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Dene L. Benjamin, Director,  
DATE 11/15/71  
Sally Gates  
10/6/75

APOLLO 8

ONBOARD VOICE  
TRANSCRIPTION

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AS RECORDED ON THE SPACECRAFT  
ONBOARD RECORDER  
(DATA STORAGE EQUIPMENT)

January 1969

GROUP 4

DECLASSIFIED AFTER 12 YEARS

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MANNED SPACECRAFT CENTER  
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## INTRODUCTION

This is the transcription of the Apollo 8 flightcrew communications as recorded onboard the spacecraft 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 8 mission was flown December 21 to 27, 1968.

Communicators in the text are identified as follows:

### Command module:

CDR	Commander	Frank Borman
CMP	Command module pilot	James A. Lovell, Jr.
LMP	Lunar module pilot	William A. Anders
SC	Unidentifiable crewmember	

### Mission Control Center:

CC	Capsule communicator (CAP COMM)
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### Remote sites:

CT	Communications technician (COMM TECH)
AB1	Airboss 1 (Recovery aircraft)
R1, R2, R3	Recovery 1, 2, 3 (Recovery helicopters)
YORK	USS Yorktown

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.

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DAY 1

00 00 22 42 CDR Roger. Thank you, Houston; Apollo 8 ...  
00 00 22 47 CDR Okay, going to close on A.  
00 00 22 50 CMP Okay, just give it a real small flip.  
00 00 22 54 LMP Is that why we've got that MASTER ALARM?  
00 00 22 57 CDR Okay, I'm --  
00 00 22 59 CC Apollo 8, Houston. You have the tape recorder,  
LOW bit rate. Over.  
00 00 23 02 CDR Thank you.  
00 00 23 04 LMP Okay, we've got it.  
00 00 23 05 CC You're welcome.  
00 00 23 06 CMP Okay, EMERGENCY CABIN PRESSURE number 2 on the ... test.  
00 00 23 10 LMP Hit it.  
00 00 23 14 CDR It's ON here.  
00 00 23 15 LMP Got it. That's good.  
00 00 23 17 CDR You got it?  
00 00 23 18 LMP That's good.  
00 00 23 19 CDR Okay.  
00 00 23 20 LMP Okay, this is a tape recorder test: 1, 2, 3, 4, 5,  
6, 7, 8, 9, 10; 9, 8, 7, 6, 5, 4, 3, 2, 1. And for  
the record, when we put the radiator to FLOW, the  
GLYCOL DISCHARGE PRESSURE dropped. Boy, it's way  
down there now, something's fishy.  
00 00 23 40 CDR What's wrong?  
00 00 23 44 LMP Apparently, we're getting the GLYCOL DISCHARGE  
PRESSURE way down.

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00 00 23 51 CDR Oh? What was wrong?  
00 00 23 52 LMP Wait awhile; it's the glycol pump.  
00 00 23 53 CDR Huh?  
00 00 23 58 CDR You lost the glycol pump?  
00 00 24 00 LMP Guess so.  
00 00 24 02 CMP Well, take a look; are we in PRIMARY?  
00 00 24 08 LMP Discharge pressure?  
00 00 24 10 CDR Not yet.  
00 00 24 11 CMP Huh?  
00 00 24 12 LMP You were - Oh, we're in SECONDARY. That's okay.  
00 00 24 14 CDR It looks to me like it's picked up here.  
00 00 24 16 LMP Okay.  
00 00 24 17 LMP Yes.  
00 00 24 19 CMP Okay, what else do you want here?  
00 00 24 20 LMP It's okay.  
00 00 24 24 LMP Okay, --  
00 00 24 26 CMP Secondary radiator leak check?  
00 00 24 27 LMP I'm ready this time (laughter). It's secondary ... - I'm not going over, there.  
00 00 24 38 CMP Okay, --  
00 00 24 39 LMP Okay, Jim.  
00 00 24 40 CMP -- the pressure's okay?  
00 00 24 42 CMP What do you want to do? The secondary glycol radiator?  
00 00 24 44 LMP The second - let her flow.

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Day 1

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00 00 24 45 CMP Well, wait a second; I'm not under the couch yet.  
00 00 24 48 LMP Okay, why don't you get underneath there, Jim, and give Frank a hand when you have a chance?  
00 00 24 52 CMP Well, how about let's take off our gloves and helmets, huh?  
00 00 24 54 LMP Okay.  
00 00 24 55 CDR Yes.  
00 00 24 56 CMP I mean, let's get comfortable. This is going to be a long trip.  
00 00 24 59 CDR You got - have you got the bags?  
00 00 25 01 CMP I'll get them.  
00 00 25 02 LMP I'll get them right now.  
00 00 25 19 LMP Okay, you want to get - CABIN AIR RETURN valve, ON.  
00 00 25 23 CDR Stand by; wait until I get my glove off.  
00 00 25 32 CDR CABIN AIR RETURN valve is OPEN.  
00 00 25 38 CDR Okay?  
00 00 25 40 LMP Okay.  
00 00 25 41 CMP Gentlemen.  
00 00 25 44 CDR Thank you.  
00 00 25 45 LMP Storage.  
00 00 25 50 CMP That's the gloves.  
00 00 25 57 CDR How's the cabin pressure, Bill?  
00 00 25 59 LMP Cabin pressure is holding good, Frank.  
00 00 26 00 CDR Okay.  
00 00 27 15 LMP You want the other bag there, Jim?

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Day 1

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00 00 27 19 CMP Let me see, I'm missing one bag here.  
00 00 27 31 CMP Wait 1.  
00 00 27 48 CDR Here you are.  
00 00 27 52 CDR Okay, you say you've got the EACPS power verifications in, Bill?  
00 00 27 56 LMP Yes, sir.  
00 00 27 57 CDR ECS monitor check?  
00 00 27 59 LMP Yes.  
00 00 28 00 CMP There is only - Oh, here it is.  
00 00 28 07 LMP Hey, it's like sitting on an ice rink, isn't it?  
00 00 28 08 CDR Yes. SPS, Bill.  
00 00 28 11 LMP SPS is roughly the same as it was. Got that one?  
00 00 28 13 CDR ... TLI.  
00 00 28 18 CDR Okay.  
00 00 28 32 CMP Okay, we can breathe a little bit, hear a little bit more, huh?  
00 00 28 34 CDR Yes, that was quite a ride, wasn't it?  
00 00 28 36 CMP Yes.  
00 00 28 37 LMP Man, that felt like that I-C was like an old freight train.  
00 00 28 43 CMP It is an old freight train, pal. It really goes.  
00 00 29 31 CDR What's that noise?  
00 00 29 32 CMP That's me; I'm into the fan area.  
00 00 29 42 CDR Why don't we turn those fans off? We don't need them, do we?  
00 00 29 52 CMP Okay, let's continue on with the checklist.

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Day 1

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00 00 29 59 CMP Okay, secondary radiator leak check, huh?

00 00 30 02 LMP Confirmed.

00 00 30 04 CMP Let me get out my fuel.

00 00 30 09 LMP Okay, we are in POWER, manual 1; primary water, AUTO - okay.

00 00 30 26 CMP Is she holding us in the proper attitude?

00 00 30 28 CDR Yes. I don't have the ORDEAL out yet; I can't tell, but it looks real good.

00 00 30 33 CMP Okay, notify LMP when ready to commence.

00 00 30 35 LMP I'm ready.

00 00 30 36 CMP Secondary glycol to radiator valve, NORMAL.

00 00 30 40 LMP Okay, just give me a buzz when you're - Yes, you're good.

00 00 30 43 CDR You got your 278 circuit breaker 1 and 2, OPEN, Bill?

00 00 30 44 LMP No, I'll go get it.

00 00 30 45 CDR Good show.

00 00 30 48 LMP ... system coming up.

00 00 30 49 CDR Huh?

00 00 30 50 LMP They're OFF.

00 00 30 52 CDR Okay.

00 00 30 55 LMP You're doing the radiator leak now, huh?

00 00 30 57 CMP Okay - -

00 00 30 59 LMP Have you got the radiator's talkback gray? Are you ready, Jim?

00 00 31 01 CMP All set whenever you are.

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Day 1

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- 00 00 31 03 LMP Okay, hit it. Everything is normal. Don't drop, you mother. Looking good. Hold it for a little while longer.
- 00 00 31 24 LMP Okay, let's go, Jim.
- 00 00 31 25 CMP Going to BYPASS.
- 00 00 31 26 LMP Go back to BYPASS. Good show.
- 00 00 31 29 CMP Okay. Frank?
- 00 00 31 30 CDR Yes.
- 00 00 31 31 CMP You want the ORDEAL?
- 00 00 31 32 CDR Yes.
- 00 00 31 36 LMP Okay, troops, I'm switching the other compressors.
- 00 00 31 39 CMP Here you go.
- 00 00 31 40 LMP I'm starting the redundant component check.
- 00 00 31 45 CDR Thank you, Bill.
- 00 00 31 46 CMP Bill, let me take out the wire; it's easier on it.
- 00 00 31 47 LMP Alright.
- 00 00 31 49 CMP Okay.
- 00 00 31 53 CMP Now, do you want the - What else do you want?
- 00 00 31 57 CDR Well, you've got to get the camera bracket out for Bill.
- 00 00 31 59 CDR Can we - let's see, can we - What are you doing, Bill?
- 00 00 32 04 LMP I just quit checking the compressor. I'm doing the redundant components check.
- 00 00 32 16 LMP Okay, secondary glycol pump is ON.
- 00 00 32 20 CDR Can you get that ORDEAL wire in that thing down there, Jim?

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Day 1

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D 00 00 32 23 CMP Yes.  
00 00 32 26 LMP Okay, secondary coolant loop's going to EVAP.  
00 00 32 32 CMP How's that?  
00 00 32 37 LMP Oh, you sweet little mother.  
00 00 32 39 CMP Is that okay?  
00 00 32 40 CDR Yes.  
00 00 32 42 CMP Okay.  
00 00 32 50 LMP Secondary EVAP has stabilized.  
00 00 33 00 CMP Camera bracket.  
00 00 33 03 LMP Thank you. That's Frank's.  
00 00 33 08 CDR Huh?  
00 00 33 10 LMP That's the long one.  
00 00 33 11 CDR What are you doing?  
00 00 33 13 CMP Drinking water.  
00 00 33 14 LMP I'm not sure, but it sure looks like the long one.  
00 00 33 17 CDR Just make sure we get the right one.  
00 00 33 18 LMP Well, we'll get the other one.  
00 00 33 22 CDR Jim, where's the other camera bracket?  
00 00 33 24 CMP Well, there's - I only saw the one in there; I may be wrong ...  
00 00 33 28 LMP Yes, this is yours, Frank. You want to stick it up here?  
00 00 33 30 CDR I don't want mine up here all the time.

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Day 1

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- 00 00 33 33 CMP The water's OFF.
- 00 00 33 35 CDR Okay.
- 00 00 33 36 CMP You might try the drinking water before we leave on TLI, too, by the way.
- 00 00 33 39 LMP We can get it out over Hawaii.
- 00 00 33 40 CDR Hey, I don't want this thing up here; it's going to just be in my way. You sure this isn't yours?
- 00 00 33 46 LMP I'll stick it up until we get another one.
- 00 00 33 48 CMP Should I wait for another one?
- 00 00 33 50 CDR Yes.
- 00 00 33 52 CMP Well, is there another camera bracket? How many camera brackets in that - that -?
- 00 00 33 55 CDR I thought there were two in there.
- 00 00 33 57 LMP I did, too.
- 00 00 34 00 CDR That's the best we're going to get.
- 00 00 34 02 LMP Okay, I'm going to secure the secondary evaporator.
- 00 00 34 05 CDR Jim, are you - You're not using the computer now, are you?
- 00 00 34 08 CMP It can go.
- 00 00 34 09 CDR Can I use a VERB 83?
- 00 00 34 10 CMP Yes. Yes.
- 00 00 34 29 CMP Okay.
- 00 00 34 37 CMP Okay, I want to jettison the covers.
- 00 00 34 49 CMP Now, I'll unstow the cameras.
- 00 00 34 51 LMP I keep looking around here; I won't see it again. We've got a Madaga - What's this coming up? Madagascar or what?

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Day 1

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00 00 34 59 CDR Yes.  
00 00 35 03 CDR Okay.  
00 00 35 06 CMP Buzz has my eye patch.  
00 00 35 13 LMP Okay, EVAP's going OFF.  
00 00 35 14 CMP (Singing)  
00 00 35 18 LMP SECONDARY PUMP, going OFF.  
00 00 35 19 CMP (Singing)  
00 00 35 24 LMP ECS indicator's PRIMARY.  
00 00 35 25 CDR You got the redundant components checked, Bill?  
00 00 35 27 LMP Checked, and we passed.  
00 00 35 31 CDR You got the fuel cells purge check?  
00 00 35 33 LMP Huh?  
00 00 35 34 CDR Does the fuel cell purge --  
00 00 35 35 LMP I haven't got that yet.  
00 00 35 39 CDR We should be getting - getting over Tananarive.  
00 00 35 54 LMP You want to check me off here?  
00 00 35 55 CDR Yes, I'd - I'd like to.  
00 00 35 57 LMP Okay, I've done EPS periodic verification.  
00 00 36 01 CDR Good enough. Alright.  
00 00 36 04 LMP ECS monitoring.  
00 00 36 06 CDR Alright.  
00 00 36 08 LMP SPS monitoring.  
00 00 36 12 CDR Okay.

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00 00 36 13 LMP      ECS redundant components. I'm ready to go on fuel cell purge.

00 00 36 17 CMP      (Singing)

00 00 36 18 LMP      Purge line heater has been ON. Stand by for a MASTER ALARM. Purging fuel cell 1, H<sub>2</sub>.

00 00 36 30 LMP      That it?

00 00 36 31 CDR      Yes.

00 00 36 32 LMP      O<sub>2</sub>.

00 00 36 37 LMP      Okay.

00 00 36 39 CDR      I didn't get a high ... too well --

00 00 36 41 LMP      Probably won't ... H<sub>2</sub>, stand by.

00 00 36 45 CDR      Yes.

00 00 36 46 LMP      Okay. Okay.

00 00 36 51 CMP      How's VERB 83 looking?

00 00 36 53 LMP      That it?

00 00 36 54 CDR      Perfect.

00 00 36 55 LMP      Fuel cell 3 --

00 00 36 56 CMP      Ooooh! (Yawn)

00 00 36 57 LMP      -- Stand by.

00 00 37 00 LMP      Okay. Okay.

00 00 37 06 CMP      Drinking water supply is ON.

00 00 37 08 CC      Apollo 8, Houston. Over.

00 00 37 09 CMP      I'll unstow the covered cameras here, but first let me get the dust covers jettisoned. Okay?

00 00 37 13 CDR      Okay.

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00 00 37 14 LMP      Purge - purge check is complete, fuel cell line heaters are OFF.

00 00 37 18 CDR      Houston, Apollo 8. How do you read?

00 00 37 22 CC      Apollo 8, Houston. Reading you weak, but clear. How me?

00 00 37 25 CDR      You're loud and clear, Mike. Everything seems to be going very well.

00 00 37 31 CC      Okay, everything looks real good here on the ground with both vehicles. We still have you 103 by 99 on your orbit from our low-speed data, and everything's looking very good. Over.

00 00 37 41 CDR      Roger. Thank you.

00 00 37 42 CMP      G&N OPTICS POWER, going ON.

00 00 37 45 CDR      Well, do you want me to get out of VERB 83?

00 00 37 47 CMP      No, you are okay.

00 00 37 49 CDR      When are you going to unstow the camera?

00 00 37 51 CMP      As soon as I get this thing done.

00 00 37 53 CMP      Okay, OPTICS COUPLING, DIRECT - DIRECT - The speed is HIGH. Okay, here we go, gentlemen.

00 00 38 02 CMP      I'm not going to look into them for a while.

00 00 38 12 CDR      Okay, 1 minute.

00 00 38 18 CMP      ... I still think it's still kind of chilly in here.

00 00 38 24 LMP      They OFF, Jim?

00 00 38 29 CMP      Yes, I guess so. Oh, I see a whole bunch of stuff - Oh, here we go.

00 00 38 33 LMP      They both OFF?

00 00 38 36 CMP      Yes, I - I guess I was just looking at the -

00 00 38 40 LMP      It's blacker than pitch out there, remember.

00 00 38 43 CMP      Boy, everytime I - Why? Is it dark out?

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00 00 38 47 LMP Yes, you're looking up into pretty much blackness.  
00 00 38 49 CMP Everytime I move the thing, I got a whole bunch of -  
of sparks, or you know, not sparks, but --  
00 00 38 54 LMP Did they go?  
00 00 38 56 CMP I guess, I can't see --  
00 00 38 57 LMP If you can see the glitter, you got - you've got it.  
00 00 39 03 LMP Turn the lights down?  
00 00 39 04 CDR Where's the other camera bracket, I wonder?  
00 00 39 09 LMP I don't know; I've always expected that other one to  
come out of there.  
00 00 39 13 CDR Listen, don't we have a stowage list in the back of  
the checklist?  
00 00 39 17 LMP That's what I am looking for, but I can't find it.  
00 00 39 23 CMP Okay, can I go into a 1691?  
00 00 39 27 CDR Yes. Go back to P00 first, Jim.  
00 00 39 29 CMP Yes. Yes, I'll just skip that. Proceed.  
00 00 39 53 LMP Do you have Tananarive?  
00 00 39 56 CDR Yes, we had them when we took the film.  
00 00 40 00 LMP Did Jim doublecheck to make sure that wasn't in there?  
00 00 40 03 CDR What's that?  
00 00 40 04 LMP That other camera bracket.  
00 00 40 05 CMP No, I haven't doublechecked yet.  
00 00 40 07 CMP I don't see anything --  
00 00 40 09 LMP -- We can handle that.  
00 00 40 11 CDR What did you say, Jim?

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Day 1

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- 00 00 40 12 CMP I don't see anything in the sextant.
- 00 00 40 15 CDR You don't?
- 00 00 40 16 CMP No.
- 00 00 40 22 CMP Now this thing's all the way.
- 00 00 40 27 CMP I heard something then.
- 00 00 40 30 LMP I'm flipping switches, and -
- 00 00 40 40 CMP I thought I'd see something in the sextant.
- 00 00 40 50 CDR Can you see out of the telescope?
- 00 00 40 57 CMP Yes, yes, yes, I sure do.
- 00 00 41 03 LMP Why don't you see if we can get the camera stuff unstowed before you go into darkness?
- 00 00 41 08 CMP Okay.
- 00 00 41 12 LMP Those cameras and that other junk.
- 00 00 41 15 CMP I - I see something in here. I thought maybe I could maybe get it into the sextant to see better.
- 00 00 41 21 LMP You're going to be doing that alignment, that P52.
- 00 00 41 25 CMP Well, okay. I'm just doublechecking.
- 00 00 41 32 CMP I think I see something floating.
- 00 00 41 38 CC Apollo 8, Houston.
- 00 00 41 40 CDR Go ahead, Houston; Apollo 8.
- 00 00 41 42 CC We have 1 minute to LOS Tananarive. We'll see you again over Carnarvon at 52:09. Over.
- 00 00 41 51 CDR Roger. We do have the optics covers jettisoned. It appears everything seems to be going fine.
- 00 00 41 57 CC Roger; optics cover jettisoned. Thank you.
- 00 00 42 01 CMP Okay. B3 is what I have right here.

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Day 1

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- 00 00 42 29 CMP Okay. You want the 16-millimeter camera, right?
- 00 00 42 31 CDR Yes, here.
- 00 00 42 33 CMP Right now; I'll just give you all these little goodies right now.
- 00 00 42 38 LMP Okay, if Frank can hold it and hand it up to me -
- 00 00 42 42 CDR What do you want?
- 00 00 42 44 LMP The 16-millimeter camera and the 18-millimeter lens?
- 00 00 42 50 CDR Okay, this is the 16-millimeter camera. You got the right kind of film in there? C-EX, ASA 60 - -
- 00 00 42 54 CMP C-EX? That right?
- 00 00 42 55 LMP Jim, you can head underneath and get that spotmeter.
- 00 00 42 57 CMP Okay.
- 00 00 42 59 CDR 18-millimeter lens, and you need a mirror?
- 00 00 43 01 LMP Yes, I guess.
- 00 00 43 03 CDR Huh?
- 00 00 43 04 LMP Yes, but I don't - I'm not sure it's going to fit on this - on this bracket here. I don't think it will.
- 00 00 43 10 CMP Where have we got the spotmeter located here?
- 00 00 43 12 CDR Right in here. Can I help you with it?
- 00 00 43 15 LMP Way under there?
- 00 00 43 26 CDR And is this the 75-millimeter magazine camera you want here?
- 00 00 43 33 LMP That's all I can get now.
- 00 00 43 37 LMP Do you see it in there, Jim?
- 00 00 43 39 CMP No, I'll look for it. I - I might see it if I kind of look for it.

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00 00 43 43 LMP Can you hang on to that one for a second, Frank?  
Okay, we've got the -

00 00 43 50 CMP Yes, here it comes up here.

00 00 43 52 LMP Alright.

00 00 43 53 LMP Which way?

00 00 43 54 CMP This way; to your right. Anything else down here?

00 00 44 00 CDR Nope.

00 00 44 01 LMP We need that other camera bracket. Let's put this one back.

00 00 44 03 CDR We sure do.

00 00 44 06 CMP How about going into your - into the stowage list and find out where it is. I haven't --

00 00 44 09 LMP I can't seem to find the stowage list, either.

00 00 44 12 CDR Maybe that's in your section.

00 00 44 14 CMP It's in the flight plan.

00 00 44 16 LMP No, this one won't work. We're going to have to use the other one.

00 00 44 18 CDR What one won't work?

00 00 44 19 LMP This camera bracket.

00 00 44 20 CDR Oh.

00 00 44 24 CDR Maybe you want to put the - This is all you need right here now, isn't it, Bill? You want to put that back? Here, I'll hold your checklist.

00 00 44 33 CDR I thought we had one of those stowage lists in the back of your checklist.

00 00 44 35 LMP Okay, I need camera number 2 with a 80-millimeter lens and some C film in it.

00 00 44 40 CMP You've got it, haven't you?

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Day 1

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00 00 44 42 CDR Camera 2, magazine A, C film; right here.  
00 00 44 52 CMP (Singing)  
00 00 44 56 LMP Coming up on darkness.  
00 00 44 57 CMP (Singing)  
00 00 44 59 CDR Yes, Jim, you'd better start getting ready for the first eclipse.  
00 00 45 02 CMP Okay.  
00 00 45 13 LMP You couldn't check that camera bracket real quick, Jim?  
00 00 45 16 CMP I'll look in here.  
00 00 45 18 LMP Okay.  
00 00 45 22 CDR 70-millimeter camera; you got all that. You got the spotmeter too, please, Bill?  
00 00 45 25 LMP I do. I've got everything I need except that bracket. ... This is a good enough place to keep it.  
00 00 45 40 CMP (Singing)  
00 00 45 43 CDR Do you need your checklist, Jim? Here I'll give it back.  
00 00 45 45 CMP Well, I'll be darned. ...  
00 00 45 50 CDR Wait a minute.  
00 00 45 52 CMP Thank you.  
00 00 45 53 CDR Well, it doesn't make it that far for TLI.  
00 00 46 12 CDR Okay, we're right up there.  
00 00 46 14 CMP How are we doing?  
00 00 46 16 CDR We're doing fine. We should be getting there. All we need is that other camera bracket.  
00 00 46 26 CMP I'm warm now. How about you?  
00 00 46 27 CDR I'm hot.

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Day 1

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- 00 00 46 28 LMP Man, I'm cold still.
- 00 00 46 50 LMP Boy, is this ...! Hey, don't let me forget about this camera, when we light off here. It's spread all over the place.
- 00 00 46 56 CMP Hey, that's right.
- 00 00 47 18 CMP I hope I can see something out of here soon.
- 00 00 47 20 CDR How's the cabin pressure?
- 00 00 47 22 LMP It has kind of eased down a little bit.
- 00 00 47 27 CDR What are you doing, Jim?
- 00 00 47 29 CMP I'm okay. I'm just getting this all put together here.
- 00 00 47 33 CDR Do you want me to read off anything to you - from the checklist? Form a checklist, maybe?
- 00 00 47 38 CMP I've got the P52 realign. You might kind of doublecheck me on it; maybe - I'm here and I'm going to turn down the floodlights and get - get my eye adapted here, because I don't see schmatz out there right now.
- 00 00 47 55 CDR Hope it hasn't clouded up ...
- 00 00 47 58 CMP Frank, I sure hope you're right.
- 00 00 48 06 CDR Alright, CM - do not key VERB 82. Do you want to go - start right from scratch with POO?
- 00 00 48 13 CMP Yes, okay. I'm going to bring this optics toward zero.
- 00 00 48 18 CDR CMC, ON; ISS is ON; PSS is - SCS is operating; BMAG's, three, are RATE 2 - G&N POWER OPTICS, ON? Jim?
- 00 00 48 29 CMP G&N POWER OPTICS are ON.
- 00 00 48 31 CDR CMC is FREE; OPTICS MODE, ZERO.
- 00 00 48 36 CMP Okay, stand by. I am going to go - I'm driving it to zero ...

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Day 1

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- 00 00 48 48 CMP Uh - oh, the trunnion won't go any farther than - 45, and -
- 00 00 48 58 CDR Need the lights down a little bit, Jim?
- 00 00 49 03 CMP Now, it's just SCS. Okay, I can see. Okay, I'm going to go to zero. I don't think - It must be going to zero.
- 00 00 49 35 CMP Okay, that looks good. ... Okay, I think I see something out there now.
- 00 00 49 44 CDR You got the OPTIC MODE to zero?
- 00 00 49 46 CMP Yes.
- 00 00 49 47 CDR OPTIC MODE, CMC.
- 00 00 49 48 CMP OPTIC MODE, CMC.
- 00 00 49 51 CDR What are you doing now?
- 00 00 49 52 CMP Okay, I'll go - I'll go to P00 right now.
- 00 00 49 58 CMF That's what you get with the burn.
- 00 00 50 00 CDR Okay.
- 00 00 50 01 CMP And by the way, we used VERB 66 at the end of our burn.
- 00 00 50 07 CDR We did?
- 00 00 50 08 CMP That's affirmative.
- 00 00 50 12 CDR Hey, are you going to 52, now?
- 00 00 50 14 CMP Well, are we dark or light out there?
- 00 00 50 17 CDR Well, you ought to be able to get it even in light. It's getting dark now.
- 00 00 50 20 CMP Okay. Well, I want to make sure we got a good one.
- 00 00 50 22 CMP Okay, VERB 37, ENTER; 52, ENTER. You want a REFSMMAT option?
- 00 00 50 32 CMP VERB 22, ENTER; 3, ENTER - -

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Day 1

19

00 00 50 38 LMP There's a couple of nice stars out here.  
00 00 50 40 CMP -- ENTER. Okay. All set, gentlemen?  
00 00 50 44 CDR Yes.  
00 00 50 46 LMP Hey, there's a bunch of stuff flying off this thing.  
00 00 50 47 CMP I know; that's what I was afraid of.  
00 00 50 50 LMP Real bright - I wonder why they're so bright?  
00 00 50 52 CDR The sun's shining.  
00 00 50 54 LMP Are we - We're boiling?  
00 00 50 55 CDR Is the sun shining, really?  
00 00 50 56 CDR Yes, look here, I got sun in it.  
00 00 50 58 LMP Oh Christ (laughter), I thought it was nighttime over here!  
00 00 51 01 LMP I can see a lot of stars over on this side.  
00 00 51 06 CDR What are you doing, Jim?  
00 00 51 07 CMP Well, I'm getting the optics adjusted here.  
00 00 51 09 CDR Yes, they make you --  
00 00 51 10 CMP Okay, 06; 06 is what? 06 is Acamar. Worst star in the world for me to look at! Oh, I'm getting more stars now.  
00 00 51 22 CMP Okay, here we go, gentlemen.  
00 00 51 24 LMP You got a real bright star --  
00 00 51 26 CMP Zero off, right?  
00 00 51 27 CDR Yes.  
00 00 51 28 LMP Real bright star - star like --  
00 00 51 30 CMP Zero off.  
00 00 51 31 CDR CMC; optic mode should be CMC.

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Day 1

20

00 00 51 34 CMP CMC? Oh, to C, huh?  
00 00 51 49 CMP Holy cow!  
00 00 51 50 CDR Any luck?  
00 00 51 57 CMP Well, it stopped by a star. The star's out, but I don't know what it is, though.  
00 00 52 01 CDR Can you see it through the telescope?  
00 00 52 03 CMP Yes. It seems to look like - Okay, I'm going to go to RESOLVE - LOW, and MANUAL.  
00 00 52 31 CMP CMC; proceed; Spica's the one I want; proceed; okay; 15, that's Sirius.  
00 00 52 41 CDR We there yet?  
00 00 52 43 CMP Yes, proceeding.  
00 00 52 45 CC Apollo 8, Houston.  
00 00 52 48 CDR Go ahead, Houston; Apollo 8. You're loud and clear.  
00 00 52 51 CC Roger; you're loud and clear over Carnarvon. We'd like to take the DSE away from you for a second.  
00 00 52 55 LMP Go.  
00 00 52 56 CDR Roger; go ahead.  
00 00 53 00 CC Thank you.  
00 01 04 32 LMP Roger; 01:28:13. Thank you.  
00 01 04 36 CMP (Singing)  
00 01 04 37 CC We are giving the DSE back to you, Apollo 8.  
00 01 04 40 LMP Roger, thank you.  
00 01 05 00 CMP Okay, what I can do is put this camera bracket - How about putting it in your temporary stowage bag, Bill?  
00 01 05 09 LMP Whatever you want. Has anybody seen the - Oh, there it is.

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Day 1

21

- 00 01 05 18 CMP Okay, who's got - You got my TLI checklist, don't you, Bill? Or Frank? Oh, I got it. Now, everyone a flight plan out?
- 00 01 05 33 CDR Okay, ...
- 00 01 05 37 CMP Or do you want to wait until after TLI?
- 00 01 05 40 IMP Okay, S-band volume, down. I'm doing - I'm doing the - the - this check.
- 00 01 06 10 CMP That booster was quite a ride. I'm still impressed.
- 00 01 06 18 CMP I was a little worried at that pogo there on the second stage - something we didn't expect.
- 00 01 06 53 CMP (Singing)
- 00 01 07 00 CMP Anyone want me down here for anything else?
- 00 01 07 10 CMP Well, I'm going to get prepared to get back in.
- 00 01 07 20 CDR You going to get that data up?
- 00 01 07 22 CMP You want the data now, or do you want to do the TLI checklist?
- 00 01 07 25 CDR Data box.
- 00 01 07 27 CMP You want the data box now, or do you want to wait to TLI?
- 00 01 07 34 CDR ... be happy. He didn't have the systems book manual.
- 00 01 07 39 CDR We ought to get those cards, too, Jim.
- 00 01 07 45 CMP Well, I hate to keep all these hoses around here, ... after TLI.
- 00 01 08 43 CDR Okay. A 5-degree difference between -
- 00 01 09 25 CDR ...
- 00 01 09 28 IMP You mean you need it again?
- 00 01 09 30 CDR Not unless you want to.
- 00 01 09 55 CMP Now, let me see. I don't know whether we need these lights on or not.

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Day 1

22

C 00 01 09 59 LMP Let me have 4-B in the SYSTEMS TEST, will you, Jim?  
00 01 10 03 CMP 4-B?  
00 01 10 04 LMP Yes, roughly.  
00 01 10 05 CMP Okay.  
00 01 10 08 LMP You can go ahead and turn it OFF.  
00 01 10 26 CDR You want to hand me that metal box, Jim, as soon  
as you finish?  
00 01 10 33 LMP It will be a lot more convenient when we can all  
get undone.  
00 01 10 37 CMP Yes, you want it?  
00 01 10 38 CDR Not really, but ...  
00 01 10 46 CMP Gentlemen.  
00 01 10 47 CDR ... BIOMED around me. They've been looking at me  
all the time.  
00 01 10 53 CMP Would you believe that I think I see little gullies  
here?  
00 01 10 56 LMP Huh?  
00 01 10 59 CDR Where do we go, to the CENTER or what? Must be  
somebody else.  
00 01 11 01 LMP Maybe they didn't want the - Where's the ...?  
00 01 11 04 CMP They had me for the whole preflight.  
00 01 11 11 LMP You're not going to be able to write on that dump  
list, are you?  
00 01 11 14 CMP Well, we'll see.  
00 01 11 15 CDR Hey, you got that metal box?  
00 01 11 17 CMP Coming.  
00 01 11 18 CDR You got a ... down there.

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Day 1

23

- 00 01 11 24 CMP Well, that's a problem. I can't help that.
- 00 01 11 44 CDR Don't look at me on that.
- 00 01 11 48 LMP You beginning to see a little horizon against the moon there?
- 00 01 11 52 CMP ...
- 00 01 11 54 LMP Yes, you can see that. It would be good if we had that for retro, wouldn't it? Entry, I mean. The thing is, we ...
- 00 01 12 06 LMP You want to make any comments about the boost part, if you get time to do it?
- 00 01 12 12 CDR Okay.
- 00 01 12 14 LMP Make them good and loud and clear; make sure everything's - -
- 00 01 12 15 CDR Are we on there now?
- 00 01 12 16 LMP Yes.
- 00 01 12 17 CDR Alright, the boost - -
- 00 01 12 19 CMP Metal box.
- 00 01 12 20 CDR Stand by.
- 00 01 12 30 CDR I can't see where this thing goes in down there. You'll have to help me, Jim. You got a flashlight?
- 00 01 12 38 LMP Here you go.
- 00 01 12 40 CDR I can't get it, but I think it's supposed to fit the bottom one here. Okay.
- 00 01 12 44 CMP Down below?
- 00 01 12 45 CDR Yes. Down here. See? I - that thing fits in underneath here and I can't - -
- 00 01 12 54 CMP I'll put my feet over here.
- 00 01 12 57 CDR We'll get those little things to stick in those rings down there. You see what I mean?

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Day 1

24

C 00 01 13 05 CMP I can't get down there, yet. I don't know where I am.  
00 01 13 11 CMP Okay, where are we?  
00 01 13 13 CDR Those little holes in the - those little things that - see the holes into the wall?  
00 01 13 20 CMP Is it over here?  
00 01 13 22 CDR No, no, right -  
00 01 13 24 CMP Oh, it's over here. Okay.  
00 01 13 25 CDR No, it should be right -  
00 01 13 26 CMP I got one. Right here. Twist a little bit.  
00 01 13 30 CDR Okay.  
00 01 13 32 CMP There's one. Now let's get the other one.  
00 01 13 37 CMP Oh, shoot!  
00 01 13 38 CDR What was that?  
00 01 13 40 CMP My lifejacket.  
00 01 13 41 CDR (Laughter) No kidding?  
00 01 13 45 CMP It hooked on the tank here. It flicked up.  
00 01 13 52 CDR Is it blowing up?  
00 01 13 53 CMP It's too early.  
00 01 13 57 LMP Why don't you take it off and give it to me, and I'll try to take it apart while you watch the panel.  
00 01 14 05 LMP Lovell just caught his lifevest on Frank's strut.  
00 01 14 14 CMP It's hard to get off, too.  
00 01 14 17 LMP That's CO in there?  
00 01 14 18 CMP Yes, CO<sub>2</sub>.  
00 01 14 19 LMP CO<sub>2</sub>?

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Day 1

25

- 00 01 14 21 CMP Yes. I think we ought to just leave the lifevest just the way it is.
- 00 01 14 23 LMP Tell you what we'll do: we'll dump it out with the vacuum cleaner over the side there, why don't we.
- 00 01 14 28 CMP Put it right back here:
- 00 01 14 30 CMP Okay.
- 00 01 14 32 LMP Hey, that power looks low.
- 00 01 14 40 CDR Yes, turn it off, Jim.
- 00 01 14 47 CMP Okay, - -
- 00 01 14 48 LMP Why don't you put it up in the spout?
- 00 01 14 52 CDR I'm afraid I'm going ... damage.
- 00 01 14 55 CMP Okay, when we get communications again, we'll ask them what to - -
- 00 01 14 58 CDR Yes, we - we can live with a little CO<sub>2</sub> ...
- 00 01 15 08 CDR Where are you going, Jim?
- 00 01 15 10 CMP Well, you want me to get this box, don't you?
- 00 01 15 13 CDR Yes.
- 00 01 15 17 LMP Hey, Jim. When I heard that noise, I looked at the CABIN PRESSURE real quick!
- 00 01 15 22 CMP Well, I knew what was wrong as soon as it happened!  
(Laughter)
- 00 01 15 32 LMP I'm just kind of thankful, too.
- 00 01 15 36 CMP Okay, gentlemen. I think we'll - I don't know - There's one thing I'm worried about: this helmet.
- 00 01 15 41 LMP Where is it?
- 00 01 15 43 CMP It's right up here -
- 00 01 15 46 LMP Can't you stick it right here?

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Day 1

26

- 00 01 15 47 CMP Is there room back there?
- 00 01 15 52 CMP I could tie it a little bit.
- 00 01 16 01 CDR Can you give me those ... , Jim?
- 00 01 16 10 CDR What's that knock?
- 00 01 16 12 LMP The clock?
- 00 01 16 16 CDR When I raised my head back, I hit it with this.
- 00 01 16 20 LMP I think I heard this ... firing over here.
- 00 01 16 27 CDR How are we as far as the -
- 00 01 16 30 LMP We're in good shape. I'm standing by for the backup COMM check.
- 00 01 16 33 CDR Hey, can I put this on the tape about this launch?
- 00 01 16 36 LMP Yes, it would be a good time to do it.
- 00 01 16 38 CDR Okay, the launch was nominal in almost every respect. It was no difficulty determining lift-off. Vibrations noticed before the thrust came up to - up to - well, before ... commit launch - commit to launch, and then at - when the hold-down arms released, the vibration went away. There was a lot of noise initially in the cabin. It was difficult to communicate. And then as we - The noise died out, we approached MAX q, when it built back up again. There was no pogo noticeable on the I-C stage. The stagings, to be frank, were all nominal. The only off-nominal factor the whole launch worth mentioning was the slight pogo that was recorded in real time on the S-II stage, and the loud - the audio level inside the - inside the cabin during S-IC burn.
- 00 01 17 47 LMP Didn't you - didn't you think the thing was still rattling like a freight train before you - as you became clear of the tower? I had the feeling that it was.
- 00 01 17 58 CDR No, I thought - when we let go -
- 00 01 18 01 LMP Yes, you could tell it let go, but I meant I thought it kept vibrating. You might make a note that that

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Day 1

27

was at 1 hour and 16 minutes if you ever want to find your tape when you debrief.

00 01 18 14 CDR

Alright.

00 01 18 26 CMP

Well, I guess I could tie it up here. Let's ask him.

00 01 18 33 CDR

Don't tie it on that hatch thing there.

00 01 18 36 CMP

Not the hatch handle. There's a hatch ...

00 01 18 43 CMP

Okay, what's the g; one g?

00 01 18 47 LMP

One (laughter) - one g; are you kidding?

00 01 18 48 CMP

I mean - during the booster period.

03 01 18 50 CDR

Yes, a little over one g.

00 01 19 02 CDR

You want to hand out - Well, I guess we won't need a flight plan. No.

00 01 19 20 LMP

The camera; configured for the backup COMM check; checked my two circuit breakers.

