's good; that light enough.

...

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-V. 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.

Yes.

Yes, that's too much.

We're up to 6...

That thing ... now, that may not be now; that may be at TLI.

I don't have any reason not to believe it.

No.

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

Okay.

VERB 66.

Okay. 10 435.6.

10 435.6. Alright, go to EMS FUNCTION, DELTA-V.

DELTA-V.

GDC align is at - What's this "D"?

Huh?

That means ...

Oh.

Won't get them on S-band.

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 IM pointing angles?
00 02 02 03 LMP  Okay, let's do one more. We're going first oppor-
tunity, 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 V_i on the DSKY at G&N.
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.
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-V\textsubscript{I} - 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?
I'm running a little bit on the warm side; how are you guys ... along?

Probably a tad on the warm side.

Suit and cabin pressures both look - I guess we should be cool.

Should be about 100 ... - okay -

Water - boiling - ... potable ...

Fuel cells ... water. It goes to potable tank first and then we - we get it.

Oh - stop there?

Yes.

Coming into the terminator.

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.

Gee, I almost went to sleep then.

Me, too; I'm taking a little rest.

It's going to be a long day.

How'd the - is this the first part of the attitude comparison check or the second part?

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

Well, we should have Tananarive. How about going - pressing ahead with the sequence pyro arm?

Okay, let me align the GDC.

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

Houston, Apollo 11. Roger.

Roger. Reading you loud and clear.

You get the pyro armed?

No, I haven't. Just a second, I'll be right with you.

Get 51 on the event timer?

We stopped boiling water.

That's good.

Old son of a gun.

Okay on the temperatures.

Looks like the setting on the AUTO thing is such that it just runs a little cold.

Yes, that's right. That's - that's what I think, too.

... have a feeling I have a ball in here.

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.

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

They're all up.
00 02 12 46 LMP  DIRECT?  MAIN A/MAIN B.
00 02 12 49 CDR  DIRECT.
00 02 12 50 LMP  S-II/S-IVB.
00 02 12 52 CDR  Check.
00 02 12 53 LMP  GUIDANCE, IU?
00 02 12 54 CDR  IU, yes.
00 02 12 55 LMP  Circuit breakers, DIRECT ULLAGE, two, CLOSED.
00 02 13 01 CDR  Okay.
00 02 13 02 LMP  And the event timer's set.
00 02 13 06 CMP  Now, why don't you - why don't you put ORDEAL on 200/LUNAR?
00 02 13 15 CDR  Alright.
00 02 13 17 CMP  Maybe you can start figuring out what the hell that ought to be.
00 02 13 32 CMP  I guess - leave them on INERTIAL for the time being.
00 02 13 45 CDR  Beyond my ability to - compute here right now.
00 02 14 10 CDR  ...?
00 02 14 27 LMP  You're not worried now on that thing.
00 02 14 29 CMP  When the motor lights up, he's worried.
00 02 14 38 CDR  ... 190, 110 degrees.
00 02 14 50 CMP  Got a long way around, yet.
00 02 15 23 CC  Apollo 11, this is Houston. 1 minute to LOS Tananarive; AOS at Carnarvon, 02:25:30.
00 02 15 35 LMP  Roger.
00 02 15 36 CDR  02:25:30.
00 02 15 37 LMP  Yes.  02:25. ...
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&W 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.
You need to get out the alarm clock.

I don't know, I think I'll just put my window guard up.

Yes.

Whopseedoo, we picked up an S-band. No noise.

What's VERB 85 going to tell me - if I call that up, Mike?

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

What's that little bump in the ... somebody?

That's me; I - I'm thrashing around over here a little bit.

I - if you wonder, I stuffed my launch checklist and - in the little gap between the -

You don't have a launch checklist.

My cue card.

Oh.

In between the - the Y-Y strut and the wall over here, to keep it from bouncing around.

Oh.

...

Yes, that says 58-1/2 degrees, huh?

Yes.

... 57-1/2 isn't that something like that? Now wait a minute.

Yes, 57-1/2 degrees.

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 TRANSIJUNAR 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?
It is.

Tank pressures looking alright?

Tank pressures are looking good.

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

Okay, 59:25 - and this light will go off at 42 -

Time is based on tracking data; let me know when you start it up.

Okay.

When you feel it, that's when it is.

Okay, this light is out - know any of it any more.

Okay, we're operate - 59:59.

There we go; thrust.

IGNITION. Call it at 15.

Okay.

Whew!

We confirm ignition, and the thrust is GO.

Pressures look good.

Flashes out window number 5.

... I'm not sure whether that's - it could be lightning, or it could be something to do with the engine -

Continual flashes ...

About 2 degrees off in the pitch ...

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 - Oopsdo.

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.
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.

Don't sweat that. 3 minutes.

3 minutes. What we got, about one g, Neil?

Pressures are good --

Yes, we've got 3 feet per second --

Just under one g.

Mike, we're within 3 feet per second on the card H-dot.

Fantastic. And it's shaking everything a little bit.

Shaking at 3 minutes.

Okay.

I hope that camera doesn't fall on your face.

I checked it; it's locked in there pretty well. Won't hurt this visor -

03:30 coming up - Should be 5.5, and it is 5.5.

Nice ride.

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

Roger. Apollo 11's GO.

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.

What would you do about it?

Nothing.

4 minutes -
Tell you what - that's Venus.
10 feet per second off on H-dot -
..., that's about where it is.
Here comes the old sun.
Gee, that's going to be bright.
Glad I got my card up.
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.

Coming up on 04:30. How you look, Buzz?
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 ... 
You guys agree with my mark; we'll be 5 minutes?
Okay.
Just a second.
5 minutes.
MARK.
Apollo 11, this is Houston. You are GO at 5 min-
utes.
Roger. We're GO.
Okay, we're just a little bit low on time.
Right on it.
... yaw.
... do that?
Yes, we better do that.
5 - 5 seconds -
What kind of g we pulling?
We got a 1.2 or 3 - 1.3, maybe.
Gee, feels a lot more than that already.
Okay, 6 - okay, about 5 seconds to nominal.
Here we go -
We have cut-off.
3.3 on the DELTA --
The DELTA-V on the EMS: 3.3.
Beautiful. EMS FUNCTION, OFF.
OFF.
SECS PYRO ARM, two, SAFE.
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.
Okay.
Okay, Houston, you read 11?
Buzz, forget I read anything in the checklist.
Yes --
Not getting any answer -
Okay, let's go to IU ACCEPT here. Now, ...
Why don't you try to get up high --
SCS TVC SERVO POWER 1, OFF.
Okay.
You want to get Houston on the radio if you can?
Yes.
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.
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?
Watch, it'll probably go back to RATE COMMAND.
That slows it down?
... keeps pitching.
Your MAN ATT, PITCH, to ACCEL COMMAND?
It went to RATE - Okay, I see a SLA panel going out.
Okay, you got to get a pitch rate in there -
See that SLA panel?
Is it flying - yet?
It's alright. She's darn well unbelievable - something.
I see it ...
Do I need some circuit breaker in to get --
I see another - No, that's alright.
-- to get this camera going? Mike?
No, you need the power on over there, though.
I turned it on.
I got it. ... beautiful.
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?
00 03 19 09  LMP   No, I don't see --
00 03 19 10  CDR   He's a little bit to our right.
00 03 19 11  LMP   Okay, I see him.
00 03 19 12  CDR   We need about a 5-degree right, and we need to stop our --
00 03 19 16  CMP   Okay. We'll stop here.
00 03 19 18  CDR   -- ... and we're pretty far away from him, too.
00 03 19 25  CMP   Okay, watch it, we should be stopping here.
00 03 19 40  LMP   How long do we want to run this film?
00 03 19 46  CDR   How does he look, Mike?
00 03 19 47  CMP   He's - he's fine.
00 03 19 52  CDR   Okay, you got 100.4 now.
00 03 19 54  CMP   Yes, I know; those numbers don't mean anything. They were 99-something when we turned around; don't ask me why. I thrust to him quite a bit, and I don't know why those numbers were screwed up, but they were.
00 03 20 13  CDR   Buzz, how does he look to you; looks like he's getting closer to me.
00 03 20 15  CMP   ... get the EMAG?
00 03 20 18  LMP   Okay.
00 03 20 19  CDR   Yes, it looks like he's drifting down just a tad, and he's supposed to be. 
00 03 20 22  CMP   How are our eight gray talkbacks; they still good?
00 03 20 29  CDR   Very good.
00 03 20 43  CMP   Flies like a spacecraft instead of a simulator. Hope that's good.
00 03 20 52  CDR   Sure beautiful. I hope you got some pictures, Buzz.
00 03 20 55 LMP I got the 16 millimeter going --
00 03 20 56 CDR Is it going?
00 03 20 57 LMP -- 16 frames at f:8 --
00 03 20 58 CDR Good.
00 03 21 01 LMP -- 70, 1/250th, ...
00 03 21 03 CDR Beautiful.
00 03 21 05 LMP It really looks nice, doesn't it?
00 03 21 08 CMP Hey, we're closing in a leisurely fashion.
00 03 21 12 LMP Hey, how long does this ...?
00 03 21 16 CMP It's on the - it's printed --
00 03 21 18 CDR Yes.
00 03 21 19 CMP -- yes, it's six frames at 15; I suggest toward the end you probably goose it up a little bit.
00 03 21 23 LMP You want to get the whole thing?
00 03 21 24 CDR I don't care - ... tell by looking at ...
00 03 21 32 LMP The thing is, with this sitting there, I can't get much with the Hasselblad. That window's no good, I'm afraid.
00 03 21 46 CDR Can I hold something for you?
00 03 21 49 LMP Take a couple of ...
00 03 21 54 CMP Yes, you might look - if you're looking for something to do, you might just look over my panel 1 and 8 and all that and make sure all the switches are - to your liking.
00 03 22 05 CDR I'll do it.
00 03 22 06 LMP ...
00 03 22 15 CDR Be sure that your RCS is working anyway.
48

Day 1

00 03 22 23 LMP How far out are you, Mike?
00 03 22 25 CMP I'm still quite a ways. That's definitely a SLA panel - there's no doubt about that. Sure looks like ... panel. That stuff's hitting from the S-IVB from us. Gees, look it - that one thing just hit the - gyro package on the S-band antenna.

00 03 22 46 LMP Yes, things occasionally come scooting out.
00 03 22 52 CMP ...
00 03 22 53 LMP And, occasionally, you know, a little piece of something hits the - what do you call that - covering? The whole IM quivers every so often. All - all the surface of it, Neil, you know, just kind of shakes like that.

00 03 23 12 CDR Yes?
00 03 23 13 LMP Just in one spot; it's not being hit. I hope it doesn't come in ... --
00 03 23 17 CMP Stand by; we're getting pretty close.
00 03 23 20 CDR Just from the APS firing, you think?
00 03 23 25 CMP Stand by; we're closing.
00 03 24 40 LMP Okay --
00 03 24 41 CDR We don't have too much --
00 03 24 43 LMP -- BMA4G MODE, three - You should stabilize and align CM - BMA4G MODE, three, to ATT l/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.
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.
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.

How do the - Speaking of that, how do the service module RCS quantities look?

Well, Buzz is fooling around with that - Let me just - -

They - they're all 90 except B, which is above 90.

Should be. Can't ever tell on 3 -

No, C and D are ... 3, anyway.

Okay -

Well, I got to go in there and dick ----

I'm not sure that we're getting ----

Well, Buzz is getting COMM right now.

Yes, let Buzz do his high-gain thing, and I'll get ready to go dick with the tunnel.

Sure is squiggly, isn't it? It really wanders all over, doesn't it?

Neil, where do you put this guy - usually?

I - clip it to that - clip up there beside the COAS - you see ----

Okay.

-- see those clips up there, one of those. It's got a snap right here that's pretty good.

I think I can get it now ----

Okay, Buzz, how am I doing on the checklist?
Well, I'm trying to --
You're at the high gain --
-- you're at postdocking; I'm trying to get the high gain going - and I'm having a little trouble -- trouble.
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 --
He's not going to have the sun in your eyes - I mean, on this thing, why don't we ...?

Is that right?

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?

Got it right here.

Okay, TVC SERVO POWER 1, to AC 1.

TVC SERVO POWER 1, to AC 1.

2 to AC 2.

Look the other way.

2 to AC 2.

TRANSLATIONAL CONTROL POWER, ON.

TRANSLATIONAL CONTROL POWER is ON.

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

Okay, stand by. ROTATIONAL CONTROL POWER is NORMAL, number 2, to AC.

ROTATION HAND CONTROLLER, number 2, ARMED.

ROTATIONAL HAND CONTROLLER, number 2, is ARMED.

It's going to have to get up pretty high to ...

Alright, time check.

Okay, we've got 6-1/2.

MARK it -

6-1/2.

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

Yes.
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 T. 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 T.
03 03 44 52 LMP  Alright. TRANSLATION HAND CONTROLLER's counter-clock - clockwise.
03 03 44 57 CMP  Hey, are you - are you on your INTERCOM switch? INTERCOM/PUSH-TO-TALK and all that?
03 03 45 03 LMP  Yes, yes.
03 03 45 04 CMP  Okay. Alright. TRANSLATIONAL CONTROLLER's - -
03 03 45 07 LMP  ... going TVC.
03 03 45 09 CMP -- clockwise -- that's verified. Alright, secondary TVC check; GIMBAL MOTORS, PITCH 2, YAW 2, ON.

03 03 45 18 CDR PITCH 2, MARK.
03 03 45 19 CMP Got it.
03 03 45 20 CDR YAW 2, MARK.
03 03 45 22 CMP Got it.
03 03 45 23 CDR Okay.
03 03 45 24 CMP Set GPI trim.
03 03 45 25 CDR Plus --
03 03 45 26 CMP Okay, it's set.
03 03 45 27 CDR -- 1.0, minus 0.2.
03 03 45 31 CMP Yes, it's set. Verify MTVC.
03 03 45 38 CDR Verified.
03 03 45 41 CMP THC, NEUTRAL.
03 03 45 43 CDR NEUTRAL.
03 03 45 45 CMP Verify GPI return to zero, zero.
03 03 45 47 CDR Verified.
03 03 45 48 CMP ROT CONTROL POWER, NORMAL, number 2, to AC/DC.
03 03 45 52 CDR AC/DC.
03 03 45 54 CMP SPACECRAFT CONTROL, CMC, verify.
03 03 45 55 CDR CMC.
03 03 45 57 CMP Okay. Now you got an option of trimming or bypassing.
03 03 46 01 CDR Let's bypass.
Alright. EMAG MODE, three, to ATT 1/RATE 2.

Okay, we're going to - Did you say after ENTER?

Before ENTER.

Okay, ATT 1/RATE 2; EMAG's in shape.

ENTER.

ENTER.

Verify SPACECRAFT CONTROL, CMC.

CMC.

Accept this with a PROCEED.

PROCEED. You ready to go?

Yes. Up, down, zero. Up, down, zero. ... OFF and the ... OFF.

3 minutes. 3 --

ROTATIONAL CONTROL POWER, DIRECT, two of them, to MAIN A/MAIN B.

ROTATIONAL CONTROL POWER, DIRECT, MAIN A/MAIN B.

Okay. SPS HELIUM VALVES, verified AUTO, barber pole; LIMIT CYCLE, OFF.

Okay.

FDAl scale, 50/15.

Alright.

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

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

You already asked them that and they said turn it on at 2 minutes.
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.

Okay. I'll be ready. Coming up on 2 minutes.

MARK -

Go on, nothing happened.

TRANSLATION CONTROLLER, ARMED.

Okay.

ROTATION CONTROLLER, ARMED.

Okay.

TAPE RECORDER ... RESET it --

Tape recorder's running, right?

Tape recorder is running. You verify the EMS set up to 81, is it, huh?

Yes, I got to go to horizontal at 35.

-- 35, 30 seconds, yes.

I'll proceed on the 99.

Alright. 60 -

You're going to watch the - go gray --

Right.

-- and the ball valve.

Right.

35 seconds; DSKY's blank, EMS MODE, NORMAL. Okay.
Yes, the moon is there, boy - in all its splendor.

Man, it's a --

Plaster of paris gray to me.

Man, look at it.

Don't look at it; here we come up --

Okay.

-- ... to T_{ig}.

8 seconds.

99 --

PROCEED.

Stand by for T_{ig}.

Got B mode --

Burning; we're looking good.

-- A, here comes B - B, I mean, THRUST A --

MARK.

Got them.

Got them both? Okay, now what's your - read your chamber pressure?

It's good. 95, 95.

PUGS is oscillating around. Okay, we're steering.

95 seconds in, it says go DECREASE, and we're ...

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

EMS and G\&N CALS together.
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  \emph{g} feels sort of pleasant, doesn't it? We're measuring just a shadow over zero \emph{g} on the \emph{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 \emph{g}-scale?
03 03 51 56  CDR  All your ... look okay over there, Buzz?
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 - cut-off.
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  ...
Okay, the rates. We're ... all three axes are about 0.1 degree per second. APS is punting back and forth.

I'm predicting 05:58.

Okay.

4 seconds early.

Right now.

May be - might be 5 by the time I get my ...

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

Look at the ...

..., didn't recognize it. ...

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.

We're now predicting 5 seconds early, 05:57.

Chamber pressure is 100 psi even.

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

Okay, going to get the DELTA-V switches OFF right at shutdown?

Shutdown, I'll get both DELTA-V THRUST, NORMAL switches, OFF.

10 seconds.

Okay. 9, 8, 7, 6, 5, 4, 3, - -
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 POO. 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 VG X column?
03 03 57 53 LMP That was the – that's the VG X residual at – before you spin.
03 03 58 00 CMP Okay.
03 03 58 02 LMP So just read the ... A.
03 03 58 04 CMP Alright.
03 03 58 10 CDR That was a beautiful burn.
03 03 58 12 CMP God damn, I guess.
03 03 58 14 LMP Whooo! Well, I have to vote with the 10 crew, that thing is brown.
03 03 58 19 CDR Yes.
03 03 58 20 CMP Sure is.
03 03 58 21 CDR Looks tan to me.
03 03 58 23 LMP But when I first saw it, at the other sun angle – –
03 03 58 24 CDR Yes?
03 03 58 25 CMP It looked gray.
03 03 58 26 LMP –– it really looked gray.
03 03 58 27 CDR Yes.
03 03 58 28 CMP More - more sun angle you get - -
03 03 58 29 LMP It got more - more brown - with increasing sun angle.
03 03 58 35 CMP Okay.
03 03 58 36 LMP It's a long ways off.
03 03 58 37 CDR Alright, let's - Okay, now we've got some things to do -
03 03 58 43 LMP Okay, let's do them.
03 03 58 48 CDR We got to do a VERB 66.
03 03 58 51 LMP Hey, wait a minute - alright.
03 03 58 53 CMP Buzz will want to do a VERB 82; now, I don't know what comes first here.
03 03 58 55 LMP Yes, VERB 82.
03 03 59 08 CMP Well, I don't know if we're 60 miles or not, but at least we haven't hit that mother.
03 03 59 11 LMP Look at that! Look at that! 169.6 by 60.9.
03 03 59 15 CMP Beautiful, beautiful, beautiful, beautiful!
03 03 59 17 LMP What - what'd it say - -
03 03 59 18 CMP You want to write that down or something?
03 03 59 19 LMP - - 60.2.
03 03 59 20 CMP Write it down just for the hell of it. 170 by 60, like gangbusters.
03 03 59 28 LMP We only missed by a couple of tenths of a mile.
03 03 59 36 CMP Hello, Moon; how's the old back side?
03 03 59 41 LMP Well, it's - -
03 03 59 42 CDR VERB 66, alright?
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 - -
I don't even know what we're doing.