00 01 19 25 CMP

What time is it? We ought to keep track of the time.

00 01 19 27 LMP

Okay.

00 01 19 29 CMP

I got plenty of time to get back in the couch. Okay, where are the - -

00 01 19 33 LMP

The primary transponder's going OFF for 4 seconds.

00 01 19 42 CMP

Okay, where are the - the - the headpads?

00 01 19 46 LMP

Secondary transponder's coming ON.

00 01 19 48 CDR

The what, Jim?

00 01 19 50 CMP

You want the headpads, don't you?

00 01 19 53 CDR

Well, not yet. Let's wait until we - Oh, you mean before the boost?

00 01 19 57 CMP

Yes.

00 01 19 58 CDR

They're in that CO<sub>2</sub> thing.

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Day 1

28

- 00 01 20 01 LMP They're going to be awful hard to put on; I know that.
- 00 01 20 03 CDR I think that's them; I'm not sure.
- 00 01 20 19 LMP And also doing a down-voice backup, and up-voice backup.
- 00 01 20 33 CDR That's down; that's down.
- 00 01 20 42 CDR Life preserver is - just floating.
- 00 01 20 48 CMP Well, that's ...
- 00 01 21 06 LMP I'm putting tape over these transponder switches.
- 00 01 21 31 LMP Sunrise coming up.
- 00 01 21 51 CDR How are the fuel cells looking?
- 00 01 21 56 LMP Secondary looks okay. It reads a little higher than the rest of them. One, even before launch, showed a little bit lower O<sub>2</sub> flow than H<sub>2</sub>. Okay.
- 00 01 22 28 CMP You going to put your shoulder harness on again?
- 00 01 22 32 LMP I never took mine off. Yes, how do you take them off?
- 00 01 22 36 LMP Well, just kind of ... I just kind of loosened my belt, there at the fastener.
- 00 01 22 47 CDR I don't know what we'll do with that damn lifevest. There's no way we can ...
- 00 01 22 55 LMP Yes, you can - -
- 00 01 22 56 CMP Yes, with the - the thing you blow it up with.
- 00 01 23 16 CDR It sure is nice to get that helmet and gloves off.
- 00 01 23 20 LMP It sure was.
- 00 01 23 31 CMP You're recording ...
- 00 01 23 52 CDR Wait a minute. Before you get back to the seat, you're supposed to turn the - You're not back in your seat for good, are you? We got a long time.
- 00 01 24 02 CMP Before - Oh, we got 2 hours and 20 minutes now.

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Day 1

29

- 00 01 24 04 CDR Yes.
- 00 01 24 07 CMP Okay, I'll go back down.
- 00 01 24 16 CMP Gee, this is the best flight I ever had.
- 00 01 24 26 LMP Because you've got to get those circuit breakers before ... up here.
- 00 01 24 29 CMP Yes.
- 00 01 25 04 CMP You know, this is very clean.
- 00 01 25 22 CMP Here comes the sun.
- 00 01 25 31 CMP Well, take a look. It crept up on us.
- 00 01 25 34 LMP I think we'll feel better when we close this. See that?
- 00 01 25 39 CMP Yes.
- 00 01 25 44 CMP Although I noticed it was pretty good, whenever we were over -
- 00 01 25 53 CMP Sunrise at 01:25.
- 00 01 26 01 CMP Alright now, would you say we lifted off on time, gentlemen?
- 00 01 26 03 LMP I'd say we did.
- 00 01 26 10 CMP There for a while though, when we were counting down there for the last seconds, I didn't think she was going to wait.
- 00 01 26 14 CDR Yes.
- 00 01 26 16 LMP Are the safety boilers still going?
- 00 01 26 17 CMP Yes, sir.
- 00 01 26 20 CDR That's one thing else we should note about the launch. That we didn't hear the noise until about 3 seconds before lift-off, even though ignition commit ... the main ... came on time.
- 00 01 26 32 CMP And the tower jettison was quite noticeable, although it wasn't the rumble you get in the DCPS.

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Day 1

30

- 00 01 26 48 CDR You want to say anything else, Bill, that you're working at?
- 00 01 26 51 CDR Bill - or Jim, how about taking the RCS check?
- 00 01 27 00 LMP She has been a little bit lower than normal ...
- 00 01 27 24 CMP Well, we could be ...
- 00 01 27 29 LMP Yes.
- 00 01 27 47 CMP I'm not too in favor of this attitude as far as - Hey, we've been doing an awful lot of upside down flying.
- 00 01 27 54 LMP You can't see any other way.
- 00 01 27 57 CDR Can't you see the horizon?
- 00 01 27 59 CMP Can you see the horizon?
- 00 01 28 00 LMP Yes. I just couldn't the other way.
- 00 01 28 06 CMP I guess maybe this is not the - No, wait a second, all I see is ...
- 00 01 28 17 CMP Yes, there's some dust out there due to the -
- 00 01 28 23 LMP Yes, you ought to give them a little blob on the - -
- 00 01 28 25 CDR Let's give them a window status report as far as contamination.
- 00 01 28 29 LMP Okay. We want to keep charts from right to left here.
- 00 01 28 32 CDR Alright. Number 1 window is clean and has lint on it, and then toward the upper part, that's plus X on the outside pane, it looks like we're already starting to form bits of frost. There was not any evidence of contamination there during staging. Number 2 rendezvous window is good with some, again, specks of lint hanging off the ...
- 00 01 28 57 CMP Number 3 window has some dust on it, and in the lower - in the lower right-hand corner, there is a smudge on - what appears to be the outside pane - I'm not too sure it's not the inside; but the visibility appears to be real good - -

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Day 1

31

- 00 01 29 15 LMP But you're never going to be recording there. You've got to talk real loud.
- 00 01 29 18 CDR Oh, he can't?
- 00 01 29 20 LMP Okay. There's a little smudge on the lower left-hand portion of the center window, and some dust on both the outside and the inside windows, but the visibility is still very good.
- 00 01 29 36 LMP Window number - window number 4 is clear. Window number 5 appears clear, but it's in the shadow at the moment, and it's difficult to tell if there's any frost forming at this point.
- 00 01 29 52 CDR Okay, very good.
- 00 01 29 54 CMP Okay, now let's check to see if we're receiving good.
- 00 01 30 10 CDR This is backup COMM check?
- 00 01 30 12 LMP Yes, ...
- 00 01 30 17 LMP Houston, Apollo 8. Over.
- 00 01 30 27 CC Apollo 8, this is Houston. Over.
- 00 01 30 30 LMP Roger, Houston; Apollo 8. Standing by for GO for the backup COMM check. Over.
- 00 01 30 34 CC Roger. Stand by 1, Bill.
- 00 01 30 43 CMP (Singing)
- 00 01 30 47 CC Go ahead; inhibit VHF downlink.
- 00 01 30 53 CC Apollo 8, this is Houston. Go ahead with backup voice check.
- 00 01 30 56 LMP Roger. This is Apollo 8 on backup voice: 1, 2, 3, 4, 5; 5, 4, 3, 2, 1. How do you read? Over.
- 00 01 31 05 CC Apollo 8, this is Houston. Go ahead with backup voice check. Over.
- 00 01 31 16 LMP Down-voice backup; up-voice backup. S-band is key ON.
- 00 01 31 20 CC Apollo 8, Houston. Go ahead with backup voice check. Over.

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Day 1

32

00 01 31 25 LMP Roger, Mike. I gave you a count, I'll give you another one. Are you standing by?

00 01 31 30 CC Roger; standing by.

00 01 31 31 LMP Roger. This is Apollo 8 with backup voice: 1, 2, 3, 4, 5; 5, 4, 3, 2, 1. Over.

00 01 31 42 CC Roger, Bill. Reading you weak, but clear.

00 01 31 45 LMP Roger.

00 01 31 46 CC Go ahead with normal S-band voice check.

00 01 31 50 LMP Roger.

00 01 31 52 LMP Okay, VHF VOL, UP; ... S-band AUX, OFF.

00 01 32 17 LMP Houston, this is Apollo 8 on normal S-band: 1, 2, 3, 4, 5; 5, 4, 3, 2, 1 - -

00 02 49 47 LMP Okay. Start your watch ... see what time it says.

00 02 49 50 CMP Huh?

00 02 49 52 LMP Call out the time, Frank.

00 02 49 54 CDR 59:17, 18.

00 02 49 56 LMP Okay, 42 is S-II SEP light, OFF.

00 02 50 01 CDR 42?

00 02 50 03 LMP Okay, you're in EMS MODE, AUTO?

00 02 50 04 CDR Yes.

00 02 50 05 LMP Okay.

00 02 50 13 CC Apollo 8, coming up on 20 seconds to ignition. Mark it, and you're looking very good.

00 02 50 19 LMP Okay.

00 02 50 20 CDR Roger.

00 02 50 21 LMP Call 42.

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Day 1

33

00 02 50 24 CDR We're past 42. That was when our light --  
00 02 50 26 LMP That's 58:42 or - 59 - -  
00 02 50 28 CDR 59 - 9, 8, 7 - 4 - 3, 2, light ON. IGNITION.  
00 02 50 40 CDR IGNITION.  
00 02 50 41 CC IGNITION.  
00 02 50 45 CDR Go ahead. Boy, it's going off in yaw.  
00 02 50 51 LMP Okay, the DAP is fine over here.  
00 02 50 53 CMP What's your attitude at ...?  
00 02 50 54 CDR Fine, 45 ...  
00 02 50 55 CMP Okay.  
00 02 50 56 LMP Okay, align yourself in attitude, we got plus or minus 5 degrees.  
00 02 51 01 LMP And the tank pressures?  
00 02 51 03 CDR Tank pressures are good.  
00 02 51 04 LMP Okay.  
00 02 51 08 CDR Are you watching the DELTA-P ...?  
00 02 51 10 LMP Yes.  
00 02 51 11 CMP 30 seconds.  
00 02 51 14 CMP You got 18 hours to - -  
00 02 51 16 LMP Don't worry about that.  
00 02 51 28 CDR Everything alright?  
00 02 51 41 CMP 60 seconds.  
00 02 51 44 CMP 20 seconds off.  
00 02 51 58 LMP Things are looking good over here.

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Day 1

34

- 00 02 51 59 CC Apollo 8, Houston. Trajectory and guidance look good. Over.
- 00 02 52 02 CDR Roger; Apollo 8. Good here.
- 00 02 52 06 CMP Okay, cutoff at 02:55:51. Okay, we're coming up on 28 000.
- 00 02 52 18 CC Apollo 8, Houston. We're predicting cutoff at 02:55:58, and it looks exactly nominal here.
- 00 02 52 27 CDR Roger.
- 00 02 52 28 LMP 02:55:58?
- 00 02 52 29 CDR Right.
- 00 02 52 33 CC Apollo 8, Houston. We've predicted cutoff 02:55:52 - 52, and that's exactly as it should be.
- 00 02 52 41 CDR 02:55:52.
- 00 02 52 42 CMP Okay.
- 00 02 52 43 LMP Shouldn't have that goddamn high flow rate up there.
- 00 02 52 52 CMP Coming up on 29 000. Okay, our yaw should be coming off now a little bit.
- 00 02 52 58 LMP 3 minutes to go.
- 00 02 53 03 CMP You should have about 8 degrees of yaw yet, compared to what - 35? A weak 35, now 37. Alright, it was what - 9 degrees?
- 00 02 53 16 CDR Hey, that  $O_2$  is pegged high, Bill.
- 00 02 53 18 LMP Yes, I know. It's just a little warmer up here. I'd - I'm looking at the DELTA-P here. The surge tank in the tank 1 ... nothing else to worry about.
- 00 02 53 31 CMP 30 000.
- 00 02 53 41 CC Apollo 8, Houston. You're looking good here; right down the center line.
- 00 02 53 44 CDR Roger; Apollo 8.

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Day 1

35

00 02 53 52 CMP Coming up on 31 000.  
00 02 54 03 CDR How's the cabin pressure, Bill?  
00 02 54 05 LMP Holding good.  
00 02 54 16 CMP Coming up on 31 5.  
00 02 54 21 CMP 02:54.  
00 02 54 22 CDR What time ...?  
00 02 54 24 CMP 02:54:56.  
00 02 54 32 CMP 02:55:52.  
00 02 54 52 LMP 1 minute to go.  
00 02 54 54 CC Apollo 8, Houston. You're looking good. Right down  
the old center line.  
00 02 54 58 CDR Apollo 8 --  
00 02 55 05 CMP ...  
00 02 55 19 CMP Stand by.  
00 02 55 22 CMP 30 seconds to go. 34 000. You got the card?  
00 02 55 27 CDR Yes.  
00 02 55 29 CMP Did you see the card, Bill?  
00 02 55 30 LMP I got it.  
00 02 55 33 CMP Okay.  
00 02 55 36 CMP 35 000. We should have good ...  
00 02 55 38 CDR Alright, 15 coming up here.  
00 02 55 42 CMP Real fine. 10 seconds.  
00 02 55 47 CMP 35 - 35 1.  
00 02 55 48 LMP How's your inertial velocity?  
00 02 55 50 CMP Velocity's looking fine.

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Day 1

36

00 02 55 53 CMP 5, 4, -  
00 02 55 57 CDR Okay, we got SECO right on the money.  
00 02 55 59 CC Roger; understand SECO.  
00 02 56 02 CMP I got a ... light; 2 seconds late on SECO. ... got  
the tape recorder.  
00 02 56 10 SC ... SECO ... gimbal ...  
00 02 56 15 CDR Jim. Go ahead, Bill.  
00 02 56 16 LMP SECO plus 10 seconds, light OFF. S-IVB goes to  
attitude hold 20 seconds and begin venting.  
00 02 56 21 CDR Okay.  
00 02 56 22 LMP S-IVB will maneuver to ORB RATE, heads down at  
0.3 of a degree per second.  
00 02 56 27 LMP Okay, record  $v_i$ .  
00 02 56 30 CMP  $v_i$ .  
00 02 56 31 LMP Give it to me.  
00 02 56 32 CMP I'll give it to you.  $v_i$  was 34 - 35452.  
00 02 56 34 LMP 35452. HDOT?  
00 02 56 37 CMP 04550.  
00 02 56 40 LMP HPAD.  
00 02 56 41 CMP Plus 01791.  
00 02 56 44 CDR Let's not go out of there. You leave it like it is.  
00 02 56 46 LMP Okay, KEY RELEASE.  
00 02 56 47 CMP I've got to go to my KEY RELEASE ...  
00 02 56 49 LMP 16 92 for KEY RELEASE?  
00 02 56 50 CMP Yes.  
00 02 56 52 LMP KEY RELEASE was 16 83?

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Day 1

37

00 02 56 55 CMP Okay, 16 83; DELTA-V<sub>x</sub> is 95485.  
00 02 57 02 LMP Y?  
00 02 57 03 CMP Minus 16833.  
00 02 57 07 LMP Z?  
00 02 57 09 CMP Plus 41124.  
00 02 57 13 LMP And DELTA-V<sub>c</sub>, Frank?  
00 02 57 15 CMP What's DELTA-V<sub>c</sub>, Frank?  
00 02 57 16 CDR Minus 20.6.  
00 02 57 19 CMP Okay, this - this --  
00 02 57 22 LMP The FLIGHT RECORDER is OFF; TAPE RECORDER is stopped --  
00 03 19 57 LMP MANUAL ATTITUDE, three, RATE COMMAND.  
00 03 19 58 CDR RATE COMMAND.  
00 03 20 01 LMP Okay, turn controller counterclockwise, plus X, and hold at zero.  
00 03 20 03 CMP Going to zero.  
00 03 20 04 LMP Turn it clockwise --  
00 03 20 05 CMP Now, wait a second. ...  
00 03 20 14 CMP Yes.  
00 03 20 15 CDR What, this?  
00 03 20 16 LMP Let me attempt to turn it OFF. Give me a 10-second warning on the flight recorder.  
00 03 20 20 CMP Yes. Okay.  
00 03 20 23 LMP 13920 ... --  
00 03 20 24 CC Apollo 8, Houston.  
00 03 20 25 LMP -- 30.

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Day 1

38

- 00 03 20 27 CDR Go ahead, Houston.
- 00 03 20 28 CC We have you about 30 seconds prior to separation, and everything is looking good.
- 00 03 20 32 CDR Roger.
- 00 03 20 39 CMP Okay, I'm coming up on 15 seconds to SEP.
- 00 03 20 42 CDR Alright.
- 00 03 20 45 CMP 10 seconds to go.
- 00 03 20 48 LMP You in AUTO?
- 00 03 20 50 CDR Yes, AUTO, AUTO, right.
- 00 03 20 52 LMP Okay, at zero, turn HAND CONTROLLER counterclockwise, plus X, and hold.
- 00 03 21 00 LMP 3 seconds, LAUNCH VEHICLE TANK PRESSURE indicator, zero; CM/LV SEP; TRANSLATIONAL COUNTER, NEUTRAL; plus X, OFF; TVC SERVO POWER 1, OFF.
- 00 03 21 09 CDR Alright.
- 00 03 21 10 LMP Okay, VERB 62, ENTER.
- 00 03 21 12 CMP VERB 62, ENTER.
- 00 03 21 13 LMP VERB 49, ENTER.
- 00 03 21 14 CMP VERB 49, ENTER.
- 00 03 21 16 LMP Okay, desired gimbal angles and proceed.
- 00 03 21 20 CMP Roger; proceed, now.
- 00 03 21 22 LMP Okay, you're notched up by 30 seconds to a minus X of 2-1/2.
- 00 03 21 26 CMP ... SEP.
- 00 03 21 27 LMP Okay, you put your other - you're not around by 30 seconds, so minus X is your roll.
- 00 03 21 31 CDR Why can't you call it yaw?

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Day 1

39

- 00 03 21 34 LMP Because we're not - see, we're not --  
00 03 21 37 CMP There's one panel.  
00 03 21 39 LMP After this camera ...  
00 03 21 46 CDR Man, where's the S-IVB? Anybody see it, now?  
00 03 21 49 CMP There it is!  
00 03 21 50 CDR You found it?  
00 03 21 51 CMP Right in the middle. Right in the middle of my window. There's not a panel around.  
00 03 21 55 CDR It's all up to you!  
00 03 21 57 CMP Give me the camera.  
00 03 21 58 LMP Well, we've got some still pictures we can take --  
00 03 22 01 CMP Could you pitch a little more?  
00 03 22 02 CDR Yes.  
00 03 22 03 LMP We haven't got in here, yet.  
00 03 22 08 LMP f:11, 1/250th.  
00 03 22 10 CMP f:11.  
00 03 22 11 CDR We've SEP'd, Houston. We've got the IV-B right in sight.  
00 03 22 19 LMP Could you pitch just a little more or ...  
00 03 22 21 CDR Which way?  
00 03 22 22 LMP Pitch up, pitch up a little more.  
00 03 22 27 CDR How's that?  
00 03 22 33 CMP I don't see the ... Maybe I can get it in a minute.  
00 03 22 46 CMP Easy on the thrusters.  
00 03 22 48 LMP Don't you think that's enough pictures of it?  
00 03 22 51 CDR Houston, how do you read Apollo 8?

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Day 1

40

00 03 22 55 CMP How far away do you think it is?  
00 03 22 59 LMP ...  
00 03 23 00 CDR How about the S-band, Bill?  
00 03 23 02 LMP Let me switch the antenna here.  
00 03 23 07 CDR I'm not going to fly around the damn thing. I don't think there's any - do you?  
00 03 23 12 CMP No.  
00 03 23 23 CDR You got lockon?  
00 03 23 24 LMP Yes.  
00 03 23 25 CDR Houston, this is Apollo 8 on VHF and S-band. How do you read?  
00 03 23 30 CDR Read you loud and clear. We've SEP'd; looking good.  
00 03 23 35 LMP You read him loud and clear? I don't --  
00 03 23 37 CDR Turn your VHF up and your ...  
00 03 23 44 LMP Okay, let's make sure we've done everything here. Get that FLIGHT RECORDER, OFF.  
00 03 23 49 CDR OFF or ON?  
00 03 23 50 LMP OFF. Okay, about 23:50, I want it OFF.  
00 03 23 53 CMP Okay.  
00 03 23 54 LMP 23:50, OFF.  
00 03 23 57 LMP At 35:50, I turn it back ON. ... 23:50 ...  
00 03 24 05 CMP Okay, let me see here.  
00 03 24 07 LMP Okay --  
00 03 24 09 CMP Our EDS POWER is OFF?  
00 03 24 10 CDR EDS POWER is going OFF.  
00 03 24 12 LMP ATT 1/RATE 2.

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Day 1

41

00 03 24 14 CDR ATT 1/RATE 2.  
00 03 24 15 LMP Okay, TAPE RECORDER is stopped --  
00 03 28 22 CDR Houston, Apollo 8. How do you read?  
00 03 28 27 CDR Roger; loud and clear. We are taking pictures of  
the S-IVB. The postseparation sequence is completed  
and we seem to have the high gain.  
00 03 29 41 CMP There she is ...  
00 03 30 29 CMP 03:36 ... 03:36 ...  
00 03 30 39 CDR Go ahead, Houston; Apollo 8.  
00 03 35 22 CDR Go ahead, Houston; Apollo 8.  
00 03 35 32 CDR We did not.  
00 03 35 34 CDR Do you want us to do that now?  
00 03 35 38 CDR Roger.  
00 03 35 44 CDR We see the earth now, almost as a disk.  
00 03 35 51 CDR We are. Tell Conrad he lost his record.  
00 03 35 59 CMP We have a beautiful view of Florida now. We can  
see the Cape, just the point.  
00 03 36 06 CMP And at the same time, we can see Africa. West Africa  
is beautiful. I can also see Gibraltar at the same  
time I'm looking at Florida.  
00 03 36 29 CMP The center window.  
00 03 37 10 CDR Go ahead, Houston.  
00 03 37 34 CDR Okay. We are listening on VHF Alfa simplex.  
00 03 37 45 CDR We are listening for VHF Alfa simplex.  
00 03 38 00 CMP Roger. Well, Mike, I can see the entire earth out  
of the center window. I can see Florida, Cuba,  
Central America, the whole northern half of South  
America, in fact, all the way down through Argentina  
and down through Chile.

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Day 1

42

00 03 38 30 CDR

Stand by. We are going through the separation-maneuver checklist here.

00 03 39 20 CDR

Houston, this is Apollo 8. We've lost sight of the S-IVB here. The separation maneuver may be delayed slightly, or else we will go ahead and make it without having her in sight.

00 03 41 58 CDR

Houston, this is Apollo 8.

00 03 42 02 CDR

When does the S-IVB do that blowdown maneuver?

00 03 43 31 CDR

Go ahead, Houston.

00 03 43 35 CDR

Go ahead.

00 03 56 01 CDR

Boy, it's starting to vent now, blowing down.

00 03 56 09 CDR

The S-IVB is really venting.

00 03 56 31 CDR

05:07:55. That is the nonpropulsive vent, but it's pretty spectacular. It's spewing out from all sides like a huge water sprinkler.

00 03 57 07 CDR

Say again that big vent time, so I can write it down please, Houston.

00 03 57 32 CDR

Roger; thank you.

00 03 58 31 CDR

We're receiving VHF music now, Houston.

00 03 58 48 CDR

I guess we are between 500 to 1000 feet.

00 03 58 57 CDR

Herb Alpert seems pretty good.

00 04 01 42 CDR

Houston, Apollo 8. I ... suggest ... essentially separation maneuver, if it's alright with you.

00 04 02 04 CDR

Houston, Apollo 8.

00 04 02 10 CDR

Roger. I believe we're going to have to vent or thrust away from this thing. We seem to be getting closer.

00 04 05 18 CDR

Go ahead, Houston.

00 04 05 24 CDR

Go ahead, Houston; Apollo 8.

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Day 1

43

- 00 04 05 31 CDR Go ahead, Houston; Apollo 8.
- 00 04 05 40 CDR You're loud and clear, Mike. Go ahead.
- 00 04 05 43 CC ...
- 00 04 05 57 CDR I don't want to do that. I'll lose sight of the S-IVB.
- 00 04 06 36 CDR Go ahead.
- 00 04 06 41 CDR Well, I don't know because I can't see the earth now, Mike.
- 00 04 06 43 CMP The earth's out here. Can you see it?
- 00 04 06 48 CDR Yes.
- 00 04 06 51 CDR We can pitch down some. Jim has the earth in the optics, so we could pitch some and get pretty close to one, I guess.
- 00 04 07 18 CDR You got the earth focused in?
- 00 04 07 22 CMP ...
- 00 04 07 32 CDR Go ahead, Houston; Apollo 8.
- 00 04 07 45 CDR 181?
- 00 04 07 54 CDR Well, then zero would be just as good, wouldn't it?
- 00 04 08 13 CDR Well, I can't do that. I'll thrust right square into that S-IVB.
- 00 04 08 21 CDR What effect - what will he maneuver to as far as the gimbal angle for this blowdown?
- 00 04 08 58 CMP ... that S-IV ought ...
- 00 04 09 14 CDR Okay.
- 00 04 09 24 CDR It's about the same. The trouble is it's pointed at us pretty well.
- 00 04 09 52 CDR So -
- 00 04 09 58 CMP Has it maneuvered yet?
- 00 04 10 01 CDR No.

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Day 1

44

- 00 04 10 18 CDR Yes, I understand. I just - as I say, I just can't very well do that now. I don't want to lose sight of this S-IVB.
- 00 04 10 34 CDR Okay. As soon as we find the earth, we'll do it.
- 00 04 10 38 LMP ... would you please pitch outside?
- 00 04 10 44 CMP No, the earth is below us, now.
- 00 04 10 49 LMP Why don't you roll to your left? That way, you could put the earth out of your ...
- 00 04 10 56 CDR Do you see the earth with your sextant, Jim?
- 00 04 10 58 CMP No, I don't ... S-IVB ...
- 00 04 11 03 CDR Houston, the venting of the S-IVB is terminated.
- 00 04 11 28 CMP I think you ought to roll ...
- 00 04 11 49 CMP ... should be right on the optics.
- 00 04 13 27 CDR I'm not getting a zero, ...
- 00 04 13 54 CDR Go ahead, Houston; Apollo 8.
- 00 04 14 07 CDR No, I'm not even sure we're going to do it yet, Mike. If I can get - We seem to be drifting away from this thing a little bit, although it is still pointing at us quite closer than I'd like.
- 00 04 14 32 CDR Okay. Well, right now, our gimbal angles are about - Roll's about 190 and pitch is about 320 and yaw is about 340. We could certainly do it in this position. That would be alright.
- 00 04 15 30 CDR And it started to ...
- 00 04 15 40 CDR How high are the temperatures, Jim?
- 00 04 16 05 CMP Hey, you started to ... there, huh?
- 00 04 17 06 CMP ... which way it's going to pitch with respect to the earth.
- 00 04 17 08 CDR Go ahead, Houston; Apollo 8.

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Day 1

45

- 00 04 17 26 CDR Well, it's as I said before. We can't definitely find the earth. I think that we are in front and a little bit above - a little bit above the - almost in front of the - directly in front of the booster.
- 00 04 17 44 CDR Perhaps a little bit horizontally displaced - towards the - Let's see -
- 00 04 18 02 CMP The earth should be right over there. Is the earth over there?
- 00 04 18 09 CMP Okay, we'll take it to the other side. We don't know ...
- 00 04 18 21 CDR Houston, to help you, we are looking right directly above the S-IVB with - the sun is - It's on the right side of the S-IVB and on our - Coming in our left number 1 window.
- 00 04 18 52 CMP Oh, here it is. There's the earth over here - -
- 00 04 18 54 CDR To the right?
- 00 04 18 55 LMP Yes, the earth's kind of low. That will be - It's in our plus-Y, plus-Z direction.
- 00 04 19 03 CDR The earth is in our plus-Y, plus-Z direction now, Mike.
- 00 04 19 24 CMP ...., do you want to do a realign?
- 00 04 19 36 LMP GDC align, IMU is ...
- 00 04 20 13 CMP What did you do? Did you do the P50?
- 00 04 20 15 LMP Yes.
- 00 04 20 52 CMP Houston, for information, I am looking through the scanning telescope now, and I see millions of stars; most of them - the venting from the S-IVB.
- 00 04 21 02 LMP There you are, Frank.
- 00 04 21 09 CMP Definitely; we are in sunlight, and it looks like they are all S-IVB, but we don't know. I am going to attempt a P52 realign at this time and see what I can do. Okay.
- 00 04 21 22 CDR Let me talk about the ...

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Day 1

46

00 04 22 31 LMP      Are you through with this?  
00 04 22 37 LMP      Jim always falls that way.  
00 04 24 28 CMP      Okay, two balls 54. You see, when you read them ...  
                          three balls ... minus 00086, plus 00141, ... Okay, ...  
00 04 26 36 CDR      Mike, anything more on this separation maneuver you're on?  
00 04 26 58 CDR      That's right. Quite a bit to our rear and down  
                          below us - off to the right.  
00 04 27 17 CDR      ... of us and slightly below us.  
00 04 27 23 CDR      It sure is staying close to us.  
00 04 27 27 CDR      Jim, doesn't it look slightly below us and slightly ...?  
00 04 27 55 CMP      Which way does the - Does anyone know which way the  
                          S-IVB pitches?  
00 04 28 02 CDR      Mike, can you just tell us which way the S-IVB pitches,  
                          and how far it will pitch to the slingshot-maneuver  
                          attitude?  
00 04 28 51 CDR      Okay. Thank you.  
00 04 28 59 LMP      Houston, are you ready to copy the IMU align information?  
00 04 29 05 LMP      Alright. Star ID is 03, and star 36; star angle  
                          difference 0.01; torquing angle: X, minus 00034;  
                          Y, minus 0027; Z, plus 00100. Over.  
00 04 29 38 LMP      Roger. Three zeros: 00027.  
00 04 29 45 CMP      Houston, we are going to have to hold up on the cis-  
                          lunar navigation until after this next little maneuver.  
00 04 29 56 CMP      What did you say your ... was?  
00 04 30 14 CMP      ... 00016 ...  
00 04 31 22 CDR      Go ahead, Mike.  
00 04 31 29 CDR      Roger. Stand by.  
00 04 33 48 CMP      Okay.

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Day 1

47

- 00 04 34 11 CDR Go ahead, Houston.
- 00 04 34 15 CDR Roger. I'm getting the COAS right on it now so it will be accurate.
- 00 04 34 27 CDR Okay. With the COAS right on the S-IVB, the roll reads 105, the pitch is 275, and the yaw is about 325.
- 00 04 34 52 CDR Roger. That should be 115 for the roll.
- 00 04 35 52 LMP Houston, Apollo 8. Over.
- 00 04 35 59 LMP Roger. If it will help you any, Mike, the earth is plus Y about 45 degrees in a minus X. I can see it out my side window, and it's a beautiful view with numerous cloud vortex.
- 00 04 36 25 LMP Negative. It's 45 degrees in the plus Y, in the XY plane towards minus X. Over.
- 00 04 36 42 LMP 45 degrees from plus Y to minus X.
- 00 04 36 51 LMP It's behind us to the right, if that will help.
- 00 04 37 13 LMP I can still see the Cape and isthmus of Central America.
- 00 04 37 37 CDR Why do you want to use - do so much, Mike?
- 00 04 37 52 CDR Okay.
- 00 04 37 55 LMP Why don't you attempt to yaw - Yaw right ... See the earth ...
- 00 04 38 16 LMP No, all you got to do is just ... yaw - yaw to the right, and, you'll be ... You'll be over in this direction ...
- 00 04 38 55 CDR Mike, do you want me to go ahead and try to do this, or are you going to give me some gimbal angles?
- 00 04 39 11 CDR Okay. I don't understand why you want so many feet per second on it, but I think I can - with just a little maneuvering, I can get away from it a lot simpler than th
- 00 04 39 30 CDR Okay.
- 00 04 39 53 CDR VHF sounds good.

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Day 1

48

- 00 04 40 02 CDR Could you yaw about 10 degrees to your - your left?
- 00 04 41 25 CMP OMNI B.
- 00 04 42 01 LMP Go ahead, Houston; Apollo 8.
- 00 04 42 19 LMP Okay.
- 00 04 42 30 LMP Roger. We are maneuvering to the attitude now.
- 00 04 43 10 CMP That look pretty good now?
- 00 04 43 12 CDR Yes.
- 00 04 43 18 CDR Okay, Houston. I understand you want 8 feet per second burn, is that right?
- 00 04 43 32 CDR Well, we are as close to being radially upward as we can determine.
- 00 04 44 07 CMP Roger, Houston. We're putting it in now.
- 00 04 45 04 CDR We're maneuvering now.
- 00 04 45 46 LMP Okay, why don't you ... window, and do that P47?
- 00 04 45 54 CDR Houston, we made the burn at 7.7 plus X, plus 00001 Y, and Z's are all zeros. The gimbal angles: roll 180, pitch 310, and yaw 020.
- 00 04 46 19 LMP Okay, Frank, whenever you're ready ...
- 00 04 46 29 CDR Did you get that information, Houston?
- 00 04 46 36 CDR Read you loud and clear. Did you get the information?
- 00 04 46 52 CDR Roger. Did you get that information? The burn was made at - initiated at 04:45.
- 00 04 47 15 LMP We're in good shape. Roll right. ... back where the earth used to be.
- 00 04 47 30 CDR Okay. Do you want us to transfer that to the CS - to the LM state vector or just leave it alone?
- 00 04 47 43 CDR Roger.
- 00 04 47 45 LMP You got VERB 66 entered?

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Day 1

49

00 04 48 59 CDR You still got it, Bill?  
00 04 49 04 LMP We're going right to it. ...  
00 04 49 14 CDR Can you roll at all?  
00 04 49 19 LMP Huh? I don't want to, now.  
00 04 49 44 LMP It's about - in the XYZ plane, it's about 10 degrees  
... Yes, right out here ...  
00 04 50 34 CDR Go ahead, Houston; Apollo 8.  
00 04 50 41 CDR Bill is the only one that can see it. Just a minute.  
00 04 50 45 CDR We're 90 degrees from its X-axis --  
00 10 19 38 SC ... 1, 2, 3, 4, 5; 5, 4, 3, 2, 1.  
00 10 19 46 LMP Well, no. We got to get a DAP load in here to make  
sure they check first, right? Okay? Okay, it's -  
You got the DAP to where you want it?  
00 10 19 56 CDR I'm going to get it right now.  
00 10 19 59 CDR Done P30?  
00 10 20 01 CMP We haven't done P30 yet.  
00 10 20 02 LMP That's right.  
00 10 20 03 CDR I know, but don't you want to do - Before you do  
P30, don't you want to look at the DAP - -  
00 10 20 07 CMP No, no, that comes way down along the line.  
00 10 20 08 CDR Alright, alright, excuse me; go ahead.  
00 10 20 10 LMP Okay, P30.  
00 10 20 13 CMP Okay.  
00 10 20 14 LMP VERB 37, ENTER; 30, ENTER.  
00 10 20 22 CMP Okay.  
00 10 20 23 CDR I want GETI.

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Day 1

50

00 10 20 24 CMP 10:59:5830.  
00 10 20 30 CMP Okay? I like it. Do you like it?  
00 10 20 31 CDR Yes.  
00 10 20 34 CMP Okay, 136, good; minus three balls 45 is good; plus 00202, good. I like it. Proceed.  
00 10 20 44 LMP I can't - I can't even see the DSKY here.  
00 10 20 51 CMP Okay, 1685 ... Okay, I'll - Okay, that's good.  
00 10 21 00 LMP Okay.  
00 10 21 01 CMP Proceed.  
00 10 21 04 CMP Set your clocks.  
00 10 21 05 CDR Okay.  
00 10 21 08 CDR Let's see, might as well have a countdown for this one, huh?  
00 10 21 11 CMP Yes.  
00 10 21 12 CDR Well, all our stuff is counting up though, isn't it?  
00 10 21 16 LMP I got mine; I can figure it - I've got 6 seconds to go or some - 6 minutes to go, 5 minutes to go - either way, so you can suit yourself.  
00 10 21 25 LMP Why don't you count down? I can call it out to you.  
00 10 21 59 CMP Okay, we don't have too much time. We've got to get a boresight star and all that stuff, too.  
00 10 22 04 LMP Yes, I know it.  
00 10 22 05 LMP Okay, you got your --  
00 10 22 06 CMP Just stand by, I don't - haven't started yet.  
00 10 22 08 LMP Start it on 50, 30 -  
00 10 22 09 CDR 7.  
00 10 22 11 CDR 37, 40 - 7, 46, 45, 44, 43, 42, 41 -  
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Day 1

51

00 10 22 17 LMP 1.

00 10 22 18 CDR/LMP START.

00 10 22 19 LMP Right.

00 10 22 20 CDR 37, 38 -

00 10 22 22 LMP Right, right.

00 10 22 23 CDR 37 -

00 10 22 24 LMP Right.

00 10 22 25 CMP Okay, proceed.

00 10 22 26 LMP (Sigh)

00 10 22 27 CMP Proceed!

00 10 22 29 CDR We are asking, Bill.

00 10 22 31 LMP Oh, okay. Proceed, Roger.

00 10 22 35 CMP Okay, we did a P52. Now we go to POO. Is that what we're doing?

00 10 22 43 LMP ... go to POO.

00 10 22 45 CMP Okay, go to 40 now.

00 10 22 49 LMP Okay, P40.

00 10 22 50 CDR You know you ought to go to POO to maneuver to the burn attitude.

00 10 22 54 LMP Yes, I will; I got it.

00 10 22 57 LMP Okay. Okay.

00 10 22 59 LMP Okay, P30. You got your optics power OFF, by the way? Oh, you're going to be using them, are you?

00 10 23 04 CMP Yes, I got to use them.

00 10 23 05 LMP Okay, CMC, ON.

00 10 23 07 CMP CMC, ON.

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Day 1

52

00 10 23 08 LMP ISS, ON. SCS, operating; test the CAUTION/WARNING lights.  
00 10 23 12 CMP Okay, go ahead. Okay.  
00 10 23 17 LMP Okay. EMS MODE, STANDBY.  
00 10 23 23 CDR STANDBY.  
00 10 23 24 LMP EMS function DELTA-V, SET.  
00 10 23 26 CDR DELTA-V, SET.  
00 10 23 28 LMP Set DELTA indicator to 15868.  
00 10 23 31 CDR Right, I'll do that.  
00 10 23 39 CDR You guys can go on; I'll get this.  
00 10 23 42 LMP That's about all there is.  
00 10 23 43 CDR Okay.  
00 10 24 09 CDR Okay, 15868.  
00 10 24 11 LMP Okay. EM MODE - EMS MODE, AUTO.  
00 10 24 15 CDR AUTO.  
00 10 24 16 LMP EMS function DELTA-V, TEST.  
00 10 24 18 LMP SCS - SPS thrust light ON and OFF in 10 seconds.  
00 10 24 22 CDR Okay.  
00 10 24 29 CDR Good, minus 19.5. Good set; it's okay.  
00 10 24 32 LMP EMS MODE, STANDBY.  
00 10 24 35 CDR STANDBY.  
00 10 24 36 LMP DELTA-V, SET.  
00 10 24 37 CDR DELTA-V, SET.  
00 10 24 38 LMP Set DELTA-V<sub>c</sub>.  
00 10 24 39 CDR What is the DELTA-V<sub>c</sub>?

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Day 1

53

00 10 24 42 CMP Okay, DELTA-V<sub>c</sub> is - 18.6.  
00 10 24 56 LMP 18.6?  
00 10 24 57 CMP 18.6.  
00 10 25 03 CDR Alright, set.  
00 10 25 05 LMP Okay, EMS function, DELTA-V.  
00 10 25 06 CDR DELTA-V.  
00 10 25 07 LMP Okay, NONESSENTIAL bus is going to MAIN B.  
00 10 25 10 LMP Okay, cycling the cryo fans.  
00 10 25 13 CMP I guess you can't complain.  
00 10 25 25 LMP Okay, I'll just do this once every minute, now.  
00 10 25 30 LMP Okay, BMAG MODE, three, RATE 2.  
00 10 25 34 CDR BMAG MODE, three, RATE 2 - 2, 3.  
00 10 25 37 LMP DELTA-V<sub>cg</sub>, CSM.  
00 10 25 41 CDR CSM.  
00 10 25 42 LMP CMC MODE, FREE.  
00 10 25 43 CDR CMC MODE, FREE.  
00 10 25 44 LMP AUTO RCS, sixteen - 16, as required for ullage.  
00 10 25 49 CDR Okay, we have here.  
00 10 25 50 LMP Load the DAP.  
00 10 25 52 CMP Okay, VERB 48, ENTER. Okay, that's good, right?  
00 10 25 55 LMP Yes.  
00 10 25 56 CMP Good. Okay, we'll proceed. Okay, 63295, 635 - okay, that's wrong.  
00 10 26 07 CMP Plus 63295. Okay. Proceed. Be minus 163, minus 129. VERB 24, ENTER; minus 00163, ENTER; plus 00129, ENTER. Okay, proceed; VERB 46, ENTER. Okay.

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Day 1

54

00 10 26 45 LMP Okay, ROTATIONAL CONTROL POWER, NORMAL, both AC/DC.

00 10 26 50 CDR NORMAL, AC/DC.

00 10 26 51 LMP DET is SET. VERB 37, ENTER; 00, ENTER.

00 10 26 57 CMP VERB 30 - I got it!

00 10 26 59 CDR I'm glad you're --

00 10 27 00 LMP SPACECRAFT CONTROL, CMC.

00 10 27 03 CDR CMC.

00 10 27 04 LMP CMC MODE, AUTO.

00 10 27 06 CDR AUTO.

00 10 27 07 LMP Maneuver to pad burn attitude with VERB 62, ENTER; VERB 49, ENTER.

00 10 27 12 CMP VERB 62, ENTER; VERB 49, ENTER.

00 10 27 18 CDR Reset that for zero.

00 10 27 20 CMP VERB 25, ENTER; and it's 345 - 3, 4, 5 --

00 10 27 25 LMP No, that's wrong. You've got to have plus.

00 10 27 28 CMP Alright, plus. Oh. 45, 00, ENTER; plus 188 - 1880, ENTER; plus 343; 00, ENTER. Okay. All set.

00 10 27 50 CDR Go ahead.

00 10 27 51 CMP Proceed?

00 10 27 52 CDR Yes.

00 10 27 53 CMP Proceed. Proceed!

00 10 27 54 CDR Proceed.

00 10 27 55 LMP Wait a minute. Okay, you got SCS AUTO and everything?

00 10 28 00 CMP Huh?

00 10 28 01 LMP You're all set, right?

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Day 1

55

00 10 28 02 CDR Yes, that's all it takes.  
00 10 28 05 LMP BMAG's -  
00 10 28 06 CDR RATE 2, you called that.  
00 10 28 07 LMP Okay then. You don't have any other  
00 10 28 14 LMP We maneuvering?  
00 10 28 16 CDR Yes.  
00 10 28 24 CDR Are we ever!  
00 10 28 45 LMP Which way you going?  
00 10 28 47 CDR Rolling right, and yawing left.  
00 10 29 24 CC Apollo 8, Houston.  
00 10 29 27 CDR Go ahead, Houston; Apollo 8.  
00 10 29 30 CC Okay, we've got a telescope alignment if you'd like  
to give it a try. Your sextant star is still good,  
but if you had problems with that, folks have worked  
out that if you look through the telescope at 10:35,  
we have a shaft and trunnion that should point you  
at center of the earth, if you'd like to give that  
one a try.  
00 10 29 50 CMP Okay.  
00 10 29 51 CDR Okay.  
00 10 29 54 CC Okay, at 10:35 - -  
00 10 29 58 CDR Write that down.  
00 10 29 59 CMP Okay, here, I got it.  
00 10 30 00 CC - - the shaft angle 006.2, trunnion 18.9. Over.  
00 10 30 13 CDR Did you get that, Jim, there?  
00 10 30 14 LMP Roger, 10:35; shaft, 006.2; trunnion, 18.9.  
00 10 57 30 CDR You heard me, didn't you? I ... Not if you just  
do a real quickly.

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Day 1

56

00 10 57 40 LMP Coming up on 2 minutes.  
00 10 57 41 CDR Okay.  
00 10 57 51 LMP Okay, 2 minutes. DELTA-V THRUST A, NORMAL.  
00 10 57 55 CDR MAIN THRUST, NORMAL.  
00 10 58 00 LMP TRANSLATIONAL HAND CONTROLLER, ARMED.  
00 10 58 03 CDR ARMED.  
00 10 58 05 LMP ROTATIONAL HAND CONTROLLER, both, ARMED.  
00 10 58 06 CDR Got yours?  
00 10 58 07 CMP Okay.  
00 10 58 08 LMP Tape recorder is RECORD, HIGH bit rate, and FORWARD.  
00 10 58 13 LMP Okay, stand by for DSKY - blanking.  
00 10 58 17 CDR Okay.  
00 10 58 24 CDR What happened to EMS, AUTO? Bill?  
00 10 58 31 LMP 30 seconds.  
00 10 58 32 CMP 30 seconds.  
00 10 58 33 CDR Okay.  
00 10 58 35 LMP I don't see how Wally did this ...  
00 10 58 36 CMP What's that?  
00 10 58 37 LMP Hold these things down.  
00 10 58 42 CDR We hear you.  
00 10 58 44 CC Stand by for a mark in 1 minute.  
00 10 58 47 CDR Roger; Apollo 8 standing by.  
00 10 58 49 CC -- 10 seconds.  
00 10 58 50 LMP Yes. Alright, I'll --

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Day 1

57

00 10 58 54 CC 5 seconds. 2, 1 -  
00 10 58 59 CC MARK.  
00 10 59 00 CC 1 minute.  
00 10 59 01 CDR Roger.  
00 10 59 06 CMP (Singing)  
00 10 59 12 LMP Okay, at 30 seconds, get EMS MODE, AUTO.  
00 10 59 13 CDR Right.  
00 10 59 18 CMP (Singing)  
00 10 59 23 CMP Your DSKY should blank?  
00 10 59 24 CDR Blank.  
00 10 59 25 LMP EMS MODE, AUTO; average g is ON.  
00 10 59 29 LMP Check your PIPA bias.  
00 10 59 30 CMP No ullage.  
00 10 59 31 CDR No ullage, yes.  
00 10 59 36 CMP Counting down.  
00 10 59 46 CMP What's that do?  
00 10 59 47 LMP FLIGHT RECORDER.  
00 10 59 50 CDR 10, 9 -  
00 10 59 55 CMP ENABLED.  
00 11 00 01 CMP Stop. At 10:02, it has to be OFF.  
00 11 00 05 CDR Okay, 10:02.  
00 11 00 07 CMP Okay.  
00 11 00 08 CDR Like a big spring.  
00 11 00 09 LMP Okay, have you gone forw - -

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Day 1

58

- 00 11 00 10 CMP Two balls off.
- 00 11 00 11 LMP Okay, now.
- 00 11 00 12 CDR Okay.
- 00 11 00 13 CMP It's holding; let's go, let's go through the checklist.
- 00 11 00 15 LMP Okay, okay, you got that; SPS THRUST light, ON, ...  
Okay, DELTA-V THRUST A, OFF.
- 00 11 00 21 CDR OFF.
- 00 11 00 22 LMP Okay, verify THRUST is OFF. I verify it over here.
- 00 11 00 25 CDR Right.
- 00 11 00 26 LMP SPS PITCH and YAW circuit breakers, CLOSED.
- 00 11 00 30 CDR They're CLOSED.
- 00 11 00 31 LMP Okay, turn them OFF: GIMBAL MOTORS.
- 00 11 00 32 CDR 1, OFF.
- 00 11 00 33 LMP Got it.
- 00 11 00 34 CDR 2, OFF.
- 00 11 00 35 LMP Got it.
- 00 11 00 36 CDR 3, OFF.
- 00 11 00 37 LMP Got it.
- 00 11 00 38 CDR 4, OFF.
- 00 11 00 39 LMP Got it.
- 00 11 00 40 CDR Okay.
- 00 11 00 41 LMP TVC SERVO POWER, 1 and 2, OFF.
- 00 11 00 42 CDR OFF.
- 00 11 00 43 LMP FLIGHT RECORDER's OFF; MAIN BUS ties going OFF.
- 00 11 00 51 CMP Okay.

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Day 1

59

00 11 00 53 LMP Okay, null residuals.  
00 11 00 54 CMP Okay, proceed. You've got your ...  
00 11 00 59 LMP Proceed.  
00 11 01 03 CDR Got them? Do I null them?  
00 11 01 05 LMP Null residuals.  
00 11 01 07 CMP 20.4.  
00 11 01 17 CMP That's an awful lot.  
00 11 01 19 CDR Yes, I know it.  
00 11 01 34 CDR There you are.  
00 11 01 35 CMP Okay - Okay. Null - residuals - residuals are nulled.  
00 11 01 40 LMP Okay, record DELTA-V COUNTER and residuals.  
00 11 01 42 CMP You can turn this OFF before --  
00 11 01 43 CDR I turned it OFF ...  
00 11 01 47 LMP EMS function, OFF.  
00 11 01 48 CDR OFF.  
00 11 01 49 LMP EMS MODE, STANDBY.  
00 11 01 52 CDR STANDBY.  
00 11 01 53 LMP BMAG MODE, three, RATE 2.  
00 11 01 54 CDR RATE 2.  
00 11 01 55 LMP DEADBAND, MAX.  
00 11 01 56 CDR DEADBAND, MAX.  
00 17 53 25 CMP How's that, sports fans? All balls.  
00 17 53 42 LMP As soon as you've got an audience, you do great.  
00 17 53 52 CMP 14640.

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Day 1

60

00 17 54 04 CMP Time.  
00 17 54 06 LMP 17:53:1936, got it.  
00 17 54 15 CDR How many markings for this set is that?  
00 17 54 21 CMP There's two stars and three marks per set.  
00 17 54 24 LMP That's three for that second - that's the same star,  
second set, third set of marks. And then you've got --  
00 17 54 29 CMP Do I have six marks, total?  
00 17 54 32 LMP You got six marks, total. You need three more on this  
same star, right?  
00 17 54 34 CMP Yes, okay. There's the third one, there.  
00 17 54 42 LMP Okay.  
00 17 54 43 CMP Okay, I got -  
00 17 55 08 CMP Okay, I go three?  
00 17 55 49 LMP Oh - you on hold?  
00 17 55 51 CMP Yes.  
00 17 55 52 LMP 18 and 3, huh?  
00 17 55 56 CMP Yes.  
00 17 56 07 CMP 74645.  
00 17 56 11 LMP Okay.  
00 17 56 14 CMP Okay. 17:55:38?  
00 17 56 20 LMP Right.  
00 17 56 39 CMP 3.  
00 17 56 40 LMP 3.  
00 17 58 21 LMP You in bold?  
00 17 58 22 CMP Hold.

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Day 1

61

00 17 58 34 LMP 8 and 1.  
00 17 58 35 CMP Right.  
00 17 58 36 LMP Got it.  
00 17 58 43 CMP 74655.  
00 17 58 46 LMP Got it.  
00 17 58 52 CMP 17:58:19.  
00 17 58 56 LMP Got it.  
00 17 59 14 CMP 3.  
00 17 59 17 LMP 3.  
00 18 00 35 CMP Oh, oh.  
00 18 00 47 LMP Three zeros, okay?  
00 18 00 56 LMP 12662.  
00 18 00 58 CMP Right.  
00 18 01 01 CMP Okay.  
00 18 01 06 LMP It only went down 17. Wait a minute.  
00 18 01 10 CMP What's that?  
00 18 01 12 LMP It only went down 17 - 17, 18, 00, 23, 00. Okay?  
00 18 01 23 CMP Okay.  
00 18 01 25 LMP Now I get this.  
00 18 01 27 CMP Proceed.  
00 18 01 30 CMP Okay, new star?  
00 18 01 31 LMP New star, number 22.  
00 18 01 35 CMP Okay, what is it, 22, star - What's the code after it?  
00 18 01 40 LMP It doesn't say.

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Day 1

62

- 00 18 01 45 CMP Yes, 00120 - 1, 2, 0.
- 00 18 01 48 LMP Which way are you going to be going? Far horizon?
- 00 18 01 51 CMP Yes, it'll be at the same horizon. Too close to gimbal lock? Yes, 03. It won't be a far move, though. 21 plus 22, ENTER; proceed; that should be a zero.
- 00 18 02 16 CMP AUTO?
- 00 18 02 18 LMP Let's - No, why don't you proceed? Let's see where it - where it's going to take it.
- 00 18 02 31 LMP Okay, we're - Pitch 123, yaw 305 - Oh, we're getting right under it.
- 00 18 02 38 CMP Yes. All set?
- 00 18 02 40 LMP Okay, CMC and AUTO.
- 00 18 02 43 CMP Okay.
- 00 18 03 12 CMP Okay - -
- 00 18 03 13 LMP Okay, we're there.
- 00 18 03 14 CMP Okay. How's that? ... zero off.
- 00 18 03 52 LMP 70645.
- 00 18 03 57 CMP What was that, again?
- 00 18 03 58 LMP 70645. Trunnion?
- 00 18 04 01 CMP Okay.
- 00 18 04 33 LMP 18:04:3472. ... with something right, here.
- 00 18 04 46 CMP I got 03. Okay?
- 00 18 04 47 LMP Yes.
- 00 18 05 06 LMP 3.
- 00 18 05 07 CMP 3.
- 00 18 06 52 CMP 18 was - Go ahead.

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Day 1

63

00 18 06 56 LMP 1898, trunnion.

00 18 07 19 CMP What - what the other ... Is this the third one or the fourth one?

00 18 07 24 LMP The third one was - 31 --

00 18 11 14 CDR Houston, do you read Apollo 8? We've got a lot of noise.

00 18 11 30 CMP Are we in -

00 18 11 32 LMP We're in hold, you want to go - What you want, AUTO?

00 18 11 36 CMP No, no, just ...

00 18 11 39 CDR Houston, Apollo 8.

00 18 11 41 CMP ...

00 18 11 43 CC Apollo 8, Houston; go.

00 18 11 45 CDR Roger; we lost you when you started talking about the -- -- 4, 5; 5, 4, 3, 2, 1. Over.

00 21 10 09 LMP Roger; and give us a comment on the voice quality.

00 21 10 24 CMP OPTICS POWER going OFF.

00 21 10 26 LMP Okay, you've already - OPTICS DRIVE, check the star - check boresight star.

00 21 10 32 CMP I've checked them all.

00 21 10 34 LMP Okay, VERB 37 - How did you get out of that?

00 21 10 44 CMP It's all been checked.

00 21 10 45 LMP Okay, VERB 37, ENTER; 40, ENTER.

00 21 10 49 CMP Okay.

00 21 10 52 LMP ...

00 21 11 06 LMP VERB 37, ENTER - -

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DAY 3

02 08 39 44 LMP

-- hazy, so we haven't really taken too many pictures on the way out. Every now and then we have taken a shot with the 70-millimeter camera and 80-millimeter lens at f:11, 1/250th, but it's questionable how good these will be, because of the haze on the windows.

02 08 40 14 LMP

Another problem has been trying to record the development of the smear on the windows. Seemed to come pretty quick on window number 3. And the technique of - of taking a picture when the sun's 85 degrees incidence is not possible, because the window frames are so thick that you can't get any sun on them with an 85-degree incidence. What pictures have been taken, have been taken about 60 to 70 degrees incidence with various f-stops.

02 08 41 03 LMP

Anybody else have anything for the record?

02 08 41 07 CDR

No.

02 08 41 08 LMP

Jim?

02 08 41 09 CMP

Yes, you might mention about this hard thing to open here.

02 08 41 13 LMP

One point we might mention is that the foodbox doors are hard to close. Looks like the foodbox has split out a little bit on the left - -

02 08 41 23 CMP

The handle's bent.

02 08 41 24 LMP

-- left side. And in - look's like we've gotten the handle bent in trying to close the door. We're able to lock it on one side now, on the right side, but not on the left. The food has generally been good, particularly the last meal: butterscotch pudding, beef stew, grapefruit drink, and chicken soup. Notable - -

02 08 41 53 CMP

Hot wa - -

02 08 41 55 CDR

-- the notable, mainly notable ones were the grapefruit drink and butterscotch pudding.

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Day 3

65

- 02 08 42 02 CMP Well, Bill, you might mention the hot water makes a big improvement, too.
- 02 08 42 06 LMP Jim Lovell says the hot water makes a big improvement. The meals I've had have been quite tasty, though none of us have really gone overboard for the little bread cru - cubes and cereal cubes.
- 02 08 42 33 LMP Also, I'd like to suggest that if they ever fly one of these TV cameras again, they put a - some kind of a sight on it. Sort of ridiculous to have a 9-degree field-of-view lens with no way of aiming it except for looking down the side or putting some chewing gum on the top.
- 02 08 42 57 LMP Also might tell Doc Frome that his toothpaste tastes pretty good. I don't know what kind of job it does on your teeth, but it's nice for settling your stomach after dinner.
- 02 08 43 10 LMP Anything else, Frank?
- 02 08 43 11 CMP We used it for frosting on the fruitcake.
- 02 08 43 18 LMP Jim Lovell is be - engaged in an activity which I shan't describe, so I think I'll cut this short and get my oxygen mask.
- 02 08 43 24 CMP But that could be improved, also (laughter).
- 02 12 59 10 LMP DSKY blank at minus 35 seconds.
- 02 12 59 14 CMP Alright, stand by.
- 02 12 59 17 CMP DSKY blank.
- 02 12 59 19 CMP Okay.
- 02 12 59 20 LMP LIMIT CYCLE, OFF.
- 02 12 59 23 CDR LIMIT CYCLE, OFF.
- 02 12 59 24 LMP EMS MODE, AUTO.
- 02 12 59 25 CDR AUTO.

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Day 3

66

02 12 59 28 LMP Okay, at 0/16 85, null v<sub>gx</sub>, y, and z. Null component. Tell me when you're going to burn.

02 12 59 43 CDR Okay, stand by.

02 12 59 47 CDR At the flash.

02 12 59 50 LMP 4, 1 -

02 12 59 55 CMP/LMP BURN.

02 12 59 58 CDR 11 seconds.

02 13 00 00 LMP Burning.

02 13 00 01 CMP 11 seconds.

02 13 00 09 CMP Should be OFF by now.

02 13 00 12 CDR ... That's good.

02 13 00 13 LMP Okay, 12 seconds.

02 13 00 15 CMP 12 seconds?

02 13 00 16 LMP Okay, record DELTA-V COUNTER, residuals; TAPE RECORDER is going to STOP --

02 13 00 55 CMP Okay, now do VERB 66, ENTER.

02 13 00 57 LMP VERB 66, ENTER.

02 13 01 01 CMP Houston, Apollo 8.

02 13 01 06 CC Go ahead.

02 13 01 08 CMP Roger; burn on time, angles nominal --

02 20 57 28 CMP What's this --

02 20 57 29 CDR What's that LOS time, Bill?

02 20 57 32 LMP 58:58 - 68:58.

02 20 57 35 CDR See if we lose the signal then.

02 20 57 37 LMP Okay.

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Day 3

67

02 20 57 38 CDR What was the seconds? Jim?

02 20 57 42 CMP I didn't bother with it; wasn't it something like 58:02?

02 20 57 54 CC Apollo 8, 10 seconds to go. You're GO all the way.

02 20 58 00 CDR Roger.

02 20 58 02 CMP 58:04.

02 20 58 06 CDR Gees.

02 20 58 10 LMP S-BAND VOLUME, down.

02 20 58 12 CDR That was great, wasn't it? I wonder if they've turned it OFF.

02 20 58 19 LMP (Laughing) Chris probably said, "No matter what happens, turn it OFF."

02 20 58 24 CMP Okay. My S-volume is down.

02 20 58 25 CDR Alright, let's go ahead with the checklist. Okay, we've got 10 minutes. We want to hold at the 6-minute mark.

02 20 58 31 LMP Okay.. You got the STABILIZATION CONTROL SYSTEM's circuit breakers, panel 8, CLOSED.

02 20 58 34 CDR Right.

02 20 58 35 LMP Closed SPS, 12, CLOSED.

02 20 58 36 CDR Right.

02 20 58 37 LMP DEADBAND, MINIMUM.

02 20 58 39 CDR DEADBAND, MINIMUM.

02 20 58 40 LMP RATES, LOW.

02 20 58 41 CDR LOW.

02 20 58 42 LMP LIMIT CYCLE, ON.

02 20 58 43 CDR LIMIT CYCLE, ON.

02 20 58 44 LMP MANUAL ATTITUDE, three, RATE COMMAND.

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Day 3

68

02 20 58 47 CDR RATE COMMAND.  
02 20 58 48 LMP BMAG MODE, three, ATT 1/RATE 2.  
02 20 58 49 CDR ATT 1/RATE 2.  
02 20 58 52 LMP ROTATIONAL CONTROL POWER DIRECT, both, OFF.  
02 20 58 54 CDR QFF.  
02 20 58 55 LMP SCS TVC, two, RATE COMMAND.  
02 20 58 59 CDR RATE COMMAND.  
02 20 59 01 LMP TVC GIMBAL DRIVE, PITCH and YAW, AUTO.  
02 20 59 03 CDR AUTO.  
02 20 59 05 LMP Have you got your GDC aligned?  
02 20 59 06 CDR Yes.  
02 20 59 11 CDR GDC aligned.  
02 20 59 13 LMP CMC and AUTO.  
02 20 59 14 CDR CMC and AUTO.  
02 20 59 18 LMP DELTA-V - Set in DELTA-V.  
02 20 59 22 CDR Up here, you mean?  
02 20 59 23 LMP Yes.  
02 20 59 24 CDR Yes.  
02 20 59 25 LMP Just going back and catching all those things.  
02 20 59 38 CDR Is that all?  
02 20 59 39 LMP That's it.  
02 20 59 41 LMP Waiting to turn on the BUS ties.  
02 21 00 23 CDR Okay, 8 minutes.  
02 21 01 00 CMP Well, the main thing to be is be cool.

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Day 3

69

- 02 21 01 03 CDR Gosh, it is cool.
- 02 21 01 07 CMP It's up to 80 in the cockpit.
- 02 21 01 10 LMP No, I think - just when my clothes touch me, it gets cold, huh?
- 02 21 01 18 CMP Well, I'll tell you, gentlemen; that moon is pretty close.
- 02 21 01 20 CDR 7 minutes.
- 02 21 01 46 LMP Pressure should go down to about 1500.
- 02 21 01 48 CMP Huh?
- 02 21 01 50 LMP Helium pressure will be going down to about 1500.
- 02 21 01 53 CMP Will it stay there?
- 02 21 01 55 CDR Okay, let's go.
- 02 21 01 57 CMP ... minute, Frank.
- 02 21 02 02 CDR Come on, Bill; 6 minutes.
- 02 21 02 06 LMP Okay. MAIN BUS ties, going ON.
- 02 21 02 16 LMP A is ON; B is ON.
- 02 21 02 22 LMP TVC SERVO POWER, one, AC 1, MAIN A.
- 02 21 02 24 CDR AC 1, MAIN A.
- 02 21 02 26 LMP AC 2, MAIN B.
- 02 21 02 27 CDR AC 2, MAIN B.
- 02 21 02 28 LMP TRANSLATION CONTROL POWER, ON.
- 02 21 02 29 CDR ON.
- 02 21 02 30 LMP ROTATIONAL CONTROL POWER NORMAL 2, AC.
- 02 21 02 32 CDR AC.
- 02 21 02 33 LMP ROTATIONAL HAND CONTROLLER number 2, ARMED.
- 02 21 02 35 CDR ARMED.

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Day 3

70

02 21 02 37 LMP Okay. Stand by for the primary TVC check.  
02 21 02 39 LMP You want PITCH 1, ON?  
02 21 02 46 CDR Not quite.  
02 21 02 47 CMP It's 5 minutes.  
02 21 02 49 LMP 69:03:20; we'll just get it at 69:03.  
02 21 02 53 LMP Okay, ready?  
02 21 02 54 CDR Yes.  
02 21 02 56 LMP Okay. Go ahead and start PITCH 1.  
02 21 02 57 CDR 1.  
02 21 02 58 LMP Got it.  
02 21 03 00 CDR YAW 1.  
02 21 03 01 LMP Got it.  
02 21 03 02 CDR Okay.  
02 21 03 03 LMP TRANSLATIONAL HAND CONTROLLER, clockwise.  
02 21 03 04 CDR Clockwise.  
02 21 03 06 LMP Verify no MTVC.  
02 21 03 07 CDR No MTVC.  
02 21 03 09 LMP Okay, SCS sec - TV - secondary TVC check.  
02 21 03 13 CDR Alright.  
02 21 03 14 LMP PITCH 2 and YAW 2, ON.  
02 21 03 16 CDR PITCH 2.  
02 21 03 17 LMP Got it.  
02 21 03 18 CDR YAW 2.  
02 21 03 19 LMP Got it.

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Day 3

71

02 21 03 20 LMP Set GPI trim.  
02 21 03 22 CMP Minus 161.  
02 21 03 24 LMP Got it.  
02 21 03 25 CMP Plus 129.  
02 21 03 28 LMP Verify MTVC.  
02 21 03 31 CDR Verified.  
02 21 03 32 LMP TRANSLATIONAL HAND CONTROLLER, NEUTRAL.  
02 21 03 34 CDR NEUTRAL.  
02 21 03 35 LMP GPI returns to zero.  
02 21 03 36 CDR Zero.  
02 21 03 37 LMP ROTATIONAL CONTROL POWER NORMAL 2, AC/DC.  
02 21 03 40 CDR AC/DC.  
02 21 03 45 LMP Okay. You want to trim it one more time.  
02 21 03 47 CDR Okay.  
02 21 03 48 LMP Okay.  
02 21 03 49 CDR Ready?  
02 21 03 50 LMP Negative.  
02 21 03 52 LMP BMAG MODE, three, RATE 2.  
02 21 03 53 CDR RATE 2.  
02 21 03 54 LMP SPACECRAFT CONTROL, CMC.  
02 21 03 56 CDR CMC.  
02 21 03 58 LMP CMC MODE, AUTO.  
02 21 03 59 CDR AUTO.  
02 21 04 00 LMP PROCEED.

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Day 3

72

02 21 04 02 CDR PROCEED. We're right there.  
02 21 04 04 LMP Okay. You ready to bypass?  
02 21 04 08 CDR Yes.  
02 21 04 09 LMP ATT 1/RATE 2.  
02 21 04 10 CDR ATT 1/RATE 2.  
02 21 04 11 LMP ENTER.  
02 21 04 13 CDR ENTER.  
02 21 04 14 LMP Gimbal test option.  
02 21 04 15 CDR Right.  
02 21 04 16 LMP Verify CMC.  
02 21 04 18 CDR Right.  
02 21 04 19 LMP Proceed. Call it out.  
02 21 04 24 CDR Oh, you ENTERED instead of - you ENTERED, Jim.  
Alright, you would bypass ... --  
02 21 04 33 CMP ... It's okay. Forget them.  
02 21 04 35 CDR Counting down. Okay?  
02 21 04 36 LMP What happened?  
02 21 04 37 CDR He ENTERED --  
02 21 04 38 CMP Should have proceeded. No sweat.  
02 21 04 40 CDR We're just counting down, now.  
02 21 04 41 LMP Okay.  
02 21 04 44 CDR 3 minutes and 34 seconds, counting.  
02 21 04 52 LMP Okay, ROTATIONAL CONTROL POWER, DIRECT, both,  
MAIN A, MAIN B.  
02 21 04 56 CDR MAIN A and MAIN --

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Day 3

73

02 21 04 57 LMP SCS helium valve, AUTO, verify.  
02 21 05 02 LMP LIMIT CYCLE, OFF.  
02 21 05 04 CDR OFF.  
02 21 05 05 LMP FDAO scale, 50/15.  
02 21 05 08 CDR Alright.  
02 21 05 10 LMP Okay, at 2 minutes to go, we'll hit the DELTA-V THRUST A, NORMAL.  
02 21 05 15 CDR Alright.  
02 21 05 21 LMP I'm going to give you a GO --  
02 21 05 22 CDR At that point there?  
02 21 05 23 CMP Yes.  
02 21 05 26 LMP At 2 minutes to go?  
02 21 05 27 CDR Hey, you know the one thing - The problem is we didn't go to trim.  
02 21 05 33 LMP Yes, I said trim - it goes to trim --  
02 21 05 35 CDR Okay.  
02 21 05 36 LMP Or zero.  
02 21 05 37 LMP It's to trim!  
02 21 05 38 CMP It is? Okay.  
02 21 05 39 LMP Yes.  
02 21 05 41 CDR On that horizon, boy, I can't see squat out there.  
02 21 05 47 LMP You want us to turn off your lights to check it?  
02 21 05 49 CMP Hey, I got the moon.  
02 21 05 51 LMP Do you?  
02 21 05 52 CMP Right below us.

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Day 3

74

02 21 05 54 CDR Okay.  
02 21 05 55 LMP It is below us?  
02 21 05 56 CMP Yes, and it's --  
02 21 05 57 LMP Oh, my God!  
02 21 05 58 CDR What's wrong?  
02 21 05 59 LMP Look at that!  
02 21 06 00 CDR Well, come on - Let's - What's, what's the -  
02 21 06 02 CMP 69:06.  
02 21 06 04 CDR Stand by, we're all set.  
02 21 06 08 CDR 213, 212.  
02 21 06 12 LMP Okay. 69:06:20.  
02 21 06 16 LMP Okay. DELTA-V THRUST A, NORMAL.  
02 21 06 19 CDR NORMAL.  
02 21 06 20 LMP TRANSLATIONAL HAND CONTROLLER, ARMED.  
02 21 06 22 CDR ARMED.  
02 21 06 23 LMP ROTATIONAL HAND CONTROLLER, both, ARMED.  
02 21 06 24 CDR ARMED.  
02 21 06 25 LMP TAPE RECORDER's going STOP --  
02 21 06 45 LMP Well, I see two - Look at that - Fantastic!  
02 21 06 47 CMP Yes.  
02 21 06 50 LMP See it? Fan - fantastic, but you know, I still have trouble telling the holes from the bumps.  
02 21 06 55 CDR Alright, alright, come on. You're going to look at that for a long time.  
02 21 07 07 LMP 20 hours, is that it?

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Day 3

75

02 21 07 17 CDR Okay.  
02 21 07 19 LMP Coming up 07:45; DSKY should blank.  
02 21 07 22 CDR 1 minute. Come on, Jim, let's watch it real good.  
02 21 07 30 CMP I'm proceeding on 99.  
02 21 07 45 CDR DSKY blank.  
02 21 07 46 LMP Okay. Okay, average g, ON; FLIGHT RECORDER's going to RECORD; EMS MODE, AUTO.  
02 21 07 56 CMP AUTO.  
02 21 07 57 LMP Check PIPA bias.  
02 21 07 59 LMP No ullage required. Standing by for engine ON enable. Proceed when you get it.  
02 21 08 07 CMP Okay.  
02 21 08 08 LMP Start your watch when you get ignition.  
02 21 08 12 LMP Stand by for - DELTA-V, NORMAL, B.  
02 21 08 16 CMP ENABLED.  
02 21 08 21 CDR 1 second, 2 seconds; alright, how's every --  
02 21 08 24 LMP We got them. Pressure's holding good.  
02 21 08 28 CDR Alright. Everything's good over here, so far.  
02 21 08 30 LMP Everything is looking good.  
02 21 08 37 CDR 15 seconds.  
02 21 08 40 LMP That's four ball valves; everything is great.  
02 21 08 42 CDR Okay.  
02 21 08 43 LMP Pressures are coming up nicely.  
02 21 08 45 CDR Alright.  
02 21 08 59 LMP Everything is great.

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Day 3

76

02 21 09 03 CMP Be the longest 4 - -  
02 21 09 04 CDR Long burn.  
02 21 09 17 CMP She holding good?  
02 21 09 19 CDR Drifting a little bit in roll.  
02 21 09 26 LMP Good shape. P<sub>c</sub> check?  
02 21 09 30 CPR 100.  
02 21 09 36 LMP EMS is counting down.  
02 21 10 04 CDR Jesus, 4 minutes?  
02 21 10 20 CDR 2 minutes.  
02 21 10 28 CDR How's it doing, Bill?  
02 21 10 30 LMP Great shape. Pressures are holding. Helium's coming down nicely. All other systems are GO.  
02 21 10 48 CDR Okay.  
02 21 10 50 LMP We're past 2 minutes; we're in mode 30.. Free area for flange TEMP. Everything is looking good.  
02 21 11 14 CMP Longest 4 minutes I ever spent.  
02 21 11 17 LMP You know, it seems like about 3g's.  
02 21 11 20 LMP 3 minutes.  
02 21 11 24 CMP Okay, you're running a little bit longer on the time on the computer. I got 58:65 - Stand by.  
02 21 11 39 LMP We're looking good, Frank.  
02 21 11 40 CMP 48 seconds.  
02 21 12 00 CMP 28.  
02 21 12 17 CMP Stand by.  
02 21 12 18 CDR Okay.  
02 21 12 20 CMP It went a little bit over, I think.

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Day 3

77

02 21 12 24 LMP 5 - -  
02 21 12 25 CMP What would - -  
02 21 12 26 LMP 4, 3 - -  
02 21 12 27 CMP Move it over.  
02 21 12 28 LMP 2, 1 -  
02 21 12 29 CDR Shutdown.  
02 21 12 30 CMP Okay.  
02 21 12 31 CDR Okay, go ahead.  
02 21 12 32 LMP Okay, DELTA-V THRUST, A and B, OFF.  
02 21 12 33 CDR OFF.  
02 21 12 34 LMP Verify thrust is OFF; it is OFF; helium valves are okay; pressure is static; FLIGHT RECORDER - okay, SPS, GIMBAL MOTORS, four, OFF, slowly.  
02 21 12 46 CMP Okay.  
02 21 12 47 CDR 1, OFF.  
02 21 12 48 LMP Got it.  
02 21 12 49 CDR 2, OFF.  
02 21 12 50 LMP Got it.  
02 21 12 51 CDR 3, OFF.  
02 21 12 52 LMP Got it.  
02 21 12 53 CDR 4, OFF.  
02 21 12 54 LMP Got it. TVC SERVO POWER, 1 and 2, OFF.  
02 21 12 56 CDR 1, OFF; 2, OFF.  
02 21 12 57 LMP FLIGHT RECORDER's OFF; MAIN BUS tie's going OFF; A is OFF; B is OFF.  
02 21 13 13 LMP Okay, go with it; proceed.

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Day 3

78

02 21 13 15 CMP Okay, null resid - proceed.  
02 21 13 16 CDR Proceed.  
02 21 13 17 LMP Null residuals.  
02 21 13 19 CDR Hold it a second or we're not going to null any.  
02 21 13 23 LMP Okay, RECORD.  
02 21 13 25 CMP Okay.  
02 21 13 27 LMP Okay, get the DELTA-V<sub>c</sub>.  
02 21 13 32 CMP Okay, DELTA-V<sub>c</sub>.  
02 21 13 34 CDR Minus 20.1.  
02 21 13 35 LMP Okay. EMS function, OFF.  
02 21 13 38 CDR EMS function, OFF.  
02 21 13 40 LMP EMS MODE, STANDBY.  
02 21 13 41 CDR STANDBY.  
02 21 13 43 LMP BMAG MODE, three, RATE 2.  
02 21 13 45 CMP Attitude?  
02 21 13 46 CDR RATE 2.  
02 21 13 47 LMP DEADBAND, MAX.  
02 21 13 48 CDR DEADBAND, MAX.  
02 21 13 52 CDR Okay.  
02 21 13 53 CMP V<sub>gx</sub> -  
02 21 13 55 LMP TRANS CONTROLLER POWER, OFF.  
02 21 13 56 CDR OFF.  
02 21 13 57 LMP ROTATIONAL CONTROL POWER DIRECT, OFF.  
02 21 14 00 CDR OFF.

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Day 3

79

02 21 14 01 LMP SPS PITCH 1 and 2, YAW 1 and 2 circuit breakers, OPEN.

02 21 14 05 CDR YAW 1 and 2, PITCH 1 and 2, OPEN.

02 21 14 09 LMP Pro - whenever you're ready, proceed.

02 21 14 11 CMP Proceed.

02 21 14 12 LMP Okay, VERB 82, ENTER.

02 21 14 14 CMP VERB 82, ENTER. Check it at zero; I'd better go to zero, now.

02 21 14 22 CDR You want to put that in the other state vector, too, don't you?

02 21 14 25 CMP Yes.

02 21 14 26 CDR Got it.

02 21 14 31 LMP Congratulations, gentlemen, you're at 00.

02 21 14 33 CDR Well, now is no time for congratulations yet.

02 21 14 35 CMP No, we get stuck with that on the carrier. Okay, VERB 82, ENTER.

02 21 14 40 CDR Right.

02 21 14 43 CMP Our state vector.

02 21 14 49 LMP Okay, you got it?

02 21 14 50 CMP We're at 1691, minus 6005. Roger.

02 21 14 55 LMP Proceed.

02 21 14 58 CMP Proceed.

02 21 14 59 LMP 00, EN --

02 21 15 00 CDR Go back to P00.

02 21 15 02 LMP 00, ENTER.

02 21 15 03 CDR Wait - wait a minute. Okay.

02 21 15 04 LMP We go to 37 and then P00, though.

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Day 3

80

02 21 15 11 LMP VERB 66, ENTER.  
02 21 15 13 CMP VERB 66, ENTER.  
02 21 15 15 CDR That's it. Dig out the flight plan.  
02 21 15 17 LMP Whew! Well, we answered it. They're meteorites, aren't they (laughter)?  
02 21 15 22 CMP Hey, I don't see a thing. Where are we?  
02 21 15 24 LMP It looks like a big - looks like a big beach down there.  
02 21 15 28 CDR Let me have the flight plan.  
02 21 15 29 CMP Holy cow, it's completely blank here.  
02 21 15 31 CDR Okay, Jim, you want to -  
02 21 15 35 CMP Have we got all the gimbal motors off and all that sort of thing?  
02 21 15 37 LMP Yes, sir.  
02 21 15 45 CDR You want to take some pictures, Bill?  
02 21 15 47 LMP Let's just go by the - whatever the flight plan says there.  
02 21 15 50 CDR Alright.  
02 21 15 53 CDR Let's see what it says to do. SPS monitor, you're all through with that? Camera PREP.  
02 21 15 59 LMP Okay, Jim has got to get them out or I'll have to - one of us - both of us probably had best get them out.  
02 21 16 02 CMP Yes, I'll just take a look here a minute.  
02 21 16 11 CMP Which ones are the craters?  
02 21 16 15 LMP Don't we - we have a lot of time for looking; let's get those cameras out. Here, do you want to stick those in, Jim? Please, when you go by?  
02 21 16 31 LMP GDC aligned and key align to IMU/ORB RATE.  
02 21 16 37 CDR Okay. ORB RATE, lunar power.