(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?
03 04 01 32 LMP What was the time we got on it?
03 04 01 34 CDR Burn time?
03 04 01 38 LMP No, no --
03 04 01 39 CDR Burn time or what?
03 04 01 41 CMP We want the big camera, huh? Big lens or small one?
03 04 01 46 CDR Oh, it doesn't really matter.
03 04 01 48 LMP 80 millimeter will probably be as good for --
03 04 01 50 CMP For the earth coming up?
03 04 01 51 CDR No, for the earth --
03 04 01 52 LMP No, for the earth coming up, we want 250. Might take some --
03 04 01 54 CDR -- not sure we can get the earth coming up --
03 04 01 55 LMP -- might take some -- some luck to get that, but --
03 04 01 59 CMP Here, you want --
03 04 02 03 CDR Tape recorder still running?
03 04 02 04 LMP Yes.
03 04 02 06 CMP It doesn't matter, we've got 2 hours on that tape, and they don't care if you run out. As long as you're on BIT RATE, LOW.
03 04 02 18 LMP Okay, infinity, at f:ll - 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.
Alrighty.

Moon ..., 5.6; earth ..., 11; ... terminator, 1.8 --

You think it's on your - your spotmeter reading for the earth?

Which way are you maneuvering now, friend?

5.6 at - 5.6 at 1/250th is probably --

Are you rolling?

Rolling?

You are, aren't you?

I'm rolling right.

Boy, they rate some rough country over there.

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

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

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

We ought to be able to get it --

--- book put back together here.

--- a couple of good shots.

The earth's going to be over here?

AOS, 76:15. That's exact --

Can you verify that you got the state vectors transferred with the VERB 83?

I'll do that.

Now, what else we got?
03 04 03 49 CDR Coming up there.
03 04 03 53 LMP ... Eyeballing and chattering. We got the burn status report? That's all?
03 04 04 02 CMP Ready to go.
03 04 04 05 LMP Okay, that looks good. Give me a VERB - 64.
03 04 04 12 CDR What happened?
03 04 04 27 LMP Ought to wash this window over here --
03 04 04 28 CDR You have a map so we can look at ...
03 04 04 30 LMP Anybody got a --
03 04 04 31 CMP Yes, it --
03 04 04 32 LMP -- anybody got a Kleenex?
03 04 04 33 CDR Yes, I think I've got one. Here you go.
03 04 04 40 CMP Here's one; it's a little moist, though.
03 04 04 43 LMP ...
03 04 04 49 CMP Well, one more ... burn.
03 04 04 53 LMP Two more.
03 04 04 57 CDR You got two more.
03 04 04 59 LMP Yes, ... got a few more.
03 04 05 05 CMP Look at those craters in a row. You see them right - going right out there?
03 04 05 07 CDR ...
03 04 05 08 CMP Look at that line of them.
03 04 05 10 CDR ...
03 04 05 13 LMP ...
03 04 05 15  CMP  Something really peppered that one. There's a lot less variation in color than I would have thought, you know, looking down?

03 04 05 26  LMP  Yes, but when you look down, you say it's brownish color?

03 04 05 29  CMP  Sure.

03 04 05 32  LMP  Oh, golly, let me have that camera back. There's a huge, magnificent crater over here. I wish we had the other lens on, but God, that's a big beauty. You want to look at that guy, Neil?

03 04 05 43  CDR  Yes, I see him.

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

03 04 05 48  CDR  That dark spot.

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

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

03 04 05 57  LMP  Look at that one.

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

03 04 06 01  LMP  Where is that dark spot?

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

03 04 06 06  LMP  Yes.

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

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

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

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

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

03 04 06 27  CMP  Shoot, you're going to have plenty of passes.
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 CDR Well, where's the freaking earth going to be now? I'm confused.
03 04 07 46 LMP In plane, I hope.
03 04 07 50 CDR How are you doing on your roll there?
03 04 07 52 LMP Well, we got about another 60 degrees to go. When's AOS?
03 04 08 00 CDR 15 - we're 7 minutes away.
03 04 08 03 LMP Okay.
03 04 08 37 CDR What a spectacular view!
03 04 08 48 CMP God, look at that moon!
03 04 09 20 CMP Fantastic. Look back there behind us, sure looks like a gigantic crater; look at the mountains going around it. My gosh, they're monsters.
03 04 09 58 CDR See that real big --
03 04 10 01 CMP Yes, there's a moose down here you just wouldn't believe. There's the biggest one yet. God, it's
huge! It is enormous! It's so big I can't even get it in the window. You want to look at that? That's the biggest one you ever seen in your life. Neil? God, look at this central mountain peak.

03 04 10 23 MS
03 04 10 24 CMP
03 04 10 26 CDR
03 04 10 29 CMP
03 04 10 35 CDR
03 04 10 37 CMP
03 04 10 51 CDR
03 04 10 53 CMP
03 04 11 01 LMP
03 04 11 07 CMP
03 04 11 17 LMP
03 04 11 20 CMP
03 04 11 26 LMP
03 04 11 41 LMP
03 04 11 50 CDR
03 04 11 59 LMP

... 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.
03 04 12 02 CDR  -- about 70 degrees.
03 04 12 03 CMP  It says pitchdown or pitchup?
03 04 12 04 CDR  Pitchdown, so we're looking forward.
03 04 12 06 CMP  Pitchdown, so we're looking forward, alright. I wonder what kind of a rate we ought to --
03 04 12 11 LMP  We got 4 minutes to get down.
03 04 12 13 CMP  Alright.
03 04 12 14 LMP  Never make it. There's a couple of new craters.
03 04 12 25 CDR  There's a good view of that --
03 04 12 29 LMP  Look warm down there, Neil?
03 04 12 32 CDR  I sure can't tell.
03 04 12 35 LMP  Looks hotter than hell to me. Boy, look at the size of that one.
03 04 12 47 CMP  Golly! Whooh! Get another picture of that big fellow.
03 04 12 51 CDR  Yes. I'm going to take one out here of him.
03 04 12 59 LMP  I've got an Easter egg coming up, gentlemen.
03 04 13 02 CDR  That's good. Gosh, it's 1 o'clock already.
03 04 13 07 LMP  Hey, you know, we got a TV show at --
03 04 13 14 MS  ...
03 04 13 15 CMP  Huh?
03 04 13 16 CDR  The next REV around, that is.
03 04 13 18 LMP  Before LOI 2.
03 04 13 20 CDR  Yes.
03 04 13 24 CMP  Could you give me a gimbal angle to pitch to?
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.

You want the flight plan?

Yes, please.

Okay, we shouldn't take any more pictures on this roll until earth comes, I don't think; this is - -

About out?

-- 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.

We might make it in time.

Yes.

There it is, it's coming up!

What?

The earth. See it?
03 04 15 17 CMP Yes. Beautiful.
03 04 15 21 LMP It's halfway up.
03 04 15 23 CDR We ought to have AOS now.
03 04 15 25 CMP You got your --
03 04 15 26 LMP Right over the LM.
03 04 15 28 CDR Are you set up?
03 04 15 30 LMP Just about to be cut off by the LM. Boy, does that ever look beautiful in the sextant.
03 04 15 36 CMP Have you got --
03 04 15 37 CDR Okay, how about MSFN --
03 04 15 39 CMP/LMP You got them.
03 04 15 42 CDR We're in OMNI --
03 04 15 45 LMP DOWN VOICE BACKUP.
03 04 15 46 CDR -- Bravo.
03 04 15 48 CC Apollo 11, Apollo 11, this is Houston. Do you read? Over.
03 04 15 52 LMP Yes, we sure do, Houston. The LOI 1 burn just nominal as all getout, and everything's looking good.
03 05 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?
Well, let's see - when we come over the hill next time, we're supposed to have them on the high gain, I think.

Not sure of that.

...

Did you use this thing?

No.

Well, let's get rid of it then; I can't see a crapping ...

77:44 - okay, - LOS is right on schedule.

77:50, we'll be at the prime meridian; now, I can set that map up so it'll tell us where we are.

Okay.

We - we're ahead on this eat period - we're behind on the last eat period or something. We got a ...

I think, Buzz, if you put - put the HIGH GAIN to MANUAL and go pitch 20 - yaw 360 - pitch minus 20, I guess - -

Minus 20; yes, that would be better.

- - and yaw 360 - -

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 -

That's fine, but -

If you did, it would be very interesting that way.

Yes. Oh, crap.

We get HIGH GAIN and we get TV at the same time - -

Well, I better start maneuvering then; doggone it, I've been yawed out of plane somehow. Let's see,
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.
Outside, huh? Alright, the switch is set for outside.

Could I have that map that y'all were looking at before, that lunar map? Thank you.

Hmm - here comes the moon.

Really beautiful.

Hey, you --

I wonder where we are.

-- we're going to stop here pretty soon, right?

Yes, at 315.

(Whistling)

Man, that's really --

It really looks gray to me now.

...?

... right down toward the ground here.

-- and you could be busy getting up supplies if you ...  

About a minute from AOS.

Okay, let's get out of this; let me get VERB 62. Okay, Mike?

Oh, I really need these ..., Buzz; I really need these goddam ... 

Well, we're not going to have much of a TV unless we get high gain.

Alright.

I'll give it back to you -- ...
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.
This pitch angle is quite a bit off nominal; 196 instead of 212.

Umm.

16 degrees.

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

We is there.

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.

Beautiful! Fantastical!

Let's burn.

That's MANUAL and ZERO - ZERO and MANUAL.

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

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.

Yes.

Okay, we got the OPTICS, ZERO?

Yes, I'm sure it is.

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

No ...

-- so you can - enter on this one.

Okay. OPTICS, ZERO, ZERO, huh?

No!
03 07 50 31  CDR  Supposed to be 0.7.
03 07 50 32  CMP  Oh.
03 07 50 33  CDR  Okay?
03 07 50 35  CMP  VERB 37, ENTER; 40, ENTER.
03 07 50 46  CMP  How does that look?
03 07 50 48  CDR  Looks beautiful. You enter on it, huh?
03 07 50 51  CMP  No. Leave it there.
03 07 50 52  CDR  Alright.
03 07 50 56  CMP  Align spacecraft roll, GDC ALIGN.
03 07 51 06  CDR  Yes, here we go - ... doesn't look bad.
03 07 51 10  CMP  No, I just got through aligning it a little while ago.
03 07 51 42  CMP  Okay, GDC's aligned.
03 07 51 46  CDR  Okay.
03 07 51 48  LMP  Check the circuit breakers.
03 07 51 50  CMP  Alright. I got - -
03 07 51 54  LMP  SCS circuit breakers.
03 07 51 56  CMP  SCS; they're all in.
03 07 51 58  LMP  SPS, 12, closed.
03 07 52 00  CMP  SPS, 12 of them.
03 07 52 02  LMP  ATT DEADBAND, MINIMUM.
03 07 52 04  CMP  MINIMUM.
03 07 52 05  LMP  RATE, LOW?
03 07 52 06  CMP  RATE, LOW.
03 07 52 07  LMP  LIMIT CYCLE, ON?
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 ...  
MAN ATT, three, to RATE COMMAND, you got that?

03 07 52 33 CMP  
Three, RATE COMMAND.

03 07 52 34 LMP  
HIMAG 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.
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 \( h_a \) and \( h_p \)?
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 \( T_{ig} \)?
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.
<table>
<thead>
<tr>
<th>Time</th>
<th>Caller</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>03 07 58 57</td>
<td>CDR</td>
<td>On the LM?</td>
</tr>
<tr>
<td>03 07 58 58</td>
<td>LMP</td>
<td>No.</td>
</tr>
<tr>
<td>03 07 58 59</td>
<td>CDR</td>
<td>I don't know, but the command module's got about ...</td>
</tr>
<tr>
<td>03 07 59 01</td>
<td>LMP</td>
<td>Little fluorescent - circles?</td>
</tr>
<tr>
<td>03 07 59 04</td>
<td>CDR</td>
<td>There's one of them.</td>
</tr>
<tr>
<td>03 07 59 07</td>
<td>LMP</td>
<td>There's some in a lot of failures.</td>
</tr>
<tr>
<td>03 07 59 10</td>
<td>CMP</td>
<td>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.</td>
</tr>
<tr>
<td>03 07 59 15</td>
<td>LMP</td>
<td>I mean, this big monstrosity out here, it fails -</td>
</tr>
<tr>
<td>03 07 59 17</td>
<td>CDR</td>
<td>Hey, we're coming up - You can see the horizon -</td>
</tr>
<tr>
<td>03 07 59 38</td>
<td>CMP</td>
<td>See if that looks pretty good - through the sextant and see if that doesn't come up.</td>
</tr>
<tr>
<td>03 07 59 47</td>
<td>CMP</td>
<td>Zap.</td>
</tr>
<tr>
<td>03 07 59 56</td>
<td>LMP</td>
<td>Sure has been ... back here.</td>
</tr>
<tr>
<td>03 08 00 05</td>
<td>CMP</td>
<td>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.</td>
</tr>
<tr>
<td>03 08 00 23</td>
<td>CDR</td>
<td>..., huh?</td>
</tr>
<tr>
<td>03 08 00 26</td>
<td>LMP</td>
<td>... solid urine particles are ...</td>
</tr>
<tr>
<td>03 08 00 29</td>
<td>CDR</td>
<td>I guess.</td>
</tr>
<tr>
<td>03 08 00 34</td>
<td>LMP</td>
<td>Wait until the back contamination people hear about that.</td>
</tr>
<tr>
<td>03 08 00 38</td>
<td>CDR</td>
<td>Yes.</td>
</tr>
<tr>
<td>03 08 00 41</td>
<td>LMP</td>
<td>No more urine dumps on the way to the moon. Put it all in a nice little bag and -</td>
</tr>
</tbody>
</table>
You're not - you've got plenty of black and white film, don't you?

Yes, plenty of black and white film.

... terminator, 4.

Use as much as you want of anything you want. 80 millimeter, 250, it's all good.

We got 20 minutes until T \textsubscript{ig}. Oh, excuse me, 10 minutes - 10 minutes until T \textsubscript{ig}, excuse me. A little over 10 - 80:11 - -

Give me a call at about 7 minutes to go.

Okay, right now -

MARK it.

Yes, siree; that there is rough - rough terrain.

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 T \textsubscript{ig}.

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.
03 08 04 40 CMP AC's ON - DC's ON.
03 08 04 46 LMP TVC SERVO POWER, number 1, AC 1.
03 08 04 48 CMP AC 1.
03 08 04 50 LMP TVC 2, AC 2.
03 08 04 51 CMP AC 2.
03 08 04 52 LMP TRAN Control POWER, ON.
03 08 04 54 CMP TRANSLATION CONTROL POWER.
03 08 04 56 LMP ROTATION CONTROL POWER, NORMAL, number 2, to AC.
03 08 04 58 CMP AC.
03 08 04 59 LMP ROTATIONAL HAND CONTROLLER, number 2, ARMED.
03 08 05 01 CMP Number 2, ARMED.
03 08 05 16 LMP Oh, I see those current - current ... went down on the fuel cells. ... right down here.
03 08 05 24 CMP The batteries are carrying the -
03 08 05 34 CDR 6 minutes.
03 08 05 52 CMP About ready for a gimbal motor or two?
03 08 05 55 LMP Alright. Let's try - PITCH 1, YAW 1.
03 08 05 58 CMP Here comes PITCH 1 -
03 08 05 59 CMP MARK it.
03 08 06 00 LMP Got it.
03 08 06 01 CMP YAW 1 -
03 08 06 02 CMP MARK it.
03 08 06 03 LMP Got it.
03 08 06 04 CMP Okay.
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?
03 08 07 54  CDR  I don't know; it goes up more on the yaw needle than the pitch needle, but I'm not sure that's indicative of anything except needle sensitivity.
03 08 08 01  CMP  Okay, did it go to ...?
03 08 08 02  CDR  Yes, it did. ... OFF and the ... OFF.
03 08 08 12  LMP  ROTATION CONTROL POWER, DIRECT, two of them, to MAIN A/MAIN B.
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.
03 08 09 38 CMP  DELTA-V THRUST, NORMAL, A, is ON.
03 08 09 41 LMP  TRANSLATION CONTROL, ARMED.
03 08 09 42 CMP  ARMED.
03 08 09 44 LMP  ROTATION CONTROL, ARMED?
03 08 09 45 CMP  ARMED.
03 08 09 48 LMP  TAPE RECORDER - COMMAND RESET.
03 08 10 01 LMP  -- BIT RATE, FORWARD.
03 08 10 05 CMP  Okay, 19 seconds ullage this time.
03 08 10 55 CMP  Okay, stand by for ...
03 08 11 03 MS  ...
03 08 11 07 LMP  EMS MODE to NORMAL?
03 08 11 08 CMP  EMS MODE, NORMAL. Stand by for ullage. ...
03 08 11 17  LMP  20, 19 -
03 08 11 19  CMP  Ullage.
03 08 11 21  LMP  You got the ullage?
03 08 11 22  CMP  Yes.
03 08 11 23  LMP  Okay. ...?
03 08 11 27  CMP  Yes. Whoops -
03 08 11 29  LMP  You want this ...? Alright.
03 08 11 32  CMP  ... and THRUST B.
03 08 11 37  LMP  A?
03 08 11 39  CMP  A, open.
03 08 11 44  CDR  She's holding - she's holding - ... looks good.
03 08 11 50  CMP  She's all over.
03 08 11 51  CDR  Okay, stand by for shutdown -
03 08 11 53  CDR  SHUTDOWN.
03 08 11 54  LMP  Shutdown, two valves, closed; two, barber pole.
03 08 11 56  CDR  Okay, DELTA-V THRUST, NORMAL, A, is OFF; stand by
          for the GIMBAL MOTORS, OFF.
03 08 12 00  CMP  PITCH 1, OFF -
03 08 12 01  CMP  MARK.
03 08 12 02  LMP  Got it.
03 08 12 03  CMP  YAW 1, OFF -
03 08 12 04  CMP  MARK.
03 08 12 05  LMP  Got it.
03 08 12 06  CMP  PITCH 2, OFF -
03 08 12 07  CMP  MARK.
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-V_c?
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  EMAG 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.
PCM BIT RATE going to LOW. ROT CONTROL POWER, DIRECT, two of them, OFF.