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Day 3

81

02 21 16 40 LMP Can I call a VERB 83 here, Jim?  
4. 02 21 16 45 CMP Oh, you're within -  
02 21 16 47 LMP Huh?  
02 21 16 48 CMP Yes, you can do that. You're below 482 miles or whatever it is.  
02 21 17 00 CDR 197.  
02 21 17 02 CMP Huh? What are you doing?  
02 21 17 04 LMP What do you need? Who're you talking to, me?  
02 21 17 06 CMP Yes, I thought you said something about VERB 97?  
02 21 17 09 LMP Oh.  
02 21 17 11 CMP You get the camera equipment, and I'll get this stuff out.  
02 21 17 18 LMP Okay, what's our camera configuration, Frank?  
02 21 17 21 CDR Okay, stand by a minute while I get --  
02 21 17 23 LMP Call them out real loud, because I'm going off the air.  
02 21 17 35 CDR Alright, I'm supposed to - Let's see, 16; 18; new C; exposure, 1/250th; 1 foot per second; one MAG.  
02 21 17 44 LMP ...  
02 21 17 53 CDR Yes, new C.  
02 21 17 55 LMP Check.  
02 21 17 56 CDR Right.  
02 21 18 08 CMP Hey, you know something; it's gray, huh?  
02 21 18 10 CDR Yes.  
02 21 18 20 CDR Okay, I've got to roll right, so watch out.  
02 21 18 25 CMP Go easy on those thrusters.  
02 21 18 34 CMP (Singing)

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82

02 21 18 35 CDR Have you got that thing running, Bill?  
02 21 18 37 LMP What's that, Frank?  
02 21 18 38 CDR The camera?  
02 21 18 43 LMP ...  
02 21 18 48 CMP Yes. Just a minute.  
02 21 19 10 LMP ..., Frank. You got the cameras ...  
02 21 19 15 CDR 2; 150th; new; B&W; MAG D.  
02 21 19 18 LMP ...  
02 21 19 19 CDR 1 - 1; 80; B&W; 1/250th.  
02 21 19 27 CMP Okay.  
02 21 19 32 LMP Okay, let's get a lens.  
02 21 19 35 CMP 2, 150?  
02 21 19 38 CMP 50 millime --  
02 21 19 39 CDR 2; 150; new; black and white; MAG D.  
02 21 19 43 LMP I've got MAG D.  
02 21 19 45 CMP Okay. Okay, MAG D. What kind of a camera?  
70 millimeter?  
02 21 19 54 LMP ... number 2 with this lens.  
02 21 20 00 CMP Okay. What else? Filters?  
02 21 20 06 CDR Doesn't say anything about filters. Oh, yes, red  
and black filter, U-4.  
02 21 20 11 CMP You got that? Okay.  
02 21 20 16 CDR Something went flying down when we started burning,  
didn't it?  
02 21 20 27 LMP ...  
02 21 20 28 CDR Huh?

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Day 3

83

02 21 20 30 LMP ...  
02 21 20 33 CDR No.  
02 21 20 36 CMP Did I write on there that - the orbit we are in?  
02 21 20 40 CDR It was just what they told me, yes - 169.1 by 60.5.  
02 21 20 43 CMP Okay. Okay, when I give the burn status report  
there, will you -  
02 21 21 17 CMP Say, look at - Can you put those cameras someplace?  
Stash them against the back of your bulkhead. Stash  
this back there, too.  
02 21 21 32 CMP Hey, you're maneuvering quite rapidly.  
02 21 21 35 CDR No, I'm not.  
02 21 22 04 CMP Well.  
02 21 22 33 CMP Tape, Bill. Thank you.  
02 21 22 41 LMP ...  
02 21 23 59 CDR Are these cameras all set up right?  
02 21 24 01 CDR Huh?  
02 21 24 03 LMP ...  
02 21 24 08 CDR Huh?  
02 21 24 09 LMP ...  
02 21 24 13 CDR Can I take one?  
02 21 24 15 LMP ...  
02 21 24 30 CDR That's what I thought: it doesn't work.  
02 21 24 38 CDR Well, that - the camera doesn't work.  
02 21 24 40 LMP You want me to try it out?  
02 21 24 42 CDR Yes.  
02 21 24 46 LMP ...

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Day 3

84

02 21 25 06 CDR      Huh? Does it work now?  
02 21 25 09 LMP      ...  
02 21 25 10 CDR      We're not that hard up; don't worry about it.  
02 21 25 15 CMP      Listen, we're not going to - -  
02 21 25 18 CDR      I just want to take a picture.  
02 21 25 21 CDR      Hey, look; just slow down and take your time. Okay.  
02 21 25 28 LMP      f:8.  
02 21 25 30 CDR      f:8 at what?  
02 21 25 35 LMP      ...  
02 21 25 38 CDR      Okay.  
02 21 25 44 CDR      Okay. Bill, get me MSFN, will you?  
02 21 25 56 LMP      AOS at 69:31.  
02 21 25 59 CDR      Oh, is it that late? Okay, I thought it was -  
02 21 26 13 CMP      Can you see it? Huh?  
02 21 26 15 LMP      Yes, ...  
02 21 26 23 CDR      It says I'm supposed to run one MAG here - of  
                          16 millimeter; new color exposure, 1/250th, spot,  
                          1 foot per second.  
02 21 26 35 LMP      ... flight plan ...  
02 21 26 42 CMP      Wait a second, Bill.  
02 21 26 47 CDR      Take your time; go slow.  
02 21 26 55 LMP      Did you take your bracket up?  
02 21 26 58 CMP      No.  
02 21 26 59 LMP      ...  
02 21 27 00 CDR      I'll get it.

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Day 3

85

02 21 27 02 LMP ...  
02 21 27 03 CDR Where is it?  
02 21 27 04 LMP ...  
02 21 27 06 CMP Boy, there're no shadows in those craters down  
there. Are we near the subsolar point?  
02 21 27 11 CDR Yes.  
02 21 27 12 CMP The subsolar point?  
02 21 27 13 CDR Yes, getting close to it.  
02 21 27 16 CMP What's our attitude?  
02 21 27 18 CDR Well, we're pitch down. We're going around it.  
02 21 27 22 CMP Are we heads up?  
02 21 27 23 CDR Yes.  
02 21 27 26 CDR Jim, have you unstowed the orbital charts?  
02 21 27 28 CMP Yes, I'm in the process right now. I've got part  
of them unstowed.  
02 21 27 44 LMP ..., Frank.  
02 21 27 48 CDR Okay.  
02 21 27 56 LMP ...  
02 21 28 19 CMP Why don't we - Say, why don't we temporarily stow it  
someplace? You're never going to use this thing at  
all? I think you're making a big mistake using that  
250 millimeter.  
02 21 28 28 LMP No, not on ... because that's ...  
02 21 28 31 CMP Oh.  
02 21 28 56 CMP Well -  
02 21 29 16 CMP Where do we start doing the fan work, Frank?

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Day 3

86

- 02 21 29 20 CDR Well, first of all, we've got to get these cameras set up.
- 02 21 29 28 CDR Bill, that's not in the flight plan.
- 02 21 29 42 CDR You want me to take some pictures with that 16 millimeter?
- 02 21 29 49 LMP Frank, ...
- 02 21 29 52 CDR New color exposure, 1/250th, spot, 1 foot per second; one whole magazine they want.
- 02 21 29 57 LMP ...
- 02 21 30 14 CDR I need the camera.
- 02 21 30 26 CDR What are you doing, Jim?
- 02 21 30 27 CMP Trying to figure out where we are, Frank.
- 02 21 30 44 CMP Alright, it's 11 south, 118 west.
- 02 21 30 48 CDR Is that all set?
- 02 21 31 07 CMP Okay, we should be -
- 02 21 31 15 CMP We're passing over Brand right now.
- 02 21 31 28 LMP Brand?
- 02 21 31 29 CMP Brand right about now.
- 02 21 31 36 CMP Holy cow, there's no resolution whatso - there's no shadows on the craters.
- 02 21 31 46 CMP Hey, there we go. There we are.
- 02 21 31 49 LMP ...
- 02 21 31 53 CMP Is that Tsiolkovsky?
- 02 21 31 54 LMP ...
- 02 21 31 55 CMP Okay, we'll go upside down.
- 02 21 31 56 CDR Well, listen, Bill, if this is the way it goes, the way you say, look at that.

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Day 3

87

- 02 21 31 59 LMP You have it all the way in, Frank?
- 02 21 32 02 CDR Yes. There's a stop on that thing; it won't go any higher than that.
- 02 21 32 08 CMP Gee, you ought to get a picture of Tsiolkovsky.
- 02 21 32 10 LMP ...
- 02 21 32 15 CMP Hey, how am I going to get any ... with this window the way it is?
- 02 21 32 20 CMP Frank?
- 02 21 32 25 CDR I don't know, Jim.
- 02 21 32 26 CMP I'm going to have to use another window.
- 02 21 32 28 CDR Okay.
- 02 21 32 36 LMP ...
- 02 21 32 38 CMP Okay, here we go.
- 02 21 32 43 CMP Houston, Apollo 8.
- 02 21 33 03 CDR What do you want this on, Bill?
- 02 21 33 05 CMP Oh, where's the other flight plan?
- 02 21 33 08 LMP Okay, be about - Going to f:8, Frank.
- 02 21 33 14 CDR f:8?
- 02 21 33 15 LMP And we just passed the subsolar point.
- 02 21 33 22 CMP Houston, Apollo 8.
- 02 21 33 29 CDR Houston, this is Apollo 8. Over.
- 02 21 33 38 CMP You through with the flight plan?
- 02 21 33 41 CDR No.
- 02 21 33 42 CMP Can I have that other flight plan when you get a chance?
- 02 21 33 45 CDR Are you hooked on to them, Bill?

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Day 3

88

02 21 33 46 CC Apollo 8, Houston. Over.

02 21 33 47 CDR Houston, Houston, this is Apollo 8. Over.

02 21 33 50 LMP He's answering you.

02 21 33 51 CMP Go ahead, Houston. This is Apollo 8. Burn complete. Our orbit is 160.9 by 60.5 - 169.1 by 60.5.

02 21 34 14 CDR Are we on the high gain, Jim? Bill?

02 21 34 18 LMP Give me a VERB 64, Frank.

02 21 34 20 CDR What are you doing here? Let's get rid of that.

02 21 34 26 CMP Houston, Apollo 8.

02 21 34 28 CDR VERB 64.

02 21 34 30 CDR I don't think we - -

02 21 34 32 CMP Roger. You are coming in very weak. Our orbit is 169 by 60.5.

02 21 34 38 CDR Give them the whole report there, Jim.

02 21 34 42 CMP I think I'm talking to myself.

02 21 34 44 CDR Why don't you get a Roger for the dump we sent them?

02 21 34 49 LMP Okay, that's - Let me go into high gain.

02 21 35 31 CDR Can you get them, Bill?

02 21 35 32 LMP We got them.

02 21 35 35 CDR Houston, Apollo 8. How do you read? How do you read Apollo 8, Houston?

02 21 35 37 LMP They've got a ground problem.

02 21 35 43 CMP You taking that at one frame per second?

02 21 35 46 LMP Yes, that's what it says to.

02 21 35 49 CDR Houston, Apollo 8.

02 21 35 54 CDR I hear - They're reading us now.

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Day 3

89

02 21 35 57 CMP There we go. Houston, Apollo 8. Over.

02 21 36 08 CDR Are we hooked on with the high gain?

02 21 36 10 CMP Yes, sir.

02 21 36 14 CMP They came through at one time, didn't they?

02 21 36 16 CDR Yes.

02 21 36 25 CC Apollo 8, Apollo 8, this is Houston, Houston. Over.

02 21 36 30 CMP Okay.

02 21 36 31 CDR Roger, Houston. We read you loud and clear. How do you read us?

02 21 36 36 CC Apollo 8, this is Houston. Reading you loud and clear now. And verify your EVAPORATOR WATER CONTROL panel switch to the AUTO position. Over.

02 21 36 48 CMP Is it?

02 21 36 49 CDR It is in AUTO.

02 21 36 50 CMP Roger - -

02 21 36 51 CDR Roger. It is in AUTO.

02 21 36 53 CDR Go ahead, Jim, with it.

02 21 36 55 CC Roger.

02 21 36 58 CDR Well, look here - this DSKY is way up.

02 21 36 59 CMP Burn status report as follows: Burn on time, burn time 4 minutes 6-1/2 seconds;  $V_{gx}$  minus 1.4; attitude nominal; no trim;  $V_{gy}$  was zero;  $V_{gz}$  was plus 0.2;  $\Delta V_c$  was minus 20.2; orbit 169.1 by 60.5.

02 21 37 47 CC Apollo 8, Houston. Roger. The burn on time, burn time was 4:06.5,  $V_{gx}$  is minus 1.4.

02 21 38 05 CDR Bill, how come this is so high here now?

02 21 38 08 LMP ...

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Day 3

90

02 21 38 10 CDR      Huh?

02 21 38 12 LMP      I'm checking the fan out.

02 21 38 13 CDR      Is it alright?

02 21 38 14 LMP      I'll let you know.

02 21 38 20 CC      Apollo 8, Houston. Verify your EVAP WATER CONTROL on panel 382 in AUTO; your EVAP OUT temperature is high. Over.

02 21 38 31 CDR      Roger; standing by.

02 21 38 38 CDR      Houston, Apollo 8. Roger; PRIMARY EVAP is AUTO; H<sub>2</sub> flow, AUTO. Do you recommend activating the secondary water boiler?

02 21 38 53 CC      Roger; copy, stand by.

02 21 38 57 CDR      Now, Jim, let's get this problem squared away here, or we won't be going anywhere.

02 21 39 03 CDR      We're not boiling, Jim - Bill?

02 21 39 04 LMP      No.

02 21 39 11 CC      Apollo 8, this is Houston. Reverify manual valve on panel 382, EVAPORATOR WATER CONTROL, AUTOMATIC. Over.

02 21 39 20 CDR      Roger; verified.

02 21 39 25 CMP      Any help down here?

02 21 39 26 LMP      Well, you might reverify it again. It's the one next to the secondary one that you had turned on.

02 21 39 32 CMP      Okay.

02 21 39 38 CC      Apollo 8, this is Houston. Recommend you activate your secondary water evaporator.

02 21 39 52 CDR      Secondary EVAP coming on the line.

02 21 39 56 CC      Roger.

02 21 40 01 CMP      Secondary evaporator is in AUTO.

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Day 3

91

- 02 21 40 03 LMP Primary is the main one.
- 02 21 40 05 CMP In AUTO.
- 02 21 40 07 CDR It dried up.
- 02 21 40 09 CMP Can you get water to it?
- 02 21 40 21 CDR How's the secondary one - primary one doing - secondary one doing, Bill?
- 02 21 40 25 LMP Secondary one is doing great.
- 02 21 40 27 CDR It's operating?
- 02 21 40 41 CC Apollo 8, Houston. Turn off your DSE, and we'll go to HIGH bit rate. Over.
- 02 21 40 48 CDR Roger.
- 02 22 02 58 LMP We completed target 72 strip and target 90 strip and the terminator photography to the south.
- 02 22 03 13 CMP Okay, we're going to get updates. And a P52.
- 02 22 03 27 CDR Roger.
- 02 22 03 29 LMP Can I have the other lunar flight plan there, Jim?
- 02 22 03 32 CDR Houston, for your information, --
- 02 22 03 33 CMP Yes.
- 02 22 03 34 CDR -- we lost radio contact at the exact second we predicted.
- 02 22 03 45 CDR Are you sure you didn't turn off the transmitters at that time?
- 02 22 03 58 CDR While these other guys all are looking at the moon, I want to make sure we got a good SPS, so how about giving me that report when you can?
- 02 22 04 12 CDR And we want a GO for every REV, please. Or otherwise, we're going to - TEI along with every REV.
- 02 22 04 36 CDR Are we on high gain, Bill?
- 02 22 04 38 LMP Yes.

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Day 3

92

02 22 04 42 CDR Well, this is ... see if I can ...  
02 22 04 44 LMP Yes.  
02 22 05 04 CMP Here's the - I'll bet you that's what we're supposed to do.  
02 22 05 09 CDR I wouldn't know.  
02 22 05 11 CMP ...  
02 22 05 15 CDR Have you got the DELTA counter over there, please?  
02 22 05 58 LMP Those two strips and the terminator photography on camera 1  
were taken on magazine E which is now reading - 29 exposures.  
02 22 06 17 CDR How are you doing, Bill?  
02 22 06 18 LMP Getting it done.  
02 22 06 21 CMP ...  
02 22 06 31 CMP I don't think so. Okay, I'm going out ...  
02 22 06 36 LMP What did you take a picture of, Frank? Do you remember ...?  
02 22 06 43 LMP And Frank took a - took a picture on camera 2,  
magazine A, which is now reading 40.  
02 22 07 04 LMP Now we're going to change - take off magazine A.  
02 22 07 10 CDR Jim, didn't I hand you a magazine over there?  
02 22 07 14 CMP Yes, I ...  
02 22 07 18 LMP Okay, what I meant for you to do ...  
02 22 07 27 CDR Negative.  
02 22 07 35 CMP Okay, we have ...  
02 22 07 43 CDR Negative, we'll have breakfast in a little while here.  
02 22 08 18 LMP We're in the dark now?  
02 22 08 23 CMP Well, it looks - sure looks that way.  
02 22 08 33 CMP 13. Capella.

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Day 3

93

- 02 22 08 48 CDR What was it, Bill?
- 02 22 08 50 LMP Capella.
- 02 22 08 53 CMP Okay.
- 02 22 09 01 CDR Have you charged these batteries, Bill?
- 02 22 09 03 LMP Never did ...
- 02 22 09 06 CMP Okay, I'll ... lights out ... I could just mark them without even - -
- 02 22 09 11 LMP Earth - earthshine is about as expected, Houston. It's not as much detail, of course, as in the sunlight, but you can see the - the large craters quite distinctly, and you can see the albedo contacts quite distinctly. And also, the - There's a good three-dimensional view of the rims of the larger craters.
- 02 22 09 42 CMP ... Wait a minute.
- 02 22 09 52 LMP I think our high-speed film will be able to pick some of this stuff up quite well.
- 02 22 10 03 CDR Oh, right over ...
- 02 22 10 24 LMP Have you got your camera ...?
- 02 22 10 33 CDR All balls.
- 02 22 10 43 CMP Okay. Minus 3077, plus 3017, plus 3065.
- 02 22 11 07 CDR Okay, the next thing we put up is my ...
- 02 22 11 13 LMP Okay, Jim, go ahead and eat.
- 02 22 11 16 CMP Okay, let me see whether I have this ...
- 02 22 11 21 LMP ... are okay, Frank?
- 02 22 11 28 LMP EPS is alright?
- 02 22 11 38 LMP ... should expect my ... later.
- 02 22 11 49 LMP This thing must be ... Oh no, don't tell me the thing dried out.

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Day 3

94

02 22 11 55 LMP      No, the boiler isn't acting up; it just dried out.  
02 22 12 30 CDR      Did you verify all the systems?  
02 22 12 33 LMP      Yes. We have sunset at -  
02 22 12 35 CDR      Not too long.  
02 22 12 42 CDR      Go ahead with your information on the filters, Houston.  
02 22 12 49 CMP      Boy, that - -  
02 22 13 37 CDR      Go ahead.  
02 22 14 02 CDR      Go ahead.  
02 22 14 25 CDR      We got you.  
02 22 14 28 CMP      ... wrong with the TV picture ...  
02 22 14 40 LMP      Now don't - Let's not even screw with the telephoto,  
                          okay, Frank?  
02 22 14 45 CDR      Right.  
02 22 14 47 CMP      Well, ought to use that wide angle. Then you could really --  
02 22 14 49 LMP      Jim? Have you got time to get that red filter out  
                          of there or not?  
02 22 14 53 CMP      Out of where?  
02 22 14 54 LMP      Out of that other - I'll get it; I'll get it.  
02 22 14 58 CMP      Did you see that other map around here someplace?  
02 22 15 00 CDR      Yes, the - the flat one?  
02 22 15 02 CMP      No, I've got the flat one; the other - folded one.  
02 22 15 26 CMP      Well, I'm not worried about these ..., but I am about  
                          the other two.  
02 22 15 33 CDR      Houston, Apollo 8. Standing by to record TEI 1 and TEI 2.  
02 22 15 54 CDR      Roger; understand.  
02 22 16 03 CMP      Where is the flight plan?

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Day 3

95

02 22 16 12 CDR You're getting that red filter?  
02 22 16 15 CMP Yes, I got it.  
02 22 16 26 CDR Roger; we could feel the chug when we threw in bank E.  
Not a chug, but we could feel the additional thrust.  
02 22 16 36 CMP Here you go.  
02 22 16 41 LMP Houston, be advised on this red-blue filter technique  
on the TV that you cannot slide the two filters out  
of the way with them taped onto the TV cameras, so I  
suggest you use red-blue, and then take them off.  
02 22 17 14 CMP Did you use 83?  
02 22 17 16 CDR Huh?  
02 22 17 17 CMP Did you use VERB 83?  
02 22 17 19 LMP Roger; you don't want the red filter; you want the  
blue by itself. Is that correct?  
02 22 17 41 LMP Roger; in work.  
02 22 17 45 LMP Tape, Jim, please.  
02 22 17 46 CMP Tape?  
02 22 18 02 CMP You got enough there?  
02 22 18 11 LMP Now give me an ...  
02 22 18 19 CMP Here - I got ...  
02 22 18 28 LMP Frank, what else have you got, ...?  
02 22 18 41 CDR Go ahead, Houston; Apollo 8.  
02 22 19 00 CDR We will not do that; we're going to stick with the  
flight plan, and make the best we can here.  
02 22 19 10 CDR As usual, in the real world, the flight plan looks  
a lot fuller than it did in Florida.  
02 22 19 26 CMP ...

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Day 3

96

- 02 22 19 29 LMP Well, I know we may need it. I got some more for you. ... remember -
- 02 22 19 36 CMP Huh?
- 02 22 19 37 LMP Did you bring the temporary stowage bag?
- 02 22 19 39 CMP ... Here it is. Yes. (Laughter) ...
- 02 22 19 46 LMP What other crises ... by the board?
- 02 22 19 49 LMP I don't need any if you want to know. After what I've got in my pocket, I (laughter) can go anywhere for a while.
- 02 22 19 56 CMP Well, how could they ...?
- 02 22 20 08 LMP Well, that kind of makes ...
- 02 22 20 22 LMP How about just holding that ... tape ... The thing is, the damn thing has 16 moving parts.
- 02 22 20 39 LMP Well, I got it, but ... I'll bet - You can just put a piece of tape on it so it stays ...
- 02 22 20 59 CMP Okay, what's this coming up ...? ... coming up here.
- 02 22 21 03 CMP At 71 hours - exactly - it's 70:21 right now. The realignment has been completed already. It's an eat period for Bill, eat period for myself; prepare to do GDC align to the IMU. Okay, at 70:55 - -
- 02 22 21 23 CDR ...
- 02 22 21 25 CMP Okay, yes, let me ... At 70:55, you're going to pitch up your ORDEAL 180, 250, and 00.
- 02 22 21 37 CMP Okay. ... And we're going to have to share a window here, Bill at 71: - -
- 02 22 21 47 LMP ...
- 02 22 21 49 CMP Yes, because - I've got to get out the ...
- 02 22 22 01 LMP Orbital photos.
- 02 22 22 21 CMP Well, I was real worried about the evaporator.

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Day 3

97

- 02 22 22 44 LMP Frank, that's the best I can do for you. If you can just hold it and - like that and take the picture.
- 02 22 22 52 LMP Okay, now look, can you - could you stick that ... stick it in the holder behind your head. I'll take that film out of your way - get a chance, stow it, that'll be the best thing to do.
- 02 22 23 36 LMP Okay.
- 02 22 23 46 LMP Jim, did you get that flight plan?
- 02 22 23 48 CMP Yes, I got it right down here ...
- 02 22 23 56 LMP Why don't we keep it right in here, I guess and -
- 02 22 23 59 CMP Well, listen, how about - now ... Okay, ...
- 02 22 24 04 LMP We could use Frank on the keypunch for the control point.
- 02 22 24 07 CMP Yes, either way, it makes no difference because you have that - -
- 02 22 24 10 CDR I've got a keypunch here. I ...
- 02 22 24 14 CMP Yes, I think, Frank, ... the attitude.
- 02 22 24 22 LMP Okay, Frank, you want to configure your 16-millimeter camera as follows: you've got 2/3 of a magazine in there.
- 02 22 25 05 LMP Okay, we're sticking - magazine J onto the 16-millimeter camera, and removing magazine H. We had magazine H running at one frame per second, and what was the f-stop - you remember? f:8 all the way through the pass; we didn't get around to changing the f-stop.
- 02 22 25 28 CDR Alright, through the pass.
- 02 22 25 32 LMP Okay, now it starts at f:2.8, 1/250th of a second. Sorry, but I got the wrong ...
- 02 22 25 44 CMP ...
- 02 22 25 45 LMP One - f:2.8, one frame per second.
- 02 22 25 49 CDR 2.8?
- 02 22 25 50 LMP Right.

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Day 3

98

- 02 22 25 55 CDR Go ahead?
- 02 22 25 56 CMP Yes.
- 02 22 26 01 LMP Well, Frank, I'm going to have to give you - Would you remind me to give you new exposures every now and then as on this map? I'll have - I'll have the map right in front of me so I can ... without any trouble. The only thing is you have to remind me.
- 02 22 26 22 LMP Okay. Tell them I've got the earth in the sextant.
- 02 22 26 48 LMP Okay, Frank? Would you start the 16-millimeter camera when you're coming across the terminator with the pass. Okay?
- 02 22 26 57 LMP I'll take the spotmeter readings and be able to tell you what the ... when we're all set for TV, and then ...
- 02 22 27 12 LMP I'm ready for a map update.
- 02 22 27 18 CMP Man, this is really exciting.
- 02 22 27 26 LMP Roger, and we're standing by for a map update.
- 02 22 27 42 CMP Houston, Apollo 8. Just for your information, after we completed P52, I have acquired the earth in the sextant. Quite a sight from here.
- 02 22 27 56 CMP Okay, O<sub>2</sub> purge set.
- 02 22 28 09 CDR How are the system's experts on the SPS coming, Jerry?
- 02 22 28 32 CDR Let's put that over there.
- 02 22 28 46 CDR Thank you.
- 02 22 29 08 CDR ... You've been living on emotions ...
- 02 22 29 11 CMP ...
- 02 22 29 21 CDR ... those last two REV's ...
- 02 22 30 49 CDR Roger; 5 minutes of HIGH bit --
- 02 22 44 36 CDR Houston, Apollo 8. We're in the process of preparing meal 4, day - correction, day 4, meal A.
- 02 22 45 29 CDR ... get me the hot water ...

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Day 3

99

02 22 45 44 CMP ... the sextant ...  
02 22 46 06 CMP How's that flight plan looking ...?  
02 22 46 29 CDR A little bit of - a little bit of - Left yaw - a little bit.  
02 22 47 16 LMP ... we'll just have to get one. But you can't for  
30 minutes ... Well, you can ...  
02 22 47 28 CMP Who wants hot water, quick?  
02 22 47 29 LMP I do. ...  
02 22 48 11 LMP Houston, Apollo 8. Over.  
02 22 48 18 LMP Are you going to be able to dump that tape prior to LOS?  
02 22 48 37 LMP Thank you.  
02 22 48 48 LMP This is a report of the photography accomplished on REV 1.  
We got target 68, target 72, target 90, and the terminator  
photography - near-side terminator, REV 1, south. I had  
cameras 1 and 2 configured properly. Camera - camera 2  
now reads - simply one exposure on MAG G. That's the  
high speed; we've had zero exposures on MAG G.  
02 22 54 22 LMP Okay, that's up to the right.  
02 22 54 43 CMP Okay, at 70:55, we're going to pass over - ...  
02 22 54 51 CDR We've got to get the TV going here now ...  
02 22 54 54 LMP Okay, MAG D - was on camera 2.  
02 22 54 58 CMP What?  
02 22 55 03 LMP One exposure - two exposures at this time. We had  
one exposure on MAG A.  
02 22 55 25 LMP MAG E was used for the targets previously mentioned,  
and is now indicating 30 - 30 exposures; that's MAG Echo.  
02 22 55 35 CDR Go ahead, Houston; Apollo 8.  
02 22 55 43 CDR Thank you.  
02 22 55 55 LMP Magazine - magazine J was on the 16-millimeter camera, run  
at one frame per second, starting about 10 minutes after LOI -

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Day 3

100

02 22 56 19 CMP Okay, this is ...  
02 22 56 32 LMP Thank you.  
02 22 56 40 LMP MAG H - When you're through taking MAG H, I'll ...  
02 22 57 00 LMP MAG H was on the 16-millimeter cam --  
02 22 57 02 CMP ...  
02 22 57 03 LMP -- 16-millimeter camera, run at one frame per second,  
at - Look at that f-stop.  
02 22 57 13 CDR 8.  
02 22 57 14 LMP On f:8 through the entire REV.  
02 22 57 26 LMP We now have MAG - What was that again, J? - MAG J  
installed for the second pass.  
02 22 57 50 CDR Are you all set with the TV, Bill?  
02 22 57 52 LMP Oh, we've got a long time.  
02 22 57 54 CMP The TV doesn't come until at 30 minutes ...  
02 22 57 58 LMP Next - next AOS?  
02 22 58 01 CMP ... the flight plan.  
02 22 58 11 CDR Next AOS is 30.  
02 22 58 16 LMP 71:39.  
02 22 58 17 CDR Yes.  
02 22 58 18 CMP 71:30 would be ...  
02 22 58 20 CDR ... half an hour.  
02 22 58 23 CMP Is that right?  
02 22 58 24 LMP Yes.  
02 22 58 25 CMP Well, I guess we don't do ...  
02 22 58 27 LMP No, we can't do them all at once.

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Day 3

101

02 22 58 29 CDR All at once?

02 22 58 45 CMP ... the earth ...

02 22 58 46 LMP No.

02 22 59 02 CMP Are you going to ...?

02 22 59 05 LMP I think you better yaw first ...

02 22 59 09 LMP What was that time again? 71:30?

02 22 59 15 LMP You don't have AOS until 71:39 ...

02 23 00 12 CMP Well, 12.2 is ... 128.

02 23 00 19 CMP ... TV pass is ...

02 23 00 39 LMP Well, I guess we could get it; you know this S-band is actually just pointing a little - a little more underneath than ...

02 23 00 55 CMP Okay, Bill, while we're going around here -

02 23 01 13 CDR How's your time? Sunrise is 71:00.

02 23 01 20 CMP Holy cow! We're not too far away from ...

02 23 01 27 LMP ... right? Ask Jim.

02 23 01 36 CMP Okay. Did you see my ...?

02 23 01 39 CDR ... camera ...

02 23 01 46 LMP What does - what does it say there in the flight plan, Frank?

02 23 01 52 CMP Hey, Frank, think I should share your ... the next ... because you're going to maintain the position, aren't you?

02 23 01 58 CDR ...

02 23 01 59 CMP I should get over there - Could you fly it from over here?

02 23 02 01 CDR Huh?

02 23 02 03 CMP Now you've got to maintain a position in the ...

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Day 3

102

02 23 02 06 CDR Well, that's just to ... whenever we fly ... with the COAS ...  
02 23 02 16 CDR Trying to get up here.  
02 23 02 18 CMP Well, look here. ...  
02 23 02 23 CDR It doesn't say anything about that.  
02 23 02 34 LMP One frame per second ... terminator.  
02 23 02 37 CMP Let me see if I can get up here ... Yes, I just ...  
02 23 03 07 CMP What do you want me to do?  
02 23 03 13 LMP What do you want to do about this television?  
02 23 03 15 CMP ...  
02 23 03 19 LMP Well, you can go on and describe where we are.  
02 23 03 20 CDR Still got that ..., Bill?  
02 23 03 23 LMP I don't see it.  
02 23 03 24 CMP Bill, why don't you just worry about the television  
as far as ...  
02 23 03 53 LMP You see the terminator yet, Frank?  
02 23 03 55 CDR Yes.  
02 23 03 58 LMP Are you pitched down - to the horizon?  
02 23 04 00 CDR Yes, down.  
02 23 04 02 CMP Okay, I've got the terminator.  
02 23 04 06 CMP Alright, the terminator is just coming over right now.  
02 23 04 08 CDR You want your camera going, Bill?  
02 23 04 10 LMP Start at - just start it a little past the terminator -  
Don't start a track until you get the terminator.  
02 23 04 21 CMP Okay, let me ...  
02 23 04 55 CMP Well, I thought we'd better - Bill, you've got - I  
guess you've got your instrument, right?

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Day 3

103

- 02 23 05 08 CMP What's the crater just before we get the terminator?  
The big one?
- 02 23 05 12 LMP It's America.
- 02 23 05 14 CMP No, no, that's the real big one.
- 02 23 05 15 CMP/LMP It's - -
- 02 23 05 16 CMP It's the one that's coming up right now.
- 02 23 05 18 LMP Von Braun and America.
- 02 23 05 23 CMP This one right down here, Bill? Bill? Is that von Braun?
- 02 23 05 28 LMP Yes ...
- 02 23 05 34 CMP I think this is Freedman coming up.
- 02 23 06 10 CDR Have you got the terminator?
- 02 23 06 12 CMP Yes.
- 02 23 06 21 CMP It might be ...; no, I think it's Freedman.
- 02 23 06 44 LMP Just run it whenever you are looking down there.
- 02 23 06 49 CMP ... take a look at ... the flight plan.
- 02 23 06 53 LMP Give me that flight plan there real quick, will you, Frank?
- 02 23 07 04 LMP Okay, let's track along the ground and run the camera ... time.
- 02 23 07 20 LMP Here - It'll - At the terminator, it will be - 2.8,  
and it'll stay that way for a good while.
- 02 23 07 32 CMP ...
- 02 23 07 49 CDR ..., we're looking good.
- 02 23 08 14 CMP Okay, starting on the right now, ...
- 02 23 08 16 LMP No, no, no, don't - don't write it down.
- 02 23 08 19 CMP Well, you're going to get - -
- 02 23 08 20 LMP No, it - it - Wait, wait'll it comes up - -

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Day 3

104

- 02 23 08 22 CMP Well, why not? Why don't you get it tracking?  
That thing's just going into the terminator.
- 02 23 08 27 LMP Well, I'd wait, or you're never going to make it through  
the pass. It's the other terminator that's more important.  
Just take a couple here, Frank.
- 02 23 08 32 CMP Alright. We should be over America right now.
- 02 23 08 47 LMP Now, we're passing over America.
- 02 23 08 50 CMP There she is.
- 02 23 08 51 LMP And we're coming up on von Braun.
- 02 23 09 01 CMP Okay, we're to the north of our track - -
- 02 23 09 03 LMP Yes.
- 02 23 09 04 CMP - - aren't we? No, we're not! My gosh, we're just  
about on it!
- 02 23 09 12 CMP Now, can you turn up the lights a little bit because  
we need this thing because we're going to - turn the light ...
- 02 23 09 21 CMP We're coming ... right now ...
- 02 23 09 44 CDR You want this thing going now, Bill?
- 02 23 09 45 LMP Yes, good.
- 02 23 09 52 CDR 3.5 still?
- 02 23 10 01 CDR Huh?
- 02 23 10 02 LMP Yes.
- 02 23 10 14 LMP I don't think the angle is the best, though.
- 02 23 10 15 CMP ...
- 02 23 10 20 CMP Oh, you can see out of this one. Bill, this is good  
lighting for one of those.
- 02 23 10 35 CMP Take those pictures ...
- 02 23 10 48 LMP Okay, we got the six pictures of the terminator, south.

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Day 3

105

- 02 23 11 08 LMP That's the north, Jim. Isn't this America sitting right out here - this big one? Or did you --
- 02 23 11 11 CMP No, no, we're over - still over America right now. See look at this big picture. I've got the - I've got the photograph on --
- 02 23 11 18 LMP Is this von Braun right here, this big --
- 02 23 11 19 CMP No, we're right in the middle of America, right now.
- 02 23 11 25 CMP You've got two other craters sticking up ...
- 02 23 11 27 LMP Right in the middle of it? Are they those -
- 02 23 11 39 CDR You still want it at 3.5, Bill? I think I --
- 02 23 11 43 LMP I want you to keep it 2.8 until we've gone 7 minutes. ...
- 02 23 11 51 CMP Yes, I know. It doesn't work; it goes out.
- 02 23 12 13 CMP There is the big ... down below us.
- 02 23 12 17 LMP Is that it?
- 02 23 12 19 CMP Yes... ... down south right now.
- 02 23 12 32 LMP Why, the rim of America is very hard to see, isn't it?
- 02 23 12 36 CDR Yes.
- 02 23 12 38 CMP Yes.
- 02 23 12 39 LMP Okay, you're right, here's von Braun. This must be von Braun, here.
- 02 23 12 45 LMP Yes, okay.
- 02 23 12 46 CMP Boy, it sure feels like you're running ... Very pretty.
- 02 23 12 51 LMP Okay, getting target 10.
- 02 23 13 20 LMP Target 10 is MAG D, frame -
- 02 23 13 37 CMP You should have a big crater on the side of you there.
- 02 23 13 57 CMP Okay.
- 02 23 14 09 CMP There it is. Now the target should be just straight ahead.
- 02 23 15 12 LMP ... target 12.
- 02 23 15 16 CMP I see it. Right there.

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Day 4

106

DAY 4

03 01 34 25 CMP 42 seconds. 42.

03 01 34 28 LMP Give me a call when the DSKY blanks.

03 01 34 30 CDR Blank!

03 01 34 31 CMP Blank DSKY.

03 01 34 32 LMP Okay. Average g is ON; FLIGHT RECORDER to RECORD; EMS to AUTO.

03 01 34 38 CDR AUTO.

03 01 34 41 LMP Check PIPA bias.

03 01 34 43 CMP Okay.

03 01 34 44 LMP Ullage as required.

03 01 34 46 CMP No ullage.

03 01 34 47 LMP Okay.

03 01 35 01 CMP ENABLED.

03 01 35 06 LMP 1, 2 - -

03 01 35 08 LMP/CMP 3, 4, 5, 6, 7, 8, 9, 10, 11 -

03 01 35 17 CDR Okay?

03 01 35 18 LMP Okay!

03 01 35 20 CDR Cutoff.

03 01 35 21 CMP Okay, cutoff.

03 01 35 22 LMP SPS light, OFF; okay, DELTA-V THRUST A, OFF.

03 01 35 26 CDR OFF.

03 01 35 27 LMP Helium valves are CLOSED.

03 01 35 28 LMP Okay, barber pole; SPS GIMBAL MOTORS, four, OFF, slowly.

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Proj. 4

107

03 01 35 34 CDR 1, OFF.  
03 01 35 35 IMP Got it.  
03 01 35 36 CDR 2, OFF.  
03 01 35 37 IMP Got it. Not quite so fast.  
03 01 35 40 CDR Okay. 3, OFF.  
03 01 35 41 IMP Got it.  
03 01 35 42 CDR 4, OFF.  
03 01 35 43 IMP Got it. Okay, THE GEMINI 1 and 2, OFF.  
03 01 35 44 CDR OFF - -  
03 01 36 04 IMP Proceed. Null residuals and record final residuals.  
Okay? You got it? ...  
03 01 36 25 IMP Okay. ECU 1 and 2, OFF.  
03 01 36 29 CDR OFF.  
03 01 36 31 IMP ECU 3 and 4, OFF.  
03 01 36 33 IMP ECU 5 and 6, three, RATE 2.  
03 01 36 37 IMP DEPHASH, MAX.  
03 01 36 40 IMP Okay, COMMUNICATION - is OFF.  
03 01 36 47 IMP TRANSMITTER POWER, OFF.  
03 01 36 59 IMP ROF CONTROL POWER BIPOLE, OFF.  
03 01 37 03 IMP SPS, PITCH and YAW circuit breaker, OFF.  
03 01 37 08 IMP Are they OFF? Then close them.  
03 01 37 09 IMP Okay, proceed.  
03 01 37 13 IMP Turn to VHF 80 and PULLIN.  
03 01 37 14 IMP VHF 80, PULLIN.  
03 01 38 02 IMP Got it. Off, PULLIN.

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Day 4

108

- 03 01 38 12 LMP Proceed, and then line 37: 00, ENTER.
- 03 01 38 24 LMP ENTER VERB 66.
- 03 01 39 14 LMP Okay, SPS ...
- 03 01 46 36 LMP Okay, let's do the - on this DSE again.
- 03 01 46 48 LMP Now, I think we - I told you earlier what I thought I'd do ... and I discovered that ... I ended up with the high-speed film, in one of the cameras - I believe it was the second REV. And it's my feeling that the - target 12 was accomplished. And I believe that targets 10, 14, 16, and 19, and possibly 20 and 21 were taken with high-speed film. What is important is you should know between which craters I changed to the other camera. I believe that ... and possibly Taruntius were taken with the proper film. Also ... probably 31 and 40. Terminator photography was taken at the end of the first REV, properly configured, as indicated previously, ...
- 03 01 48 49 CMP One was at 26.
- 03 01 48 56 LMP Okay, terminator photography was accomplished at the morning far-side terminator, ... and I believe we had the high-speed camera. We used the 16-millimeter camera ... with the proper f-stop. It's been rather difficult to - to keep ... on REV 2. ...
- 03 01 49 53 LMP Magazine U, I have 47 exposures used, and high speed on 40 of them. We are now set up for magazine K for the - training photography, and magazine U, 70 millimeter, ...
- 03 01 50 25 LMP Houston, Apollo 8. Over.
- 03 01 50 39 LMP Houston, Apollo 8. Over.
- 03 01 50 47 LMP Roger; read you loud and clear, and ready for the burn status report.
- 03 01 50 55 CDR Houston -
- 03 01 50 56 LMP Roger; the burn was on time; 11 seconds; 0.2 was  $V_{gx}$ ; 1.8  $V_{gy}$  - that's minus 1.8; minus 0.2  $V_{gz}$ .  $\Delta V_c$  was minus 20.4; VERB 82 gives us an apogee of 62 and a perigee of 60.8.

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Day 4

109

03 01 52 17 CDR Roger.  
03 01 52 21 CMP Hey, Bill.  
03 01 52 22 LMP Yes.  
03 01 52 23 CMP Are you looking for one of those ...?  
03 01 52 54 CMP ... if that's where you put it.  
03 01 57 30 LMP ... number 58, magazine - C.  
03 01 59 04 LMP Houston, how are you reading Apollo 8?  
03 01 59 14 LMP You're loud and clear.  
03 02 00 47 CDR Houston, Apollo 8. We're on high gain now if you want to get the high-speed data to look at that burn.  
03 02 01 01 CDR Okay, I think I've made a mistake, on the last ... DSE ... I've gotten confused here. ... Can you hold it for about 5 seconds - about 1 minute?  
03 02 01 29 CDR Okay.  
03 02 01 31 CMP Wait just a second; 58 is not around - starting on frame 61.  
03 02 01 39 CDR Okay, you can dump the data now.  
03 02 01 51 CDR Did you get it?  
03 02 01 54 CDR Have you updated the -  
03 02 06 43 LMP Houston, Apollo 8. ... meal 4, day - day 4, meal ...  
03 03 13 28 CDR Man, that's a charm.  
03 03 13 35 LMP Magazine E showing 95 exposures will be used for far-side terminator south photography for REV 4 and target 10 and 20 series which we believe were shot by the high-speed film on REV 1. We're using magazine I and magazine D to do the vertical stereo. Both of those show zero.  
03 03 22 18 LMP Okay. Frame number 104 was taken into von Braun -

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Day 4

110

- 03 03 22 39 LMP - which showed an interesting little ridge down the middle of it in one of the turtleback stills in one - in the little side crater - in the crater to the east.
- 03 03 23 06 LMP The next exposure was taken at 75:23:06.
- 03 03 23 32 LMP Target 19.
- 03 03 23 39 LMP Exposure 116.
- 03 03 23 51 LMP And was taken at 1/60th of a second at 5.6 with the terminator. We'll do it at 250th - that's good enough.
- 03 03 24 13 LMP Spotmeter readings vertically are recorded on the map for lumens -
- 03 03 24 27 LMP And they're all reading between 160 and 320.
- 03 03 24 36 LMP Oblique: about 4 in the - between 460 and 320.
- 03 03 25 39 LMP What time have you got, Frank?
- 03 03 25 42 CDR ...
- 03 03 25 45 LMP Okay, going for target number 14, magazine E, frame 116.
- 03 03 26 22 LMP 116 will be a target-of-opportunity photo showing some mountains on the horizon.
- 03 03 27 08 LMP Okay, camera number - vertical stereo camera was put to 5.6 from 2.8 at 75:27.
- 03 03 28 02 LMP Huh?
- 03 03 28 42 LMP What time have you got, Frank?
- 03 03 28 46 CDR 75:28.
- 03 03 29 33 LMP Okay -
- 03 03 29 39 LMP What's the time?
- 03 03 29 40 CDR 12:23.
- 03 03 29 41 LMP Starting at 12:23 on the event timer, we're going across what I think is - is Washington, though it's very hard to tell.

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Day 4

111

- 03 03 30 04 LMP Target 19 was taken with MAG E, about frame 107; series of three.
- 03 03 30 41 LMP Make it a series of four.
- 03 03 31 04 LMP Okay, we finished - target 19; four exposures on frame 111.
- 03 03 31 26 LMP What's your time, Frank?
- 03 03 31 30 CDR 14:05 ...
- 03 03 31 52 LMP We should have put this over in your window. How about - Can you take this in your window?
- 03 03 32 01 CDR Now, you want it while it's running?
- 03 03 32 03 LMP Yes, go ahead. It's getting in the way of this other one.
- 03 03 32 07 LMP I'll count out the exposures for you.
- 03 03 32 12 LMP Yes.
- 03 03 32 20 LMP Can you call out your time, Frank, please?
- 03 03 32 22 CDR 15 minutes.
- 03 03 32 23 LMP 14?
- 03 03 32 24 CDR 15.
- 03 03 32 37 LMP Okay, target number 23; 15 minutes; frame 112.
- 03 03 33 06 LMP (Cough)
- 03 03 33 37 CDR I've got to use that (yawn) - I've got to roll right.
- 03 03 34 08 LMP Time, Frank?
- 03 03 34 11 CDR 16:55.
- 03 03 34 16 LMP Turn it to f:8 if you haven't got it there already.
- 03 03 34 20 CDR That's where it was when you handed it to me.
- 03 03 34 21 LMP Good.
- 03 03 35 10 CDR 17:15.

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Day 4

112

03 03 35 11 LMP Okay.  
03 03 35 45 LMP Fresh impact crater: MAG E, frame 117, about 18 minutes.  
03 03 38 14 LMP Will you give me a VERB 6 $\frac{1}{4}$ , Frank?  
03 03 38 21 LMP I've got a bunch of scraps here - they're to be shot - would you give me the end tape --  
03 03 38 24 CDR ...  
03 03 38 30 LMP Okay.  
03 03 38 34 LMP Okay.  
03 03 39 17 LMP Okay, frame - hope I'm not losing count here.  
03 03 39 27 LMP Okay, definitely frame 114, target of opportunity, extremely fresh impact crater.  
03 03 39 46 LMP Time: 75:39:30.  
03 03 40 51 CDR You want to rotate in 6 minutes, Bill?  
03 03 40 56 LMP Not now, I'm checking here.  
03 03 41 00 LMP Frame 115, another extremely fresh impact crater taken at 75:41. If the window was a little more clear, I - Looks like it might be up on the top of the hill.  
03 03 41 32 LMP What time do you have, Frank? Is it 20?  
03 03 41 36 CDR 25 almost. 24:19 now.  
03 03 41 37 LMP Okay, let's go.  
03 03 41 42 LMP Did they give you a time to rotate?  
03 03 41 47 CDR What?  
03 03 41 48 LMP Did they give you a time to rotate?  
03 03 41 51 CDR ... wants me to rotate 75:46.  
03 03 41 54 LMP Yes, we've got a ways to go yet.  
03 03 41 57 CDR 3 minutes - No, it's 5 minutes.

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Day 4

113

- 03 03 42 31 LMP Okay, let's go - f:ll.
- 03 03 46 06 CMP What time are you supposed to be pitching up?
- 03 03 46 09 LMP I don't pitch up until ...
- 03 03 46 10 CMP Okay.
- 03 03 46 27 CDR Alright, we're going to roll.
- 03 03 46 33 CDR Ready? Set.
- 03 03 46 47 LMP The impact crater was at - just prior to subsolar point on the south side, and the floor of it, didn't really get to - There is one dark hole, and I couldn't get a quick enough look at it to see if it might be anything volcanic.
- 03 03 47 30 CDR Oh, my God! Look at that picture over there! Here's the earth coming up. Wow, is that pretty!
- 03 03 47 37 LMP Hey, don't take that, it's not scheduled.
- 03 03 47 39 CDR (Laughter) You got a color film, Jim?
- 03 03 47 46 LMP Hand me that roll of color quick, will you - -
- 03 03 47 48 CMP Oh man, that's great!
- 03 03 47 50 LMP - - Hurry. Quick.
- 03 03 47 54 CDR Gee.
- 03 03 47 55 CMP It's down here?
- 03 03 47 56 LMP Just grab me a color. That color exterior.
- 03 03 48 00 CMP ...
- 03 03 48 01 LMP Hurry up!
- 03 03 48 06 LMP Got one?
- 03 03 48 08 CMP Yes, I'm looking for one. C 368.
- 03 03 48 11 LMP Anything, quick.
- 03 03 48 13 CMP Here.

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Day 4

114

03 03 48 17 LMP Well, I think we missed it.  
03 03 48 31 CMP Hey, I got it right here!  
03 03 48 33 LMP Let - let me get it out this window. It's a lot clearer.  
03 03 48 37 CMP Bill, I got it framed; it's very clear right here.  
You got it?  
03 03 48 41 LMP Yes.  
03 03 48 42 CDR Well, take several of them.  
03 03 48 43 CMP Take several of them! Here, give it to me.  
03 03 48 44 LMP Wait a minute, let's get the right setting, here  
now; just calm down.  
03 03 48 47 CDR Calm down, Lovell.  
03 03 48 49 CMP Well, I got it ri - Oh, that's a beautiful shot.  
03 03 48 54 CMP 250 at f:11.  
03 03 49 07 LMP Okay.  
03 03 49 08 CMP Now vary the - vary the exposure a little bit.  
03 03 49 09 LMP I did. I took two of them.  
03 03 49 11 CMP You sure we got it now?  
03 03 49 12 LMP Yes, we'll get - we'll - It'll come up again, I think.  
03 03 49 17 CMP Just take another one, Bill.  
03 05 15 20 CMP I tried it. ... a problem. Would you believe the ...?  
03 05 16 47 CMP Yes.  
03 05 16 57 CMP Okay.  
03 05 17 07 CMP That's everything.  
03 05 17 09 LMP Pardon?  
03 05 17 14 CMP Roll - roll right.

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Day 4

115

- 03 05 17 31 CMP ... okay.
- 03 05 17 50 CMP ... go back to your residuals. Proceed. ... 2000 ... Okay, we should be 00 now.
- 03 05 18 31 CMP 00; proceed. Latitude - Okay, this is what you copied down. Let's see, latitude and longitude, ... and attitude ... best points at 239. Write down 239. That's your latitude and longitude and ... attitude.
- 03 05 19 07 CMP Okay.
- 03 05 19 13 CMP Latitude, minus 06269; longitude over two, minus 78954; attitude, plus 00152.
- 03 05 20 20 CMP ... okay, that would be the - okay.
- 03 05 20 37 CMP ... the way you resolved and ...
- 03 05 21 10 CMP We're a little bit - We're on the fourth REV? This is the fourth REV, right? You're just a little bit south of ... yes, this ... stuff is really great for this. See, he's trying to get the right attitude, here.
- 03 05 22 42 CMP You're 5 degrees up, huh? That's a good attitude.
- 03 05 27 11 CMP Okay, I just ...
- 03 05 27 41 CMP I wish I hadn't added the time to that.
- 03 05 27 54 CDR You looking it up again?
- 03 05 27 57 CMP Yes, I am ...
- 03 05 28 11 CMP Yes, there's a big probability too there's a ...
- 03 05 30 02 CMP 1. 2. 3. ... 4, 5. Proceed. Two balls? Two balls.
- 03 05 31 26 CMP ...
- 03 05 31 28 LMP I demanded it on that one.
- 03 05 31 34 CMP ...
- 03 05 31 36 LMP You haven't got - Do you have the one before Mike, by any chance?

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Day 4

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- 03 05 31 40 CMP I don't know; I better check. This is what you call 222, friends.
- 03 05 31 51 CMP Yes, this has got to be right ... I figured that once and I know I can find it.
- 03 05 32 18 CMP Okay. Latitude is minus 09638.
- 03 05 32 24 LMP Minus 09638.
- 03 05 32 30 CMP Okay, and longitude over two is plus 8169.
- 03 05 32 40 LMP ...?
- 03 05 32 42 CMP Plus 8169.
- 03 05 32 51 CMP Latitude is minus four balls 7.
- 03 05 33 04 CMP Okay.
- 03 05 34 17 CMP Okay, could you read off the latitude and longitude ...?
- 03 05 34 23 LMP ...
- 03 05 34 29 CMP 06?
- 03 05 36 56 LMP ... Okay, f - f:ll. 250th.
- 03 05 37 40 CMP Okay, 27:48. You can go right ... this will give us the - ... 37:48 ...
- 03 05 38 34 LMP Well, if it's not ...; it'll drop to zero, if it doesn't ... because ... yes.
- 03 05 40 47 LMP Okay.
- 03 05 41 02 CDR The ... says we have to go about 50 before this should start falling.
- 03 05 41 17 LMP We can do nothing at the ... before HIGH bit rate.
- 03 05 41 27 LMP Yes, I'm going - Are you positive about that?
- 03 05 41 29 CDR Yes.
- 03 05 41 33 LMP Give me a 30-second warning when you want to say something. I'll have to stop it, ... that leaves 30 seconds ...

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Day 4

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- 03 05 42 47 CDR Yes.
- 03 05 43 23 CDR If it would have been LOCK, we've got - got two of them.
- 03 05 43 46 CMP Bill, ... Do you know I can see the horizon? Can you see the horizon?
- 03 05 43 59 LMP Pitch up?
- 03 05 44 00 CMP Yes, pitch up to -
- 03 05 44 20 CDR Pitch is about 50.
- 03 05 44 23 CMP Can you pitch up some more?
- 03 05 45 20 CMP No, that's about right. Let's take pictures of ... You see the ... right there.
- 03 05 46 37 CDR Houston, Apollo 8. How do you read?
- 03 05 46 40 CMP You have the ...?
- 03 05 46 43 LMP Yes, I've got it over here.
- 03 05 46 45 CMP You've got it?
- 03 05 46 46 LMP Here you go; I'll pass ...
- 03 05 47 04 CDR Houston, Apollo 8. Go ahead.
- 03 05 47 11 CDR Roger. Looks like the evapora - looks like the evaporator is holding okay; at least it trys to. But it dropped the temperature down to about 32 and now it's picking back up again to stabilize at about 42 degrees.
- 03 05 48 14 LMP Do you need any more film there, Jim?
- 03 05 48 30 CDR Okay, if I'm ...
- 03 05 48 32 CMP Huh? Okay.
- 03 05 48 40 CDR Houston, Apollo 8.
- 03 05 48 49 CMP Roger, Houston; this is Apollo 8. What we are doing on the control point tracking - I managed to look for CP 1 at the same time we were trying to do CP 2 on this REV. I picked two marks which are just as

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Day 4

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small, but more easily recognizable than the ones that were given to me. I know that I can repeat the process and pick the same small point on the next REV. Now I can try to look for the control points that are written down, but I think that I have better control over the ones that we have.

03 05 49 33 CMP

Roger. One more point: the control point times which you have given me are a little bit off, and I can notice by comparing the maps that these maps are not too well aligned either.

03 05 49 58 CMP

That's affirmative. That's why I picked them. They're both - they're both very prominent features, and they are both very small craters about the same size as the ones we are looking for, but I can pinpoint them on a map.

03 05 50 41 CMP

Yes, you need about a 10-degree pitchup from that attitude. Houston, Apollo 8.

03 05 50 54 CMP

Roger. One more comment is just that, what with all the controversy at data priority meetings, it looks like 10 degrees pitchup is the best attitude to obtain the horizon so that you can follow the landmark down through the scanning telescope. If we pitch down any more, a full-up trunnion will not gather - get the horizon, and the horizon is a great help in leading yourself into the control point.

03 05 52 03 CDR

How does that look, Jim? We should be about over PC 3.

03 05 52 08 CMP

Well, I just sort of find PC 3 because ... get it ...

03 05 52 30 CMP

Let's see, do you have that ... thing? Is that it?

03 05 52 44 CMP

Go ahead.

03 05 53 11 CMP

Roger, Houston. CP 1: latitude, minus 6 - 06269; longitude over two, minus 78954; attitude, plus 00152. For CP 2: latitude, minus 09638; longitude over two, plus 89691; attitude, minus 00007. I tried to get CP 3 at the - at the same time, but I - I let it get by to get set up for the first crack at the landing site.

03 05 54 14 CMP

Roger. CP 1: latitude, minus 06269; that's the latitude. The longitude over two for CP 2: plus 81691.

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03 05 54 40 CMP And it appears that RESOLVE, MEDIUM is a very good combination to use around the ...

03 05 54 54 CDR Yes.

03 05 54 57 CMP And it appears so far, Houston, that no spacecraft pitch motion is required to get five marks on the target in plenty of time.

03 05 55 21 CDR Okay, let's get ready for - Here's a couple of ...

03 05 55 56 CMP How's the water boiler doing, Frank?

03 05 56 40 CMP Okay, that would be 78 percent.

03 05 57 03 CMP Frank, could you just get me ...?

03 05 57 15 CMP Hey, Frank, why don't you go ahead and get some sleep?

03 05 58 41 CMP Yes, Frank.

03 05 58 49 CMP Yes, roll some up there.

03 05 58 57 CMP Okay, just hold it there, 10 degrees down and - Are you sure you're aligned good? Did you use the landing site? Okay.

03 05 59 17 LMP I got about a 10-degree yaw, here, Jim, ...

03 05 59 51 LMP Okay, Jim, what's the other ...?

03 05 59 54 LMP You going to be turning it off?

03 06 00 10 LMP ... which one was this? Control point sighting? CP number 526?

03 06 00 16 CMP No, this will be landing mark zero, AUTO OPTICS.

03 06 00 25 LMP What - what's that? ... pseudo landing site?

03 06 00 40 CMP I got ... Is that about 10 degrees?

03 06 00 47 CMP Oh, ... I think that's perfect. The horizon just comes up to the top ... zero optics.

03 06 01 25 CMP (Singing)

03 06 02 59 CMP Pitch up there about 7 degrees.

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Day 4

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- 03 06 04 07 CMP Okay, we'll stop and compute the ... right now.
- 03 06 04 19 CMP Go ahead.
- 03 06 04 20 LMP Go ahead, Houston.
- 03 06 04 35 LMP Okay, ...
- 03 06 04 43 LMP You have some updates here ...
- 03 06 04 50 CMP Okay, now we might get a program alarm.
- 03 06 04 52 LMP Okay, I've got the ...
- 03 06 05 35 CMP Okay, what I'm going to do now, is ...
- 03 06 06 41 CMP Okay, I ... a little bit - yaw to the right. You're indicating 50 degrees in pitch and yaw ... Oh, this ... is a piece of cake. It's a real piece of cake.
- 03 06 07 21 CMP ... about 3 minutes fast in ...
- 03 06 07 59 CMP ... yaw ... roll left instead of right ...
- 03 06 08 05 LMP Okay, how's your TEMP?
- 03 06 08 40 CMP For your information, Houston, instead of ... the landing site again, I'm going to give it to AUTO OPTICS, now. ... one ... it's very easy to distinguish ... and I can even pick out the - If I can see ... landing site even though it's still about 60 degrees trunnion.
- 03 06 09 05 CMP Okay, let's --
- 03 06 09 07 LMP Roll right?
- 03 06 09 23 LMP Here we are.
- 03 06 09 25 CMP Okay.
- 03 06 09 34 LMP How far below 10 degrees are you reading, anyway?
- 03 06 09 38 CMP I don't know, just don't worry about it.
- 03 06 09 40 LMP Oh, okay.
- 03 06 09 46 LMP What kind of a pitch are we reading?

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Day 4

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03 06 11 24 CMP Okay.

03 06 11 26 LMP Which way do you want to roll? Roll left?

03 06 12 47 LMP Okay.

03 06 13 00 LMP Yaw up, roll right 180 ... 2 degrees ... 2 degrees ...

03 06 13 26 CMP Call them ...

03 06 13 32 CMP Go ahead, Houston.

03 06 13 48 CMP Roger; I found out it didn't work ... MANUAL OPTICS ...

03 06 14 45 CDR Houston, Apollo 8. Stand by 1.

03 06 16 49 CDR Go ahead, Houston.

03 06 17 12 CMP Roger, or I could use no landmark AUTO OPTICS instead of the code.

03 06 17 37 CMP Okay, let me ...

03 06 36 05 LMP Okay. Okay, IMU align, REFSMMAT - We've done that.

03 06 36 17 CMP Yes.

03 06 36 20 CMP I think it's better.

03 06 36 22 CMP Okay. Did you finish that camera, or do you want me to do it?

03 06 36 27 LMP No, I never got around to that.

03 06 36 29 CC Apollo 8, Houston. Over.

03 06 36 32 CMP Go ahead, Houston.

03 06 36 35 LMP Hey, that thing is so loose it's coming apart.

03 06 36 37 CC ...

03 06 36 50 CMP Roger; will do.

03 06 36 52 LMP Okay, I'm going to go to BLOCK, right?

03 06 36 55 CMP Yes.

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Day 4

122

- 03 06 36 57 LMP Okay.
- 03 06 37 00 CMP That's in the checklist, isn't it - VERB 47 - or the flight plan?
- 03 06 37 06 LMP What's that?
- 03 06 37 08 CMP Transfer of the state vector.
- 03 06 37 09 LMP Yes. You did the IMU alignment? Think the GDC will last for another REV or not?
- 03 06 37 21 CMP That's okay.
- 03 06 37 26 LMP Roll 180 degrees at 2 degrees per second.
- 03 06 37 45 LMP You ready to roll, Jim?
- 03 06 37 47 CMP Yes, you're going back to what now?
- 03 06 37 55 CMP You're just going back to the landmark again.
- 03 06 38 00 LMP Yes.
- 03 06 38 01 CMP Okay. You got - Do you have a map update, Bill?
- 03 06 38 07 LMP Yes.
- 03 06 38 19 LMP I got it.
- 03 06 38 20 CMP Go ahead, Houston.
- 03 06 38 23 CC ...
- 03 06 38 35 LMP Yes, he's asking if we didn't have anything to say.
- 03 06 38 38 CMP Yes.
- 03 06 38 40 LMP Roger. We didn't have much to say - We couldn't see out the windows very well, Mike.
- 03 06 38 47 LMP It's really too bad.
- 03 06 39 07 CMP Okay. Here's a piece of camera equipment. Where does this go?
- 03 06 39 18 LMP Stick it down in that box on the left - on your right-hand side - in one of those boxes.

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Day 4

123

- 03 06 39 22 CMP You still got about a quarter of a roll of film left ...  
a little more than that.
- 03 06 39 30 LMP Okay, man.
- 03 06 39 31 CMP I'll stick it in my pocket.
- 03 06 39 32 LMP We might as well use it.
- 03 06 39 36 CMP In order to identify it, why don't I just take this  
one off?
- 03 06 39 50 LMP Here's your map, and here's your book, Jim.
- 03 06 39 52 CMP Okay. Okay, let me make sure I'm ...
- 03 06 40 05 LMP Have you got through reviewing your landmark map?
- 03 06 40 09 CMP Okay, now here's what we have to do this time, Bill.  
I've got two AUTO OPTICS positions in, and - and -  
I've got to get a third landmark. Okay, let me see.  
The time would be - -
- 03 06 40 34 CC ...
- 03 06 40 36 LMP Go ahead.
- 03 06 40 39 CC ...
- 03 06 41 01 LMP Okay. I guess the 60-degree limit does still hold,  
huh?
- 03 06 41 46 CC ...
- 03 06 41 52 LMP Okay. We just don't want to boil our IMU.
- 03 06 41 56 CC ...
- 03 06 41 59 LMP No, the - -
- 03 06 42 01 CC ...
- 03 06 42 04 LMP Roger, Houston.
- 03 06 42 06 LMP No, they just said don't worry about the sixth - No,  
it's working, but they said if it does act up, don't  
worry about the - -

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Day 4

124

- 03 06 42 09 CMP Roger, Houston. I'll read the book this time.
- 03 06 42 11 LMP -- 60-degree limit, with a secondary loop.
- 03 06 42 32 LMP Frank, here's a map floating or - Jim, here's a map floating around.
- 03 06 42 40 LMP Oh, it's right there.
- 03 06 42 42 CMP You know, that was one of the easiest points I've ever found.
- 03 06 42 46 LMP Good.
- 03 06 42 47 CMP You didn't need maps or anything to make that ... You saw it, too, didn't you? You didn't have to look at the map but one time?
- 03 06 42 58 LMP Yes, out the side window there when we had the TV pass.
- 03 06 43 05 CMP I hope you got some good 70-millimeter shots of that area, Bill, because that's - that's it --
- 03 06 43 10 LMP Of what area?
- 03 06 43 11 CMP Of our prime landing area, because right now we'll be passing over lighting conditions of our P 2 --
- 03 06 43 16 LMP I haven't, Jim, because we - we always roll about that time when we get TV.
- 03 06 43 22 CMP No, I'm still taking pictures. I'm still landmark tracking.
- 03 06 43 26 LMP Yes, I can't take - I can't take pictures when you're tracking, because these side windows are shot. They look out the side anyway.
- 03 06 43 33 CMP Well, that's why I wanted to get some before when we were doing that tracking, because then - Did you do them when we got that other track?
- 03 06 43 38 LMP I tried to.
- 03 06 43 42 CMP I think - Probably be our primary landing site.
- 03 06 43 44 LMP Why don't you just make it a project just to make sure you get some, because you can recognize it better than I can.

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Day 4

125

- 03 06 43 55 CMP Oh, yes, but you - -
- 03 06 43 56 LMP You got - -
- 03 06 43 57 CMP -- the 16-millimeter through here is lousy.
- 03 06 43 58 LMP No, the 16's no good. You've got to - you've got a 70-millimeter lens? If you have image - if you - if you - if you track your target, then you've got better resolution than the other one.
- 03 06 44 10 CMP Well, the thing is, it doesn't show enough of what you want to look for; that's the big thing, too. Yet, in spite of the place to land, you - -
- 03 06 44 16 LMP Did you ever see how big it could work?
- 03 06 44 17 CMP - - you want the big picture.
- 03 06 44 18 LMP Huh? Okay, let me show you how much you get, though.
- 03 06 44 26 CMP What - what I'm trying to show the people is the big - big areas around there, what they can see in the way of craters and mountains and things. You see, if I just show them a real fine resolution of a bunch of craters, they don't know what they are.
- 03 06 44 43 LMP Okay.
- 03 06 44 44 CMP That's the big point.
- 03 06 44 48 CMP That's why that earth-moon shot with a whole big expanse of - What have we got?
- 03 06 44 53 LMP High gain. Okay. It's behind us and up. Let's try OMNI B. Okay.
- 03 06 46 18 LMP Okay. ... pitch down at 0000.
- 03 06 46 36 LMP Rolling over; got to get it back down.
- 03 06 46 47 LMP It'll get worse before it gets better.
- 03 06 46 52 CMP Okay. Let's see, our first control point is at - -
- 03 06 46 56 LMP Okay, let's see how much time we got.
- 03 06 46 57 CMP - - 78:46. We got all sorts of time. We got 25 minutes.

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Day 4

126

- 03 06 47 02 LMP 0.2 of a degree per second.
- 03 06 47 25 LMP You get - give me the word on the ORDEAL, here, Jim, and - let me know how we're doing. 62 60?
- 03 06 47 36 CMP Yes.
- 03 06 47 37 LMP Okay, that sounds good. How about giving me a -
- 03 06 47 40 CMP Oh, that's our orbit.
- 03 06 47 44 LMP Yes, how about giving me the high gain?
- 03 06 47 51 CMP GDC isn't aligned in roll; I've got to do that.
- 03 06 47 54 LMP Okay, stop your attitude there before you - stop your ...
- 03 06 47 58 CMP Okay, I'll wait until I get there then.
- 03 06 49 49 CMP What else does the flight plan say, Bill?
- 03 06 49 53 LMP I don't see any - There's a 16-millimeter camera, sextant bracket, C-EX, 1 - 1/500th of a second. You been having any at 1/500th of a second?
- 03 06 50 11 CMP Mine was at 250. They say 1/500th of a second, now?
- 03 06 50 13 LMP Yes.
- 03 06 50 16 LMP The other one's 1/250?
- 03 06 50 17 CMP Take a look, take a look.
- 03 06 50 20 LMP ... left and then 150th.
- 03 06 50 28 CMP Okay, 1/500th of a second.
- 03 06 50 30 LMP Okay. Start it at IP 1, time of closest approach.
- 03 06 50 33 CMP Okay.
- 03 06 50 34 LMP That'll be doing spacecraft exterior atmosphere, but, hell, we can't do anything with these windows.
- 03 06 50 45 CMP Shouldn't it be getting a little more picturesque?
- 03 06 50 48 LMP Yes, beginning REV 6. It doesn't seem like we've hardly been here that long, does it?

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03 06 51 07 000

It's not 0.5% it's about 0.4%

03 06 51 07 000

You can't fit many more people than 8 passengers in a car. It would be interesting to see if you could fit 9 people in a car. It would beat up.

03 06 51 07 000

The things that I am most interested in from the new car are:

03 06 51 07 000

Yes, but they're not as good as the ones we really interested in, like infotainment system, etc.

03 06 51 07 000

Like me, I'm going to change the infotainment, etc.

03 06 51 07 000

Hmm?

03 06 51 07 000

I'm going to align the GPS. You want to make sure I do it right?

03 06 51 07 000

Well, I think you'll do the job.

03 06 51 07 000

OK, we're going to do it.

03 06 51 07 000

...

03 06 51 07 000

OK, I did it. The car is aligned. Now, I'll just hit the button and wake her up.

03 06 51 07 000

100% position is 0.5, max torque, 0.6%.

03 06 51 07 000

It's been aligned. See it? 0.6%.

03 06 51 07 000

OK, so, dim, you want to align the infotainment, etc?

03 06 51 07 000

Sure, I'll do it. Dim, see it? Once, let me just go through this whole procedure here.

03 06 51 07 000

Yes, I gave it one minute to align it, then I'll do the wheel turn and the position setting by hand. See it?

03 06 51 07 000

Yeah, all fine, OK, now I'm gonna do it, ok?

03 06 51 07 000

Yeah.

03 06 51 07 000

OK, so, I'm gonna do it.

03 06 51 07 000

Yeah.

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03 06 55 48 LMP Pardon me?  
03 06 55 50 CDR ...  
03 06 55 51 LMP No, I just put it to number 1 - number 1 ball align to GDC.  
03 06 55 57 CDR ...  
03 06 55 58 CMP Okay, is the COAS -  
03 06 56 04 LMP Okay.  
03 06 56 06 CMP Getting ready to get align with the number 2 ball?  
03 06 56 08 LMP I'm going to align the GDC, right.  
03 06 56 14 CMP Okay.  
03 06 56 23 CMP ...  
03 06 56 27 CMP Okay, now you want this one?  
03 06 56 29 LMP Yes, now I'll need that.  
03 06 56 33 CMP You got it, looking at you.  
03 06 56 36 LMP Okay, that's -  
03 06 56 39 CMP That's your pitch.  
03 06 56 40 LMP What? Zero? Or 34?  
03 06 56 44 CMP 34 degrees.  
03 06 56 45 LMP That's good. Good.  
03 06 57 17 LMP Coming up on REV 6.  
03 06 57 19 CDR ...  
03 06 57 21 LMP Yes, you just went down about 5 minutes ago.  
03 06 57 23 CDR ...  
03 06 57 24 LMP No. (Laughter)  
03 06 57 26 CDR ...

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03 06 57 27 LMP That's right. (Laughter)  
03 06 58 12 CC ...  
03 06 58 18 CMP Roger, Houston. We'll give it another try here.  
03 06 58 32 CMP What time is it there? About 2 o'clock?  
03 06 58 42 CMP Are you finished with the computer?  
03 06 58 44 LMP Yes, go ahead.  
03 06 59 20 CDR How are the systems, Bill?  
03 06 59 25 LMP Well, the last time I looked at them, they were pretty good, chief.  
03 06 59 32 LMP All the gages are looking at each other.  
03 07 00 03 LMP If you want to say anything about your tracking pass this time, I - Just let me know and we can go into HIGH bit rate.  
03 07 00 15 CMP Okay.  
03 07 00 25 CMP Okay, how about keeping your eye on these camera settings, too, on the next couple of passes?  
03 07 00 29 LMP You wanted to be 10 degrees, didn't you?  
03 07 00 33 CMP Yes.  
03 07 00 36 LMP Well, overshot, then.  
03 07 00 54 LMP Okay, the first one is 1/500th of a second.  
03 07 00 56 CMP Okay.  
03 07 02 05 CMP All those scientists are saying now, "Ohhh, if we only had a geologist onboard."  
03 07 02 10 LMP Okay, he couldn't see anything. I took that monocular and tried to eyeball it out the window last time.  
03 07 02 16 CMP Yes?  
03 07 02 18 LMP Nothing but a big blur out there. He'd see enough to make it interesting, but not enough to do anything.

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- 03 07 03 05 CMP Okay, I'm going to go out of here.
- 03 07 05 30 LMP 4 minutes.
- 03 07 05 51 LMP Okay, when's your first PCA - TCA?
- 03 07 05 56 CMP 79:10.
- 03 07 05 58 LMP Huh?
- 03 07 05 59 CMP 79:10.
- 03 07 06 00 LMP 79:10?
- 03 07 06 04 CMP Yes, sunrise, it says here.
- 03 07 06 06 LMP I can't hear you.
- 03 07 06 07 CMP Sunrise is 79:08.
- 03 07 06 08 LMP Yes.
- 03 07 06 22 CMP We're 3 minutes away; that's 9 degrees.
- 03 07 06 35 CMP Oh, boy, I may see the sun; I'd better be careful too. Hey, there is - there's a - there's a glow, you can see the sun come around a little bit.
- 03 07 06 44 LMP Is that right?
- 03 07 06 45 CMP Yes, I can see the sun come up before it comes up.
- 03 07 06 54 CMP Like zodiacal light, a little bit, maybe.
- 03 07 06 57 LMP Rim brightening, they call it?
- 03 07 06 59 CMP Yes.
- 03 07 07 27 CMP Yes, you sure can.
- 03 07 07 34 CMP Oh boy!
- 03 07 07 43 LMP Can you describe it?
- 03 07 07 50 CMP Yes, it's a real bright glow right in one spot, and it fans out all over the horizon. And I'm just trying to move my eye away, because the sun's going to peek over

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Day 4

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here any second now, and it's getting brighter and  
brighter, and it's get - It's an even light.

- 03 07 08 04 LMP Bright spot fans out over horizon?
- 03 07 08 06 CMP Yes, yes, then it fans up into the air; it's an even  
light; then all of sudden, it - The sun is peeking out  
right now.
- 03 07 08 12 CMP Whooo!
- 03 07 08 19 CMP See it?
- 03 07 08 35 LMP Gees, I got a start there. I saw that - some stuff come  
out of the optics or something; I thought it was a star  
whirling by.
- 03 07 08 53 CMP Alright, now you want to roll to keep that trunnion --
- 03 07 08 57 LMP We wouldn't want - I didn't realize you were that  
quick. Okay, which way?
- 03 07 09 00 CMP Okay, roll - roll left.
- 03 07 09 01 LMP Roll left, okay.
- 03 07 09 03 LMP I'm yawing --
- 03 07 09 05 CMP Watch her - watch her as she comes down.
- 03 07 09 07 LMP I yawed a little left.
- 03 07 09 09 CMP Okay.
- 03 07 09 44 LMP How are we doing?
- 03 07 09 47 CMP Okay.
- 03 07 09 52 CMP Is it 10 degrees left?
- 03 07 09 54 LMP Yes, right now. You got enough roll? What happened?
- 03 07 10 06 CMP I went to MANUAL. I'll get it for you.
- 03 07 10 47 LMP You alright? You got your camera on?
- 03 07 10 53 CMP I'll put it on, just as soon as we get rid of the sun.

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Day 4

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- 03 07 11 11 CMP ... turn it down now.
- 03 07 11 16 LMP Wait a minute, you - you want me to - you want me to try to avoid it?
- 03 07 11 19 CMP Yes, you can pitch down a little bit.
- 03 07 11 22 LMP Hey, wait a minute, are you - I'm roll - I may roll over 10 degrees.
- 03 07 11 29 LMP That you that's driving it?
- 03 07 11 31 CMP No, I'm not driving it now. Well, I'm driving it now, yes. That's enough. That's enough.
- 03 07 11 38 CMP Let me go back there and try this CMC again.
- 03 07 11 48 CMP Okay, let's try that one again.
- 03 07 11 53 LMP Pitch down?
- 03 07 12 03 LMP We're right smack on 10 degrees.
- 03 07 12 06 CMP Okay.
- 03 07 12 12 CMP You can pitch down a little more, if you want to.
- 03 07 12 14 LMP Okay.
- 03 07 12 55 CMP Okay, AUTO OPTICS is doing the whole thing for me. Now - get this camera going.
- 03 07 13 28 CMP AUTO is fairly close.
- 03 07 13 52 CMP Fantastic pictures here, Bill.
- 03 07 14 36 CMP Give you a MANUAL OPTICS.
- 03 07 16 01 CMP Oh my gosh!
- 03 07 16 02 LMP What?
- 03 07 16 03 CMP My AUTO OPTICS has put it right on.
- 03 07 16 05 LMP We going to make that angle, or not?
- 03 07 16 14 CMP I'm just letting it run here for a little bit before I try to brake it.