OFF.

Circuit breakers, PITCH 1, YAW 1, PITCH 2, YAW 2, OPEN? Proceed and go to VERB 82. No!

Why not?

That isn't what it says - it says ... and go to POO --

You get this -

-- I want to get the circuit breakers -

Up to ..., and I want to get AVERAGE g off, there we go, it's in POO - VERB 82.

All those listening to the tape, please report that - we need a change in the checklist.

66.1 by 54.4; now you can't beat that.

No, this is about --

That's right downtown.

-- this is 65.7 --

By 5½ point --

We're more elliptic now, huh?

That's about as close as you're going to get.

Yes, I bet we never get circular.

Hey, have you got any more circuit breakers - I mean any more switches for me?

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 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. We 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 --
... Yes, roll 180, pitch down 81, ORB rate. God damn, here comes the draft again.

Okay, we're supposed to start charging battery A.

Charge battery A, huh?

Let's see what we have; SPS monitor check --

Two breakers out there; two breakers out there - BAT B, BAT B. BAT A, you say - Neil?

BAT A, yes - if you please. Charging BAT A, then on to --

Then roll 180, and then we'll talk about this pitchdown, alright?

Then you might as well go to your - 293 INERTIAL, I guess.

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.

It's going to be a long time before that battery gets back up to 39-1/2 volts.

We done plumb tuckered that one out.

LOI I could've got to it, I imagine.

Yes.

Are you going to maintain ORB rate?

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.

Do we have to do anything - to the O₂ to pressurize the LM?
No, we haven't - small enough - DELTA-P -
That's 0.9.
0.9?
Yes.
Yes, we have to build up pressure a little bit.
Build up that cabin pressure just a little bit, and I'll start the DIRECT $O_2$ valve, OPEN.
It says observe the lunar surface.
That's what it says you ought to supposed to be doing.
It's brown; it's brown.
Brown all around. There's no doubt which way that - little crater hit.
Here's that same one going by again, Neil, remember? That bright job?
Yes.
Man, there's white stuff all over - and it's black right around the rim.
Hey, well, I'm - while this thing's rolling over, I'm going to take a pee; I'm going to go pee.
180, if you don't mind.
That's a spectacular crater.
Did you shoot some pictures while you were over there?
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 -
Boy, there must be nothing more desolate than to be inside some of these small craters, these conical ones.
People that live in there probably never get out.

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?
03 08 24 00 CMP Over and over.

03 08 24 30 CDR Got that DIRECT O₂ ..., didn't you?

03 08 24 33 CMP Yes, just a tiny bit.

03 08 24 34 CDR Okay.

03 08 24 42 CMP It'd be kind of interesting to see some of this dump go on straight from polar orbit. Wonder how long it's going to take before it impacts?

03 08 24 53 CDR It obviously - is not really in polar orbit if it's going off - going off that way. Yes, it's inclined to the small angle.

03 08 25 03 CMP Sure looks like it.

03 08 25 04 CDR It's going straight out there through. That's real funny.

03 08 25 13 LMP Son of a gun, that one's got a little - little curve on it.

03 08 25 23 CMP Would you believe that, Neil? One went out and curved around like that. Can you explain that?

03 08 25 32 CDR I guess it just glanced off another particle or something.

03 08 25 35 CMP Oh, no, no, no, no; if it's curved.

03 08 25 40 CDR It had a little bubble in it that came to the surface and went kapoom and --.

03 08 25 43 LMP No --.

03 08 25 44 CMP There's atmospheric drag up here.

03 08 25 47 CDR -- departed it with a little DELTA-V.

03 08 25 49 LMP I think what's really happening is - we're rolling and - it's changing the angle that I'm looking out the window.

03 08 25 55 CMP Let's see, I want to pitch down 80 degrees to -- ... 293, down 293, I believe that, I wonder what rate would be reasonable --
<table>
<thead>
<tr>
<th>Time</th>
<th>Role</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>03 08 26 10</td>
<td>CDR</td>
<td>Okay, it's about 7 minutes until AOS.</td>
</tr>
<tr>
<td>03 08 26 17</td>
<td>CMP</td>
<td>Down 80 degrees in 7 minutes, that's - let's see, about 10 degrees per minute, 10 degrees per minute is -</td>
</tr>
<tr>
<td>03 08 26 31</td>
<td>CDR</td>
<td>... floating up here -</td>
</tr>
<tr>
<td>03 08 26 33</td>
<td>CMP</td>
<td>61 ...</td>
</tr>
<tr>
<td>03 08 26 38</td>
<td>LMP</td>
<td>Well, Mike probably let him out.</td>
</tr>
<tr>
<td>03 08 26 45</td>
<td>CMP</td>
<td>Okay, that ought to almost get it there and, damn, I don't want to see any more than that.</td>
</tr>
<tr>
<td>03 08 26 58</td>
<td>LMP</td>
<td>You can open the battery ... pad.</td>
</tr>
<tr>
<td>03 08 27 11</td>
<td>CMP</td>
<td>That ought to be enough.</td>
</tr>
<tr>
<td>03 08 27 31</td>
<td>LMP</td>
<td>...</td>
</tr>
<tr>
<td>03 08 28 02</td>
<td>CMP</td>
<td>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.</td>
</tr>
<tr>
<td>03 08 28 20</td>
<td>CDR</td>
<td>We probably can do it. You could stop it right here if you wanted to spend the gas.</td>
</tr>
<tr>
<td>03 08 28 25</td>
<td>CMP</td>
<td>Yes. That's the only trouble, the doggone gas. What are you on?</td>
</tr>
<tr>
<td>03 08 28 42</td>
<td>CMP</td>
<td>A picture looking out over the LM as well.</td>
</tr>
<tr>
<td>03 08 28 45</td>
<td>CDR</td>
<td>Yes.</td>
</tr>
<tr>
<td>03 08 28 46</td>
<td>LMP</td>
<td>Shouldn't be a bad picture. Why don't we stop it?</td>
</tr>
<tr>
<td>03 08 28 48</td>
<td>CMP</td>
<td>Okay.</td>
</tr>
<tr>
<td>03 08 28 56</td>
<td>CDR</td>
<td>We ought to be able to get high gain from this attitude, shouldn't we?</td>
</tr>
<tr>
<td>03 08 29 10</td>
<td>CDR</td>
<td>Think we ought to get the long lens on, Mike?</td>
</tr>
<tr>
<td>03 08 29 12</td>
<td>CMP</td>
<td>Yes, we ought to get the 250 - we ought to do it at 250.</td>
</tr>
</tbody>
</table>
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 38 CDR  We better have color.
03 08 29 43 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 05 LMP  Probably over there on the shelf.
03 08 30 08 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
<table>
<thead>
<tr>
<th>Time</th>
<th>Call Sign</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>03 08 31 06</td>
<td>CMP</td>
<td>Okay, I've still got f:8 and ...</td>
</tr>
<tr>
<td>03 08 31 10</td>
<td>CDR</td>
<td>250th at f:8, I think we can do it, and infinity.</td>
</tr>
<tr>
<td>03 08 31 16</td>
<td>CMP</td>
<td>I don't know; what's the matter with where you had it?</td>
</tr>
<tr>
<td>03 08 31 19</td>
<td>CDR</td>
<td>Oh, son of a gun! (Laughter) We're going backwards. Oh, well.</td>
</tr>
<tr>
<td>03 08 31 28</td>
<td>LMP</td>
<td>Oh dear. Dumbkopf!</td>
</tr>
<tr>
<td>03 08 31 32</td>
<td>CMP</td>
<td>That's it, I think, there, Neil - so pitch down.</td>
</tr>
<tr>
<td>03 08 31 36</td>
<td>LMP</td>
<td>Prior planning prevents poor performance.</td>
</tr>
<tr>
<td>03 08 31 38</td>
<td>CDR</td>
<td>Thank you. Is that right, Buzz?</td>
</tr>
<tr>
<td>03 08 31 40</td>
<td>CMP</td>
<td>All that - Where'd you ever hear that one, Buzz?</td>
</tr>
<tr>
<td>03 08 31 45</td>
<td>LMP</td>
<td>I can't think.</td>
</tr>
<tr>
<td>03 08 32 12</td>
<td>LMP</td>
<td>Oh, that's a bright one; I got to get that one ...</td>
</tr>
<tr>
<td>03 08 32 16</td>
<td>CMP</td>
<td>No lie!</td>
</tr>
<tr>
<td>03 08 32 25</td>
<td>CDR</td>
<td>150 - you don't want to take too many on this.</td>
</tr>
<tr>
<td>03 08 32 30</td>
<td>CMP</td>
<td>No. Might as well put the other one back on.</td>
</tr>
<tr>
<td>03 08 32 35</td>
<td>CDR</td>
<td>Well, you might save that for some earth shots.</td>
</tr>
<tr>
<td>03 08 32 49</td>
<td>LMP</td>
<td>Wow!</td>
</tr>
<tr>
<td>03 08 32 53</td>
<td>CDR</td>
<td>...</td>
</tr>
<tr>
<td>03 08 32 55</td>
<td>CMP</td>
<td>You got it, huh?</td>
</tr>
<tr>
<td>03 08 33 04</td>
<td>LMP</td>
<td>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.</td>
</tr>
<tr>
<td>03 08 33 37</td>
<td>LMP</td>
<td>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.</td>
</tr>
</tbody>
</table>
03 08 34 15 LMP ... that one ... into the LM.
03 08 34 38 CMP Here is the earth. Hey, I got the view over here.
03 08 34 44 LMP I guess I'd better get the high gain off, hadn't I?
03 08 34 49 CDR Did it just come up?
03 08 34 50 CMP Yes.
03 08 34 53 LMP We need that ...
03 08 34 56 CMP Do we still got high gain?
03 08 34 58 CDR Yes.
03 08 35 01 CMP It's says minus 67 and zero.
03 08 35 06 LMP Minus 67 and zero.
03 08 35 09 CMP And zero.
03 08 35 10 LMP Okay, MANUAL - and - AUTO - medium. There we go.
           Can't make up his mind between zero and - 360.
           Okay, we got them.
03 08 35 30 CDR Okay.
03 08 35 31 CC Apollo 11, Houston. ...
03 08 35 35 CDR Do you want to talk to them?
03 08 35 39 CDR ... Roger, Houston. Burn status report follows:
DELTA-T<sub>ig</sub> zero; burn time, 17; angle through the
pad values, DELTA-V<sub>G</sub><sub>x</sub> was plus 0.3; V<sub>G</sub><sub>y</sub>, minus 0.0;
V<sub>G</sub><sub>Z</sub> minus 0.1; DELTA-V<sub>c</sub>, minus 5.2; fuel, 362;
O<sub>X</sub>, 364; unbalance, plus 50, and a postburn NOUN 94,
66.1 by --
03 09 40 25 LMP Well, they look like they were made to go - That's
- that's it, isn't it? Weren't they made to put
here so you stow them by putting them on here in-
stead of the way we do it?
03 09 40 40 CDR ...
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.
03 09 44 32 LMP  No, it's not in there; it was on my girth shelf.
03 09 44 34 CMP  Okay.
03 09 44 35 CDR  Oh, okay, there it is. Did you get that one put back?
03 09 44 39 CMP  No, but I will.
03 09 44 41 CDR  Okay, appreciate it. I had it in my mind that -- our --
03 09 44 47 CMP  You want to do something to the polarizing filter, Neil?
03 09 44 59 CDR  -- we got room for it up there.
03 09 45 00 CMP  I'll stick it up there on the ceiling. There's a --
03 09 45 02 CDR  -- not really.
03 09 45 03 CMP  -- we got room for it up there.
03 09 45 29 CMP  You want the 16-millimeter while you're down here, Neil?
03 09 45 31 CDR  Yes.
03 09 45 32 CMP  The 16-millimeter bag as well?
03 09 45 33 CDR  Yes, I'll take that one, too.
03 09 45 36 LMP  Okay.
03 09 45 59 CMP  Well, that - damn stuff won't stick. Haven't got a piece of Velcro on there yet.
03 09 46 10 CDR  You're not ...
03 09 47 34 CMP  Man, can't you stop some of that racket up there?
03 09 47 38 LMP  Huh?
03 09 47 52 CMP  That's the S-band - you turn your volumes down.
03 09 48 06 SC  (Coughing)
03 09 48 17 CMP Is that better on the S-band?
03 09 48 19 CDR Yes.
03 09 48 20 LMP Yes.
03 09 48 21 CMP Okay.
03 09 48 50 SC (Sneeze)
03 09 48 51 LMP There's one that's got mission rules in it - but I can't place - at the moment, put my hands on it. ...
03 09 50 10 LMP It's a NO-GO - GO/NO-GO - the one one I'm looking for. Hey, that's beautiful.
03 09 50 28 CDR Like this?
03 09 50 31 LMP Yes.
03 09 50 33 CDR That's the one we made the changes in, right?
03 09 50 37 LMP Right.
03 09 50 40 CDR It may be up in the - in the command module, huh? Have you got another clip?
03 09 50 49 LMP For the window?
03 09 50 51 CDR I thought we might just stick my - activation checklist right - right there, and we'll be all ready coming in.
03 09 50 56 LMP Right here?
03 09 50 57 CDR Yes. ...
03 09 51 02 LMP We may be ending up with one more than we're authorized - one, two, three, four, five. Yes, one of these will be changed over to - As a matter of fact, I stole one from Mike - but one of them we'll change over to the --
03 09 51 18 CDR I'll go check around up here.
03 09 51 20 LMP Oh, wait a minute, here it is. I got it.
03 09 51 24  CDR  I don't think the --
03 09 51 25  LMP  This other one got changed.
03 09 51 28  CDR  No, it didn't.
03 09 51 31  LMP  You want to do that?
03 09 51 32  CDR  Yes, I can do that.
03 09 51 50  LMP  And in the meantime - Let's see, where'd the film go?
03 09 52 19  LMP  Now, the thing that would be nice to find out is if - how well - go - the 80-millimeter - with the film pack on it - in color.
03 09 53 20  LMP  You do put these in with this dark slide in, don't you? Is that right?
03 09 53 24  CDR  Which one you got? 60? 60 you do, and the 80 you - ...
03 09 53 40  LMP  ...
03 09 53 42  CDR  Yes, dark slide in.
03 09 53 55  CDR  It'll lock it the other way. That - that side - it'll pull it closed.
03 09 53 59  LMP  Alright. ... for telling me.
03 09 54 10  LMP  Boy, that thing goes all over, doesn't it? Maybe we ought to - do these the other way around.
03 09 55 33  LMP  Neil, we got two magazines, two color, A ... - one of them is R and the other is S.
03 09 55 42  CDR  Yes.
03 09 55 43  LMP  I'm going to put the R in the reserve camera.
03 09 55 46  CDR  Okay.
03 09 55 47  LMP  And the S in the surface camera.
03 09 55 48  CDR  Good idea.
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<tr>
<td>03 09 55 49</td>
<td>LMP</td>
<td>Even though we're going to use them the other way.</td>
</tr>
<tr>
<td>03 09 56 33</td>
<td>CDR</td>
<td>Do you want to try it out in there?</td>
</tr>
<tr>
<td>03 09 56 36</td>
<td>LMP</td>
<td>I guess we could open the window here, just as well.</td>
</tr>
<tr>
<td>03 09 56 59</td>
<td>LMP</td>
<td>The window's all - frosted over.</td>
</tr>
<tr>
<td>03 09 57 04</td>
<td>CDR</td>
<td>Is it?</td>
</tr>
<tr>
<td>03 09 57 06</td>
<td>LMP</td>
<td>Well, I hate to stick my finger on it; I'm not sure which side it's on.</td>
</tr>
<tr>
<td>03 09 57 09</td>
<td>CDR</td>
<td>We'll have to - have to turn the heaters on tomorrow.</td>
</tr>
<tr>
<td>03 09 57 16</td>
<td>LMP</td>
<td>No, I think when the sun gets on them, it'll - ... them. Yes, the one on your side is ...</td>
</tr>
<tr>
<td>03 09 58 08</td>
<td>CDR</td>
<td>The black and white is magazine 2.</td>
</tr>
<tr>
<td>03 10 02 05</td>
<td>LMP</td>
<td>I don't guess there's any need to tape that up now.</td>
</tr>
<tr>
<td>03 10 02 18</td>
<td>LMP</td>
<td>We're on the back side now, right?</td>
</tr>
<tr>
<td>03 10 02 20</td>
<td>CDR</td>
<td>Yes, just come into - we're just coming into sunlight.</td>
</tr>
<tr>
<td>03 10 02 22</td>
<td>LMP</td>
<td>And we don't get the - contrast ...</td>
</tr>
<tr>
<td>03 10 02 31</td>
<td>CDR</td>
<td>What's the mission time, Mike?</td>
</tr>
<tr>
<td>03 10 02 35</td>
<td>CMP</td>
<td>Just a second. About 82 hours even.</td>
</tr>
<tr>
<td>03 10 02 39</td>
<td>CDR/CMP</td>
<td>...</td>
</tr>
<tr>
<td>03 10 02 40</td>
<td>CMP</td>
<td>82:02.</td>
</tr>
<tr>
<td>03 10 02 42</td>
<td>LMP</td>
<td>Okay, when do you get your tracking?</td>
</tr>
<tr>
<td>03 10 02 44</td>
<td>CMP</td>
<td>In a little while.</td>
</tr>
<tr>
<td>03 10 02 47</td>
<td>LMP</td>
<td>About what time?</td>
</tr>
<tr>
<td>03 10 02 52</td>
<td>CMP</td>
<td>About another half hour.</td>
</tr>
<tr>
<td>03 10 02 56</td>
<td>LMP</td>
<td>Before 83 hours?</td>
</tr>
</tbody>
</table>
03 10 03 06  CDR  Wasn't like this yesterday - must be because the sun was on it.

03 10 03 24  LMP  Boy, look at that big mother coming up there. Looks like we're heading for ... over the horizon.

03 10 04 22  LMP  I don't think there's any place except in the - in here, that it says anything about 16-millimeter footage -

03 10 04 33  CDR  In the card, right?

03 10 04 35  LMP  No, I'm thinking about for the descent. Here we are; 16 millimeter, HC-EX, f:4, 500, infinity, 6 frames per second. Okay.

03 10 05 14  CDR  You got the flight plan handy, Mike?

03 10 05 16  CMP  Yes, I have; just a second.

03 10 05 19  CDR  I don't want it up here; I just want you to - when you get a chance, to read off the items that are on there, make sure we got them.

03 10 05 26  CMP  It says perform housekeeping chores, stow helmets, stowage bags; unstow mirror, checklist, and disposal assembly. Stow interim stowage assembly, unstow and configure for use 16 millimeter, HC-EX, f:4, 500, infinity, 6 frames per second. That's all it says - on that page. That's where we are now. The next thing is an hour from now when we transfer to LM power and activate the COMM.