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Day 4

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03 07 16 17 LMP It's getting kind of small.  
03 07 16 19 CMP That's - that's okay. Don't bother using up gas. Okay.  
03 07 16 23 LMP Alright. I already bothered, I'm sorry.  
03 07 16 30 LMP I haven't loaded this camera, ...  
03 07 17 18 CMP Ahhhh!  
03 07 17 19 LMP What? What happened?  
03 07 17 24 CMP Oh, that's okay.  
03 07 17 26 CMP It's chilly in here --  
03 07 17 28 LMP Don't - don't wake up Frank.  
03 07 17 29 CMP Oh, okay. Okay.  
03 07 17 37 CMP Yes. Sorry, Frank, I didn't mean to disturb you.  
Thought I pushed the wrong button.  
03 07 18 13 CMP Okay, what's your attitude now?  
03 07 18 17 LMP Seems to - oh, about 6 degrees.  
03 07 18 18 CMP Above?  
03 07 18 19 LMP Yes.  
03 07 18 21 CMP Okay, just hold it right there.  
03 07 18 56 CMP Okay, we've got another one coming up. Same procedure.  
03 07 19 06 CMP This is - Now, where's that book?  
03 07 19 14 CMP I've got ... book's over there.  
03 07 20 43 LMP Should be coming up on Low right now.  
03 07 21 13 CMP Okay, we're tracking the new one.  
03 07 21 15 CDR ...  
03 07 21 16 LMP Yes?  
03 07 21 17 CDR ...

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Day 4

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03 07 21 18 LMP It's still going on, Frank.  
03 07 23 39 CMP Do we have the recorder on?  
03 07 23 43 LMP On LOW bit rate. Do you want to say something?  
03 07 23 46 CMP Yes, well.  
03 07 23 48 LMP You're quite welcome. Okay, why don't you stop it, and put it to HIGH bit rate, and put it forward again?  
03 07 24 03 CMP Okay.  
03 07 24 10 CMP (Whistling) Okay.  
03 07 24 13 CMP Tape recorder is where - RECORD, FORWARD --  
03 07 24 16 LMP Just put it - put it to STOP.  
03 07 24 19 CMP Which one is it, the center?  
03 07 24 21 LMP Yes.  
03 07 24 22 LMP No, no, no, no. Push this forward.  
03 07 24 24 CMP Forward?  
03 07 24 25 LMP Put it this way in the middle.  
03 07 24 26 CMP Yes.  
03 07 24 42 CMP -- several comments on --  
03 07 24 43 LMP Good and loud; they'll never be able to hear you there.  
03 07 24 46 CMP Several comments on landmark tracking. The last time I used AUTO OPTICS, putting in the coordinates, I found the first time in MANUAL OPTICS for CP 1. The G&N system did quite well. It tracked almost as good as I could track manually right on the target, and I tipped it over just at the last moment to take my five marks. There - appears to be very smooth tracking; no problem - with this particular system. I'm now in CP 2; I have it just below the horizon now, and it's tracking down from the horizon automatically.  
03 07 25 32 CMP Okay. Now, what do you want me to do?

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- 03 07 25 36 LMP The same deal in reverse.
- 03 07 25 40 CMP Okay, I'll go to - STOP?
- 03 07 25 45 LMP Yes.
- 03 07 27 45 CMP Look at that! It is right on!
- 03 07 32 32 CDR Are you using this map for anything, Jim?
- 03 07 33 23 LMP Got the rate, Jim?
- 03 07 38 42 CMP No, this is pretty good, though, I didn't - Maybe that could be the problem. Maybe I could ...
- 03 07 38 56 CMP Oh, it's scheduled a little later in the day ...
- 03 07 39 11 LMP What is that, Jim?
- 03 07 39 42 CMP What was that? ...
- 03 07 39 47 LMP Oh, that?
- 03 07 39 48 CMP You hear that noise over there?
- 03 07 39 49 LMP Yes.
- 03 07 42 17 CMP Okay.
- 03 07 44 17 LMP How long does this hand controller stay armed?
- 03 07 44 23 LMP Hey, Jim.
- 03 07 44 24 CMP Yes.
- 03 07 44 25 LMP This hand controller's armed.
- 03 07 46 47 CMP This should be ... or ...?
- 03 07 47 20 LMP Houston, Apollo 8.
- 03 07 47 29 CMP Try them again.
- 03 07 47 30 LMP Houston, Apollo 8.
- 03 07 48 47 LMP Houston, this is Apollo 8. Over.
- 03 07 50 09 CMP Did you see our landing site, Frank?

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03 07 50 11 CDR      Huh?

03 07 52 03 LMP      Houston, Apollo 8. Over.

03 07 52 54 CMP      Yes, sir. ... down there?

03 07 55 42 CMP      Houston, Apollo 8.

03 07 55 49 CMP      Roger. Houston, a few words on our optics tracking system. I used AUTO OPTICS for control points 1 and 2 on the backside, and they worked beautifully, tracked both targets for me. And I went to the control point 3 as designated in our orbital-control book to see the latitude and longitude that was given to me, and used AUTO OPTICS to track that particular coordinate with it, and it was very close to the actual tracking plot. I picked the mark there where I did a final marking and recorded latitude and longitude. I'm now about to come up on the landing site and using AUTO OPTICS in the coded input to see how that works.

03 07 59 33 CMP      Go ahead.

03 07 59 51 CMP      I ... on the P52 ...

03 08 01 05 LMP      Yes.

03 08 02 48 CMP      Well, you can almost ...

03 08 02 53 CMP      I'll do one thing until I get up there, but ...

03 08 06 25 CMP      You want to take a look at this? ... it's something - I don't know what.

03 08 06 52 CMP      Just wonderful ... right on ...

03 08 07 56 CMP      Mike, Apollo 8.

03 08 08 03 CMP      Roger; I'm in AUTO OPTICS now on the landing site. It would just warm up old Jack Schmidt's heart. This AUTO OPTICS is tracking perfectly on the - target and the two IP's turned out beautifully. I have a beautiful view of it. The first IP's ... through the vertical now and the second one is coming up - it's just a grand view.

03 08 08 45 CMP      For Jack's information, the sun angles that we see now from the first IP, second IP, and the P 1 are just right, I think, for landing conditions. The shadows aren't

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too deep for you to get confused, but the land is - has texture to it, and there are enough shadows to make everything stand out.

03 08 09 12 LMP

If Jack's listening, tell him that the optics may be doing alright, but the eyeballs are having a little trouble seeing through all this smear on the windows.

03 08 09 31 LMP

The windows have the same smear to - The rendezvous windows are okay, but they're so small and looking in the wrong direction so far.

03 08 09 41 LMP

I think the vertical stereo will be okay.

03 08 11 09 LMP

It certainly looks like we picked the more interesting part of the moon to land on. The backside looks like a sandpile my kids have been playing in for a long time. It's all beat up, no definition, just a lot of bumps and holes.

03 08 11 25 CDR

I'm looking at IIP 2 right now, Houston, and it's a great spot.

03 08 11 32 LMP

The area we're over right now gives some hint of possible volcanic, though I can't eyeball it at the moment to pin it down. There are some craters and buildups that just definitely suggest volcanic activity.

03 08 12 04 LMP

Yes, that backside doesn't look too good.

03 08 12 13 LMP

That was relatively speaking, of course.

03 08 12 29 CMP

Frank, we're just finishing up the ... here. ...

03 08 14 56 CMP

We've got to copy this ..., too.

03 08 16 55 LMP

... Frank, the SPS is about ... hours ...

03 08 16 59 CDR

Okay.

03 08 17 06 CMP

Okay.

03 08 17 07 LMP

We got about 4 hours ... It's about 4-1/2 hours.

03 08 17 32 CMP

You know, ... the trash bag, we ought to get out that ... and look it over.

03 08 18 04 LMP

Same set.

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03 08 18 05 CMP Do you need that anymore, Bill?  
03 08 18 07 LMP Lan - landing site, landing site. Yes.  
03 08 18 13 CMP Do you need that anymore, Bill?  
03 08 18 14 IMP Do I need what? No, I don't need anymore.  
03 08 18 19 LMP You might as well sleep, or one of us might as well, because it doesn't - doesn't take two guys to do it, and you can't see anything else anyway. The other guy's just sitting around scratching his rear.  
03 08 18 43 CMP Have they sent us updates, yet?  
03 08 18 45 CDR No.  
03 08 18 51 CMP Houston, Apollo 8.  
03 08 18 57 CMP Go ahead, Houston.  
03 08 19 03 CMP Roger. Get all - the figures?  
03 08 19 07 LMP Roger.  
03 08 19 08 CMP Okay.  
03 08 19 09 LMP It's up to him.  
03 08 19 13 CDR Have we lost contact with them?  
03 08 29 08 SC I think there's pieces of a ...  
03 08 29 10 SC I think I'll just hold onto this thing ...  
03 08 39 24 LMP Go ahead, Houston.  
03 08 39 30 IMP Roger; how far did you want us to dump that water?  
03 08 39 42 LMP Roger; 25 percent.  
03 08 39 43 CMP We ought to get that thing set up right now.  
03 08 39 45 LMP Okay.  
03 08 39 49 CMP Because I can be - we can be tracking while we're dumping, too.

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Day 4

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- 03 08 40 52 CMP Houston, Apollo 8.
- 03 08 41 11 CMP Are you receiving our - our tracking data?
- 03 08 41 27 CMP Okay, thank you.
- 03 08 41 47 CMP Roger; will do. Now, isn't this ... in the flight plan, some place along the way, there?
- 03 08 42 04 CMP Are you getting out, Frank? You getting out?
- 03 08 42 37 LMP Wait a minute; pitch up. You ... you pitch down ...
- 03 08 42 56 CMP Well, let me see now. That's the right connection; I think so. We got - Where is the filter, Bill?
- 03 08 43 05 LMP I think they made a mistake here in the flight plan.
- 03 08 43 07 CMP Oh, you have it on here, huh?
- 03 08 43 11 CMP Do you have the water - This - URINE HEATER's been ON, right?
- 03 08 43 14 LMF If you pitch down, yes -
- 03 08 43 37 CMP Okay, we have the hose connected, so we want to go through the procedure.
- 03 08 43 47 LMP Okay, WASTE STOWAGE VENT, VENT for 5 seconds.
- 03 08 43 51 CMP You want to be - -
- 03 08 43 52 CDR ...
- 03 08 43 54 CMP I'll show you; just a minute.
- 03 08 44 00 CMP Yes, they're OPENED and CLOSED ... here. I'm in 4-A? Okay, if it's reading 1, I could put WASTE - WASTE TANK's VENT for 5 seconds, huh?
- 03 08 44 12 LMP Right, WASTE STOWAGE, VENT, yes, for 5 seconds.
- 03 08 44 17 CMP Done.
- 03 08 44 21 CMP BATTERY, VENT.
- 03 08 44 22 LMP 4-A?
- 03 08 44 25 CMP Yes. Take her down?

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Day 4

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- 03 08 44 27 LMP Take the BATTERY, VENT, down. It's not down; let it come down.
- 03 08 44 31 CMP Well, it's getting real close to it.
- 03 08 44 32 LMP Oh, there it goes. Okay, it's down.
- 03 08 44 34 CMP It's down?
- 03 08 44 35 LMP Okay, CLOSE them both.
- 03 08 44 37 LMP Make sure your URINE HEATER's ON.
- 03 08 44 44 CMP URINE HEAT's on A.
- 03 08 44 45 LMP Okay. And - go ahead and dump the waste.
- 03 08 44 48 CMP Okay, we take that over and put it on - where it says, "OPEN/CLOSE, WASTE TANK SERVICING."
- 03 08 44 55 LMP Yes.
- 03 08 44 56 CMP Put that to OPEN. Leave it go in there.
- 03 08 45 03 CMP Okay, now we got to watch the waste tank.
- 03 08 45 11 LMP Yes, I'm watching it.
- 03 08 45 13 CMP You're watching it? Okay. You got WASTE TANK, ON, then?
- 03 08 45 16 LMP Yes.
- 03 08 45 17 CMP Okay.
- 03 08 45 20 LMP I don't know, Frank.
- 03 08 45 36 CMP It's still pretty good. Let's see here ...
- 03 08 45 38 LMP Okay, we're dumping the waste tank now, Houston.
- 03 08 45 42 LMP You want to get up here now?
- 03 08 45 48 CMP Okay, just about even.
- 03 08 45 59 CMP You want to get up on one of these seats? You want to get up here?
- 03 08 46 05 LMP This is okay over here. Clear.

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Day 4

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- 03 08 46 25 LMP It'd be a good time to do it, because there's more - Jim's really the only one that's busy, and I can fix his.
- 03 08 46 45 LMP Yes.
- 03 08 46 47 LMP Yes, it - it'll take a good while.
- 03 08 46 53 LMP It's up at 85 percent. Right now, it's 47.
- 03 08 46 59 CMP How much film do we have left over, Bill?
- 03 08 47 02 LMP Well, I'll tell you, Jim, these windows are so bad, you can just take pictures - say one - We need - we need - Don't get into that interior - interior's for inside stuff; and we need one - 16 millimeter for the convergent stereo, and - oh, about a half of one for that image-motion compensation which - kind of a low-priority thing.
- 03 08 47 33 CMP Do you - do you want VERB 83? Did you look for --
- 03 08 47 40 LMP Yes, it's the ... isn't all that bad, but we could try - we are allowed to yaw. We could try VERB 83 for drill.
- 03 08 47 59 CMP Okay, I'd better get out the books and --
- 03 08 48 00 LMP This one says 92; I'll crank it around a little bit.
- 03 08 49 09 CMP Okay, how's our RCS doing?
- 03 08 49 11 LMP Good.
- 03 08 49 12 CMP Let's see if --
- 03 08 49 14 LMP Well, it hasn't changed since we started. See, it's still about - 67 percent.
- 03 08 49 28 LMP SPS is holding steady.
- 03 08 49 32 LMP Did you cycle through the EPS, Jim? ... --
- 03 08 49 38 CMP No, I haven't done that, yet. Okay, and don't forget --
- 03 08 49 42 CDR ...
- 03 08 49 43 LMP Yes, well -
- 03 08 50 02 CMP Okay, EPS. You're on BAT B charge, you know?

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03 08 50 05 LMP Yes, just leave that there, don't change that.  
03 08 50 07 CMP Okay, it's 39 ... now.  
03 08 50 14 CMP Okay, I can cycle this one okay, right?  
03 08 50 17 LMP Slip those around those cameras, Jim, and I'll fix them while you're shooting that landing site.  
03 08 50 30 LMP Okay, we got - let's see, we got 23 minutes until sunrise, so we've got a lot of time.  
03 08 50 49 LMP I haven't seen that water going down any at all.  
03 08 50 52 CDR ...  
03 08 50 55 CMP Well, ... steam pressure's --  
03 08 50 56 LMP It's not going down any.  
03 08 50 58 CDR Bill.  
03 08 50 59 LMP Not going down.  
03 08 51 00 CDR What?  
03 08 51 01 LMP Not going down.  
03 08 51 03 CMP Ask Houston if it's -  
03 08 51 04 LMP Okay, you want to - Let's see here. Put the purge line - Take that wat - Shut the wa - Well, that off - put the water on, and - put that purge fitting on it.  
03 08 51 16 CDR ...  
03 08 51 19 LMP Oh!  
03 08 51 20 CDR ...  
03 08 51 22 CMP That's one thing you forgot to tell us!  
03 08 51 23 LMP (Laughter)  
03 08 51 28 CMP Here it goes.  
03 08 51 29 LMP Yes, I can see it; it's dumping.

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Day 4

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03 08 51 33 CMP And we solved another mystery!

03 08 51 37 CMP We have three problems and one's F. Borman.

03 08 51 40 CDR ...

03 08 51 42 LMP Yes, it's going down.

03 08 53 01 CMP Go ahead, Houston.

03 08 53 11 CMP Roger.

03 08 53 13 LMP How much longer do you think we have to go on the battery charge there, Mike?

03 08 53 24 LMP If you can wake up the EECOM, why don't you have him ask the back room?

03 08 53 36 LMP (Laughter)

03 08 53 40 LMP Yes, it is. Yes.

03 08 53 50 LMP Okay, thank you very much.

03 08 54 30 CDR ...

03 08 54 31 LMP Huh?

03 08 54 33 CDR ... water?

03 08 54 36 LMP 60 - 70 - 75 percent, 75 percent.

03 08 54 42 LMP Yes.

03 08 54 56 CMP (Singing)

03 08 55 42 CMP Well, did you guys ever think that one Christmas you'd be orbiting the moon?

03 08 55 47 CMP I say, one Christmas Eve you'd be orbiting the moon?

03 08 55 51 LMP Just hope we are not doing it on New Year's.

03 08 55 54 CMP Hey, hey, don't talk like that, Bill; think positive.

03 08 55 57 CDR ...

03 08 55 59 LMP I said, just hope we don't do it on New Year's.

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Day 4

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- 03 08 56 02 CC ...
- 03 08 56 04 LMP Okay, see you on the other side, Mike.
- 03 08 56 20 LMP Me, too.
- 03 08 56 25 CMP That was pretty spectacular: never to see the moon until just before braking into - into LOI.
- 03 08 56 32 LMP That's kind of a nonchalant approach, you know that (laughter)? Remember Warren North's procedure of eyeball the moon, and whatever we had to do to -
- 03 08 56 41 CMP Yes, ...
- 03 08 56 50 LMP Would you turn my S-BAND VOLUME down to about 2, Mike - Jim?
- 03 08 56 54 CDR ...
- 03 08 57 10 LMP The other way (laughter).
- 03 08 57 12 CMP How's that?
- 03 08 57 13 LMP Great!
- 03 08 57 16 LMP You know that venting - that water put a good torque on us.
- 03 08 57 20 CMP Well, I'm debating now, - I'm debating whether to use it again or not, Frank.
- 03 08 57 23 CMP I can use it for the landing site, I guess, again.
- 03 08 57 29 LMP Hey, we were tracking down there real nice. Soon as we started to vent, we went poof!
- 03 08 57 34 CMP Is that right?
- 03 08 57 35 LMP Yes.
- 03 08 57 36 CMP You'd better have - It's a good thing we are venting now, and not on that 10th REV or something like that.
- 03 08 57 42 CMP Did you sleep?
- 03 08 57 46 CMP We're on the 7th - coming over here - Where are we? We're coming from here.

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- 03 08 57 58 CMP Yes, we're coming - Actually we are right down here.  
How's your - There's one I've got to get. Huh?
- 03 08 58 30 CMP You all finished with 83, Bill?
- 03 08 58 33 LMP Yes, I sure am.
- 03 08 58 37 CMP I'll see if our orbit has changed any.
- 03 08 59 08 CMP These optics are outstanding.
- 03 08 59 10 CDR What?
- 03 08 59 12 CMP The optics.
- 03 08 59 28 CDR ...
- 03 08 59 35 CMP Yes.
- 03 08 59 41 LMP Okay, water quantity is 55 percent.
- 03 08 59 44 CDR How much?
- 03 08 59 45 LMP 55.
- 03 08 59 58 CMP 5th REV.
- 03 09 00 02 CMP 7 and 8 are the last two that we got. You got TV right  
down here.
- 03 09 00 19 LMP O<sub>2</sub> FLOW HIGH.
- 03 09 00 23 CDR Huh?
- 03 09 00 24 LMP O<sub>2</sub> high flow; it's from that venting, I guess.
- 03 09 00 29 LMP That and - oh, the water - the accumulator just came  
on. The accumulator just came on.
- 03 09 01 10 CDR ...
- 03 09 01 12 LMP 50 percent.
- 03 09 01 18 CMP Are you in position, Bill?
- 03 09 01 20 LMP Yes.
- 03 09 01 22 CMP 81:01, it's coming up on that time, now.

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- 03 09 01 26 CMP 81:09, I got to get this stuff started.
- 03 09 01 30 LMP ...
- 03 09 01 49 LMP This one calls for pitch down 5 degrees, Jim.
- 03 09 01 55 LMP You want to do that, or are you just going to do that 10-degree thing?
- 03 09 01 59 CMP No, you can - pitch at least on the horizon for this, because - otherwise, it's going to - This hasn't changed though, I don't think.
- 03 09 02 11 LMP Well, it has in the flight plan, whether you - it's up to you, however you want it. Doesn't make any difference --
- 03 09 02 14 CMP Huh?
- 03 09 02 15 LMP -- I can't see anything out here anyway.
- 03 09 02 16 CMP I just don't want to get the sun in my eyes.
- 03 09 02 18 LMP You want me to pitch down to the horizon or past?
- 03 09 02 24 CMP Yes, you can pitch down a little bit past the horizon.
- 03 09 02 26 LMP Give me a moment here, then.
- 03 09 02 48 LMP Okay, you want to hop in here, Frank?
- 03 09 02 50 LMP Say, you want to get in here?
- 03 09 02 54 CDR ...
- 03 09 02 56 LMP Okay.
- 03 09 03 09 LMP Huh?
- 03 09 03 13 LMP Oh, okay.
- 03 09 03 18 LMP I can put this ... right there.
- 03 09 03 44 LMP Is it?
- 03 09 03 52 LMP Okay. That better?
- 03 09 04 02 LMP It's about 35, huh, Frank?

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Day 4

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- 03 09 04 11 LMP Well, I still say 35.
- 03 09 04 20 LMP Well, it does. You got to lead it a little bit, because it's - Any time now - It - it always drops a little bit more.
- 03 09 04 27 CDR ...
- 03 09 04 28 LMP Yes, it would be a good time.
- 03 09 04 30 LMP Jim, you want to give him that vacuum vent?
- 03 09 04 41 LMP Okay, stick the vacuum thing on there, and vent it for a while.
- 03 09 04 44 CMP Here's the vacuum.
- 03 09 04 45 CDR ...
- 03 09 04 46 CMP What?
- 03 09 04 47 CDR ...
- 03 09 04 49 CMP Here you go.
- 03 09 05 22 CMP We might get a possible program alarm.
- 03 09 06 15 CMP What's your attitude, Bill?
- 03 09 06 17 LMP I'm about 5 degrees pitch down and 5 degrees roll right.
- 03 09 06 30 SC (Blowing nose)
- 03 09 07 09 CMP Did you get through?
- 03 09 07 10 CMP Okay ...
- 03 09 07 11 CDR Okay, Jim.
- 03 09 07 13 CMP Well, the sunlight suddenly came in there. It wasn't like the last time I saw it.
- 03 09 07 20 LMP I'm pitched down quite a bit this time.
- 03 09 07 30 CMP Okay. Keep tracking, Bill. She'll be ready.
- 03 09 07 38 CMP I changed the IP, Frank. I thought this had a better symbol to it. I can remember this one better.

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Day 4

148

- 03 09 07 49 LMP When did you start the first time?
- 03 09 07 52 CMP Let's see.
- 03 09 07 55 CDR ...
- 03 09 07 56 LMP Say again.
- 03 09 07 58 CMP How's the water doing?
- 03 09 08 02 CMP 81:09 is -
- 03 09 08 05 LMP Yes, I do.
- 03 09 08 06 CMP Yes, I have -
- 03 09 08 19 CMP We're still throwing away a lot of stuff on that.
- 03 09 08 56 CMP You want something to hold on to or what?
- 03 09 09 50 CMP Boy, you ought to see the lunar surface with this 28-power scope!
- 03 09 10 05 CMP This is fantastic!
- 03 09 10 13 LMP Can you see anything at all that looks like a volcano?
- 03 09 10 16 CMP No.
- 03 09 10 17 LMP Huh?
- 03 09 10 19 CMP This is utterly fantastic!
- 03 09 10 27 CMP You should get it when it's just rising - you get it with just the horizon still there; you've got to hurry, though. I've got to take a shot here shortly.
- 03 09 10 39 CMP She's tracking.
- 03 09 10 46 CMP I got it right there, big as the mark.
- 03 09 11 25 CMP Where - How far are you pitched down now, Bill?
- 03 09 11 27 LMP 10 degrees - 6 degrees.
- 03 09 11 32 LMP Too much?

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Day 4

149

- 03 09 11 37 CMP I just wanted to know - Yes, 6 degrees is too much; although it's AUTO tracking, I can just barely see the edge. 6 degrees is too much pitchdown.
- 03 09 12 16 LMP How's that?
- 03 09 12 5<sup>1</sup> CMP That's it - Whatever you have right now is a good shot.
- 03 09 12 56 LMP Okay.
- 03 09 13 12 LMP Got 5 degrees.
- 03 09 13 14 CMP Okay.
- 03 09 14 19 CMP I'm tracking on this - on this telescope, and it's - the sextant, and it's much better.
- 03 09 14 59 CMP Yes.
- 03 09 15 02 LMP Almost.
- 03 09 18 27 CMP You don't get -
- 03 09 18 47 CMP You know, even at 60 miles though, it seems like it's still that far away.
- 03 09 19 58 CMP There's still things coming off.
- 03 09 20 01 LMP There's still stuff coming out.
- 03 09 20 31 CMP Well, I wish I could say that we saw a volcano or something, but I'm afraid this is - just an amazing sight.
- 03 09 20 37 LMP I haven't seen a thing - seen a thing that looked like a volcano all day long.
- 03 09 20 41 CMP I haven't either.
- 03 09 20 43 LMP I said I haven't seen a thing that looked like a ve - volcano all day long.
- 03 09 20 47 CMP Tsiolkovsky - Tsiolkovsky is the only one that has the distinct appearance to it - -
- 03 09 20 50 LMP Yes, the filling does.
- 03 09 20 54 CDR ...

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Day 4

150

- 03 09 20 55 LMP Yes, please.
- 03 09 20 56 CDR ...
- 03 09 20 57 LMP Yes, I'll just kind of ease - just - Oh - okay, you coming over here, now?
- 03 09 21 01 LMP Sure.
- 03 09 21 02 CMP Have you dropped down in attitude?
- 03 09 21 06 CMP What's your attitude in pitch, Bill?
- 03 09 21 07 LMP I'm going to take a leak, now. I should have told you.
- 03 09 21 11 LMP About 8 degrees.
- 03 09 21 13 CMP Above?
- 03 09 21 14 LMP Below.
- 03 09 21 15 CMP Oh, below, yes. That's bad.
- 03 09 21 24 CMP Should stay at least at the horizon, if you can.
- 03 09 21 26 LMP Well, you liked what I had before; it's only about 2 degrees difference.
- 03 09 21 30 CMP Well, when it's tracking far like this, see what the trunnion is? 46 degrees?
- 03 09 21 37 CMP Well, maybe it does, maybe it's ...
- 03 09 21 41 LMP Tell you what - Why don't I give you that other camera?
- 03 09 21 45 LMP You've got color film; why don't you get a picture of the earth as it comes up next time?
- 03 09 22 05 LMP (Laughter) Well, that was real good. Okay, you ready?
- 03 09 22 18 CMP Have you pitched up at all?
- 03 09 22 26 LMP Yes, we're pitching up. Just having a changing of the watch, here.
- 03 09 22 34 LMP I'll get that, Frank. Go ahead.
- 03 09 22 38 LMP In the back - It's toward me - it's right there. ... lower.

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03 09 22 50 CMP Boy, here's another amazing sight! Watching AUTO tracking with the orange background.

03 09 23 00 CMP Man, that's an amazing sight!

03 09 23 04 CMP The landmark line of sight is going by; it's so bright, it's orange! And the star line of sight is white.

03 09 24 27 LMP Hey, let me swap you cameras there.

03 09 24 31 LMP It floated off the wall.

03 09 24 35 LMP Camera.

03 09 25 41 LMP Here you go.

03 09 28 30 CDR Bill?

03 09 28 34 LMP Yes.

03 09 28 36 CDR ...

03 09 28 39 LMP Alright.

03 09 28 40 CDR ...

03 09 28 47 CMP Still try to get a series, Frank, if you have a - ... you using 70 millimeter?

03 09 28 51 CDR Yes.

03 09 29 02 CMP Huh?

03 09 29 03 CMP Yes, yes, go ahead; I'm just - just waiting for the solution to come up.

03 09 29 13 CMP I've been using the sextant to mark -

03 09 29 53 CMP Boy, this tracking is - Yes, it is fairly easy.

03 09 32 21 LMP You boiling?

03 09 32 28 LMP Huh?

03 09 32 41 CMP Do we have LOW bit going? Maybe we ought to discuss what we're seeing here. You have some sort of tape recorder going so that we can discuss what we're seeing?

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~~CONFIDENTIAL~~ Day 4

152

03 09 32 50 CMP Yes, just something that I could talk for some time without - -

03 09 32 54 CDR Go ahead and ...

03 09 32 55 CMP Okay, anytime.

03 09 33 09 CMP The last two control points I've been tracking with the sextant which gives us - gives me much finer control to track the landmark with. I've been using the same landmarks as before. And the sextant magnifies the landmark, and it's very easy to maintain the sextant on the landmark.

03 09 33 29 CMP RESOLVED to MEDIUM were the control modes.

03 09 33 37 CMP On the second control point, the crater which I take, which is in the middle of Gemini, is very easy to see one side has collapsed, the side to the left. And you can see rocks and debris tumbling down. On many of the craters that go by, especially near the one on control point 1, I can see where hard rock had stayed in place around the rim of the crater as the rest of the debris had folded over into a mound down into that crater floor.

03 09 34 56 CMP I'm coming up on the crater - as a matter of fact, the Crater Slayton right now. We're going directly over it.

03 09 35 11 CMP And just beyond that one is the Crater Carr.

03 09 35 22 CMP The newer craters that surround the older ones have sharper ridges - and the - They're more roundly formed like - like cones, funnels, and along the insides are a brighter material than the other craters. And they also don't have the step functions that the bigger - bigger craters have. There's one - there's two bright craters just to the west of Slayton that have this particular characteristic.

03 09 37 55 CMP In the vicinity of the Crater Carr, it's very difficult to see the ground now; it's very bright, a uniform brightness, and the craters seem to dim out somewhat.

03 09 38 08 CMP You can still make some of the rilles and hills of the smaller craters and the white material of the newly formed ones, but - it's much more a hazy appearance than craters on either side. That must be near the sub-solar point.

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Day 4

153

03 09 38 29 CMP Okay. You can stop it now, if you want to.  
03 09 38 34 CMP Okay.  
03 09 40 35 CDR You got a program alarm, Bill.  
03 09 40 43 LMP What did I do wrong?  
03 09 40 51 CMP Oh, counted 15 seconds from zero.  
03 09 41 01 CMP Yes.  
03 09 41 07 CMP Well, you got a RESTART that time.  
03 09 41 10 LMP Oh, shit!  
03 09 41 11 CMP Don't worry.  
03 09 41 21 CMP (Singing)  
03 09 41 26 CMP VERB 34, huh? Well, you gave me bum dope. Well, I'll be doggoned!  
03 09 41 38 CMP ..., I guess.  
03 09 41 46 CDR It's not mine.  
03 09 42 52 CMP 34, ENTER.  
03 09 43 06 CDR Oh, brother! Look at that!  
03 09 43 16 CMP What was it?  
03 09 43 18 CDR Guess.  
03 09 43 20 CMP Tsiolkovsky?  
03 09 43 21 CDR No, it's the earth coming up.  
03 09 43 22 CMP Oh.  
03 09 43 29 LMP Augh! Quit rocking the boat!  
03 09 43 34 CDR What did you get, another program alarm?  
03 09 43 35 LMP Yes, 1620.  
03 09 43 43 CMP VERB - VERB 37, not permitted.

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03 09 43 54 LMP Fine. Okay, Jim, well, it's your time to take a rest.  
03 09 43 57 CMP (Laughter)  
03 09 44 00 CDR ... reach those two program alarms and the RESTART.  
And it is your time to take a rest.  
03 09 44 04 CMP Okay, just a minute. Let me - VERB 37 - VERB 37, ENTER;  
00. Okay, we got one more coming up here.  
03 09 44 18 CMP 81:43.  
03 09 44 30 CMP VERB -  
03 09 44 34 CDR Are you getting MSFN?  
03 09 44 44 CMP Huh!  
03 09 44 45 CDR Houston, Apollo 8.  
03 09 44 50 CC Roger, Frank, good morning. You're loud and clear;  
how me?  
03 09 44 53 CDR Loud and clear.  
03 09 44 54 CMP Proceed. VERB 22, ENTER.  
03 09 45 00 CC Welcome back.  
03 09 45 02 CDR Thank you.  
03 09 45 06 CMP ENTER; proceed; VERB 25, ENTER.  
03 09 45 21 CMP Minus 89, then plus 48631, ENTER; minus 00253, ENTER;  
proceed.  
03 09 45 54 CDR How's the SPS doing? ...  
03 09 46 05 CMP VERB -  
03 09 46 16 LMP What do you want, the gun? I'll hand it to you.  
03 09 46 32 CMP Yes, would you, please?  
03 09 46 39 CDR Where's the update book? Does anybody know?  
03 09 46 44 LMP I've been looking for it.

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Day 4

155

- 03 09 46 46 CMP Yes, I got it here in my hand.
- 03 09 46 53 CC Apollo 8, Houston.
- 03 09 46 56 CDR Go ahead, Houston.
- 03 09 47 00 CC Roger; we have a request that Jim space his marks, his five marks out a bit more slowly. If possible, we'd like to get a couple of them past the zenith. We're getting five of them with rather rapid spacing and from the geometry viewpoint, it would be better if you would slow them down a little bit and lengthen them out so as to include a couple of them past the zenith. Over.
- 03 09 47 27 CDR Roger; we understand.
- 03 09 47 36 CMP Houston, Apollo 8. That last set of marks are invalid, so disregard what came through the last time.
- 03 09 47 48 CC Roger; understand the last set of marks are invalid. Over.
- 03 09 47 52 CMP Roger, if you'd correlate with - The set I'm about to take is the last set.
- 03 09 48 04 CC We've got an awful lot of background noise, Jim. Could you say again, please?
- 03 09 48 10 CMP Roger; I'm coming up on control point 3; I tried to take another control point in between 2 and 3, but didn't do it, so I just - to get out of the program, I just marked and got out of the program.
- 03 09 48 25 CC Roger; understand you are coming up on 3.
- 03 09 49 49 CMP If I got a program alarm, disregard it - it's because I took too many marks.
- 03 09 51 25 CDR Huh?
- 03 09 51 28 CMP ...
- 03 09 51 35 CDR What?
- 03 09 51 40 CDR This time, it did though, huh? 31
- 03 09 52 03 CC Apollo 8, Houston.
- 03 09 52 05 CDR Go ahead, Houston; Apollo 8.

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Day 4

156

03 09 52 10 CC Roger; on Jim's marks, we'd like to get spacing of approximately 30 - 30 seconds between each mark. The last ones we are copying roughly 15 seconds between marks, and we would like to stretch it out even further if that is okay with you.

C3 09 52 28 CMP Okay, tell him ...

03 09 52 29 CDR Alright.

03 09 52 30 CMP I'll stretch her out all the way.

03 09 53 31 CMP You got the hot water on? I can pour some hot water while I'm waiting.

03 09 53 34 CDR Yes. Here's one for you.

03 09 53 38 CMP Okay.

03 09 53 46 CMP Okay, just stand by 1.

03 09 54 31 CMP Here's one.

03 09 54 32 CDR Thank you.

03 09 54 34 CMP I got it.

03 09 54 41 CMP Thank you.

03 09 55 15 CMP Let me know if anybody else wants some.

03 09 57 31 CMP Here it comes, Bill.

03 09 57 41 LMP ...

03 09 58 31 CMP What's that noise?

03 09 58 35 CDR What is that noise?

03 09 58 38 CDR Huh?

03 09 58 41 CDR Oh.

03 09 58 43 CMP What was it?

03 09 58 44 CDR Had his leg against the hose.

03 09 59 19 CMP There you go.

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Day 4

157

03 09 59 23 CDR ... book?  
03 09 59 24 CDR I just gave it to you.  
03 09 59 27 CMP Check Bill's.  
03 10 01 16 CDR The program alarm just blinked.  
03 10 01 18 CMP That's okay. It's below the earth.  
03 10 01 45 CMP It won't drive now until it - If it's below 50.  
03 10 01 53 CDR Until what?  
03 10 01 54 CMP Until that trunnion gets up.  
03 10 02 17 CMP Houston, Apollo 8.  
03 10 02 23 CC Apollo 8, Houston. Over.  
03 10 02 25 CMP Roger, Mike. I find that tracking is much easier using the sextant than the scanning telescope; you have finer control and at these orbital speeds RESOLVED to MEDIUM seemed to be the best combination.  
03 10 03 05 CC Apollo 8, Houston. Do you read?  
03 10 03 08 CMP Roger. Did you copy?  
03 10 03 13 CC Roger; I copy that it's - Tracking is easier using the sextant than the scanning telescope; it gives you finer control, and say again after that. Over.  
03 10 03 24 CMP And the combination of RESOLVED and MEDIUM is perhaps the best combination - the combination of - our speed LOW is too low. You can't catch up with the target.  
03 10 03 41 CC Roger; understand that the best combination is RESOLVED and MEDIUM. LOW is just too low.  
03 10 03 48 CMP Roger.  
03 10 03 51 CMP You can't keep up with the landing site, I should say.  
03 10 03 56 CMP There goes the trunnion now, see, Bill - Frank?  
03 10 04 00 CDR Yes.

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Day 4

158

03 10 04 02 CMP It's tracking us beneath the earth.  
03 10 05 43 CMP How do you all feel?  
03 10 05 44 CDR Fine. Why?  
03 10 05 48 CMP I was just curious.  
03 10 05 50 CDR You tired?  
03 10 05 53 CMP Oh, I'm a little tired. I guess we all are.  
03 10 05 57 CDR You're going to be busy right afterwards. Those last two REV's.  
03 10 06 02 CMP I've got a sleep period coming up here, though, I think. Don't I?  
03 10 06 04 CDR Yes, right - right after this.  
03 10 06 08 CDR Let that computer rest.  
03 10 06 15 CMP What do we have on our TV debut?  
03 10 06 19 CDR I got that ...  
03 10 06 25 LMP ...  
03 10 06 27 CDR You mean on the left there?  
03 10 06 29 CMP Well, it's always here; I haven't started tracking yet.  
03 10 06 35 CMP Do you see it coming up already?  
03 10 06 38 CDR On the left; I'm not sure if that's it or not, though, but it's a triangular-shaped mound.  
03 10 06 42 CMP Oh, here we go, right now.  
03 10 06 47 CMP This isn't computing the right thing, here.  
03 10 07 40 CMP What's your attitude, Frank?  
03 10 07 42 CDR I'm down some. You want me to pitch up?  
03 10 07 45 CMP Yes.  
03 10 07 46 CDR Huh?

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Day 4

159

03 10 07 50 CMP Yes, it's down now.  
03 10 09 06 LMP Got it.  
03 10 09 12 CDR What are you doing, Jim?  
03 10 09 14 CMP Tracking.  
03 10 09 25 CMP I could easily see a LM on here.  
03 10 10 10 CMP What's my trunnion and shaft?  
03 10 10 13 CDR 20 and four- 15; 203 and 16, 17, 18 - -  
03 10 10 18 CMP Okay.  
03 10 12 21 CMP I'm through with the landing site right now. Don't touch the computer, though.  
03 10 13 10 CDR Let me see - Have you got the update book, Bill?  
03 10 13 21 CMP No, I gave it back to you if I recall. Did you look down in here?  
03 10 13 28 CDR Huh?  
03 10 13 29 CMP I did, I gave it back, because I don't think that -  
03 10 13 32 CMP Houston, Apollo 8.  
03 10 13 34 CDR I got it.  
03 10 13 37 CC Apollo 8, Houston. Over.  
03 10 13 39 CMP Roger; I'm not too sure what happened that time, Mike. I was marking on the landing site using the code, and I kept getting a large trunnion for AUTO OPTICS, and I could see that the target - the landing site was coming up, so I just went manually and marked, and yet the - the latitude and longitude was - were quite different from the nominal.  
03 10 14 15 CC Roger; we copy that, Jim.  
03 10 14 37 CDR Get rolled over here, Jim. Then, you can do a P52.  
03 10 14 41 CMP Okay.

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Day 4

160

- 03 10 15 37 CDR You might as well start shooting some of this film, Bill, because we're not going to do this converse and stereo because we've got that high TV. And then we're going to get ready for TEI and knock everything else off.
- 03 10 15 54 CMP Bill, you want to take care of this 16-millimeter camera?
- 03 10 16 02 LMP What?
- 03 10 16 11 LMP I need a lens ...
- 03 10 16 49 CDR We should be able to get them on - on high gain here in a minute, Bill.
- 03 10 17 24 CDR Go ahead, Houston; Apollo 8.
- 03 10 17 28 CC Roger; we're checking into Jim's remarks on P22; and in the meantime, I have your maneuver pads and map updates at your convenience. Over.
- 03 10 17 39 CDR Roger.
- 03 10 17 42 CDR If we're going to get settled here, you want to do a P52, Jim?
- 03 10 17 46 CMP Yes, whenever you get settled down.
- 03 10 17 50 CDR How about right now?
- 03 10 17 54 CMP Okay. Proceed ... that inertial, and I'll have it in a jiffy.
- 03 10 18 01 CMP One more REV of this stuff and we're finished. No more experimentation.
- 03 10 18 11 CDR Go ahead with your data, Mike.
- 03 10 18 15 CC Okay, and before that, we'd like to take the DSE away from you, please, for a while.
- 03 10 18 22 CDR Alright? Is that all right, Bill?
- 03 10 18 26 CDR It's all yours.
- 03 10 18 30 CC Thank you, and we'd like you to go to POO and ACCEPT --
- 03 10 40 54 LMP Go ahead with ... I'll get ...

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Day 4

161

03 10 40 57 CDR Are you - are you comfortable?  
03 10 40 59 LMP Why?  
03 10 41 00 CDR I mean, do you want to sleep?  
03 10 41 01 LMP No, I was just asking.  
03 10 41 03 CMP ...  
03 10 41 05 LMP Come again.  
03 10 41 07 CDR I - I ...  
03 10 41 11 LMP Go on.  
03 10 41 12 CDR No, no. They've - they've got - Jesus Christ, they've got plenty of data. You can tell them almost anything ... everybody --  
03 10 41 16 CMP Okay ...  
03 10 41 18 CDR Oh, I did, you're too tired; you need some sleep, and I want everybody sharp for TEI; that's just like a retro.  
03 10 41 24 LMP Why don't - Hey, Frank, how about on this next pass you just point it down to the ground and turn the goddamn cameras on; let them run automatically.  
03 10 41 30 CDR Yes, we can do that.  
03 10 41 32 LMP Okay.  
03 10 41 37 CDR Shit, I just burned this film up.  
03 10 41 39 CC Apollo 8, Houston.  
03 10 41 41 CDR Go ahead.  
03 10 41 44 CC This REV coming up we'd like to clarify whether you intend to scrub control points 1, 2, and 3 only, and do the pseudo landing site or whether you also intend to scrub the pseudo landing site marks. Over.  
03 10 41 58 CDR We're scrubbing everything; we'll - I'll stay up and point - Keep the spacecraft vertical, and take some automatic pictures; but I want Jim and Bill to get some rest.

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Day 4

162

03 10 42 11 CC Roger. Understand.

03 10 42 49 CDR Unbelievable - the detail these guys study up. A very good try, but just completely unrealistic, stuff like that. I should have --

03 10 43 05 LMP I'm willing to try it.

03 10 43 06 CDR I should have warned you. No. You try it, and then we'll make another mistake, like entering instead of proceeding or screwing up somewhere like I did.

03 10 43 14 CMP ...

03 10 43 15 CDR I want you to get your ass in bed! Right now! No, get to bed! Go to bed! Hurry up! I'm not kidding you, get to bed!

03 10 43 24 CMP ... try again?

03 10 43 26 CDR No, they said they don't want to.

03 10 43 27 LMP No, no, they said okay.

03 10 43 29 CDR Yes, really.

03 10 43 30 LMP What - what would you like me to do?

03 10 43 31 CDR Go to bed! When we come over it, we'll get that thing going when we get to daylight, and then you guys go sack out for 2 hours.

03 10 43 37 LMP Shall we - shall we do that detailed thing there, that really --

03 10 43 40 CDR No.

03 10 43 46 CMP Okay.

03 10 43 56 LMP Say, give me that lens back there, will you?

03 10 43 59 CDR Which one, Bill, this one?

03 10 44 01 LMP No, the 80.

03 10 44 02 CDR Camera, you mean?

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Day 4

163

- 03 10 44 03 LMP Yes.
- 03 10 44 09 SC (Whistling)
- 03 10 44 10 CDR You haven't been in there since we've been in lunar orbit yet, have you?
- 03 10 44 13 LMP In where?
- 03 10 44 14 CDR Down below. Why don't you - why don't you - go local horizontal, sometime before you turn - We haven't shot a single high-speed picture yet, that's any good; just let me just turn the goddamn thing on prior to --
- 03 10 44 30 LMP Alright.
- 03 10 44 31 CDR -- prior to ...
- 03 10 44 56 LMP This is the tail end ... this time.
- 03 10 45 00 CDR Huh? Are we losing it?
- 03 10 45 02 LMP No, I don't want to go to local horizontal yet.
- 03 10 45 03 CMP ...
- 03 10 45 05 CDR Oh, no, just go to sleep, Jim.
- 03 10 45 09 CDR I know how I felt, and I know how you guys do.
- 03 10 46 17 LMP Hey, I can see the moon out here ...
- 03 10 46 30 CDR Is that earth's turn on here, or what?
- 03 10 46 32 LMP Yes, that's what --
- 03 10 46 33 CDR Huh?
- 03 10 46 34 LMP I - I - Yes, that's why I want to get the pictures over here.
- 03 10 46 36 CDR Okay.
- 03 10 47 31 LMP You want to put it on OMNI?
- 03 10 47 32 CDR Okay, give me the roll left - Which way are you going to go?

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Day 4

164

- 03 10 47 36 LMP Well, let's see. I can roll to the right, and that'll keep us good, won't it?
- 03 10 47 39 CDR Yes.
- 03 10 47 44 CDR The only window that's any good - are these rendezvous - You kind of pitch it down, and you get some -
- 03 10 48 35 CDR Okay, which way are you headed? Oh, you're going to roll, going to roll - -
- 03 10 48 38 LMP We're going to roll to the right, so we can get that high gain up. Right window ...
- 03 10 49 04 CDR Alright, I keep expecting to be seeing the moon.
- 03 10 49 12 LMP Yes.
- 03 10 49 13 CDR Right.
- 03 10 49 16 LMP Well, you're going to have to just yaw towards me a little bit.
- 03 10 49 18 LMP ...
- 03 10 49 31 LMP Would you hit those lights down there with your foot, Fran
- 03 10 50 37 LMP Hell, we're going away from it, huh?
- 03 10 50 39 CDR Huh?
- 03 10 50 40 LMP We're going away from it, huh?
- 03 10 50 42 CDR Oh, yes.
- 03 10 50 44 LMP Yes, sure is.
- 03 10 50 50 CDR I'm pitching down, but we're going that way.
- 03 10 50 52 LMP Are we? We're going this way?
- 03 10 50 53 CDR Yes, we're going that way.
- 03 10 50 55 LMP Oh, okay.
- 03 10 51 00 CDR You know, it kind of gets you down.
- 03 10 51 04 LMP I thought we were going - we're going towards the earth.

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Day 4

165

03 10 51 10 LMP Why don't you snap a few? Can you see it still in your rendezvous window?

03 10 51 13 CDR See what? The earth?

03 10 51 15 LMP No, the - ground.

03 10 51 17 CDR Oh, I see, yes.

03 10 51 31 CDR That enough?

03 10 51 32 LMP Yes. What happened?

03 10 51 35 CDR Snap that thing on or we end up doing another automatic one.

03 10 51 43 CC Apollo 8, Houston; 4 minutes to LOS. You have control of the DSE now, and all your systems are looking good.

03 10 51 51 CDR Thank you very much, Mike.

03 10 51 56 CC You bet.

03 10 52 01 CDR Lovell's snoring already.

03 10 52 06 CC Yes, we can hear him down here.

03 10 54 07 LMP You going to point at the horizon, Frank?

03 10 54 10 CDR I pointed it straight down, I thought.

03 10 54 13 LMP Like when we get ready to go inertial, we get a shot of the horizon as it comes up.

03 10 54 18 CDR Well, I'm already straight down pointing ... Thought you might ... one of these ...

03 10 54 25 LMP No, I did back there.

03 10 54 36 CC Apollo 8, Houston.

03 10 54 38 CDR Go ahead.

03 10 54 41 CC We have 1 minute to LOS, Frank. You can terminate stirring up your cryos anytime, and we agree with all your flight plan changes. And have a beautiful back-side; we'll see you the next time around.

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Day 4

166

- 03 10 54 55 CDR Thank you. I'll get those, Bill.
- 03 10 54 59 LMP Have you - have you done any of the cryos?
- 03 10 55 03 CDR Huh?
- 03 10 55 20 CDR Is that thing running now?
- 03 10 55 24 CDR Is that thing running already?
- 03 10 57 18 CDR Huh? Did you put it on OFF?
- 03 10 57 31 LMP Here you go.
- 03 10 58 06 CDR We're doing fine; why don't you go to bed? I'll - Just tell me what the click - just turn that thing? Look! This thing here? Right over your head?
- 03 10 58 26 CDR No, I want you to get to bed. Come on now. You've been up all the time; it's in the flight plan. God damn it, go to bed! To hell with the other stuff! We'll bust our ass for it.
- 03 10 58 42 CDR Do I just turn that when the time comes? What do I have to do to start it?
- 03 10 59 53 LMP ... eighth; it's going to start with me.
- 03 11 02 54 LMP ... stay 1 more minute.
- 03 11 03 01 CDR I know it. Get going! I think this is a closed issue. Get to bed!
- 03 11 03 07 CDR I don't care; get to bed!
- 03 11 03 09 CDR No, you get to bed; get your ass to bed. You quit wasting one - one - I - I - I - I don't want to talk about it.
- 03 11 03 20 CDR Shut up; go to sleep, both of you guys.
- 03 11 03 27 CDR I'll just click it on when the time comes.
- 03 11 03 32 CDR You should see your eyes; get to bed!
- 03 11 03 35 CDR Don't worry about the exposure business, God damn it, Anders; get to bed! Right now! Come on!

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- 03 11 05 05 CDR I don't want ... Alright. You want me to take some pictures? Get some sleep now. You've only got a couple hours, Bill, before we're going to have to be fresh again.
- 03 11 05 20 CDR Yes. Okay. I'll take care of it all. Alright. I just got up, remember? I slept for 4 hours.
- 03 11 05 34 CDR No, I didn't.
- 03 11 05 40 CMP ...
- 03 11 05 42 CDR Yes. Go to sleep.
- 03 11 05 46 CDR Houston already came back and said, "Fine."
- 03 11 05 52 CDR Yes.
- 03 11 05 59 CDR A quick snooze, and you guys will feel a hell of a lot better tomorrow.
- 03 11 06 45 CDR Well, you're tired; it's not cold.
- 03 11 06 51 CMP Okay.
- 03 11 42 15 CDR Houston, Apollo 8.
- 03 11 42 20 CC Apollo 8, loud and clear.
- 03 11 42 22 CDR Roger.
- 03 11 43 22 CDR Fine, I'm fine.
- 03 11 53 46 CC Apollo 8, Houston.
- 03 11 53 47 CDR Go ahead, Houston; Apollo 8.
- 03 11 53 50 CC Roger, Apollo 8. A couple of notes for you. On the P52 that you're coming up to on this REV, we've looked at your state vectors and all your information. The platform looks good, and it appears that it is your option if you would like to bypass this P52; your platform will still be good at the following TEI pass. And we'd like to have your PRD reading, and I guess we are behind the sleep summary. Over.
- 03 11 54 27 CDR Okay. Well, Jim and Bill are both resting now, and I rested for about 3 hours or 4 hours during the period earlier today.

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- 03 11 54 40 CC Roger. Copy.
- 03 11 54 45 CDR And this PRD now reads 144.
- 03 11 54 51 CC PRD, 144. We have an update ready to go into your computer for the state vector if you want to go to POO and ACCEPT.
- 03 11 55 05 CDR POO and ACCEPT.
- 03 11 59 51 CDR Now we are standing by to copy this TEI 9 pad.
- 03 12 00 15 CC Okay, Apollo 8. We have completed with the computer. You can use VERB 47 to transfer, and I have the TEI 9 pad.
- 03 12 00 25 CDR That's Ken, isn't it? Just a minute and I'll take those.
- 03 12 01 06 CDR Okay. I went to POO and then VERB 47, and I'm ready to copy.
- 03 12 01 12 CC Okay, do you have it in BLOCK?
- 03 12 01 16 CDR Say again. It's in BLOCK; Roger.
- 03 12 01 20 CC I say, do you have UP TELEMETRY in BLOCK?
- 03 12 01 22 CDR Roger.
- 03 12 01 27 CC Okay. This pad is a TEI 9, SPS G&N: 45597, minus 040, plus 157, 087:19:1820, plus 34188, minus 01353, plus 00780, 180, 008, 001, November Alfa, plus 00187, 34223, 313, 34021, 42, 0898, 253, 033, down 131, left 28, plus 0758, minus 16500, 12987, 36277, 14648, 16; primary star, Sirius; secondary, Rigel; 129, 155, 010, four quads, 15-second ullage, horizon on 1.2-degree window line at T minus 3; use high-speed procedure with minus Mike Alfa. After looking at the burn information from your previous SPS burns, it appears that the engine performance should give us a 3-second burn time, longer than what you have on the pad. The pad number should correspond with what you got out of the computer. So we have not factored this into the past data; however, you can anticipate the engine for a normal DELTA-V to give you a 3-second - 3.7-second burn in excess of the computed times. Over.
- 03 12 05 51 CDR Roger. Thank you.
- 03 12 06 00 CDR TEI 9, SPS G&N: 45597, minus 040, plus 157, 087:19:1820, plus 34188, minus 01353, plus 00780, 180, 008, 001, NA,

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plus 00187, 34223, 313, 34021, 42, 0898, 253, 033, down 131, left 28, plus 0758, minus 16500, 12987, plus 36277, 14648, 16; and that's Sirius and Rigel, 129, 155, 010, four-jet, 15 seconds, 1.2 the gaze on the window at T minus 3, high-speed, minus MA, engines 3.7 seconds longer than given.

- 03 12 07 11 CC That's affirmative, Apollo 8. And when you get around to it, if you would like for us to dump your tape, we can do that when you get on the high gain.
- 03 12 07 23 CDR Roger.
- 03 12 08 04 CDR Okay, you should have it on the high gain now, Houston.
- 03 12 08 11 CC Roger. Why don't you go ahead and dump the tape?
- 03 12 08 20 CDR Roger.
- 03 12 24 35 CC Apollo 8, Houston. The tape recorder is back to you.
- 03 12 24 42 CDR Thank you.
- 03 12 25 20 CMP Hey, Bill, ... aspirin.
- 03 12 25 24 CDR You got a headache?
- 03 12 25 28 CDR Hey, you don't have to tell them about aspirin. I told Berry ...; just the other two.
- 03 12 25 39 CDR Yes, you ought to be good and tired, too.
- 03 12 26 28 CDR There's a magazine floating around. Can you grab that please, Jim?
- 03 12 26 47 CDR Huh? It's for you to sleep.
- 03 12 26 51 CDR Hey, this little radiometer that I got is up to .124 now. What's yours reading?
- 03 12 26 55 CC Apollo 8, Houston.
- 03 12 26 58 CDR Go ahead.
- 03 12 27 02 CC We have looked at all your systems and all your trajectory information, and you have a GO for another REV.
- 03 12 27 12 CDR Oh, thank you.

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Day 4

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03 12 34 05 CDR Houston, Apollo 8. How do you read?  
03 12 34 11 CC I'm reading you weak, but clear, Frank.  
03 12 34 13 CDR How about this antenna? Is that any better?  
03 12 34 19 CC It is a little louder.  
03 12 34 24 CDR Okay.  
03 12 34 35 CDR (Whistling)  
03 12 35 04 CMP ... align ...?  
03 12 35 06 CDR We didn't have to do one, Jim. No, they said that  
they'd checked it, and it looked real good, and they'd  
let you sleep.  
03 12 39 44 CDR Hey, Ken, how'd you pull a duty on Satur - on Christmas  
Eve? You know, it happens to bachelors every time,  
doesn't it?  
03 12 39 53 CC I wouldn't be anywhere else tonight.  
03 12 39 55 CDR Ha, ha.  
03 12 42 06 CDR Ken, how's the MSFN tracking of this lunar orbit coming out?  
03 12 42 28 CC Okay, Frank. It's looking like it's coming right down  
the pike. It's doing just what it's supposed to, and  
apparently all our computer programs have got the right  
numbers in them because they're predicting where you're  
going.  
03 12 42 40 CDR Are they covering any of these anomalies due to hard spots?  
03 12 42 48 CC They're detectable, but they're not changing things  
enough to be anything more than of interest.  
03 12 42 56 CDR Well, I hope they're as good with the corridor as they  
were with that LOI. That was beautiful.  
03 12 43 03 CC It sure was. That's - that is textbook all the way.  
03 12 44 26 CC Apollo 8, Houston.  
03 12 44 28 CDR Go ahead.

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Day 4

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03 12 27 14 CDR Do what? Yes.  
03 12 27 41 CDR Understand we're GO for REV 9?  
03 12 27 48 CC Affirmative.  
03 12 27 52 CDR I feel - I - Listen, I'll be the first to tell you I had enough sense; I went down and crapped out before.  
03 12 29 01 CDR How is the weather down there, Ken?  
03 12 29 06 CC Entirely beautiful; loud and clear and just right in temperature.  
03 12 29 11 CDR How about in the recovery area?  
03 12 29 15 CC That's looking real good.  
03 12 29 17 CDR Very good.  
03 12 29 25 CC Yes, they told us that there's a beautiful moon out there.  
03 12 29 30 CDR Yes, I was just saying there's a beautiful earth out there.  
03 12 29 36 CC It depends on your point of view.  
03 12 29 38 CDR Yes.  
03 12 29 55 CDR Almost - -  
03 12 29 56 CC If you're looking for something to do up there, Frank, you might get that BIOMED switch over to the left position.  
03 12 30 01 CDR Okay.  
03 12 30 40 CDR Are you ready?  
03 12 30 45 CDR 5, 4, 3 - Say again.  
03 12 30 52 CDR Ken, are you re - -  
03 12 30 53 CC All set.  
03 12 30 54 CDR 5, 4, 3, 2, 1 -  
03 12 30 58 CDR MARK.  
03 12 33 37 CDR How do you read me on OMNI A, Ken?

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Day 4

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03 12 44 31 CC

Okay, we're about - inside 10 minutes to LOS; we'll be picking you up again at 85:40. And we'll have all of the TV types' information standing by. In the event that the situation develops again, for pointing accuracy, if I see anything that looks like the terminator or anything of that nature, I'm going to call the dark side of it 12 o'clock, and use that as a reference system, and we'll try that. If that doesn't dope out any problems with camera pointing, why, I may try - call for a plus pitch, and then I'll just correct what I see to account for it.

03 12 45 14 CDR

Roger. We're not going to use that telephoto lens. But I don't believe we'll get - be able to get a picture of the earth. It's going to have to be the - the terminator and the - the lunar surface. I'm looking at the earth right now; we won't see it again during that period.

03 12 45 33 CC

Okay. Real fine, then. And next time around, why - We'll take an extra special look at all the parameters. We'll have our TEI pad for you, and we'll use the last REV for a real good hack on all systems. I'll give you a rundown by system of all things we see and where they stand.

03 12 45 54 CDR

Okay, fine.

03 12 50 17 CC

Apollo 8, Houston. We're approaching 4 minutes to LOS; all systems are GO.

03 12 50 24 CDR

Roger. Thank you.

03 13 02 19 CDR

You sick, Jim?

03 13 07 03 CDR

Yes. Fine.

03 13 07 08 CDR

I'll call you all in about 15 minutes for that TV show.

03 13 12 32 CDR

You sick?

03 13 13 27 CDR

We might as well go ahead. We might as well go ahead. Yes, we've got about 15 minutes to get set up.

03 13 13 34 CDR

Huh? Well, we've got to get the TV out now. I don't think we ought to screw around with this.

03 13 13 40 CDR

Huh?

03 13 14 34 LMP

... TV?

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Day 4

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- 03 13 14 37 CDR Well, let's talk about that; that's what I wanted.
- 03 13 14 40 CDR Why don't we do this? Why don't you hold it out the window, like you did, and each one of us talk - -
- 03 13 14 47 LMP ...
- 03 13 14 48 CDR Well, they want to hang onto the terminator, but we'll go out, and then you talk about what you saw, and Jim will talk about what he saw, and I'll say a couple of words. And then we'll say something about how this kind of reminds you of how it might have started, and then you read the first four of those, and Jim reads the next four, and I'll read the last two, and we'll say good night.
- 03 13 15 08 CMP ...
- 03 13 15 11 CDR No, just this one. I don't want to complicate it any more than that, because we got the high gain antenna problem and everything.
- 03 13 15 20 CMP Why don't we ...?
- 03 13 15 22 CDR Hey, wait. We've got to do it up right because there will be more people listening to this than ever listened to any other single person in history.
- 03 13 15 39 CMP ... first four ...
- 03 13 15 41 CDR Let Bill say the first four, and you say the next four, and I'll say the last two. There's no more.
- 03 13 16 03 CDR Just put it away; don't you have time to?
- 03 13 16 08 CDR Alright.
- 03 13 16 20 CDR No, I don't know where the tape is.
- 03 13 16 23 CDR Huh? What'd you say, Bill?
- 03 13 16 38 CDR Okay?
- 03 13 17 03 CDR Then as soon as we go through this, we go into a GI party. Everything gets put up, and we'll concentrate on TEI. Okay?
- 03 13 17 17 CMP ...

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Day 4

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- 03 13 17 18 CDR We've got a lot of time.
- 03 13 17 23 CDR Store all the cameras, store everything, because this burn will be a bang. How much do you need? What rate?
- 03 13 18 28 CMP ...
- 03 13 18 29 CDR Huh?
- 03 13 18 34 CDR I can't hear you.
- 03 13 18 36 CDR No. Yes, I got it completed.
- 03 13 18 43 CDR That long? Here.
- 03 13 19 46 CDR Why don't we each talk about one thing that impressed us most out of what we saw and describe it? Okay?
- 03 13 19 57 CDR How much do you have? The same?
- 03 13 20 20 CDR How ... a change?
- 03 13 20 26 LMP We ought to make it perfectly.
- 03 13 20 28 CDR Yes, they wanted it to drag on a little bit longer, but we'll cut it off when we feel like it. Okay?
- 03 13 20 32 SC ...
- 03 13 20 43 CDR Yes, then we could take all the lunar stuff and put it somewhere; you know, all the maps and things --
- 03 13 20 48 CMP Yes, I got ...
- 03 13 20 49 CDR -- and we'll put it all in one place and get the whole - Put all the cameras away and get the whole damn thing in shipshape.
- 03 13 21 02 CDR Because now she's going to take us home!
- 03 13 21 13 CDR Huh?
- 03 13 21 39 CDR Let's only have the stuff out we're going to need to operate with for the burn. Here's some stuff stuck up here. There's cameras floating all over the place. Jim, fix me one of those.
- 03 13 21 55 CMP ...

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Day 4

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- 03 13 21 58 CDR     Alright. Here comes a couple of magazines - I don't know what -
- 03 13 22 14 CDR     What are these?
- 03 13 22 25 CDR     That doesn't ... - You better put all the camera equipment away in one place.
- 03 13 22 29 CMP     Here we go.
- 03 13 23 34 CDR     This one? Huh?
- 03 13 23 37 CDR     No, put everything away.
- 03 13 23 56 CDR     Got this big 16-millimeter camera and the camera cord.
- 03 13 24 03 CDR     Huh?
- 03 13 24 06 CDR     It's about 10 minutes.
- 03 13 24 11 CDR     You want to tape that?
- 03 13 24 14 CDR     Huh?
- 03 13 24 19 CDR     Where do these brackets go?
- 03 13 24 22 CDR     Alright.
- 03 13 24 52 CDR     Man, I wonder how -
- 03 13 24 57 CDR     Huh? I wonder how in the hell it goes in here. Who took it out?
- 03 13 25 39 CDR     You sure this one came out of here, too, Bill?
- 03 13 25 42 LMP     ...
- 03 13 25 46 CDR     Jim, where did you get this camera bracket out of?
- 03 13 25 49 CMP     ...
- 03 13 25 51 CDR     They did?
- 03 13 25 56 CDR     Who's cutting - Somebody's closing off one of those inlets somewhere.
- 03 13 26 03 CDR     Is that toothpaste thing of yours going over that one, Bill?

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Day 4

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03 13 26 09 CDR This one - this compressor started lugging down.  
03 13 26 15 CMP What?  
03 13 26 16 CDR I said the compressor started lugging down.  
03 13 27 16 CDR Get all this junk off here, all the old P30's. There's  
that monocular, too. Where did it go?  
03 13 27 53 CDR Huh? Where does that go?  
03 13 28 17 CDR There's a ...  
03 13 28 19 CDR No, put them all away.  
03 13 28 51 CDR I got that one; do you want to put them on?  
03 13 29 03 CMP ...  
03 13 29 27 CDR I don't know - How - how does this store, Bill?  
Together or separately?  
03 13 29 30 LMP Take ...  
03 13 29 40 CDR I guess that 150 - 250 millimeter comes off, and this  
one goes on.  
03 13 30 05 LMP Now, we'll open the ...  
03 13 30 07 CDR That goes on that other camera.  
03 13 30 12 LMP ...  
03 13 30 14 CMP Okay.  
03 13 30 17 CDR Let's take that clip off that wire there, too, shall we?  
I don't like that.  
03 13 31 54 CMP (Coughing)  
03 13 32 10 CMP ...  
03 13 32 13 LMP Flight plan.  
03 13 32 17 CMP That's it.  
03 13 32 19 CDR R3 is open. I got the tape right here.

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Day 4

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03 13 32 36 CDR      Huh?

03 13 32 43 CDR      Bill, can we get through this place? Oops.

03 13 32 55 CDR      Did you stow the sextant bracket?

03 13 33 14 CDR      Bill? Want me to hold it? There it is.

03 13 34 00 CDR      After this ..., I'll store the ORDEAL, too.

03 13 34 08 CDR      That should be -

03 13 34 15 LMP      ... send down the update ...

03 13 34 20 CDR      Huh?

03 13 34 23 CDR      Yes.

03 13 34 56 LMP      May I see that blurb - that ... thing?

03 13 34 59 CDR      The what, Bill?

03 13 35 00 LMP      The thing we're supposed to read?

03 13 35 02 CDR      Oh yes, what time is it? 85 something?

03 13 35 05 LMP      85:35.

03 13 35 07 CMP      And then ... complicated.

03 13 35 17 LMP      There you go. Why don't you get a map, Jim, so we can tell the folks what you're looking at?

03 13 35 23 LMP      Which one do you want - What do you want me to read?

03 13 35 25 CDR      The first four.

03 13 35 37 LMP      Okay.

03 13 35 39 CDR      Okay?

03 13 35 47 LMP      What time is AOS?

03 13 35 50 CDR      I don't know. It should be any time now.

03 13 36 39 LMP      I can't see it. There's so much light on here.

03 13 36 41 CMP      It's minus 63 degrees pitch, 350 degrees yaw.

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03 13 37 02 LMP I'm not getting anything. What are you going to try to - What window are you going to do it out of?

03 13 37 06 CDR Huh?

03 13 37 09 LMP What are you going to do it out of? This side window here, the terminator, or what?

03 13 37 10 CDR I can't hear you.

03 13 37 11 LMP What window are you going to do it out of?

03 13 37 13 CDR Well, wherever we can get the high gain on. I'll point --

03 13 37 18 LMP We're pointed straight up in the air, now.

03 13 37 20 CDR No, we're not. We're just about horizontal.

03 13 37 23 LMP Oh. My visual is off.

03 13 37 27 CMP (Singing)

03 13 37 36 CMP (Singing)

03 13 37 47 CDR Probably be best out that rendezvous window there.

03 13 37 50 LMP Yes. If you'd yaw about 30 degrees this way, you could probably pick the earth coming up over the hill.

03 13 37 53 CDR To the right?

03 13 37 55 LMP Yes.

03 13 37 57 CDR Alright.

03 13 38 00 LMP Where abouts are we?

03 13 38 02 CDR Somewhere over the moon.

03 13 38 05 LMP Here, we'll take it out that window over there --

03 13 38 07 CDR We'll have to yaw to the left, wouldn't I?

03 13 38 08 LMP No, you'll have to yaw to the right, and - to get the rendezvous; maybe pitch up just a little bit.

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03 13 38 15 CDR Okay. It's -  
03 13 38 22 LMP It's on.  
03 13 38 24 CDR Are we getting them?  
03 13 38 25 LMP Well, it's just - The trouble is, I don't think you'd normally get it out the rendezvous window and have the high gain, too, Frank.  
03 13 38 42 CMP You tell me --  
03 13 38 44 LMP The thing to do would be, - if you want to get the earth, to get the yaw - to yaw up and pitch up.  
03 13 38 57 CDR Try to get COMM, will you, Bill?  
03 13 39 03 LMP Okay, well, gee - I don't see it out there anywhere. Do you? The earth? I don't think we've had AOS yet.  
03 13 39 14 CMP You're going down, it says right here.  
03 13 39 16 LMP I'll know when to get them as soon as we get on an OMNI.  
03 13 39 21 LMP You'll have to pitch up, Frank; I can't get them now, on - on the -  
03 13 39 24 CDR Huh?  
03 13 39 25 LMP You'll have to pitch up; I can't get them on the high gain there. Pitch or - or yaw - pitch up or yaw and/or yaw right.  
03 13 39 34 CDR I'll do both.  
03 13 39 35 LMP Okay.  
03 13 39 52 CDR How's that steam pressure, Bill?  
03 13 39 53 LMP Good.  
03 13 39 54 CMP ... Frank.  
03 13 39 55 LMP It isn't even boiling yet.  
03 13 40 02 LMP Yes, we just started.  
03 13 40 09 LMP Where's the pad book? Doesn't it have the --

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Day 4

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03 13 40 11 CDR Here it comes!  
03 13 40 12 LMP Okay.  
03 13 40 13 CDR Oh boy!  
03 13 40 14 CMP Get a good shot of her?  
03 13 40 17 CDR Yes, see it?  
03 13 40 21 CMP Well, keep the camera there. Keep the camera.  
03 13 40 23 LMP Here it comes. Here it comes. But you're not on yet.  
03 13 40 31 LMP You got it - you got to do something.  
03 13 40 37 LMP Pitch up or yaw -  
03 13 40 39 CDR Yaw right?  
03 13 40 44 LMP Yaw right.  
03 13 40 45 CMP Oh, Jesus.  
03 13 40 46 CDR Oh, I get it off this camera - window over here.  
03 13 40 51 LMP Okay.  
03 13 40 54 CMP Houston, Apollo 8.  
03 13 40 58 LMP Roll her a little bit. Roll her a little bit to the - to the right.  
03 13 41 06 CMP Here, you want me to fly it just to come a - -  
03 13 41 07 LMP That one's got it, the roll. Yes, yes. It's the roll that's got it. Roll right, if you can.  
03 13 41 12 CMP We're rolling.  
03 13 41 18 LMP Come on, gang.  
03 13 41 25 CMP We're going to radial out. Are we - You got her coming up? You see her, Frank?  
03 13 41 33 CDR Yes, it's beautiful.  
03 13 41 39 LMP You got to roll.

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03 13 41 41 CMP It's rolling.  
03 13 41 43 CDR Watch the gimbal lock.  
03 13 41 45 CMF Yes.  
03 13 42 00 LMP You got to roll - -  
03 13 42 01 CMP Right.  
03 13 42 02 LMP - - and yaw.  
03 13 42 05 CMP We're over 45 degrees in yaw right now.  
03 13 42 10 CMP We're still yawing, and we're still rolling.  
03 13 42 12 LMP Where is it, Frank? Point to it.  
03 13 42 13 CDR I'm pointing right at it with the camera.  
03 13 42 15 LMP Then why in the hell we're not getting it? Okay.  
03 13 42 18 CDR Should be getting it.  
03 13 42 20 LMP Try again here.  
03 13 42 36 CDR Got it?  
03 13 42 37 CMP There, you got it; you're on.  
03 13 42 46 LMP There you got it. It was in some kind of a gimbal lock-up there.  
03 13 42 51 CDR Try - try it - call them.  
03 13 42 53 LMP Houston - -  
03 13 42 54 CMP Houston - Go ahead, go ahead.  
03 13 42 56 LMP Houston, Apollo 8. Over.  
03 13 42 58 CC Loud and clear and an initial look at your systems are good. Over.  
03 13 43 01 LMP Roger. We've got the T - -  
03 13 43 02 CC We've got a picture, Apollo 8.

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03 13 43 03 LMP Roger, we've got the TV - -  
03 13 43 04 CMP Roll - roll left.  
03 13 43 05 LMP Huh?  
03 13 43 06 CDR Roll left a little, can you?  
03 13 43 07 CMP Yes.  
03 13 43 11 CDR Did he say it was a good picture?  
03 13 43 12 LMP How's the picture look, Houston?  
03 13 43 17 CC Loud and clear.  
03 13 43 19 LMP The TV look okay?  
03 13 43 24 CC Looks very good.  
03 13 43 26 CMP Welcome from the moon, Houston -  
03 13 43 28 CDR And the world.  
03 13 43 34 CC Thank you.  
03 13 43 40 CMP Okay, why don't you describe what - Where abouts are we here anyway?  
03 13 43 45 CDR Tell them - this camera's just the thing. Tell them what we're going to do.  
03 13 43 54 CMP You got the - got the thingamajig? Want me to roll a little bit?  
03 13 44 00 LMP Houston, you're seeing a view of the earth, taken over the lunar horizon. We're going to follow the track until the terminator, where we will turn the spacecraft and give you a view of the long shadowed terrain at the terminator, which should come in quite well in the TV.  
03 13 44 25 CMP We don't know whether you can see it from the TV screen, but the moon is nothing but a milky white, completely void.  
03 13 44 35 CDR You're going to have to show it out that picture now; I've lost it.  
03 13 44 37 LMP Okay.

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- 03 13 44 38 CMP We're changing the cameras to the other window now.
- 03 13 44 41 LMP Can you pitch down now and - -
- 03 13 44 44 CDR Pitch down.
- 03 13 44 46 LMP - - and let me get out the rendezvous window and yaw, maybe?
- 03 13 44 50 CMP Which way do you want to yaw?
- 03 13 44 52 LMP Yaw toward me and away from - away from the earth.
- 03 13 44 55 CDR This is Apollo 8, coming to you live from the moon. We've had to switch the TV camera now; we've showed you first a view of earth as we've been watching it for the past 16 hours. Now we're switching so that we can show you the moon that we've been flying over at 60 miles altitude for the last 16 hours. Bill Anders, Jim Lovell, and myself have spent the day before Christmas up here, doing experiments, taking pictures, and firing our space-craft engines to maneuver around. What we'll do now is follow the trail that we've been following all day, and take you on to a lunar sunset.
- 03 13 45 43 CDR The moon is a different thing to each one of us. I think that each one of - each one carries his own impressions of what - of what he's seen today. I know my own impression is that it's a vast, lonely, forbidding-type existence or expanse of nothing; it looks rather like clouds and clouds of pumice stone.
- 03 13 46 09 LMP Can't you get it down? I can't see it, Jim.
- 03 13 46 10 CDR And it certainly would not appear to be a very - -
- 03 13 46 12 LMP ... 30 degrees.
- 03 13 46 13 CDR - - inviting place to live or work. Jim, what have you thought most about?
- 03 13 46 21 CMP Well, Frank, my thoughts were very similar; the vast loneliness up here of the moon is awe-inspiring, and it makes you realize just what you have back there on earth. The earth from here is a grand oasis in the big vastness of space.
- 03 13 46 38 CDR Bill, what do you think?

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- 03 13 46 40 LMP I think the thing that impressed me the most was the lunar sunrises and sunsets. These, in particular, bring out the stark nature of the terrain, and the long shadows really bring out the relief that is here and hard to see in this very bright surface that we're going over right now.
- 03 13 47 04 CDR Describe - That's not color, Bill - Describe some of the physical features of what you're showing the people.
- 03 13 47 10 LMP I'm changing to the other window now.
- 03 13 47 17 LMP What sea are we coming up to? Smith's Sea?
- 03 13 47 20 CMP Yes. Smyth's - Smyth's Sea.
- 03 13 47 23 LMP We are now coming onto Smyth's Sea, a small mare region covered with a dark material. There is a fresh bright impact crater on the edge towards us, and a mountain range on the other side.
- 03 13 47 43 CMP Pyrenees. Okay, hold it right there. Hold it.
- 03 13 47 45 LMP These mountains are the Pyrenees. Is that right?
- 03 13 47 49 CMP No, I take that back; it's ...
- 03 13 47 50 CC Apollo 8, we're not receiving modulation on the signals. We do have sync.
- 03 13 47 55 CDR Are you reading us, Apollo - Houston? Maybe it's turned OFF, Bill.
- 03 13 48 00 CC Apollo 8, we're reading you loud and clear, but no picture --
- 03 13 48 03 CDR Somehow it got OFF again.
- 03 13 48 04 LMP What?
- 03 13 48 05 CMP Roger. We understand. Take a look now.
- 03 13 48 06 LMP It's ON now.
- 03 13 48 07 CDR How about now, Apollo?