03 10 06 04  LMP  12 feet per second - half an hour.

03 10 06 15  CMP  Did you say something about taking pictures right now?

03 10 06 18  CDR  No, no; stop the camera.

03 10 06 21  CMP  Yes, I know, I don't think it'd take a very good picture right now.

03 10 06 29  LMP  One thing, when you get way up here, you can - see a lot more of that secondary strut.

03 10 06 39  CMP  No, that thing - that's holding up those damn baffles.
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. ... What do you know, it works!

I could sure get the stop watch, huh?

Yes, you have the exact time to AOS - because I don't have my watch - set up for that.

...
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.
Well, I can't do anything until we transfer to LM power.

Do you know where the shaving cream is?

Shaving cream?

Yes.

Yes, I sure do; it's --

In the penlight.

-- in the penlight compartment, huh?

How about this thing; you see any need to -- to keep that in the LM?

Neil, what did you do with the -- camera back sight?

I haven't had it.

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.
03 10 25 04 CMP The razor wasn't in there?
03 10 25 06 CDR The razor's in here, and I think the shaving cream was when I pulled it out, but --
03 10 25 11 LMP How much time to AOS, Mike?
03 10 25 15 CMP 82:30 - about 5 minutes.
03 10 28 42 LMP Don't know what I'm doing with VHF B on.
03 10 28 52 LMP Hey, Mike?
03 10 28 53 CMP Yes.
03 10 28 57 LMP You got VHF B available?
03 10 28 59 CMP What? Say again?
03 10 29 05 LMP I don't know. According to this lousy thing, I'm powering up VHF B - T/R.
03 10 29 11 CMP Not right now, not for another half hour or so.
03 10 29 13 LMP No, I know, but - Are you going to have your VHF on?
03 10 29 21 CMP If I'm going to record your data, I am.
03 10 29 30 LMP Well, it doesn't say doodly squat about recording data.
03 10 30 30 LMP ... coming up now.
03 10 31 54 CDR Did you get them?
03 10 31 56 LMP No, sure didn't.
03 10 32 05 CDR Yes.
03 10 32 07 LMP But I can't see ... - I see the earth, but it's a lousy picture.
03 10 32 27 CMP Could you wait just 1? I'm right in the middle of the event-timer setting.
03 10 32 41 CMP Okay, Houston. We'll be doing P22 in just a couple of minutes here.

CONFIDENTIAL
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 --

Okay.

-- whether I'm spaced properly or not, you know what I mean?

Yes.

Coach me along on when to take mark number 2, mark number 3, 4, 5.

And could you give me a hack on the MDC mission timer? It's going up to 35 minutes. Ready --

MARK it.

35 minutes.

Okay, that's good. That program alarm is normal; it will reach that when the trunnion gets down below 50 degrees.

Okay.

All I'm doing is waiting for - the time; everything else is done.

You holding inertial, Mike?

Yes.
03 10 35 50 LMP No wonder the earth isn't moving.

03 10 36 06 CMP Ho-hum, ho-hum. I only got set up for this thing about an hour early (laughter). Better late than never; better early than late.

03 10 37 04 CMP ... should be coming over the horizon here pretty soon.

03 10 37 08 LMP What should be?


03 10 37 20 CMP Now, we'll see if you can find something that looks like A-1.

03 10 37 23 LMP I got the earth down by the strut.

03 10 37 56 LMP The problem with this window is, Neil, I think it's too cold in here.

03 10 37 59 CMP Neil, I'm going to get up here and get pitch - MANUAL ATTITUDE PITCH to ACCEL COMMAND. Those hand controllers are armed, so beware.

03 10 38 02 CDR Okay.

03 10 41 25 CMP If I'd known you were going to be here, I'd of incorporated you into the procedures.

03 10 41 30 CDR Keep looking through the periscope, then.

03 10 41 32 CMP What I need is - 0.3 to 0.5 on this thing, closer to 3. I'd get it, but you --

03 10 41 40 CDR I'll watch.

03 10 41 41 CMP -- just as a doublecheck --

03 10 41 42 CDR I'll watch.

03 10 42 11 CMP The preflight - ...

03 10 42 55 CDR That ... is working.

03 10 42 56 CMP Okay, fine.

03 10 43 31 CMP Okay, MARK it -
Number 1. They're 30-second marks.
Check.
15.
How many?
15 - 20 - 25 - 30 -
MARK it -
Number 3.
Okay.
I have a feeling somehow I got to do these ...
15 -
Okay.
25 -
MARK it -
Number 3.
Okay.
15 - 20 - 25 -
MARK it -
Number 4.
Okay.
15 - 20 - 25 -
MARK it -
Number 5.
Okay.
...
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 -- ... 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.
Just like the simulator.

Okay, now, the flight plan says where we want to stop ..., that says so right here - pitch 229 is where we want to stop.

Okay, we've gone by that, however, quite a ways.

I'm sorry, let's stop, then.

Is that local vertical?

No.

Okay. And after those pictures, ... lunar surface.

You want to go back to 229 or what?

Let me see the flight plan just a second. Yes.

Might as well just - just let it stop itself, Neil.

I've got to - look at the --

Yes, go ahead.

-- the ... ... like - gangbusters?

... 225 is ...

MARK -

02009.

MARK -

22590. Minus 00177.

Okay. So much for that.

A beautiful view out here, Neil.

What's the GET?

It's 82:51.
There's Mount Marilyn.

Yes.

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.

Sure enough.

You got a good view there, Neil?

Yes, I sure do.

Houston, Apollo 11.

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.

Okay.

Well, one P22 out of the way. Ho, ho, ho!

What were the results?

Well --

Or could you tell?

-- they're sort of inconclusive because I marked -- see, they gave me --

That's in work, Houston. Hey, how about holding this for just a little bit?

Yes, let's hold this attitude a little bit; I want to look at the --

Boy, that's beautiful out there, isn't it?
03 10 54 01  CDR  -- TPI approach. Man, this is really something; you ought to look at this. You want to watch our approach into the landing site; you got to watch right through this window. We're coming over - we just passed Mount Marilyn. We're coming up on Maskelyne series here - straight out ahead, coming into the landing area.

03 10 54 21  CMP  Houston, we're holding inertial a little while to study the approach to the landing zone.

03 10 54 39  CDR  See the monocular -

03 10 54 41  CMP  I don't either, ...

03 10 54 44  CDR  Is there one?

03 10 54 50  LMP  Well, a crater --

03 10 54 51  CMP  There go Sidewinder and Diamondback. God, if you ever saw checkpoints in your life, those are it.

03 10 54 56  CDR  But ... we don't get to see them.

03 10 54 58  CMP  You don't?

03 10 54 59  CDR  No, we roll over right here at this little - well, you see Boot Hill coming up right here?

03 10 55 06  CMP  Yes, yes, yes.

03 10 55 07  CDR  And just beyond it that's - that crater right on track there, the big one?

03 10 55 11  CMP  That's Mount Marilyn? Past Boot Hill?

03 10 55 13  LMP  No, Duke Hill.

03 10 55 14  CMP  Duke Hill?

03 10 55 15  LMP  No, I'm sorry ... that's --

03 10 55 17  CDR  Duke Island, Duke Island.

03 10 55 20  CMP  Oh God, look at that Moltke; he's my favorite ... Look at that son of a bitch. You see all those roads - triangular roads leading right past him?
03 10 55 29  CDR Yes.
03 10 55 30  CMP That's US 1, I guess, huh?
03 10 55 31  CDR Yes.
03 10 55 33  CMP There's crater 130 over there although I can't
quite see -- see 129, but I can't quite see 130.
03 10 56 12  CMP Can you see ..., Neil?
03 10 56 20  CDR I'm not sure.
03 10 56 25  LMP I think I can see it, for sure. Yes, I got it
beautiful -- I can -- I got the whole landing site
here.
03 10 56 35  CDR That far?
03 10 56 40  LMP The one that's shorter there?
03 10 56 49  LMP Houston, this is Apollo LM in the Eagle -- Apollo 11
in the Eagle, and I got a beautiful view of the
whole landing area.
03 10 57 08  LMP Roger. I can see the entire landing area from the
position I'm in looking out the left window in the
LM.
03 10 57 20  CMP ...
03 10 57 26  LMP That's right.
03 10 58 05  LMP Boy, that sure is eerie looking.
03 10 58 06  CDR Isn't that something?
03 10 58 08  MS ...
03 10 58 10  CMP ... enough of a shot down there, but you can't find
a single spot on the surface that doesn't look
... 1-degree sun angle, that's -- that's just a
lousy sun angle.
03 10 58 28  CDR That's spectacular out there -- Looks like you're
flying right into the side of a mountain, doesn't it?
03 10 58 32 CMP Yes, sure does.
03 10 58 34 LMP I missed taking a picture of it, ...
03 10 58 49 CMP Well, that was good ... Shall we go to maneuver, I mean to sleep attitude - anybody object to doing that?
03 10 58 59 CDR That'd be alright.
03 10 59 05 LMP Okay, I'm ready for you cats to transfer to LM power. What time GET you got?
03 10 59 13 CMP 80 --
03 10 59 15 CDR Get the ..., Buzz.
03 10 59 17 CMP -- 83 hours. You ready to do it?
03 10 59 20 LMP ...
03 10 59 22 CMP You ready to do it?
03 10 59 23 LMP Stand by. Yes, go ahead and do it.
03 10 59 32 CMP Okay.
03 10 59 33 LMP You got 83 hours right now, huh?
03 10 59 35 CMP Yes, 83 hours, and we're on LM power.
03 11 00 26 LMP Glycol pump.
03 11 00 28 CMP Houston, Apollo 11. How do you read on high gain? Over.
03 11 00 37 CMP Okay. You want wide beam, for some reason?
03 11 00 39 LMP Will you cut my SUIT POWER and AUDIO, OFF, please?
03 11 00 43 CMP Yes.
03 11 00 51 LMP Okay, fine.
03 11 00 53 CDR Okay, going OFF now.
03 11 00 54 CMP We're starting our maneuver to sleep attitude; roll 82, pitch 229, yaw zero.
03 11 01 11  CMP    About ready to maneuver?
03 11 01 14  LMP    Go ahead.
03 11 01 16  CMP    Okay.
03 11 02 52  CDR    Yes?
03 11 03 08  CDR    You're past step 4?
03 11 03 41  CDR    Houston, ll.
03 11 03 45  CDR    What's the page?
03 11 03 48  CDR    Okay. We're on page - activation 12, 13, at step 4, verify descent talkbacks - gray, and they're barber pole.
03 11 04 20  CDR    Stand by. We've got it. We've just had - one circuit breaker out of position. We have them gray now.
03 11 05 18  CMP    Watch that.
03 11 05 20  CDR    Don't we want it dark?
03 11 05 24  CMP    I thought the lights were going out. Man, that voltage is really falling off.
03 11 05 43  LMP    Hey, Mike.
03 11 05 44  CMP    Yes.
03 11 05 45  LMP    ... VHF ... circuit breaker ...
03 11 05 50  CMP    I can't hear you, Buzz.
03 11 05 52  CDR    He says, "Why don't you turn on VHF B, just for kicks."
03 11 05 55  CMP    Alright, I'll do it. You going to send me some data?
03 11 06 00  LMP    Yes, I'll get right to it.
03 11 06 02  CMP    Huh?
03 11 06 03 LMP I'll get right to it.
03 11 06 04 CMP Alright.
03 11 06 07 LMP Soon as I get some COMM first.
03 11 06 09 CMP Yes, because when I - because when I record your data, I'm on SIMPLEX A.
03 11 06 17 LMP Yes, well, that's when you're talking at the same time.
03 11 06 20 CMP Yes, okay. You want me just to turn up B now?
03 11 06 22 CDR There's signal strength.
03 11 06 50 LMP Hello, Houston, hello, Houston; this is Apollo 11, Eagle. Over.
03 11 07 22 CDR A lot of static - on the command module S-band.
03 11 07 27 CMP Well, we - we should still have him.
03 11 07 39 CDR Houston, Apollo 11. Radio check on S-band.
03 11 08 04 CDR I'm not getting them on -
03 11 08 08 CMP Well, we're almost at sleep attitude; just stand by 1, and, as soon as we get there, I'll find out where they are. I'm going to dick with the DAP right now.
03 11 09 16 CDR I've got nothing but static.
03 11 09 31 CMP Houston, Apollo 11. Over.
03 11 09 52 LMP Hey, Mike, you transmitting on B?
03 11 10 00 CDR Mike, what are you transmitting on up there?
03 11 10 04 CMP Say again.
03 11 10 06 CDR What are you transmitting on up there?
03 11 10 08 CMP I'm transmitting right now on OMNI A, but I'm about to get new high-gain angles; just 1 second. Okay, we're there.
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?
LMP 03 11 13 22
I don't believe they can hear you, Mike. ... sleep attitude.

CMP 03 11 13 26
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.

LMP 03 11 13 40
Houston, Eagle. ... high gain ...

CDR 03 11 14 11
No go.

CMP 03 11 14 12
What'd he say?

CDR 03 11 14 13
COMMAND RESET.

CMP 03 11 14 14
Okay.

LMP 03 11 14 36
... try him again.

CMP 03 11 14 39
Houston, Columbia. Reading you loud and clear.

CMP 03 11 43 24
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.

CDR 03 11 43 40
Yes.

CMP 03 11 43 42
But -

LMP 03 11 43 47
...

CMP 03 11 43 50
What?

LMP 03 11 43 51
...

CMP 03 11 43 59
Yes, forward's okay.

CDR 03 11 44 15
I don't think that would be too horrible sleeping down there.

CDR 03 11 44 28
It's for sure it's not going anywhere; this one's bolted down two places - and this one is --

CMP 03 11 44 35
You can try it. If we could find a place to put our legs back in there, it'll be alright.
03 11 45 13  CMP  See - it's going to be hard to get into that - sampler there.

03 11 45 19  CDR  No - no, that's alright. That's the place for it.

03 11 46 30  CDR  (Sneeze)

03 11 46 34  CMP  Okay, lights went out - except for all those radio-active ones in there.

03 11 47 12  LMP  Well, COMM's good. Son of a bitch might work.

03 11 47 21  CMP  Sure it'll work. Anything in a pretty cockpit like that is bound to work.

03 11 47 38  CMP  Well, I propose leaving the probe and drogue in here overnight. Save all - doing all that claptrap in the morning.

03 11 47 48  CDR  It's okay with me.

03 11 47 49  LMP  Fine.

03 11 47 50  CMP  You through in the LM?

03 11 47 54  LMP  How's that going to affect --

03 11 47 57  CMP  Sleeping!

03 11 47 58  LMP  -- sleeping?

03 11 47 59  CMP  I'll be glad to sleep over there, alright? I don't think it'll affect that; I'd rather sleep, I'd rather sleep with the probe and drogue than have to dick with it in the morning.

03 11 48 06  LMP  Alright, that's fine; I can have it there. I don't know how I'd get out, but - (laughter).

03 11 48 13  CDR  ...

03 11 48 15  CMP  That's ..., alright.

03 11 48 25  LMP  Hey, you don't want to bring this one back? You on a weight-saving kick for the command module?

03 11 48 35  CDR  You want it?
Sure, you --

There's room for the Hasselblad.

-- you got stowage space?

You can have it if you want it.

You got a place to fix things that rattle around?

Sure. Like hatches? ... if you'll take time to get out of the hallway.

Let's get some music.

Get out of my damn hallway, Aldrin, so I can put my hatch in and then we can all --

How about these tapes?

Okay.

Okay, 95:50 IVT to the LM. What time is it now?

83:53.

I figure that as being 12 hours. About time for a Lomotil, huh? Well, not quite.

How about the systems stuff - to put the machine to bed.

You go to REACQ and NARROW?

Yes.

So I guess the COMM's pretty well taken care of?

Yes.

Have you got the waste water dump?

No, I haven't done that, but I will.

Let's see, I imagine we want to go out of VOICE? Or not?

Very, very --
03 11 51 18 LMP The whole bit they said.
03 11 51 24 CMP Okay.
03 11 51 57 CMP Lunar orbit asleep; (cough) S-BAND SQUELCH, ENABLE?
03 11 51 58 LMP I did it.
03 11 51 59 CMP Got that, huh?
03 11 52 00 LMP Yes.
03 11 52 01 CMP HIGH GAIN, REACQ, NARROW; antenna pitch angle --
03 11 52 06 LMP Yes, I did that.
03 11 52 07 CMP -- that's all it says.
03 11 52 08 LMP Okay.
03 11 52 10 CMP Plus the normal configuration.
03 11 52 13 LMP Doesn't it say anything about DOWN VOICE BACKUP -- or any of that stuff?
03 11 52 16 CMP (Cough)
03 11 52 31 CMP No.
03 11 52 33 LMP Okay.
03 11 52 37 CDR Waste water dump, we'll wait until 84 hours; they may have the vent modeled or some crazy thing like that, so I want to be at the right time.
03 11 52 45 LMP Alright.
03 11 52 47 CMP Well, let's see, normal lunar configuration. Well, it is DOWN VOICE BACKUP.
03 11 52 52 LMP Yes.
03 11 52 54 CMP Well, let's get going here. PRIMARY, PRIMARY, HIGH,
VOICE, (cough) PCM, RANGE, DOWN VOICE BACKUP, AUX
TAPE, OFF; TELEMETRY to DATA; and UP TIM COMMAND
to NORMAL; VHF A and B, OFF; RECEIVE only, ...;
PCM/ANALOG, RECORD, FORWARD, NORMAL, NORMAL - that's okay, LOW - PRIMARY, REACQ, and NARROW. Well, COMM's set.

03 11 53 56 LMP Good.
03 11 53 57 CDR I got to vacuum up some water and dump the waste water tank, and we're about set.
03 11 54 05 CMP Hey, I got a fuel cell - O₂ -
03 11 54 09 CDR Hey, our water's about all gone.
03 11 54 10 CMP Did they say anything about the O₂ purge?
03 11 54 13 CDR Must have gone into the LM.
03 11 54 14 CMP Yes, I think it did; it went on the windows. They didn't say anything about it, huh?
03 11 54 17 LMP No.
03 11 54 18 CMP Well, I guess we'll do it then. Anybody get my -
03 11 54 36 CDR Well, heck, I guess we're really not through with them yet, are we?
03 11 54 39 CMP 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?
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.
... - ... novel and earn a million dollars.

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?

(Laughter)

Oh, that is weird - that crazy moon out there again, huh? Funny-looking thing.

Buzz, this crazy bracket goes right here. It's probably right the hell in your way, isn't it?

No, no.

Not in your way?

No, I can survive with that.

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 -

Well, if I don't need this thing anymore, I think I'll stow that one away. Systems are yours tomorrow?

Yes.

I don't know as we've got much to do; there's a purge.

Is it 84 hours yet? Yes, it is; I'm going to dump the waste water.

You dumping?

Yes.

(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?
<table>
<thead>
<tr>
<th>Time</th>
<th>Participant</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>03 12 11 19</td>
<td>LMP</td>
<td>Huh?</td>
</tr>
<tr>
<td>03 12 11 27</td>
<td>CDR</td>
<td>I can't think of any use for two of them.</td>
</tr>
<tr>
<td>03 12 11 31</td>
<td>LMP</td>
<td>Okay.</td>
</tr>
<tr>
<td>03 12 15 24</td>
<td>LMP</td>
<td>That COMM was so good I don't think I'd need those damn things ...</td>
</tr>
<tr>
<td>03 12 16 29</td>
<td>CMP</td>
<td>Anybody say anything about terminating battery current?</td>
</tr>
<tr>
<td>03 12 16 33</td>
<td>LMP</td>
<td>No.</td>
</tr>
<tr>
<td>03 12 16 45</td>
<td>CMP</td>
<td>You remember anything about that, Neil?</td>
</tr>
<tr>
<td>03 12 16 48</td>
<td>CDR</td>
<td>No.</td>
</tr>
<tr>
<td>03 12 18 12</td>
<td>CMP</td>
<td>Somebody's blue towels? Did I dislodge those by mistake or did you have those?</td>
</tr>
<tr>
<td>03 12 18 18</td>
<td>CDR</td>
<td>No, don't believe I had them.</td>
</tr>
<tr>
<td>03 12 18 20</td>
<td>LMP</td>
<td>I had them out, kind of floating around back here.</td>
</tr>
<tr>
<td>03 12 18 38</td>
<td>LMP</td>
<td>Everything I think you could dislodge, they forgot to put Velcro on the damn thing.</td>
</tr>
<tr>
<td>03 12 19 31</td>
<td>CMP</td>
<td>Could you - maybe reach back and - hand me that wrench right quick?</td>
</tr>
<tr>
<td>03 12 19 40</td>
<td>CDR</td>
<td>Yes, I sure could. Sure could ...</td>
</tr>
<tr>
<td>03 12 19 54</td>
<td>CMP</td>
<td>You want me to swap one?</td>
</tr>
<tr>
<td>03 12 20 00</td>
<td>CDR</td>
<td>No, I think I'll keep one for tonight.</td>
</tr>
<tr>
<td>03 12 20 03</td>
<td>CMP</td>
<td>Okay.</td>
</tr>
<tr>
<td>03 12 20 26</td>
<td>CDR</td>
<td>Thank you.</td>
</tr>
<tr>
<td>03 12 20 27</td>
<td>CMP</td>
<td>You're welcome.</td>
</tr>
<tr>
<td>03 12 21 56</td>
<td>CMP</td>
<td>You like this?</td>
</tr>
<tr>
<td>03 12 21 58</td>
<td>CDR</td>
<td>Not much.</td>
</tr>
</tbody>
</table>
...?

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.
<table>
<thead>
<tr>
<th>Time</th>
<th>Caller</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>03 13 40 17</td>
<td>CDR</td>
<td>We'll see you on the other side.</td>
</tr>
<tr>
<td>03 13 40 45</td>
<td>LMP</td>
<td>Anybody have one?</td>
</tr>
<tr>
<td>03 13 40 47</td>
<td>CDR</td>
<td>I'll have a little one.</td>
</tr>
<tr>
<td>03 13 40 48</td>
<td>LMP</td>
<td>Okay. Here you are.</td>
</tr>
<tr>
<td>03 13 41 28</td>
<td>CMP</td>
<td>Yes.</td>
</tr>
<tr>
<td>03 13 41 29</td>
<td>CDR</td>
<td>Okay.</td>
</tr>
<tr>
<td>03 13 41 47</td>
<td>CMP</td>
<td>I guess what I'm doing I should do with the paper towels.</td>
</tr>
<tr>
<td>03 13 42 56</td>
<td>CDR</td>
<td>Everybody through with the water?</td>
</tr>
<tr>
<td>03 13 43 00</td>
<td>LMP</td>
<td>Yes, go ahead.</td>
</tr>
<tr>
<td>03 13 44 08</td>
<td>LMP</td>
<td>Ever find your box?</td>
</tr>
<tr>
<td>03 13 44 11</td>
<td>CMP</td>
<td>No. Gosh, you remember when they told us about - about putting buttons on the seat of these pants?</td>
</tr>
<tr>
<td>03 13 44 27</td>
<td>CDR</td>
<td>No, I don't remember.</td>
</tr>
<tr>
<td>03 13 44 33</td>
<td>LMP</td>
<td>Yes, they were working out – this elaborate scheme.</td>
</tr>
<tr>
<td>03 13 44 38</td>
<td>CMP</td>
<td>Yes, ... had a choice between ... and Velcro.</td>
</tr>
<tr>
<td>03 13 44 52</td>
<td>CDR</td>
<td>What's its use? I mean, don't keep me hanging in suspense.</td>
</tr>
<tr>
<td>03 13 44 55</td>
<td>CMP</td>
<td>Well, whatever I tell them, they didn't give me.</td>
</tr>
<tr>
<td>03 13 44 57</td>
<td>CDR</td>
<td>Shouldn't have anything.</td>
</tr>
<tr>
<td>03 13 44 59</td>
<td>LMP</td>
<td>Nothing in it.</td>
</tr>
<tr>
<td>03 13 45 01</td>
<td>CDR</td>
<td>Good grief, man!</td>
</tr>
<tr>
<td>03 13 45 02</td>
<td>CMP</td>
<td>They tell me you got to use Velcro on there. Maybe on the other side.</td>
</tr>
<tr>
<td>03 13 45 08</td>
<td>CDR</td>
<td>Use –</td>
</tr>
<tr>
<td>03 13 45 12</td>
<td>CMP</td>
<td>I got a - pair of jockey shorts. Now cut - cut the lights off - lights off.</td>
</tr>
</tbody>
</table>
Very good, very good.

How'd you sleep last night, Buzz, up on top?

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.

Why don't you guys sleep underneath tonight? I'll sleep top deck.

Oh, you're going to sleep downstairs tonight, aren't you?

Yes, that's right; I remember ...

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?

No, I don't think so.

Well, take your druthers, whichever you prefer.

Anybody ... goes right up here?

I've just been kind of looking around for it myself.

..., Buzz?

...

What?

I ... you.

Oh.

...?

Yes, yes.

Yes, I ...
Day 4

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.
03 14 18 56 CMP I'll tell you what we ought to do, ...
03 14 18 59 LMP Oh, okay, let me go do that.
03 14 19 51 LMP Anybody know when AOS is?
03 14 20 07 CMP When is AOS?
03 14 20 09 LMP Yes. When is AOS ...?
03 14 20 18 LMP 86:38?
03 14 20 21 CMP I think it's ...
03 14 20 24 LMP Okay.
03 14 20 37 CDR ... along in here.
03 14 20 41 LMP Yes.
03 14 24 48 CMP Where the hell is the horizon with the world coming over it? I guess it's behind us, huh?
03 14 24 58 CDR Up there? We should be getting earthshine - earth-rise 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.
... Got a MASTER ALARM coming on here.
Your f:8 is 250 - at infinity?
Yes.
Good deal. Keep working, you got a lot of film.
Well, it's...
And I was...
Good deal.
...

Glad to hear it.
Through?
Yes - ...
It's good...
Yes, I guess so. Nothing like filming your...
... this field of view, it's mostly just blues - I keep getting mostly black and blue.

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.

Huh? Is that right? Really should have looked.
... flow?
RATE to HIGH, Neil.
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?

Okay, this one is 1 second slow down in the LEB.

Let's see, these things come in the command module don't they, those umbilicals?

... well, we don't want them.

... anyway, it compares.

... well, we couldn't do that without switching - well, you can have them in here all the time.

... there's no way for me ... probe and drogue ... docking ...

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?

Here's this LCG check. "Verify ... stick visible in red or green band."

Yes. Not ... as it should be.

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.

Having any luck there, Michael?

...
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 small - blah.

03 23 47 15 CDR (Humming)
03 23 48 12  CDR  Okay.
03 23 48 58  CDR  You want one?
03 23 48 59  CMP  ...
03 23 49 00  CDR  Yes.
03 23 49 02  CMP  ...
03 23 49 43  CDR  We've got a roll rate in; 0.3-degree roll rate. Now it's taking it out; now it's taking it back out the other way.
03 23 50 34  LMP  ... Now, let's see.
03 23 50 41  CDR  I'll keep an eye on ... for you.
03 23 51 04  CDR  ... on here.
03 23 51 06  LMP  Okay, I'm going on.
03 23 51 08  CDR  Okay.
03 23 53 30  CDR  What's that?
03 23 53 34  LMP  Did you repress, huh?
03 23 54 24  LMP  How come you don't ... LM power?
03 23 54 26  CMP  Okay. Stand by. You're on LM power. What?
03 23 54 38  CDR  What did he say?
03 23 54 39  LMP  ...
03 23 54 41  CMP  Oh, what time is it? It's 95:54.
03 23 55 12  CMP  Now, switch from RATE, HIGH, to RATE, LOW. But that might make it better and maybe a little bit worse.
03 23 55 21  LMP  ...
03 23 55 35  CMP  I guess that's right then, Neil; it rattles across the deadband at a fairly high rate.
03 23 55 44 LMP ... 
03 23 55 46 CMP Alright. 
03 23 56 31 LMP ... 
03 23 56 34 CMP Sure as hell is. 
03 23 56 50 CMP I can't get that ... 
03 23 56 53 CDR This one - this one? That won't hurt it. ... 
03 23 59 09 CMP Stand by for some MASTER ALARMS; I'm purging.
DAY 5

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!
04 00 07 58 CMP  NORMAL, NORMAL.
04 00 09 19 CMP  Another MASTER ALARM coming.
04 00 10 52 CMP  Stand by for MASTER ALARM.
04 00 12 54 CMP  Neil, where's the voice tape recorder, you know?
04 00 12 59 CDR  Might be in the ...
04 00 13 01 CMP  Okay. Oh, you son of a bitch, you! Gah!
04 00 13 10 CDR  ...
04 00 16 17 CDR  ...
04 00 16 18 CMP  Can't get it ...; it's behind the ...
04 00 16 27 CDR  Yes.
04 00 16 28 CMP  ... hard time getting anything down here ...
04 00 16 37 CDR  Okay.
04 00 16 38 CMP  You got some things up there.
04 00 16 41 CMP  Neil, all this food and stuff up here, you going
to take with you, or drink, or eat?
04 00 17 47 CDR  No, I'll take ...
04 00 17 54 CMP  Okay. Chewing gum, you want any of that?
04 00 18 07 CDR  ... concerned ...
04 00 18 12 LMP  ...
04 00 18 19 CMP  Neil, I hate to bother you; could you get my
solo book out of R-1 there?
04 00 18 23 CDR  What?
04 00 18 24 CMP  My solo book out of R-1.
04 00 18 28 CDR  Solo book?
04 00 18 29 CMP Yes. Look --
04 00 18 30 CDR R-l?
04 00 18 31 CMP Yes, it should be in R-l. 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.
Go ahead.

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?

Roger.

Eagle, Columbia.

Go ahead.

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.

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?

Okay.

Mike, let us know how you're coming up there now and then.

I'm doing just fine. I've cocked eight out of the 12 docking latches, and everything is going nominally.

Okay.

All 12 docking latches are cocked.

Okay.

And I'm ready to button up the hatch.

Hey, Mike. Have you got the - got to the tunnel vent step yet?

I'm just coming to that. What can I do for you?

Well, we're waiting on you.
Okay.

We're still ahead of the timeline, so take your time.

Okay.

Okay, I'm ready to go to LM tunnel vent.

You got it all vented now?

Negative, it's a slow process. I'm on VENT, but it's just going to take a little while here.

Roger. Just give us a call. We're pressing on with some other stuff.

Okay.

How's our attitude holding?

Looks good.

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.

Moving in.

How you doing, Mike?

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.

Okay.

I've got a 3.5 psid now; I'm going to start a maneuver here in a few minutes to depressurize it.

Okay.

How you - how you guys doing?
Okay. We're doing our regulator checks now.

So I heard.

I'm starting the maneuver.

How long you got - to end this maneuver, Mike?

Oh, about another 2 or 3 minutes we should be there - no, less than that.

We're there; we're at the new attitude.

Okay, we're going to put our gear down.

... MASTER ARM --

Okay.

LANDING GEAR DEPLOY, FIRE.

Here we go, Mike.

Bam, it's out. Ain't no doubt about that.

And it's gray.

Alright. Your ED LOGIC POWER A, CLOSED.

LOGIC POWER A, CLOSED.

Alright, fire it again.

Okay.

Nothing happened, huh?

Right.

Okay, now --

I heard it click.

Yes, so did I.

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(ll), ED LANDING GEAR FLAG, OPEN.
04 02 15 23 CDR The gear went down okay, Mike.
04 02 15 26 CMP Good deal.
04 02 18 40 CDR Columbia -
04 02 19 13 LMP Loud and clear.
04 02 19 45 CDR Columbia, do you read Eagle?
04 02 19 47 CMP Eagle, do you read Columbia?
04 02 19 51 LMP Yes, I'm working on the high gain right now.
04 02 19 54 CMP Okay, I'm reading him loud and clear.
04 02 20 14 LMP You in the right attitude, Mike?
04 02 20 17 CMP That's affirm.
04 02 20 29 CMP Houston, Columbia. You're loud and clear.
04 02 21 51 LMP Houston, Eagle. Over.
04 02 22 08 CMP Buzz, you on the forward OMNI?
04 02 22 10 LMP Houston, Eagle. Over.
04 02 22 15 CMP Buzz, are you on the forward OMNI?
04 02 22 17 LMP Roger. I am.
04 02 22 20 CMP Houston, Columbia. Eagle is on the forward OMNI.
04 02 22 39 LMP Columbia, go ahead.
04 02 23 13 LMP Houston, Eagle. Go ahead.
04 02 23 19 LMP Roger. I got you now. I fed in those angles for the S-band, and I couldn't get a lockon; it
appears as though the antenna would have to be looking through the LM in order to reach the earth. Over.

04 02 24 03 LMP Roger. Ready to copy.
04 02 24 32 LMP Roger. LM weight, 33627; CSM weight, 36651; pitch trim, 00470; roll trim, 00589. Over.
04 02 25 02 LMP Roger. Understand.
04 02 25 12 CMP Houston, Columbia. Do you read?
04 02 25 29 CMP Roger. S-BAND VOICE to VOICE. How do you read now?
04 02 25 45 CMP Houston, Columbia. Over.
04 02 25 53 CMP Houston, Columbia in DOWN VOICE BACKUP. Do you read?
04 02 26 04 CMP Affirmative. Columbia in DOWN VOICE BACKUP. How do you read me?
04 02 26 34 CMP Houston, Columbia's in OMNI C, Charlie, DOWN VOICE BACKUP and, when you get a chance, could you look up the coordinates of 130 for me, please? I have conflicting information between my cue card and my flight plan. I'd like to know which coordinates you want me to use.
04 02 27 04 LMP Houston, Eagle. Completed gear extension okay.
04 02 27 54 CMP Thank you, Houston.
04 02 29 14 CMP Yes, I had the coordinates loaded off the cue card which is - for crater 130.
04 02 31 29 CMP Roger. Thank you.
04 02 33 11 LMP Roger. We're just sitting around waiting for something to do. We need a state vector, a REFSMAT 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.

04 02 33 54 LMP
Roger. We'll go ahead with the DAP and the throttle check since we don't have a gimbal drive test, okay?

04 02 35 31 CMP
Houston, Columbia. Those T₁ and T₂ times are still good, aren't they?

04 02 35 40 CMP
I say, the T₁ and T₂ times remain unchanged, affirmative?

04 02 35 53 CMP
Thank you.

04 02 37 56 LMP
Houston, Eagle.

04 02 38 03 LMP
Roger. In accordance with the - page 47, step 1, we had the guidance control in PGNS and MODE CONTROL, PGNS, AUTO; and, of course, the circuit breakers are not in on the thrusters yet, so when we started through the DAP and proceeded on NOUN 46 - and we're looking at NOUN 47 now - why, we got an RCS TCA light, and we've got four out of the eight other bright-colored red flags. I think that this is explained by the fact that we are in - PGNS and AUTO and just unable to fire the thrusters. Over.

04 02 39 21 LMP
Roger.

04 02 40 00 CDR
Houston, Eagle. Are you going to need the high gain before you can look at our GDA position indicators?

04 02 40 35 CDR
I can go to a high ...

04 02 40 41 LMP
I can give you HIGH BIT RATE on the OMNI's if that will help you any.

04 02 40 59 CDR
Roger. Understand.

04 02 41 39 CMP
Boy, you just can't miss those checkpoints - those Diamondback and Sidewinder.

04 02 42 21 CMP
AUTO optics is pointed just a little bit north of crater 130; pointing north.
Houston, Eagle. We're ready to pressurize the RCS. Over.

Roger.

That's affirmative; the landing gear is out and gray.

Houston, Columbia. I've completed my marks. I've gone ACCEL COMMAND in all three axes to prevent that thruster firing that last time.

Houston, Columbia. As soon as you have the necessary data on the downlink, let me know and I'll proceed.

Stand by, please.

I will.

Roger.

Roger. Looks good.

Ready to copy.

Roger. 224, plus 60267; 225, plus 58148; 226, plus 70312; 227, minus 50031. Over.

Eagle, Columbia. My P22 is complete. I'm continuing this maneuver to AGS CAL attitude.

Roger.

Roger. Columbia, Eagle. Have you about maneuvered there, yet?

Negative.

Houston, Eagle. Are those angles for after the maneuver that Columbia is going to make or are they for right now? Over.

We have about another 120 degrees to go, Buzz.

Houston, Eagle. I believe I've got you on the high-gain antenna now in HIGH BIT RATE. Over.
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.
Okay, it looks real quiet now; I'm ready to go right now.

Buzz, you copy?

Buzz, you copy?

Okay, Mike. Thanks.

Now, ... might check me on this, I - it's - I'm ready to go anytime you're ready.

Roger. We'll be ready to go in just a minute.

Okay, I'm starting my 5-minute rate - right now.

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.

Roger.

Looks like a ...

Halfway through it, it looks like I have ... degrees in roll is about all.

Yes, those look like good ones right now.

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.

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.

Okay.

When your rendezvous radar self-test is complete, let me know and I'll check out my transponder.

Excuse me, Mike, what did you say?

I say, when your rendezvous radar self-test is complete, let me know and I'll check out my transponder.

Yes, we're through with that now.

Thank you. I'm maneuvering the ...

That transponder checked out. I hope they've got a nice, big, strong ... for you.

Very good.

Hey, Mike, what would you recommend as a good setting on the 16 millimeter?

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.

Yes, what you say, f:8 at 1/250th?

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.

How about using, as an undocking time, 100 hours and 12 minutes? That suit your fancy?
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.
Okay. I'm still holding ...

Okay, looks pretty good to me now.

Okay.

Just like in the simulator, you're drifting off to one side and down below a little bit.

Yes.

The gear are looking good; I've seen three of them.

The MESA is not down, right?

Say again.

The MESA's still up?

Yes.

Good.

Now, you're looking good.

Roger. Eagle's undocked. The Eagle has wings. Looking good.

Okay. You've got it, POO and DATA.

You check our tracking light, Mike?

It came on.

Camera's working beautifully.

Track off?

It's off.

I'm ready to start my yaw maneuver if it suits you, Mike.
Does it look like you're going to be able to do this without firing any thrusters, Mike?

I'd have to fire laterally once or twice.

Very small.

Go ahead, Houston. Eagle is ready to copy.

Go ahead.

That's affirmative. Go ahead with the PDI.

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.

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.

Neil, I'm maneuvering in roll.

Roger. I see.

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.

Okay. That explains the difference.

You want him to go to HIGH GAIN, YAW, zero or - say again the numbers.

Okay. YAW, zero; PITCH, minus 20, on the HIGH GAIN. Columbia.

Yes, I copy that, and I'll do it just as soon as I get to it.
Okay, he says he'll do that as soon as he gets around there.

Okay, Neil, I'm all set for the SEP burn, and we're looking good on this phasing.

Okay.

Columbia, read you loud and clear. Houston, how me?

Burn time, 30 seconds.

Okay, state vector looks relatively good.

Mike, how do you read?

Columbia, Eagle. How do you read?

Very good. How do you read me?

Very good. If you are ready, give the mark and we'll go to B DATA. Over.

Stand by 1. I'm ...

Are you ...?

63.

...; they look good.

Okay, let's switch to B DATA now.

Okay.

Eagle, Columbia.

Go ahead.

Columbia's ...

Eagle, Columbia. How's it going?

Mike, the burn's complete; it was on time - residuals are nulled, and AGS's free.
Beautiful.
Eagle, Columbia.
Go ahead.
Roger. I'm ready to go back to VHF RANGING configuration. Be alright?
Roger. Let's go now to VHF RANGING.
Over and out.
Okay.
And you got VERB 76 in?
Yes, 76 is in ... locked up.
And we're ... 7.5 ...
Roger. That's just what we got, 7.6.
Okay.
POO?
8 minutes --
We're in good shape --
- - coming up on 8 minutes.
- - for ... - -
HIGH BIT, 8 minutes.
You don't have an 8-minute mark.
67 feet per second. Go ahead with the ...
Can't beat that. Okay, through with that?
Yes. I like it.
Hold on to the ... below.
Okay. And I'll pull the breakers - think we can ... roll.

Yes.

Got them both?

What?

Got them both?

Yes. ...

Okay, it ...

Going to load the PDI plus 12, right?

Right.

Okay. I'm going to start pitching down to 125.

No PDI plus 12.

I have you right down ... 65 feet per second.

Sounds good.

Okay, the camera is set. And ought to be ready to do the P52.

Yes.

Not going to be much of a drift check.

It - it torques them late enough to ensure that - ... the drift check.

Sure seems like we're going the wrong way.

How much do we got to go to pick it up?

Got to go - oh, half the moon to go, I guess.

Coming down already.

Okay. It's got us 152; it's 151; there's ..., okay? ...
04 05 48 44  LMP   There's 52.
04 05 48 54  CDR   Got 8 minutes ...
04 05 48 59  LMP   Now we can let us take - let it take us there.
04 05 49 03  CDR   No, wait; don't do that.
04 05 49 05  LMP   Why not?
04 05 49 06  CDR   I have to roll.
04 05 49 09  LMP   Yes, that's right.
04 05 49 11  CDR   In 2 more minutes.
04 05 49 32  LMP   Well, I did ... attitude.
04 05 49 37  CDR   Yes, you'll have to roll over; well, I guess I might as well do that.
04 05 49 45  LMP   Where's your watch? Got your stopwatch?
04 05 49 48  CDR   Got it in my pocket.
04 05 50 03  LMP   Well, the ... us over, huh?
04 05 50 06  CDR   ...
04 05 50 16  CDR   And, one thing I'd appreciate if you could - see if you could - find the -
04 05 50 30  LMP   What?
04 05 50 34  CDR   The map.
04 05 50 36  LMP   Yes. Which one do you want? I've got --
04 05 50 37  CDR   ...
04 05 50 40  LMP   That it? Where do you want it?
04 05 50 52  LMP   Trade you that for a piece of gum. There it is.
04 05 50 59  CDR   ...
04 05 51 17  CDR   When do we have to get these? Alright, go on.
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.
Alright, let me - let me do my rain dance with the DSKY here.

Okay.

Got it on?

Now I need a VERB 76. I'm right on in pitch.

You want a VERB 76? Okay, you got it.

Hmm.

How are you doing - you going to be about ready to mark?

Yes.

Say, how about you remembering the number that I read to you; don't have to write it down. Roll right just a little.

Just about ready to mark.

Go ahead.

Oh, this cottonpicking - thought I was.

Give me a ... check.

Ready?

Getting close.

Okay.

Ready?

Yes.

MARK it.

124 19, 124 19. Well, it should have been - 124 00.

Do another one?
04 05 59 06 LMP Yes.
04 05 59 12 CDR Okay. I'm about ready.
04 05 59 21 LMP Tell me when.
04 05 59 31 CDR Ready -
04 05 59 33 CDR MARK it.
04 05 59 34 LMP Okay. 134 17; KEY RELEASE; PROCEED. ... it should have been - 124 01. One more. Getting closer.
04 06 00 18 LMP Ready whenever you are.
04 06 00 29 CDR Stand by. How's our roll?
04 06 00 36 LMP Okay.
04 06 00 43 CDR MARK it.
04 06 00 44 LMP ... - 13; KEY RELEASE; PROCEED. 4 13 - ... it should have been - closer yet.
04 06 01 00 CDR Okay, Mike, we passed the star check. Foxtrot.
04 06 01 04 CMP Very good. ...
04 06 01 16 CDR Very good. Okay? ...
04 06 01 29 LMP Alright, let's go to - pitch to 180, 285, and zero.
04 06 01 47 CDR Okay. We'll ...
04 06 02 11 CDR Cottonpicker just won't stay - try it!
04 06 02 16 LMP Well, wait until we lose that descent stage, man.
04 06 02 19 CDR We'd better take - a - piece of tape; hold that down.
04 06 02 25 LMP How about if you get the bottom in the - get the bottom underneath this cover? That help?
Well, it - it's still not; I've had it in there real good couple of times.

Your hoses were tearing hell out of my board.

Sorry.

You got INVERTER 1 circuit breaker in, right?

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.
04 06 04 18 LMP
ENGINE STOP button was reset?

04 06 04 24 CDR
ENGINE STOP button is START, but it is going to be now.

04 06 04 31 LMP
Alright. Window bars; THROTTLE CONTROL to AUTO.

04 06 04 39 CDR
Okay. THROTTLE CONTROL to AUTO.

04 06 04 42 LMP
Alright, TTCA --

04 06 04 44 CDR
THROTTLE on MINIMUM.

04 06 04 45 LMP
-- ENABLE - ENABLE - THROTTLE in MINIMUM. Okay, in 35 minutes, we'll get the BAT feeds ON and --

04 06 04 56 CDR
That's the wrong time, right?

04 06 04 57 LMP
No, no, no.

04 06 04 59 CDR
...? PDI?

04 06 05 00 LMP
It's - oh - about - probably maybe a second, right here, ... 32. Okay?

04 06 05 09 CDR
Yes, it's about a second off.

04 06 05 13 LMP
If it's fast, I'll stop it; if it isn't, why, forget it.

04 06 05 50 LMP
You want this one over there?

04 06 05 51 CDR
I need this out. Burn in 46 minutes.

04 06 05 57 LMP
You want this one?

04 06 06 00 CDR
Yes. I don't - think - it'll be helpful, but I'll stick it here and pull it out if I need it.

04 06 06 20 LMP
Let's see; we haven't got P20 going yet, have we?

04 06 06 23 CDR
No.

04 06 06 24 LMP
Let's do that. Let's get the RENDEZVOUS RADAR circuit breaker in.
04 06 06 27  CDR  Okay.
04 06 06 34  LMP  IN.  Might look at the DPS.
04 06 06 51  CDR  What do you hear?
04 06 07 00  LMP  ... glycol pumps.
04 06 07 03  CDR  Alright.
04 06 07 10  CDR  Look at that.  Oh, that must have been - ...
04 06 07 20  LMP  Okay, ascent - tank pressure - temperature's up, changed to - I don't know.
04 06 07 28  CDR  DPS's good -
04 06 07 30  LMP  Look at all that RCS we got.
04 06 07 35  CDR  That's more than we've ever had in the simulator, isn't it?
04 06 07 38  LMP  Yes.
04 06 07 51  CDR  Got your camera rigged?
04 06 07 54  LMP  The other circuit breaker? Camera's all set to go.  I hope the others just don't fall out.  Got them both in?
04 06 08 01  CDR  Yes.
04 06 08 17  LMP  Well, let's hope he's in mode 2.
04 06 08 33  LMP  Okay, I'm going to get the ASCENT BATS, ON.  BATTERY 5, ON; looks good.  BATTERY 6, ON; that's good.
04 06 09 08  CDR  Yes, we've lost it.
04 06 09 14  LMP  Well, did it go to mode 2?  That's where I want it to go.
04 06 09 22  CDR  No - I can't tell.
04 06 09 26  LMP  Yes, it's going to mode 2.  Hasn't it.
<table>
<thead>
<tr>
<th>Time</th>
<th>CDR</th>
<th>LMP</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>04 06 09 33</td>
<td>CDR</td>
<td>Yes.</td>
<td></td>
</tr>
<tr>
<td>04 06 09 34</td>
<td>LMP</td>
<td>Yes. There we are. Beautiful.</td>
<td></td>
</tr>
<tr>
<td>04 06 09 38</td>
<td>CDR</td>
<td>Go to AUTO TRACK?</td>
<td></td>
</tr>
<tr>
<td>04 06 09 39</td>
<td>LMP</td>
<td>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)</td>
<td></td>
</tr>
<tr>
<td>04 06 10 01</td>
<td>LMP</td>
<td>Hear that, too, huh?</td>
<td></td>
</tr>
<tr>
<td>04 06 10 06</td>
<td>CDR</td>
<td>Sounds like wind whipping around the trees.</td>
<td></td>
</tr>
<tr>
<td>04 06 10 16</td>
<td>LMP</td>
<td>Okay, AUTO TRACK.</td>
<td></td>
</tr>
<tr>
<td>04 06 10 32</td>
<td>LMP</td>
<td>Okay, we ready to go to P63?</td>
<td></td>
</tr>
<tr>
<td>04 06 10 36</td>
<td>CDR</td>
<td>Yes.</td>
<td></td>
</tr>
<tr>
<td>04 06 11 07</td>
<td>LMP</td>
<td>Okay, get a - get a - Need to compare a T_d time. 09:50. That's right.</td>
<td></td>
</tr>
<tr>
<td>04 06 11 25</td>
<td>CDR</td>
<td>See that Big Dipper there?</td>
<td></td>
</tr>
<tr>
<td>04 06 11 27</td>
<td>LMP</td>
<td>That's a big out of plane, but I don't know which way it is.</td>
<td></td>
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<tr>
<td>04 06 11 33</td>
<td>CDR</td>
<td>I believe minus - but they were expecting it.</td>
<td></td>
</tr>
<tr>
<td>04 06 11 36</td>
<td>LMP</td>
<td>Okay, four -</td>
<td></td>
</tr>
<tr>
<td>04 06 11 38</td>
<td>CDR</td>
<td>That's within 7 ... seconds. Okay?</td>
<td></td>
</tr>
<tr>
<td>04 06 11 53</td>
<td>LMP</td>
<td>Okay. These should not be in AUTO, right?</td>
<td></td>
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<tr>
<td>04 06 11 57</td>
<td>CDR</td>
<td>Yes. Remember that one.</td>
<td></td>
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<tr>
<td>04 06 12 13</td>
<td>LMP</td>
<td>180, 287, 0. Here goes.</td>
<td></td>
</tr>
<tr>
<td>04 06 12 46</td>
<td>CMP</td>
<td>Give me --</td>
<td></td>
</tr>
<tr>
<td>04 06 12 47</td>
<td>CDR</td>
<td>You'll get them before we will.</td>
<td></td>
</tr>
<tr>
<td>04 06 12 50</td>
<td>CMP</td>
<td>Ready to give them a status report? DOI?</td>
<td></td>
</tr>
</tbody>
</table>
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 -
04 06 33 07  CDR  IGNITION. 10 percent.
04 06 33 14  LMP  Just about on time.
04 06 33 18  CDR  You got the OVERRIDEs ON?
04 06 33 21  LMP  OVERRIDE is ON. 24. FLASH. THROTTLE, up.
04 06 33 34  CDR  Good. Okay.
04 06 33 42  LMP  PGNS holding.
04 06 33 59  LMP  Okay, we're reading your relay to us, Mike? I'll leave it in SLEW. Relay it to us. See if they got me now; I got good signal strength on SLEW.
04 06 34 21  LMP  Okay, rate of descent looks good.
04 06 34 27  LMP  Roger. Copy.
04 06 34 44  LMP  Copy.
04 06 34 49  CDR  Okay. Coming up on 2 minutes; going good. AGS's good?
04 06 34 57  LMP  AGS and PGNS agree very closely.
04 06 34 59  CDR  RCS is good; no flag. DPS pressure is good. 1 minute.
04 06 35 11  LMP  30 feet per second. Light's on. Altitude's a little high.
04 06 35 21  CDR  Okay, we want a 10. Let's get - You want to get rid of this radar?
04 06 35 30  LMP  Yes.
04 06 35 31  CDR  To SLEW?
04 06 35 32  LMP  SLEW.
04 06 35 43  LMP  Houston, I'm getting a little fluctuation in the - AC voltage now. Just the meter, maybe, huh?
04 06 36 03  CDR  Okay, we went by the 3-minute point early. A little off.
04 06 36 11 LMP  Rate of descent looks real good. Altitude - right about on.

04 06 36 16 CDR  Our position checks downrange show us to be a little off. AGS - AGS is showing about 2-feet-per-second greater rate of descent.

04 06 36 34 CDR  MARK.

04 06 36 35 CDR  Show us to be about - Stand by. Maybe have to stop that.

04 06 36 41 LMP  Altitude rate looks right down the groove.

04 06 36 44 CDR  Roger. About 2 seconds off - rolling over.

04 06 36 54 CDR  Okay, now watch that signal strength because -

04 06 36 58 LMP  Yes, I think it's going to drop.

04 06 37 01 CDR  Boy, I tell you, this is much harder to do than it was -

04 06 37 09 LMP  Keep it going.

04 06 37 16 LMP  Houston, before we leave you, the ED BATS are GO at 4 minutes.

04 06 37 28 LMP  Roger.

04 06 37 44 CDR  How you look over there? Okay?

04 06 38 02 LMP  Okay. You got good lockon.

04 06 38 05 CDR  We got a lockon?

04 06 38 06 LMP  Yes. Altitude light's out.

04 06 38 08 CDR  Okay.

04 06 38 12 LMP  DELTA-H is minus 2900. We got the earth right out our front window.

04 06 38 20 CDR  Sure enough.
04 06 38 22 LMP Houston, you're looking at our DELTA-H. Program alarm.
04 06 38 29 CDR 1202; 1202.
04 06 38 40 CDR What is it?
04 06 38 42 LMP That's in core ...
04 06 38 46 CDR Give us a reading on the 1202 program alarm.
04 06 38 57 LMP Roger. 330. Okay, looks like about 820. Roger. Copy. 6 foot ...
04 06 39 12 LMP Same alarm and it appears to come up when we have a 16 68 up.
04 06 39 19 CDR Were we - were - was it coming down?
04 06 39 22 LMP Yes, it's coming down beautifully.
04 06 39 26 CDR Roger; it looks good now.
04 06 39 32 LMP THROTTLE, DOWN.
04 06 39 33 CDR THROTTLE, DOWN, on time.
04 06 39 35 LMP You can feel it in here when the throttle's down; better than the simulator.
04 06 39 46 LMP AGS and PGNS look real close.
04 06 39 48 CDR Okay. No flags. RCS is GO; DPS is GO; pressure is - okay.
04 06 40 11 LMP Okay, I'm still on SLEW, so we may tend to lose as we gradually pitch over; let me try AUTO again now, and see what happens. Okay, looks like it's holding.
04 06 40 25 CDR Okay. 07:30 coming up. Should be ...
04 06 40 36 LMP ...
04 06 40 45 CDR And I have the window. I have that - view - out the window - Going to ...
04 06 40 56  CDR  Coming up on 8 minutes.
04 06 41 00  LMP  Could you give us an estimated switchover time, please, Houston?
04 06 41 08  LMP  Okay, 7000, ... Looks good.
04 06 41 16  LMP  Roger.
04 06 41 33  LMP  P64.
04 06 41 40  CDR  ... over. Okay. 5000, 100 feet per second is good, and I'm going to check my attitude control.
04 06 42 01  CDR  Attitude control is good - manual attitude control is good. Okay, 3070.
04 06 42 15  LMP  Roger; understand. Go for landing, 3000 feet. Program alarm - 1201.
04 06 42 22  CDR  1201. Okay. 2050.
04 06 42 29  LMP  2000 feet; 2000 feet.
04 06 42 30  CDR  Give me an LPD.
04 06 42 32  LMP  Into the AGS, 47 degrees.
04 06 42 33  CDR  Give me an LPD.
04 06 42 35  LMP  47 degrees.
04 06 42 37  CDR  47.
04 06 42 38  CDR  That's not a bad-looking area. Okay.
04 06 42 51  CDR  1030 is good.
04 06 42 55  CDR  What's LPD?
04 06 42 58  LMP  35 degrees, 35 degrees; 750, ... coming down to 23.
04 06 43 05  CDR  Okay.
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.
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.
04 06 46 55 CDR ... vent.
04 06 48 12 CMP Houston, how do you read Columbia on the high gain?
04 08 32 56 LMP Okay, Houston. On DESCENT 1, the fuel and oxidizer are reading 10 psi; on DESCENT 2, fuel is reading 10 psi; oxidizer, 11 psi.
04 08 34 02 CDR Okay, going back to OFF.
04 08 34 40 CDR ... is OPEN. Yes, ...
04 08 34 46 LMP Alright, we need the -
04 08 34 52 LMP Houston, Tranquility Base is ready to go through the powerdown and terminate the simulated countdown.
04 08 35 08 CDR Hope he is, too.
04 08 35 10 LMP OPEN.
04 08 35 13 CDR Okay, the operations HEATER circuit breaker is OPEN.
04 08 35 21 LMP Roger. It's in progress. Anytime, take your helmet off.
04 08 35 45 LMP Roger. Couldn't have had better treatment from all of you back there.
04 08 40 55 CMP Houston, Columbia. Copy NOUN 49?
04 08 41 02 CMP Roger.
04 08 41 44 CMP Yes, stand by 1, Charlie, for the next ...
04 08 41 56 CMP Well, the area looks smooth, but I was unable to see them. I just picked out a distinguishable crater nearby and marked on it.
04 08 42 12 CMP It looks like a nice area, though.
04 08 42 46 CMP Houston, Columbia. I say again: I did not see them. AUTO optics pointed at a spot very close to the coordinates which you gave me, so I picked
out a tiny crater in that area and marked on it, so that I'll be able to have repeatable data, but I was still unable to see them.

**04 10 36 14** CMP

Houston, Columbia. I'm coming up on my time for the first pass when I may be able to see the LM. Do you have any topographical cue that might help me out here on - AUTO optics is tracking between two craters. One of them, as the LM sees it, would be long at 11 o'clock; the other would be short and behind him at 5 o'clock. They're great big old craters - depressions.

**04 10 38 40** CMP

Roger, Houston. Columbia ... up. I kept my eyes glued to the sextant that time, hoping I'd get a flash of reflected light off the IM, but I wasn't able to see any of my scan areas that you suggested.

**04 10 39 17** CMP

It's going past now, Bruce, but I scanned that area that you are talking about very closely, and no, I did not see them.

**04 10 40 26** CMP

Go ahead.

**04 10 40 57** CMP

Stand by 1.

**04 10 49 03** CMP

Houston, Columbia. Over.

**04 10 49 21** CMP

Houston, Columbia. Over.

**04 10 50 09** CMP

Houston, Columbia. Over.

**04 10 53 21** CMP

Okay.

**04 11 05 13** CMP

Houston, Columbia on the high gain.

**04 11 05 23** CMP

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

**04 11 05 39** CMP

Ready to copy.

**04 13 19 44** CMP

Columbia.

**04 14 08 54** CMP

Houston, Columbia on the high gain. Over.

**04 14 09 01** CMP

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

**04 15 18 29** CMP

Columbia. Roger.
04 15 18 49 CMP Negative that.
04 16 05 58 CMP Houston, Columbia on ... How do you read?
04 16 06 10 CMP Roger; Columbia OMNI Charlie. How do you read?
04 16 06 34 CMP Hallelujah.
04 16 06 57 CMP Roger, understand. You want a option 1 - P52, option 1?
04 16 09 09 CMP P52.
04 16 14 51 CMP Roger, Houston. Columbia's reading you.
04 16 15 20 CMP Roger. Stand by.
04 16 15 46 CMP Ready to copy.
04 16 17 37 CMP Houston, Columbia.
04 16 18 07 CMP Negative, Bruce. Just give me your latitude - longitude over 2, altitude, and the grid squares. Never mind the other; you're broken up.
04 16 18 28 CMP Well, that is, if you have the new information; otherwise, I'll just use the old numbers.
04 16 18 37 CMP Okay.
04 16 22 17 CMP Houston, Columbia. You got the new coordinates?
04 16 22 31 CMP Roger. Have you got the new coordinates for me?
04 16 23 13 CMP Roger. Thank you.
04 16 23 43 CMP Okay.
04 16 23 56 CMP Okay. I read back plus 00692, plus 11713, and minus 00144. And you have a grid square for me?
04 16 24 36 CMP Kilo 0.9 and 6.3. Thank you. One of these grid squares is about as much as you can scan on a single pass.
04 16 25 38 CMP Roger.
Okay.

Houston, Columbia ...

Roger. I can't see them.

Roger. ...

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.

Roger. How's the fuel coming?

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.
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.
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.
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?
Right.

You know, I didn't see a lot of dust in the cockpit, did you?

No, there was a fair amount. What did you get, 283?

Yes.

... 

Okay.

No. We'll wait until CDH.

Okay, thank you.

Okay.

No, I didn't; go ahead, Mike.

I think we are now, finally, and I think I have you in sight.

We have 51 5.

Well, the ground's got 51 5, and we got 51 5. Yes. First time we've ever agreed on anything.

Want these ... first?

Not yet.

I don't know why.

I had to turn my S-band off so I could hear him - my S-band switch on the audio panel. Woo-woo!

Yes, that works good.

Not at this point, no.

Okay.

... Hey, Mike, how do you read me?
Okay, let's go to B DATA on your command.

Eagle, Columbia.

Loud and clear.

Affirmative; we're at the burn attitude, too.

Eagle, Columbia. When you get a chance, could you give me the - the CSI P76 pad and your NOUN 84 and your NOUN 33?

Yes, we'll do that in a minute.

Alright.

Okay, Mike, you want the burn time and the NOUN 81; is that right?

Okay, the burn time is 125:19:34.7, and the burn is 51.5, zero, and zero.

Okay, I understand. Plus 51.5, zeros, and zeros, and you're using 125:19:34.70. Thank you kindly.

I'm in maneuver attitude, all set to burn if necessary. I've got about 45 minutes to T - 45 seconds to Tg.

Okay.

We're burning, Mike.

Burn complete, Mike.

Good show.

Okay, Mike, our CDH time is 126:17:45.58. Over.

Roger; copy. CDH, 126:17:45.58.

Affirmative.

Eagle, Columbia. I have you in an orbit 49.5 by 46.1.

Okay, thank you.
Day 6

Eagle, Columbia. I'd like to go back to VHF RANGING configuration, please, on your mark.

Roger. On my mark -

MARK, VHF RANGING.

... Well, which way did I go?

... out of plane.

What?

Did you hear that?

Why you don't hear these 3 - 3500-pound rocket engines when you're sitting on them, I'll never know.

Yes.

... structure somehow.

3.5, Neil.

Woo-woos is on VHF B -

... B?

Not on A.

(Laughter) That's your story, huh?

That's rugged country.

Yes, that perigee we're on ...

... alright, isn't it?

I got 4 feet forward and I got back 7 ...

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.
I sure do; it's been on - yes, we do - it's been on all the time.

We should see the tracking light now - That's it - Doesn't look ... but it's not - turned off.

Okay, let's try and get a Y-dot, or an R-dot, at 30 seconds.

It'll be the first time we've ever done it.

No, let me get COMM.

We're really going to be crying.

[Simulated crying]

My - top thruster over here has got a lot of brown holes in it - in the exit nozzle.

See it?

Yes.

You know, these thrusters aren't used much over here. Well, maybe ... or something.

See it?

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 T₁g. 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?
05 07 04 35  CDR  Burn's complete. Did you read? Burn's complete.
05 07 04 40  CMP  Thank you.
05 07 04 43  CC  Eagle, Houston. Aft OMNI, LOW BIT RATE, and we'll see you at 127 plus 51.
05 07 05 07  LMP  Okay, ... ... 5, huh?
05 07 06 10  CDR  Well - say when ... Oh, wait a minute.
05 07 06 50  LMP  Chart at 26/7 forward for -
05 07 06 55  CDR  Pretty reasonable.
05 07 06 59  LMP  AGS had these residuals after its completion after the burn.
05 07 07 39  CDR  I can't see you, Michael.
05 07 07 44  CMP  ... moving in at ...  
05 07 07 50  CDR  Okay. I got good radar; I just can't see you.
05 07 08 03  CMP  ...
05 07 08 49  LMP  Do you think that pressure dropped?
05 07 08 51  CDR  Yes.
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.

...

...

Okay.

(Yawn)

...

Yes, so do we.

A hundred and what?

...

Okay, NOUN 81, minus 0, plus 0.4, plus 0.9.

And now, plus 0.4, plus 0.9. ...
And 15 minutes after TPI, I've got --

... 

M-l.

... 

... your burn's a little late.

... be burning -- ...

Okay, ... the ... on? There it is.

Neil, I guarantee you that the burn is precise, okay?

... 

Good.

... good burn ...

No, it's not going to be late. Maybe 5 seconds.

Burn complete.

Thank you.

Well, it's all over but the docking.

Check the start out there.

Okay.

... 

You still got him?

Yes. I probably won't when the sun gets in my telescope.

... ... hold the ...

Now I can't see --

The what?

CONFIDENTIAL
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.
Alright.
Okay, ... have a plastic one and a ...
Bring the ... back.
I think we'll make it (laughter).
Don't tell that to poor ..., though (laughter).

...
We'll see you at ...
Okay.
One of those two bright spots is bound to be Mike.
How about picking the closest one?
Good idea.
... this light?
Is that alright?
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 ...

...
Okay.
...
Right - that's ...
12 on here, right?
Not exactly.
Not exactly?
You're a little less. You're 10 seconds less in ...

About that ...
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 track-
ing 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  ...
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.
Okay. Don't ... other spacecraft.

No, I'm not going to lose you, brother.

What have you got for ...? ... I have 6.8 and 9 miles, ... out. Oh, that checks.

Got ... up? I thought I made it pretty clear.

Not as sporty a ... as we thought, huh?

That wasn't - bad at all; the alignment was - pretty dicey.

Yes, sir.

That was just luck (laughter).

I hope you ...

I'll be glad to get to the ...

Yes, but I hate to ...; will you get ...?

Okay.

Oh, it'll come off, I guess - ...

These screws here --

Alright, there's a couple of bolts --

-- these screws here might do it.

-- there's a couple of bolts down there that have come loose - if I remember. ... I'll get them.

I'm slowly closing at 32 feet per second and a mile and a half.

Okay, I've got a mile and a half and 32-1/2.

...

Take ...

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.
That's good. What ... are you in?

Hope we're not going to get a pitch straight down.

We've got a - pitchdown and then a yaw to do - ...

... 

Looks good.

I'm sure you're going to get ..., I'll tell you that.

It flies good, though.

...?

Okay, now, if I pitch over, I'm going to be looking right into the sun.

... 

Hope you know how to roll.

Yes, I do. I ...

You want to end up with that window - opposite his right window so you don't want to roll right. Right?

Yes.

The only trouble is, it's towards - towards 90, isn't it?

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 -
05 07 51 29  CDR  I'll be looking into his left window when I pitch up.
05 07 51 32  LMP  I don't think so. If you did it right now you'd --
05 07 51 36  CMP  ... I got the earth coming up already; it's fantastic!
05 07 51 40  CDR  Okay, you got me.
05 07 52 00  CC   Eagle and Columbia, Houston. Standing by.
05 07 52 05  CDR  Roger; we're stationkeeping.
05 07 52 08  CC   Roger.
05 07 52 24  LMP  Pitch up ... pass right up just a little, you got a better view - bottom side ... - move back.
05 07 52 45  CMP  ... - that's right.
05 07 53 08  CDR  Okay. I'm getting about into the right attitude, I think. ...  
05 07 53 18  LMP  Yes.
05 07 53 21  CDR  That roll's pretty far; I don't know just how much - so that's - Oh, it's going to go BLOCK!
05 07 53 28  LMP  That's it - going to AGS?
05 07 53 32  CDR  Yes, ... ATT DEADBAND.
05 07 54 11  CDR  Okay, Mike, I'll get - try to get in position here, and then you got it.
05 07 54 18  CMP  Okay.
05 07 54 37  CDR  How does the roll attitude look?
05 07 54 41  CMP  ... 
05 07 54 47  CDR  Let's see how the DSKY thinks it looks.
05 07 54 52  CMP  Have you stopped rolling yet?
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 ...?

Yes. Right there. Okay, ... l -

Well, we might need to at least have a platform ...

Yes.

Okay, now, Neil, when you feel us contact, you're going to turn ... seconds, is that right?

That's right.

Okay, Buzz.

We got a platform to make.

Okay.

I'm not going to do a thing, Mike; I'm just letting her hold in ATTITUDE HOLD.

Okay.

I think we ought to be at 4 JETS for this, ...

HOLD.

...

He's about 15 feet out now.

Okay, I'd better try out the radar.

Don't you want to beef up that radar?

Yes.
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.
05 09 06 18 LMP Okay.
05 09 06 32 LMP Use what?
05 09 06 34 CDR Use lithium hydroxide.
05 09 07 06 CDR That thing still doesn't fit. No, they didn't fix it.
05 09 07 10 LMP Huh?
05 09 07 11 CDR They didn't fix it. I had thought somebody had mentioned it, at least.
05 09 07 19 LMP ...
05 09 07 20 CDR What?
05 09 07 21 LMP ...
05 09 07 24 CDR Get some tape.
05 09 07 26 LMP Yes.
05 09 07 29 CDR Still got some here?
05 09 07 30 LMP Yes.
05 09 07 31 CMP ...
05 09 07 35 CDR Okay.
05 09 08 54 CDR Do you want to vacuum off any of those - those ... spills or anything?
05 09 09 07 LMP Well, that's ...
05 09 09 22 CDR Oh, the tape, I guess.
05 09 09 25 LMP Want tape?
05 09 09 26 CDR Yes, please.
05 09 09 27 LMP Here you are.
05 09 10 35 LMP About how many pictures did you take with - the closeup camera?
I don't know; 30 maybe, 40?

I hope I took the thing apart correctly.

Push the cutter bar down first?

Yes.

It's all right, then.

How are you doing?

Can't hear you.

(Laughter) Well, that stuff can't ... tell; think of Bobby ...

Say, you did get a couple of hard ones in there, didn't you?

Yes.

I guess we leave this here or do you want to take it up?

I'd leave that here.

That might be a little hard to explain.

Yes.

Hey, Neil?

Yes?

...

Okay.

... get rid of this ...

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 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 ...
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.

How about the data bag?

No, I need this bag.

Well, I've got one here. I'll go try to get some more - when I go over. Okay?

Okay. Give me the vacuum tube.

Let me get my back to you first.

Need a PPK.

Huh? I guess they're in here. PPK's?

I guess they're over here.

..., you know? (Laughter)

Get your circuit breakers pushed, AUDIO control circuit breakers?

...

How are you doing?

It's filthy.

Does all this stuff come in here?

Well, I guess that ought to do it.

Okay.

...

Yes.

...

Just a minute.

Say, I need some of those data books.
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 - -
-- Buzz. Okay, that one, just turn it to - turn it to position 1 - extreme left; that one. There you go. Thank you.

I thought you were going to be doing VHF RANGING on the darn thing because we had it set up for - VHF ...

I don't know where ... other than that.

That was to --

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.

Huh?

Oh, no.

So, that's just the contingency.

No, negative.

That's the contingency.

We move the drogue there. ...

We've got to reach down and grab that extension handle and all that good stuff.

That was alright, we understand.

Yes.

Damn! My ears hurt from wearing this thing.

How are the earpieces - inside ...

...

...

Yes, I hate those damn ...
Yes, they're not...

Yes. I believe - Did you hear any noise during - you didn't hear any noise during descent, did you?

...

...

How about during lift-off?

...

How was lift-off? How did lift-off feel?

Well, there was a little - little blast - then we started moving; then we could see all those...

... 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 --

CONFIDENTIAL
Day 6

05 11 05 09 LMP  -- what stuck to the spacecraft, I think you can see afterwards --

05 11 05 12 CMP  What do you think it is from the geology stand-

05 11 05 19 CDR  ... point, is it basalt dust?

05 11 05 21 CMP  Well, do the rocks - do the rocks all look the

05 11 05 28 LMP  same? They're different - good, great; I'm glad
to hear it.

05 11 05 42 LMP  There's really a tremendous -

05 11 05 46 CMP  Little sparkly stuff; quite a bit of it all over.

05 11 05 48 MS  I'll be damned; I'm glad - I'm glad it wasn't

05 11 05 50 LMP  just --

05 11 05 59 CMP  ... Luckily, you were able to get a little bit of
everything. I mean, were the rocks - I mean, how
did you - did you go around and - just pick up
rocks, put them in - in -

05 11 06 08 LMP  We were kind of rushed, if that's what you mean.

05 11 06 15 CMP  Yes.

05 11 06 24 CDR  ...

05 11 06 25 CMP  Great, great. Yes, it's - beautiful. Man, that's

05 11 06 38 LMP  beautiful. It doesn't make a dip whether ... and

05 11 06 40 CMP  all that, I mean you know, they mapped the area and

05 11 06 41 LMP  eventually, it does -

05 11 06 41 LMP  you can see those -...
05 11 06 54 CMP That's great; fantastic! That'll keep those geologists jumping for years.

05 11 07 00 LMP Yes, you got to keep ... No, that's right, you got a 6-foot pole, you just stick ... --

05 11 07 07 CMP Sort of like wet sand --

05 11 07 08 LMP -- about that far.

05 11 07 09 CMP Is that right? I don't know. I'm inclined to ...

05 11 07 17 CDR ... Is this yours?

05 11 07 59 CMP You yawed right 13 degrees? What's nominal?

05 11 08 05 CDR Yaw left 13 degrees.

05 11 08 08 CMP Ah so, ah so.

05 11 08 32 CDR I guess the main thing on this stowage is to make sure it's reasonable for the g's we'll get during TEI and sometime on the way home we can get everything all squared away for ... .

05 11 08 46 CMP No, I'm in no rush. Go ahead - go ahead and get everything all packed away; I hate to have - a couple of suits out. If you want to air it for a while, go ahead and get the hose to it, and - I'm in no rush. I'll take this thing off after you guys are done there.

05 11 09 20 CDR ...

05 11 09 30 CMP Yes. Is that right?

05 11 09 44 CMP You finally got it level, huh? What was that thing that you said it was supposed to be concave but it was convex? 

05 11 09 50 LMP ...

05 11 09 53 CMP Yes, yes.

05 11 10 01 LMP ... looking down there ... sure looked like it was convex ... Neil walked back a little later and it was right smack in the middle --
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 ...?

It's that dark battleship gray like?

When you looked down sun, it's very tan, very tan.

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.

... 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?

CONFIDENTIAL
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) ...

(Yawn)

... 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?
05 11 35 29 CDR  What's your altitude?
05 11 35 34 CMP  ...
05 11 35 52 CDR  I guess we could put — to ...
05 11 37 25 LMP  Hey, Neil, I think this — this does have something ...
05 11 37 30 CDR  Alright.
05 11 37 35 LMP  ... Now it's on the other side. No, down, down ...
05 11 39 18 LMP  What did you have on ...?
05 11 39 24 CMP  No, that side. Yes, it was down to 3. He called 30 seconds at one time.
05 11 39 32 LMP  Yes, ...
05 11 39 38 CMP  Yes, he called 60 seconds; then I heard him call 30 seconds.
05 11 40 15 CMP  Yes.
05 11 40 16 LMP  ... I got it, thank you.
05 11 40 21 CMP  Well, it's held under that forward-velocity unit.
05 11 40 46 CMP  How's that?
05 11 41 05 CMP  With the ..., I don't see how you can —
05 11 41 19 CDR  Leaving on your ... in here?
05 11 41 26 CMP  I think — you had that same pair on all the time.
05 11 41 57 CDR  Is that the ... — sitting there?
05 11 42 05 CMP  Yes, here it is.
05 11 42 06 CDR  Let me put it down here. Bring it on down. Over here. Put them all in one place.
05 11 42 30 CDR  You ready for your underwear? Mike — you ready for your underwear? You ready for your underwear?
05 11 42 43 CMP  Just a minute; yes.
05 11 42 54 LMP  ... - put our - LCG.
05 11 42 59 CDR  Yes.
05 11 43 10 CMP  Somehow we'll figure a way to ...
05 11 45 22 CDR  2 feet per second.
05 11 45 46 LMP  You didn't maintain that 3-1/2 feet per second
down there.
05 11 45 51 CDR  (Laughing)
05 11 45 56 LMP  Well, I hope - I hope they have the data that shows
just what we did have at contact when they can get
photographs ... all the film we got.
05 11 46 14 CDR  Yes.
05 11 46 19 LMP  Well, I really couldn't put the ... no place, not
that I'm sure of it, but my light came on, why,
... hit.
05 11 47 18 CDR  Yes, that's sure - the way that thing was working
- the way that thing was working and stayed locked
on all the way down - Gees, it was a beautiful
thing.
05 11 47 44 CDR  You mean you didn't ...?
05 11 47 53 LMP  Getting all the damn alarms.
05 11 48 06 LMP  Boy, I thought for a while there that some of
those might get a little ... - ... I'd reset the
program alarm in time for a ... out of there.
05 12 59 10 CMP  Will that one do? ...
05 12 59 48 LMP  Are you staying in this inertial attitude? Let's
just leave it in REACQ then; it works just like
a charm.
05 12 59 55 CMP  Yes, that's right.
05 13 00 09 CDR  How about that?
05 13 00 55  CDR  Beautiful.
05 13 00 59  CMP  405 and 404 - What's the matter with it? (Laughter)
05 13 01 02  LMP  403 I think we ...
05 13 01 09  CMP  ... alignment, oops, I got 404 again.
05 13 01 55  CMP  How about that, wise asses! Huh?
05 13 01 58  LMP  You had a - you had to work though, didn't you? ...
05 13 03 08  CMP  ... O$_2$ fuel cell's ...
05 13 03 17  CDR  This is not dumping.
05 13 03 19  CMP  I figured that.
05 13 03 25  CDR  Did you try the other line?
05 13 03 26  CMP  Well - no, I haven't tried a whole number of alternatives. In fact, number 1 is not dumping. My guess would be that it's something to do with this connection in the UCD or something like that. When you try to dump your ... regular urine bag, ... It's so goddam smelly, I hate to grab it and dick around with it, but I guess I got to.
05 13 03 47  CDR  Not entirely. I think I'd rather stick around ...
05 13 04 40  CDR  ...
05 13 05 36  LMP  How long does it take to warm up this thing? 3 hours?
05 13 05 38  CMP  ...
05 13 05 46  CDR  What state vector is in the LM slot? The LM?
05 13 05 54  LMP  ... minus a few feet per second. ...
05 13 05 59  CDR  Well, we got something in the LM slot ...
05 13 06 03  CMP  Well, that's just an old vectors, because I never did VERB 66, I don't think, after ...
Day 6

05 13 06 32 LMP We got 22 feet per second. Almost have to be IM - previous to the SEP burn.

05 13 10 11 CDR Well, when it gets to be light, we got to ...

05 13 10 19 LMP Well, we probably ought to - ... TPI.

05 13 10 27 CMP Yes, the maneuver ... right amount of ...

05 13 11 24 CDR ... give me a waste bag. ...

05 13 11 31 CMP Yes, just ... a lot ... there.

05 13 12 17 CMP It was back here.

05 13 12 19 LMP Yes.

05 13 13 03 CMP Who took the roll of tape?

05 13 13 08 CDR Isn't it in its place? Closet?

05 13 13 10 CMP No, no, it's not in there. It doesn't have that closet anymore. The last I saw it, it was up on the MDC. I gave it - I handed it to one of you guys to -

05 13 13 17 LMP Yes, I stuck it someplace.

05 13 13 25 CMP Let's invent a new home for it because that old home is full of that smelly old urine bag.

05 13 13 34 CDR The floodlight isn't - hasn't even made the bottom of the package warm yet, fellows.

05 13 13 39 LMP Well, when it goes up there, we'll have to put it up here.

05 13 17 10 CMP I got the tape - right underneath your couch. Okay?

05 13 17 19 LMP Alright.

05 13 17 25 CMP Okay, we need a new home for the tape. Anybody got any good suggestions?

05 13 17 36 CMP Okay?

05 13 17 39 LMP Alright.
Day 6

That was quite a wild gyration for docking.
It was.
Son-of-a-bitching --
You did a pretty good ...
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.

...  
No, I would.
...
No, no.
...
... No sooner than I fired that goddamned bottle, than wow; and away we went.
...
No - they're way down so, I don't know - just ...
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 ...
...
... I mean later on ... all those ...
Look at this.
Yes.
Figured nobody could see where we were.  ...
Hey, did we decide the ... back?
No, the data should go to the log ... The only good thing there you can say about it is ...

... you guys. ... love them ...

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.

At least, we can forget them until the debriefing.

Yes (laughter).

...

This thing ... make a great ...

Picked up the CSM problem.

I've never thought about it.

...

No.

All at once.

None of them.

Yes.

... long time.

It's ...?

You got something ...?

Yes. Yes, sir. Purring across the deep. Okay. Look at that.

Yes. We can get VERB 64 before we come over the hill and see what looks good.

Okay. LOS.

Okay. I'm ready to proceed now.
Day 6

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 annoy-ing - 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?
05 15 00 30  CMP  What I'm saying is, on the 30 degree, I have both panes of glass --

05 15 00 34  IMP  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  IMP  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 T_g. 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?
(Laughter) Yes.

Oh, shit. ... yaw out 1.4 degrees. Why in the hell didn't I do that? Read that number wrong.

Yes, it should have been 1.4 degrees yaw.

That "1" gets moved over so far.

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.

Okay, we're there, Neil; by the time you can get down there and get your eyeball out the window - -

Hey, what did you do with those numbers again?

Oh, we'll crank them in the computer.

Oh, I got them.

Questioning the accuracy of the computer?

...

Okay, you satisfied with that?

ENTER.

Give me the numbers.

1519, CMC OPTICS ZERO, OFF. VERB 41, NOUN 91.

You mean after I went to all this work of cranking those numbers in you're going to drive back to zero?

We got PROGRAM ALARM and an OPERATOR ERROR.

(Laughter)

Christ. Give me the numbers, 1519 and what?
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 T\textsubscript{ig}. 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.
05 15 08 44  CMP  Okay, that's a good one. One - stand by l, 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.
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 $T_{ig}$.
05 15 12 55 CMP  Alright.
05 15 13 10 CDR  It's hot in here, isn't it?
05 15 13 17 LMP  ... boiling any water.
05 15 13 21 CDR  You do it all?
05 15 13 22 LMP  No. It's not too hot, it's 65.
05 15 13 31 CMP  Those temperatures are deceptive. I don't know where they measure it, but the cold point is -
05 15 13 36 CDR  Okay. Sunrise, now 10 minutes prior to $T_{ig}$; I should have the horizon on the 10-degree line, huh?
05 15 13 43 CMP  No, 10 degrees - 2 minutes.
05 15 13 45  CDR  2 minutes; that's more like it, there.
05 15 14 00  CMP  ... this COAS as far as steering and everything goes, it's hopeless.
05 15 14 09  CDR  ...
05 15 14 12  CMP  I'm graphically reminded of it at this moment. Yes. I see a horizon. It looks like we are going forward (laughter).
05 15 14 26  CDR  Shades of Gemini.
05 15 14 29  CMP  It is most important that we be going forward (laughter).
05 15 14 40  CMP  There's only one really bad mistake you can make there.
05 15 14 50  LMP  Shades of Gemini retrofire, are you sure we're - (laughter) - No, let's see - the motors point this way and the gases escape that way, therefore imparting a thrust that-a-way.
05 15 15 03  CDR  Yes, horizon looks good.
05 15 15 06  LMP  Okay, we got 8-1/2 to $T_i$.g.
05 15 15 28  CMP  Somewhere along the line, I think I'll trim this maneuver just for the hell of it. Would this be a good time to do it, Buzz, at 8 minutes prior? You don't care when I do it, do you?
05 15 15 35  LMP  No, it probably would be after we - when the gimbals are out.
05 15 15 38  CMP  Oh, yes, alright. Okay.
05 15 15 47  CDR  Beautiful looking horizon, it's hard to describe.
05 15 15 50  LMP  We can see it if we look through that thing you have.
05 15 15 53  CMP  Where's ...?
05 15 15 55  LMP  Here or here? God, it has an eerie look to it. It's not a horizon, it's just a band.
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.
Ready for the bus ties.
Yes, sir. Whenever you are; it's about 6 minutes.
... ON, verified.
Okay.
..., ON. ... and a half.
Alright.
Okay. TVC SERVO POWER 1 to AC1.
1 to AC1.
2 to AC2.
2 to AC2.
05 15 17 34 CDR TRANSLATIONAL CONTROL POWER, ON.
05 15 17 36 CMP ON.
05 15 17 38 CDR ROTATION CONTROL POWER, NORMAL, number 2, AC.
05 15 17 41 CMP AC.
05 15 17 44 CDR Arm ROTATION CONTROLLER, number 2.
05 15 17 46 CMP ARMED. So far, so good.
05 15 17 59 CDR Okay. When do you want the gimbal motors on?
05 15 18 01 CMP Oh, at about 5-1/2 minutes.
05 15 18 04 CDR Okay, that's right now.
05 15 18 05 CMP Right now?
05 15 18 06 CDR Yes.
05 15 18 07 CMP Okay.
05 15 18 08 CDR Here comes PITCH 1, ready?
05 15 18 09 CMP No.
05 15 18 10 CDR Wait a minute. Okay. Go.
05 15 18 11 CMP PITCH 1.
05 15 18 12 CDR PITCH 1 -
05 15 18 13 CDR MARK it.
05 15 18 15 CMP Got it.
05 15 18 16 CDR YAW 1 -
05 15 18 17 CDR MARK it.
05 15 18 18 CMP Got it.
05 15 18 19 CDR Okay. TRANSLATION CONTROLLER, clockwise.
05 15 18 22 CMP Clockwise.
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.
Alright. ... we're coming up on ... out to your right.

Okay.

Okay, verify MTVC.

Verified.

TRANSLATION CONTROLLER, NEUTRAL.

NEUTRAL.

GPI return to zero, zero.

It does.

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

AC/DC.

SPACECRAFT CONTROL, CMC.

CMC.

Trim.

We did.

Okay. EMAG MODE, three, to ATT 1/RATE 2.

ATT 1/RATE 2.

ENTER.

ENTER.

Verify CMC.

CMC verified; AUTO verified.

Proceed.

Okay, for the GIMBAL DRIVE. Up, down, zero. Up, down, zero. Okay, standing by for P-AX, OFF, and the Y-AX, OFF -
05 15 20 19 CDR  MARK it.
05 15 20 21 CDR  Good trim.
05 15 20 23 LMP  ROTATIONAL CONTROL POWER, DIRECT, two, MAIN A/MAIN B.
05 15 20 26 CMP  MAIN A/MAIN B.
05 15 20 28 LMP  SPS HELIUM VALVES, two of them, verified AUTO; LIMIT CYCLE, OFF.
05 15 20 34 CMP  Okay, LIMIT CYCLE's OFF.
05 15 20 36 LMP  FDAI SCALE, 50/15.
05 15 20 38 CMP  50/15.
05 15 20 42 LMP  Okay, wait for 2 minutes for DELTA-V THRUST A.
05 15 20 46 CDR  2 minutes to get our horizon check at 10 degrees.
05 15 20 48 LMP  Yes, and - sneaking up on there, looks pretty darn good. Looks like we're darn near right.
05 15 21 10 CDR  Just about midnight in Houston town.
05 15 21 15 CMP  Yes.
05 15 21 16 LMP  Okay, coming up on 2 minutes, and this damn horizon check is going to be, would you believe, perfect?
05 15 21 23 CDR  I hope so.
05 15 21 24 LMP  Fantastic. First time we ever got a perfect horizon check. Spent too many hours in the simulator looking for an unreal horizon. Alright, horizon check passes.
05 15 21 37 CMP  Beautiful.
05 15 21 38 LMP  2 minutes --
05 15 21 39 CDR  DELTA-V THRUST A --
05 15 21 40 CMP  NORMAL.
05 15 21 41 CDR — DELTA-V —
05 15 21 42 LMP TRANSLATION CONTROLLER, ARMED.
05 15 21 43 CDR — okay, DELTA-V THRUST A, NORMAL; stand by for a malfunction - it's not there. Very good.
05 15 21 49 CMP Probably get the sun in your window on that burn.
05 15 21 51 CDR Yes, I believe it.
05 15 21 52 CMP The sun - -
05 15 21 53 LMP ROTATIONAL HAND CONTROLLER, number 2, ARMED.
05 15 21 58 CMP ROTATIONAL HAND CONTROLLER, number 2, is ARMED.
05 15 22 01 CDR Alright.
05 15 22 04 CMP Ullage is going to be 16 seconds at 2 JETS.
05 15 22 07 LMP TAPE RECORDER is going to COMMAND RESET on the HIGH BIT RATE.
05 15 22 25 CMP Got to go from STANDBY to NORMAL.
05 15 22 28 LMP I'll do that in 35 seconds.
05 15 22 29 CDR Ullage is 16 seconds, 2 JETS.
05 15 22 30 CMP 16 seconds, 2 JETS, confirmed.
05 15 22 40 CMP Coming up on 1 minute —
05 15 22 42 CMP MARK it.
05 15 23 03 CMP Okay, stand by for 35 seconds.
05 15 23 07 CMP MARK it -
05 15 23 08 CMP DSKY blanks; EMS is in NORMAL.
05 15 23 13 LMP Check.
05 15 23 17 CMP Coming up on 15 seconds.
05 15 23 18 CDR Okay, I'll get the 99.
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 ...
Should I be going ...?

Follow the needle; follow the needle ... Take it off. Okay. Looking good.

This was ... --

... How's that nitrogen pressure? Okay?

Yes.

Good.

... pressures are GO.

2 minutes -

MARK it -

Hits the end of that roll deadband, it really comes crisply back.

Okay, chamber pressure's falling off a little bit; now it's going back up; chamber pressure's oscillating just a tad.

10 seconds left, ... --

We don't care about the chamber pressure, ... watch yourself for - brace yourself - Standing by for ENGINE, OFF.

It should be shutdown now.

Okay?

SHUTDOWN. 4 -

... going to gray and barber pole.

Okay?

Okay.

Let's look at what we got. DELTA-V THRUST A and B are OFF --
A and B are OFF.

-- SPS valves, CLOSED?

Okay.

Stand by for the GIMBAL MOTORS.

Okay.

PITCH 1, OFF.

YAW 1, OFF.

Got it.

PITCH 2, OFF.

Got it.

YAW 2, OFF.

Got it. TVC SERVO POWER 1 and 2 are OFF?

OFF, OFF.

MAIN BUS TIE's coming ON - okay.

Proced.

Beautiful.

X and - 0.2.

X and Z, 0.2.

X and Z, good.

F. Okay, and Z is down. Okay, then - you want to record those - five balls --

Let me record them --

-- 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.
Okay, the residuals were 0.1, 3.9, and point --

Beautiful burn; SPS, I love you; you are a jewel! Whoosh!

Alright - EMS FUNCTION, OFF.

EMS FUNCTION --

EMS MODE to STANDBY.

STANDBY.

EMAG MODE, three, to RATE 2. DEADBAND, MAX --

Three to RATE 2; DEADBAND, MAX --

... OFF, ... OFF --

Got the burn time to be about 02:30. You in BIT RATE LOW?

02:30 or 02:31 --

Okay. Let's go. ROTATIONAL CONTROL POWER, DIRECT, two of them, OFF?

OFF, OFF. Good show.

We want to pitch over, I guess. Don't know if it matters much which way.

Oh, probably - up will be the best --

Pitch up.

-- to keep the moon in sight.

Alright, is that ROTATIONAL CONTROL POWER, DIRECT, two of them, OFF?

Yes, I do.

Circuit breakers - SPS PITCH 1, PITCH 2, YAW 1, YAW 2, OPEN?

They're open.
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, PO0? To get the HIGH GAIN?
05 15 29 11  CDR  We want - Yes, POO's good - and we want a VERB 48.
05 15 29 16  LMP  Yes. Get in PO0 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 PO0, 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.
05 15 29 58 CMP  -- RCS monitors checked -- (Laughter) Okay, here comes Buzz's baby -- VERB 83 -- de-dum-de-dum-de-dum. Operator error (laughter).

05 15 30 08 LMP  ... you don't know how to do it.

05 15 30 09 CMP  (Laughter)

05 15 30 13 LMP  Look at that, would you? Look at that.

05 15 30 14 CMP  Isn't that beautiful?

05 15 30 15 CDR  Pretty good.

05 15 30 16 CMP  A thing of beauty is a joy forever.

05 15 30 22 LMP  Alright, now call the VERB 89 in and see which way that --

05 15 30 25 CMP  Oh, come on, you're not serious.

05 15 30 45 LMP  ... know to find out which way the ... is --

05 15 30 49 CMP  -- you were wrong. ...

05 15 31 07 CMP  Okay, we got to visually acquire moon, take pictures, and then you got a P52 to do.

05 15 31 15 CDR  ... some unknown reason --

05 15 31 17 LMP  We haven't got any damned program ready to call up. ... It's the only way you can do it. Supposed to do a VERB 66 and then put numbers ... apogee ... and then look at altitude and altitude rate --

05 15 31 34 CDR  What are you doing, Mike? What you taking pictures of --

05 15 31 40 CMP  Oh, I don't know. Wasting film, I guess.

05 15 31 43 CDR  You can take some pretty good pictures out of the hatch, here.
You're right. This crapping thing — ... set on f:4 or 5.6; that's probably about right.

Here's a ring that came from somewhere; I wonder where (singing).

You want to take pictures over here? Go ahead, why don't you just set up that —

I'll check window 3.

— set up that tape and let it do its thing; it's still got a long way to go for ...

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

Oh, we'll probably want — How many cameras you got?

Let me have a camera. How many cameras?

Well, only one camera, but I've got ... lenses.

You're a poor ... 

Well, let's take some color, and —

Want the 80, right? On this one?

Yes, I think you want to get —

Let me know when I'm in a — in a good attitude to stop this pitch. How about right now?

Stop. What are you doing?

I'm rolling.

What for? What do you want to roll for?

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 —

Alright, I've seen enough of VERB 83, Mike —

Here you go.
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.

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