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- 03 13 48 11 IMP Yaw it if you can.
- 03 13 48 12 CC Loud and clear.
- 03 13 48 13 CDR Right or left?
- 03 13 48 15 LMP Right.
- 03 13 48 17 CDR Okay.
- 03 13 48 18 LMP Roll.
- 03 13 48 19 CC Good picture.
- 03 13 48 20 CDR Right.
- 03 13 48 22 CMP What you're seeing as we cross Smyth's Sea - are the craters Kästner and Gilbert.
- 03 13 48 30 CDR Tell them there's a very bright impact crater now.
- 03 13 48 32 CMP And what we have noticed especially that you cannot see from the earth are the small bright impact craters that dominate the lunar surface.
- 03 13 48 44 CDR How's that now, Bill?
- 03 13 48 45 LMP Yes, the more right roll, the better.
- 03 13 48 47 CDR Alright, more right roll.
- 03 13 48 53 CDR Can you show the horizon?
- 03 13 48 54 LMP That's what I'm on.
- 03 13 48 57 CDR Describe the horizon.
- 03 13 49 01 LMP The horizon here is very, very stark.
- 03 13 49 03 CDR I can't even see it is the trouble.
- 03 13 49 04 LMP The sky is pitch black, and the earth, or the moon rather, excuse me, is quite light, and the contrast between the sky and the moon is a vivid dark line.
- 03 13 49 18 LMP Coming into view of the camera now are some interesting old double-ring craters, some interesting features that are quite common in the mare region and have been filled

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by some material, the same consistency of the mare and same color; here are three or four of these interesting features. Further on the horizon, you see the Pyr - These are the Pyrenees, aren't they? - -

- 03 13 49 46 CMP After the Sea of Fertility; first, we're going over the Sea of Crises.
- 03 13 49 47 LMP What are these mountains?
- 03 13 49 49 CMP Well, there's the Foaming Sea.
- 03 13 49 52 LMP Okay. The mountains coming up now are heavily impacted with numerous craters whose central peaks you can see in many of the larger ones.
- 03 13 50 06 CMP Actually, I think the best way to describe this area is a vastness of black and white, absolutely no color.
- 03 13 50 20 LMP The sky up here is also a rather forbidding, foreboding expanse of blackness, with no stars visible when we're flying over the ear - over the moon in daylight.
- 03 13 50 33 CMP Are we coming up near our - near our target area?
- 03 13 50 38 CDR No, I don't think - we've got quite a ways to go.
- 03 13 50 47 CMP Do you need this anymore? I'll find out where we are here in a hurry.
- 03 13 50 50 LMP You can see by the numerous craters - -
- 03 13 50 54 CDR Yes, you better leave it on there.
- 03 13 50 55 LMP - - that this planet has been bombarded through the eons with numerous small asteroids and meteoroids, pockmarking the surface every square inch.
- 03 13 51 08 CMP And one of the amazing features of the surface is the roundness of most of the craters. It seems that most of them have a round, mound-type appearance instead of sharp, jagged rocks.
- 03 13 51 20 LMP Only the very newest features have any sharp definition to them, and eventually they get eroded down by the constant bombardment of small meteorites.
- 03 13 51 33 CMP You hope.

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- 03 13 51 37 LMP Okay, there's two big craters coming up on the right. I don't know which ones they are.
- 03 13 51 43 CMP Where? What does it look like here?
- 03 13 51 44 LMP How's the picture now, Houston?
- 03 13 51 50 CDR Don't tell me we've broken lock.
- 03 13 51 52 LMP Houston, are you reading us?
- 03 13 51 54 CC Roger. Reading you loud and clear, and the picture looks real fine.
- 03 13 51 56 CDR Good.
- 03 13 51 57 LMP Thank you.
- 03 13 52 02 LMP Can you see the two large craters to the - just to the right of our track, Houston?
- 03 13 52 16 CC Affirmative.
- 03 13 52 20 CMP That might be Kästner and Gilbert, although I'm not too sure. I can't see out.
- 03 13 52 25 LMP It's hard to get me and the camera in the window at the same time (laughter).
- 03 13 52 28 CMP Could I look out here just a second just to find out where we are? Well, we're still over the - Okay, we're still over the east side. Here comes Smyth's Sea now.
- 03 13 52 49 LMP The very bright features you see are the new impact craters, and the longer a crater has been on the surface of the moon, why, the more mottled and subdued it becomes.
- 03 13 53 04 CDR Hey, Bill, you're not talking to geologists.
- 03 13 53 07 LMP What do you want me to say?
- 03 13 53 09 CMP Here's - here's where we are.
- 03 13 53 11 LMP Okay. Go ahead - -
- 03 13 53 12 CMP Smyth's Sea - -
- 03 13 53 13 LMP You read it off.

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- 03 13 53 18 CMP Excuse me a second.
- 03 13 53 26 CC Apollo 8, we've apparently lost your voice; the picture is still good.
- 03 13 53 30 LMP Roger.
- 03 13 53 36 CMP Houston, we're passing over the area that's just to the east of Smyth's Sea now in checking our charts. Smyth's Sea is coming up in a few minutes.
- 03 13 53 52 LMP ... that gimbal lock back.
- 03 13 53 56 CMP Yes, watch out for gimbal lock, please.
- 03 13 54 00 CDR How are you doing, Bill? Can you see it?
- 03 13 54 02 LMP Yes, that's good. I can't see much out here with this camera in the way.
- 03 13 54 13 CDR Huh? Bill.
- 03 13 54 14 CC Apollo 8, if you go to P00 and ACCEPT, we'll uplink some information.
- 03 13 54 20 LMP (Laughter) We're not over Smyth's Sea.
- 03 13 54 35 CDR Boy, that baby really took some ..., didn't it?
- 03 13 54 41 LMP We are now coming up towards the terminator, and I hope that soon we'll be able to show you the varying contrasts of light as we go into the darkness.
- 03 13 54 51 CDR Okay.
- 03 13 54 53 CMP Well, the terminator's - -
- 03 13 54 54 CDR Houston, we're - we're in P00, and you have the computer.
- 03 13 54 56 CMP - - is where we're ending.
- 03 13 55 02 CDR Don't stop, Bill, (laughter) I didn't mean to cut you off.
- 03 13 55 05 LMP We'll have another thought soon - there are a lot of holes down there.

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- 03 13 55 14 LMP We're now approaching a series of small impact craters. There is a dark area between us and them which could possibly - could be a - old lava flow.
- 03 13 55 37 LMP We going sideways?
- 03 13 55 38 CDR/CMP Yes.
- 03 13 55 42 CMP Is that crater on the backside called Tchaikovsky - Kil - Kil - Kilkowsky [Tsiolkovsky] or something like that?
- 03 13 55 50 LMP It's an old Russian name, isn't it? That's the Goddard of --
- 03 13 55 54 CMP Yes.
- 03 13 55 56 CDR You can see the large mountains on the horizon now ahead of the spacecraft to the north of our track.
- 03 13 56 07 CMP Okay. ... his camera over there ...
- 03 13 56 08 LMP Are those the Pyrenees?
- 03 13 56 14 CMP I'm checking that. No, we - think maybe - No, there's a bright crater right there.
- 03 13 56 23 LMP The intensity of the sun's reflection in this area --
- 03 13 56 24 CMP Unless we could have rotated off here.
- 03 13 56 25 LMP -- makes it difficult for us to distinguish the features we see on the surface, and I suppose it's even harder on the television, but as we approach the terminator and the shadows become longer, you'll see a marked change.
- 03 13 56 48 CMP I don't know where we are now because we yawed off so much.
- 03 13 56 51 LMP We're going sideways. Frank's window would be the best one to look - Do you see the terminator coming yet, Frank?
- 03 13 56 55 CMP Yes.
- 03 13 56 56 CDR I don't know which way it is. I - I didn't look to see which way we were going.
- 03 13 57 00 LMP There's a very dark crater in the filling material of this valley in front of us now. It's rather unusual

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in that it is sharply defined, yet it's dark all over its interior walls, whereas most new-looking craters are a very bright interior.

03 13 57 37 LMP

A small impact crater in front of us now in a little mare, well defined and quite new, and another one approaching. The spacecraft is facing north from our track. We are going sideways to our left.

03 13 57 57 LMP

What is that mare up there now, that big one?

03 13 58 00 CMP

Straight ahead?

03 13 58 01 LMP

Yes.

03 13 58 03 CMP

North? Okay, let me check it here. Well, there's the Sea of Crises coming up - Oh, that big one is the Sea of Crises over there.

03 13 58 10 LMP

We are now --

03 13 58 11 CMP

I made a mistake with the -

03 13 58 12 LMP

- - seeing the Sea of Crises coming over the horizon. What's the name of that crater right between us and it?

03 13 58 16 CMP

Okay, I'll get it for you right now. That's - Condorcet Crater.

03 13 58 28 LMP

Condorcet?

03 13 58 30 CMP

Let me see just to make sure. Are we under a sea right now, Smyth's Sea? That's the Condorcet Crater. Condorcet.

03 13 58 36 LMP

And we believe the crater, the large dark crater between the spacecraft and the Sea of Crises is Condorcet Crater. The Sea of Crises is amazingly smooth as far as the horizon, past this rather rough mountainous region in front of the spacecraft.

03 13 58 54 CMP

How are you doing? ...

03 13 58 56 CDR

...

03 13 59 11 CC

Apollo 8, we are through with the computer. You can go back to BLOCK, and it looks like we are getting a lot of reflection off your window now.

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- 03 13 59 20 CDR You want me to try it out this window?
- 03 13 59 21 LMP Yes, that'll be better. Roger; we'll switch windows.
- 03 13 59 24 CDR I'll have to watch out for gimbal lock this way.
- 03 13 59 29 CDR Is it still ON, Bill?
- 03 13 59 31 LMP Yes. Be careful when you grab that handle, because apparently you can turn it OFF.
- 03 13 59 35 CDR Ask him how that is.
- 03 13 59 38 LMP How's that look now, Ken?
- 03 13 59 42 CC Real fine.
- 03 13 59 45 LMP Okay, you'll have to - ... I can't see where you are, Frank.
- 03 13 59 58 CDR I wonder what - Oh, hell.
- 03 14 00 02 LMP Okay, what is the problem here? Okay.
- 03 14 00 11 CDR Pitch up.
- 03 14 00 12 CMP I can't pitch up too much.
- 03 14 00 13 LMP Can you roll? Don't pitch up, just roll - You can roll - -
- 03 14 00 18 CMP Right?
- 03 14 00 19 LMP Roll right, and you can yaw - yaw left, - Get your right gimbal off a little bit. Roll right and yaw left.
- 03 14 00 26 CMP Okay, I'm doing it.
- 03 14 00 27 CC Apollo 8, can you tell us which window you are looking out? And there's a large crater, looks like it is sticking up in the upper right-hand corner of our picture. Can you identify that one?
- 03 14 00 35 LMP Alright, you better - We're going to lose it if you don't move over.
- 03 14 00 41 CDR Roger, we're just about to lose lock here. That's why we're slowing up a little bit. You're alright.

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03 14 00 48 LMP We see the Sea of Crises in front of us now, and we're looking out the left-hand rendezvous window.

03 14 00 55 CMP That might be - Firmicus.

03 14 00 59 CDR What's the name of the crater out in the Sea of Crises? That's probably the one they're talking about.

03 14 01 02 CMP Picard is right out there on the right-hand - left-hand side of it. We --

03 14 01 06 CDR How are we going to keep lock now, Bill?

03 14 01 08 LMP Okay, keep - the thing to do is to - is to roll right - is the best thing to do.

03 14 01 16 CMP Okay, I'm rolling right. I've got - I'm in there right now --

03 14 01 20 LMP Well, we're not able - That's their problem.

03 14 01 23 CDR Their problem?

03 14 01 24 CMP Tell them that's Picard.

03 14 01 26 LMP Houston, how you reading us now?

03 14 01 33 LMP The crater you see on the horizon in the Sea of Cri - How are you reading us, Houston?

03 14 01 49 CC Loud and clear, Apollo 8, and we have a picture that's good.

03 14 01 52 LMP Roger; we're getting a lot of static. The Sea of Crises is in front of us on the horizon, and the dark crater Picard can be seen in the middle. We're now approaching the moon sunrise or the spacecraft sunset. This is an area that the sun has just recently come up on the moon.

03 14 02 23 LMP What's this - what sea are we over now, Jim?

03 14 02 28 CMP This is part of the Sea of --

03 14 02 29 LMP Don't - don't - You better - you better yaw a little bit to the left. You're going to get the sun on Frank's window now.

03 14 02 36 CDR Yes, yaw left.

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- 03 14 02 39 CMP Do you want me to still roll?
- 03 14 02 40 LMP See the mare we're over now has a mottled look about it, --
- 03 14 02 45 CMP The Sea of Fertility we're on.
- 03 14 02 46 LMP -- but not very heavily cratered, so it must be relatively new.
- 03 14 02 50 CMP We're over the Sea of Fertility.
- 03 14 02 51 LMP This is the Sea of Fertility, and we're coming up on a large crater, the delta-rim variety. It has a strange circular crack pattern around the middle of it.
- 03 14 03 14 LMP How many miles across is that crater?
- 03 14 03 17 CMP Is that - You're looking at Taruntius?
- 03 14 03 20 LMP Yes.
- 03 14 03 21 CMP Taruntius, probably.
- 03 14 03 24 LMP Yes, how many - Just give me a guess. 20 miles? 30 miles?
- 03 14 03 29 CMP Must be 30 or 40 miles.
- 03 14 03 30 LMP The crater that you're seeing now is about 30 or 40 miles across.
- 03 14 03 37 LMP Ro - You better - You better roll left.
- 03 14 03 40 CMP Roll left?
- 03 14 03 41 LMP Yes.
- 03 14 03 44 CDR Yaw left, too. I see the - Here's earth in our background.
- 03 14 03 49 CMP Okay, I'm rolling left.
- 03 14 03 51 LMP How's your picture quality, Houston?
- 03 14 03 56 CC It's phenomenal.
- 03 14 03 58 LMP There's an interesting rille directly in front of the spacecraft now, running along the edge of a small mountain, rather sinuous shape, with right-angle turns.

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What - what - Keep rolling - keep rolling - You're - Roll it left, Jim.

03 14 04 22 CMP

Roll left, okay.

03 14 04 27 CMP

This area just to the west of the Sea of Crises is called the Marsh of Sleep, and to the west of that is the Sea of Tranquility.

03 14 04 38 LMP

Can you see the fracture patterns going across the mare in front of us now, Houston?

03 14 04 46 CDR

Now, you better stop the roll.

03 14 04 47 CC

That doesn't quite stand out.

03 14 04 48 IMP

Yes.

03 14 04 49 CMP

Cut the roll.

03 14 04 51 LMP

Roger; it's a series of cracks, faults across the middle of the mare. They drop down in about three steps to the south. The parallel fault pattern to the north has a drop down in the center. I think you may be going too far now, Jim.

03 14 05 16 CMP

Too far which way?

03 14 05 17 LMP

Yawing a little bit too far left.

03 14 05 19 CMP

Yawing too far left?

03 14 05 20 LMP

Yes, why don't you yaw right a little bit?

03 14 05 22 CDR

Yaw right a little bit.

03 14 05 23 IMP

Yes, we want to -

03 14 05 24 CDR

Yaw right.

03 14 05 25 LMP

Or else, you may just - If you want to keep going, I'll put it out this window now.

03 14 05 28 CDR

That's fine on there - that's fine. Who do you want to give it to?

03 14 05 32 CMP

Now, that crater right out there is - that nice round one is -

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- 03 14 05 39 LMP Well, they can - Frank is at the other one.
- 03 14 05 42 CDR I hope all of you back on earth can see what we mean when we say it's a rather foreboding horizon. A rather --
- 03 14 05 49 LMP Stark, maybe.
- 03 14 05 50 CDR Stark and unappetizing sort of place --
- 03 14 05 53 LMP Is this our landing site we're going over now?
- 03 14 05 55 CMP Yes, this is our landing site right down here.
- 03 14 05 57 LMP We're now going over our --
- 03 14 05 58 CMP Approaching our landing site.
- 03 14 05 59 LMP Approaching one of our future landing sites --
- 03 14 06 00 CMP Right now.
- 03 14 06 01 LMP -- selected in this smooth region to --
- 03 14 06 05 CMP Called the Sea of Tranquility.
- 03 14 06 06 LMP -- called the Sea of Tranquility, smooth in order to make it easy for the initial landing attempt in order to preclude having to dodge mountains. Now you can see the long shadows of the lunar sun - sunrise.
- 03 14 06 26 CDR Hey, why don't we start reading that thing, and that would be a good place to end it.
- 03 14 06 34 CMP No, we've got to go into it very nicely. Why don't we - as we go into sunset --
- 03 14 06 36 LMP Right.
- 03 14 06 37 CMP -- or is it sunrise? This is sunrise, yes. We're approaching lunar sunrise.
- 03 14 06 39 LMP We are now approaching lunar sunrise, and for all the people back on earth, the crew of Apollo 8 has a message that we would like to send to you: "In the beginning, God created the heaven and the earth; and the earth was without form and void, and darkness was upon the face of the deep; and the spirit of God moved upon the face of the waters. And God said, 'Let there

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be light,' and there was light. And God saw the light, that it was good. And God divided the light from the darkness."

03 14 07 24 CMP

You got it, Frank.

03 14 07 25 CDR

No, it's your ...

03 14 07 28 CMP

"And God called the light Day, and the darkness He called Night. And the evening and the morning were the first day. And God said, 'Let there be a firmament in the midst of the waters, and let it divide the waters from the waters.' And God made the firmament and divided the waters which were under the firmament and the waters which were above the firmament, and it was so. And God called the firmament Heaven. And the evening and the morning were the second day."

03 14 07 59 CDR

Can you hold this camera?

03 14 08 00 LMP

You want to pass it over here, Jim?

03 14 08 02 CDR

No, it's perfect right where it is.

03 14 08 03 LMP

Okay.

03 14 08 06 CDR

"And God said, 'Let the waters under the heaven be gathered together into one place and let the dry land appear,' and it was so. And God called the dry land Earth, and the gathering together of the waters called these Seas. And God saw that it was good." And from the crew of Apollo 8, we close with good night, good luck, a merry Christmas, and God bless all of you, all of you on the good earth.

03 14 08 39 CMP

That's it.

03 14 08 40 CDR

Don't say anymore now.

03 14 08 41 LMP

I just turned it OFF. You want it ON again?

03 14 08 42 CDR

No, leave it OFF. Great! Great!

03 14 08 43 LMP

OFF?

03 14 08 44 CDR

Yes.

03 14 08 45 LMP

Okay.

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3 03 14 08 46 CMP Camera's OFF?  
4 03 14 08 47 LMP Yes.  
03 14 08 49 CDR Hey, how can you beat that? Gees, we just went into  
the terminator right in time.  
03 14 08 54 CMP Okay, let's get the spacecraft back in even keel again.  
Here, here's this, Frank.  
03 14 09 06 CDR Alright, let's get the flight plan out here.  
03 14 09 09 CDR We've got to get it.  
03 14 09 11 CMP Okay.  
03 14 09 21 LMP Whew! Pretty impressive out there.  
03 14 09 22 CDR Boy, it sure is.  
03 14 09 37 CDR Okay, men.  
03 14 09 39 CMP It's 86 hours.  
03 14 09 44 CDR Houston, how do you read Apollo 8?  
03 14 09 53 CDR Don't tell me they didn't hear us.  
03 14 09 58 CDR Houston, Apollo 8.  
03 14 10 03 CC Apollo 8, reading you loud and clear.  
03 14 10 05 CDR Roger. Are we off the air now?  
03 14 10 18 LMP Why don't you just roll over to the right, Frank, and  
then you can -  
03 14 10 22 CC Affirmative, Apollo 8. Go ahead.  
03 14 10 25 LMP Did you read everything that we had to say there?  
03 14 10 30 CC Loud and clear; thank you for a real good show.  
03 14 10 33 LMP Okay. Now, Ken, we'd like to get all squared away for  
TEI here. Can you give us some good words like you  
promised?

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03 14 10 43 CC Yes, sir. I have a maneuver pad. I think we would like to start by dumping the tape. If we can have that, I have your --

03 14 10 50 CMP You want me to get that, or -

03 14 10 51 CC -- TEI 10 maneuver pad, and then we will run through a systems brief.

03 14 10 57 CDR I understand this is the maneuver pad that we will use for TEI. Is that correct?

03 14 11 09 CDR And you've got the tape, Houston.

03 14 11 16 CMP Ready to copy, Ken.

03 14 11 21 CC Roger. TEI 10, SPS G&N: 45597, minus 040 --

03 14 38 36 CDR Thank you.

03 14 38 45 CMP (Singing)

03 14 39 14 LMP Do you still have the ...?

03 14 39 17 CDR I'll get it afterwards, Bill.

03 14 39 21 CMP That temporary storage bag, Bill, is located - Yes, it's up here.

03 14 39 28 CMP I got trash in that temporary storage bag I'm leaving there.

03 14 39 34 LMP Okay.

03 14 39 38 CMP It stinks to high heaven.

03 14 39 40 CDR All that urine always stinks real bad, too.

03 14 39 52 CDR What was the time for the REV before?

03 14 39 55 LMP 85:17.

03 14 39 59 CDR No, I don't know what day it is. This is day 4. No, hell; eat it - it doesn't matter. Eat any one you want.

03 14 40 11 CMP 87:19.

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- 03 14 40 12 CDR What?
- 03 14 40 13 CMP 87:19.
- 03 14 40 16 CDR Yes. What were the gimbal angles there? 180, 8 - See, it's about the same. And the horizon was what? 1.2?
- 03 14 40 22 CMP Degrees.
- 03 14 40 23 CDR Okay, minus 3, right? So, we'll get the --
- 03 14 40 24 CMP ...
- 03 14 40 25 CDR This is the picture it's going to be right now.
- 03 14 40 26 CMP 52.9.
- 03 14 40 27 CDR Huh?
- 03 14 40 29 CMP 52.9.
- 03 14 40 31 CDR Yes. That's ours - The other one was 1.8.
- 03 14 40 34 CMP I've got to update this one.
- 03 14 40 35 CDR Yes, but we'll see - see, what I'm saying is we'll see just as we come around into the - into the sun now, we should see just the way it's going to be. See what I mean?
- 03 14 41 06 CMP Checking that boresight star is going to be kind of difficult.
- 03 14 41 08 CDR Yes, you're looking right into the earth's - the earth. And it looks like the sun's going to be right in our face, too.
- 03 14 41 27 CDR You can probably check your star through the sextant while we're on the other side. Maybe.
- 03 14 41 35 CMP Well, if you maintain the same position we're burning as we go around --
- 03 14 41 38 CDR Unless the platform drifts.
- 03 14 41 40 CMP -- I'll check it - It was like this. If we get a good enough - well, we won't though, see? We go around like this. I could check it when you're over here. Maybe I can.

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- 03 14 42 05 CDR We want to make sure that we're burning the way we're going, too. You know?
- 03 14 42 09 CMP Yes.
- 03 14 42 35 CDR Okay, now we're on - I think you're supposed to go MANUAL on the other one, first. Yes.
- 03 14 42 51 CMP That's D.
- 03 14 42 53 CDR I don't think that's any good. That's a good one.
- 03 14 42 58 CMP That's C.
- 03 14 43 01 CDR C. Houston, how do you read Apollo 8 on OMNI C?
- 03 14 43 09 CDR Thank you.
- 03 14 43 23 CMP Hey, look it. If you get to this attitude -
- 03 14 43 28 CDR Yes?
- 03 14 43 29 CMP That's inertial, right?
- 03 14 43 30 CDR Yes.
- 03 14 43 31 CMP It shouldn't make any difference what REV we're on.
- 03 14 43 34 CMP As far as I'm concerned, --
- 03 14 43 35 CDR ... earth, moon, or what?
- 03 14 43 36 CMP No, I mean checking the boresight star.
- 03 14 43 39 CDR Huh?
- 03 14 43 40 CMP Checking the boresight star.
- 03 14 43 42 CDR But it isn't all - This isn't always the same - Yes, you can take the difference - -
- 03 14 43 45 CMP Oh, oh, oh, you're splitting the difference? Okay.
- 03 14 43 47 CDR Yes.
- 03 14 43 51 CDR Bill, where are you?
- 03 14 43 52 LMP Right under here.

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03 14 43 53 CDR Okay, you're not - Are you under me?  
03 14 43 54 LMP Yes.  
03 14 43 55 CDR Oh, I'm sorry. I didn't want to hurt you. I didn't.  
Huh? Good.  
03 14 44 11 CMP Look for hardware junk that's floating around.  
03 14 44 42 CMP (Singing)  
03 14 45 08 CMP Yes. Need some help down there?  
03 14 45 47 CDR See, here we are right now, right where it ...  
03 14 45 59 CMP I'll be able to check it back here.  
03 14 46 02 CDR Think so?  
03 14 46 03 CMP Well, if we come up like this.  
03 14 46 05 CDR Yes. Hey, look at that - Earthshine from somewhere.  
Oh, my gosh, look you can see the - Hey, look right  
ahead there. There's a star.  
03 14 46 18 CMP I can't tell.  
03 14 46 20 CDR Son of a bitch, we're going backwards.  
03 14 46 25 CMP Yes.  
03 14 46 27 CDR What time is this post burn supposed to be?  
03 14 46 37 CMP You're right. They're coming up this way.  
03 14 46 38 CDR Huh?  
03 14 46 39 CMP If you're looking like that, they're coming up this way.  
03 14 46 42 CDR From underneath.  
03 14 46 49 CDR What? I don't see that.  
03 14 46 59 CDR We're going to burn out this way, I guess, huh?  
03 14 47 02 CMP But on the other side, right?  
03 14 47 04 CDR Yes.

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Day 4

201

03 14 43 53 CDR Okay, you're not - Are you under me?  
03 14 43 54 LMP Yes.  
03 14 43 55 CDR Oh, I'm sorry. I didn't want to hurt you. I didn't.  
Huh? Good.  
03 14 44 11 CMP Look for hardware junk that's floating around.  
03 14 44 42 CMP (Singing)  
03 14 45 08 CMP Yes. Need some help down there?  
03 14 45 47 CDR See, here we are right now, right where it ...  
03 14 45 59 CMP I'll be able to check it back here.  
03 14 46 02 CDR Think so?  
03 14 46 03 CMP Well, if we come up like this.  
03 14 46 05 CDR Yes. Hey, look at that - Earthshine from somewhere.  
Oh, my gosh, look you can see the - Hey, look right  
ahead there. There's a star.  
03 14 46 18 CMP I can't tell.  
03 14 46 20 CDR Son of a bitch, we're going backwards.  
03 14 46 25 CMP Yes.  
03 14 46 27 CDR What time is this post burn supposed to be?  
03 14 46 37 CMP You're right. They're coming up this way.  
03 14 46 38 CDR Huh?  
03 14 46 39 CMP If you're looking like that, they're coming up this way.  
03 14 46 42 CDR From underneath.  
03 14 46 49 CDR What? I don't see that.  
03 14 46 59 CDR We're going to burn out this way, I guess, huh?  
03 14 47 02 CMP But on the other side, right?  
03 14 47 04 CDR Yes.

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Day 4

202

03 14 47 05 CMP So it'll be upside down - We'll be upside down, forward. Okay.

03 14 47 09 CDR What time is that supposed to be? 27 - 87 what? Yes. Yes, yes, yes, we're alright.

03 14 47 21 CMP Well, it ought to be 87:19.

03 14 47 27 CDR 87:19, huh?

03 14 47 40 CMP Roger.

03 14 47 57 CDR I'm going to take a leak, a little leak would feel good.

03 14 48 05 CMP ... went floating by here.

03 14 48 07 CDR Huh?

03 14 48 09 CMP A bunch of crap just went floating by.

03 14 48 17 CDR Where are you, Bill?

03 14 48 35 CMP Here's a little piece that got away from somebody.

03 14 49 29 CMP Okay, we're maneuvering up, Bill - Frank. You see?

03 14 49 51 CMP You want to leave these suits in the L-shaped bag?

03 14 50 36 CMP What say? Where? The tape? With the helmet? The helmet?

03 14 51 52 CMP (Sneeze)

03 14 52 17 CC Apollo 8, everything looks good going over the hill.

03 14 52 19 CMP Roger, Ken. Thanks a lot. We'll see you around the next pass. Well, just have our TEI update for us ready early, okay?

03 14 52 26 CC Roger.

03 14 52 51 CMP (Singing)

03 14 53 00 CMP What did you say? 89. However, we have - we're checking an 87 one, because it's going to be almost similar, to see what our attitude's going to be like.

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Day 4

203

03 14 53 16 CMP Yes.

03 14 53 20 CMP Where are you going to put the food after you make it?

03 14 53 23 CMP I'm not going to make mine until after the burn.

03 14 53 34 CMP ... Oh.

03 14 54 52 CDR Did you get everybody out a meal, Bill?

03 14 54 55 LMP I'm going to.

03 14 55 06 CMP Here - Boy, there's some things in my pocket they don't know about.

03 14 56 20 CMP I wouldn't say this was too good, would you?

03 14 56 40 CMP Anybody care to brush their teeth?

03 14 57 01 CMP We are maneuvering now, aren't we? I mean, you know, with respect to the -

03 14 57 08 CMP I say, our spacecraft is maneuvering with respect to the -

03 14 57 14 CMP What did I say that TEI 9 time was?

03 14 58 03 CMP 87:19; that's - 22 minutes from now, 21 minutes from now. That's a TI 9 burn, which is the - one REV before this one - I want to see what our attitude is going to be. Here, you want some toothpaste? Huh?

03 14 58 55 CMP I'll get them; I'll get them. You might hit the IMU switch.

03 14 59 09 CMP Here you go, Bill.

03 14 59 25 CMP 87:19.

03 14 59 34 CMP We're just - Hold on just a second.

03 15 00 58 CMP Take a look at this - at your window position. We're at about - Let's see,  $T_{ig}$  - was it  $T_{ig}$  minus 2, that other one? 87:17? 87:17, your  $T_{ig}$  position, your window position? Okay, it's in the - it's in the update book. Right up there. Yes?

03 15 02 57 CMP What's that?

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Day 4

204

- 03 15 03 07 CMP Let me see.
- 03 15 03 20 CMP Which is which? The moon is darker than the sky.
- 03 15 03 42 CMP So, who turned on the light?
- 03 15 03 55 CMP Well, I think we're in the proper position, though.
- 03 15 04 00 CDR Why don't you check to make sure we're still ... posigrade?
- 03 15 04 32 CMP Supposed to be stars there.
- 03 15 04 44 CMP Man, I've got to get that star check early. I'll never get it this way. I have to get that star check early to - you know - I mean I - It can't be too early because the moon will be in the way, but it's got to be early enough so I can see.
- 03 15 05 00 CMP Okay. Hey, the DAP load ought to be pretty good, huh? You see if the DAP load changed any.
- 03 15 05 17 CMP Huh. ... load the DAP. Huh? You want this display in the ... position? Okay. Want to turn up your display just a little bit? Okay.
- 03 15 05 53 CDR How are the boilers working, Bill?
- 03 15 05 57 CMP Okay, that's good for four quads. That's C is DAP; A, B, C, D. Right. Okay. Proceed. Zero is - Oh, the second one? The second one is the roll quad ... Okay, 45821, 45597. 45597. Alright, well, it went up two digits. I'll try it here now. That's already been done. 42 is Peacock.
- 03 15 08 29 CMP (Singing)
- 03 15 08 37 CMP Where are you?
- 03 15 08 54 CMP (Yawn) ... 87 - 9 - 19. 87 - 9 - Wait a second, that's - For this time, it's 87:19. Do you have a good horizon? I see horizon right here.
- 03 15 09 28 CMP Well, I mean, where - Do you see the horizon at all?
- 03 15 09 36 CMP Hey, I don't want to burn into it.
- 03 15 09 43 CMP Well, I see something down there.

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Day 4

205

- 03 15 09 49 CDR That's the - You're seeing the terminator, not the horizon. Well - okay, that's the one we're going to burn on; you've got to get clear before we burn.
- 03 15 10 19 CMP What do you mean?
- 03 15 10 24 CMP Oh. Well, how far up are we - Oh, we've still got 9 minutes to go - 3 degrees per minute. What's the attitude here? 180? Pitch is - Let me read pitch off and then see ... yaw.
- 03 15 10 47 CMP You want a 180, though. You want a 180.
- 03 15 10 54 CMP Oh, it's - it's - Get - Wait a second. Well, it says 180.
- 03 15 11 00 LMP Roll 180.
- 03 15 11 01 CMP Oh, oh, oh, pitch 7, yes. Okay. You know what amazed me is that you can see in those shadows.
- 03 15 12 01 LMP Yaw zero then?
- 03 15 12 05 CMP Yaw is zero. She calls 7 more minutes. And - Let me see here, 1 degree at  $T_{ig}$  minus 3. 1 degree - What's this? Is that - is that it? 87:19, that would be 87:19, that would be 87:16 - in 4 minutes.
- 03 15 13 07 CMP Okay, I see the horizon. Yes.
- 03 15 13 14 CMP Right on the edge here - here - We're swinging in like this to it.
- 03 15 13 20 CMP It's like doing a loop.
- 03 15 13 34 CMP Look at down there, Bill: all those lines in a straight row like sand dunes.
- 03 15 14 27 CMP Okay, 2 minutes - minute and a half, about.
- 03 15 14 37 CMP I think you're about right.
- 03 15 14 45 CMP 1.2 degrees? You're wide after  $T_{ig}$  - At  $T_{ig}$  minus 3, at 16. Yes. Should probably be .. it's probably going to be the horizon right here, because you're upside down.
- 03 15 15 43 CMP Got your checklist, Bill? Okay. No, I just wondered.

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Day 4

206

- 03 15 16 06 CMP That's your logbook.
- 03 15 16 16 CMP Now. Let's see. No, wait a second - In 18 seconds. Okay, how's it now?
- 03 15 16 26 LMP ...
- 03 15 16 28 CMP Well, you can say it's 1.2 degrees with - at  $T_{ig}$  minus 3.
- 03 15 16 34 CMP I think that's kind of hard to spot in there; don't you think, Bill? Oh, you're 39; you're just a couple seconds early.
- 03 15 16 51 LMP We're going the right way now.
- 03 15 16 53 CMP Yes, we're upside down going that way. And we're going with the orbit.
- 03 15 17 29 CMP (Singing) Well, you still might be pitched down. It might be that you burn like this. You might be burning before you get to the top.
- 03 15 18 20 CMP I don't know, but I'll find out.
- 03 15 18 42 CMP I don't think this is a good place for this, Bill. I'm going to put this - in here or some place. Euh? No, this - Did you find it?
- 03 15 19 16 LMP Is that yours?
- 03 15 19 19 CMP No, I think that's mine; open it up and find out.
- 03 15 19 25 CDR That's Jim's there.
- 03 15 19 49 CMP Now is burn time - We got - little bit - about 10 - 15 seconds after burn time.
- 03 15 20 23 LMP Where's your checklist?
- 03 15 20 24 CDR I don't know.
- 03 15 20 26 CMP You didn't put it in my seat, did you?
- 03 15 20 55 LMP There's part of it - there's volume 1.
- 03 15 21 08 CMP Why don't you put that in your mailbox?
- 03 15 21 32 CMP I'm going to put this volume 2 away, too.

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Day 4

207

- 03 15 21 44 LMP Why don't you keep up this -  
4. 03 15 22 50 CMP That's the chartbook.  
03 15 23 09 CMP Got any emergency procedures to go over here? What  
are you going to do? Okay.  
03 15 23 32 CMP Just a minute, Bill; I'll give you a hand. Now, we  
don't need these two things, right?  
03 15 23 43 LMP No, I got the flight plan out.  
03 15 24 50 CMP I don't think it's down there. That's just full of junk.  
03 15 25 20 LMP Is that it?  
03 15 26 46 CMP (Whistling)  
03 15 27 36 CMP Well, who's got - who's got the Pentels? Anybody got a  
Pentel?  
03 15 27 42 CDR Here's one.  
03 15 27 43 CMP Okay, we've got two. Okay, I want to - No, wait a  
minute - I just don't want to --  
03 15 27 50 CDR Oh, I'm sorry.  
03 15 27 51 CMP I just want to get it when we - tape here.  
03 15 27 58 CDR 87:38:42.  
03 15 28 46 CMP Yes.  
03 15 28 49 CDR For God's sake, shift the right thing there, Jim, when  
we go to arm the thing.  
03 15 28 54 CMP Right. Proceed.  
03 15 28 55 CDR We got a - we've got to ullage. Don't let me forget  
that: 15-second ullage.  
03 15 28 59 CMP Right.  
03 15 29 06 CMP That's true.  
03 15 29 07 CDR Alright, we're going to get another one.

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Day 4

208

- 03 15 29 33 CMP Do you want to do a gimbal drive test?
- 03 15 29 36 CDR Yes, I think we might as well. Don't you?
- 03 15 29 40 CMP Okay, I'll ... Just the way we had planned it!
- 03 15 29 45 CMP Aren't you going to talk to the world?
- 03 15 29 50 CMP I don't know. That's the one, but it's not the final one.
- 03 15 29 57 CDR This is our retro burn, young man.
- 03 15 30 16 CDR Huh?
- 03 15 30 17 CMP What do you mean? 213 - 215 seconds, that turned out to be.
- 03 15 30 33 CDR Minus 40 feet on the DELTA-V in 2 seconds.
- 03 15 31 09 CDR When are you going to stop the water boiling - after the burn?
- 03 15 31 12 LMP Yes, I think we ought to get away from the ...
- 03 15 31 14 CDR Okay.
- 03 15 31 15 LMP We can stop it ...
- 03 15 31 19 CDR Well, let's just start it after the burn, then, huh?
- 03 15 31 22 LMP Huh?
- 03 15 31 23 CDR Stop it after the burn and not before it. Is that right?
- 03 15 31 25 LMP Yes. ...
- 03 15 31 32 CMP (Singing, yawn)
- 03 15 32 14 CDR That TV camera worked pretty well.
- 03 15 32 20 CMP There's one thing that I'm amazed at, and that is that the communications here are a lot better than I expected.
- 03 15 32 25 CDR Gees, they're great; knock, knock, knock. Let's not say anything until we're on the carrier, what do you say (laughter)?
- 03 15 33 58 LMP ... DELTA-V ...

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Day 4

209

03 15 34 02 CDR      Huh? I didn't hear you.  
03 15 34 04 CMP      29 something - 25 - -  
03 15 34 08 CDR      DELTA-V nominal is - -  
03 15 34 10 CMP      Just make sure you can get the right one. Go ahead.  
03 15 34 13 CDR      3532.  
03 15 34 15 CMP      You mean 3522.3.  
03 15 34 20 CDR      That's a big kick in the pants, you know it? 2000 miles  
                        an hour - You can look at it that way - about - more  
                        than that. We should be getting there in 4 minutes.  
03 15 34 58 CMP      (Singing)  
03 15 35 23 CDR      2 minutes and 18 seconds, and we're going home? Is  
                        that what you said?  
03 15 35 26 CMP      Yes.  
03 15 35 30 CDR      01:38. Takes a long time though, doesn't it?  
03 15 35 52 CDR      How does the SPS look, Bill?  
03 15 36 34 CDR      Maybe that's what we're doing.  
03 15 36 38 CMP      Yes.  
03 15 36 42 CMP      Let's see, ... I probably could use ...  
03 15 36 47 CDR      You couldn't here.  
03 15 36 48 CMP      Huh?  
03 15 36 50 CDR      I don't think you could here; you could roll there, though.  
03 15 36 59 CDR      How does that look? Huh? Huh? Can you get them on an  
                        OMNI with that?  
03 15 38 25 CMP      (Whistling)  
03 15 38 55 CDR      We're supposed to have him, Bill.  
03 15 38 58 CMP      Think you just did.

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Day 4

210

- 03 15 39 01 CDR Houston, Apollo 8. How do you read? We got signal strength, Bill?
- 03 15 39 12 LMP Yes, it just probably takes them awhile to get squared away down there.
- 03 15 39 33 LMP Wonder what good it is to have that engine pointing at the moon that way?
- 03 15 39 37 CMP Pardon.
- 03 15 39 40 LMP We going to get it too hot?
- 03 15 39 43 CMP No.
- 03 15 39 44 CDR Hello, Houston, Apollo 8.
- 03 15 39 49 CC Go ahead, Apollo 8.
- 03 15 39 50 CDR Okay, do you want the computer?
- 03 15 40 04 CMP There won't be any ...
- 03 15 40 05 CDR Huh?
- 03 15 40 37 CC Apollo 8, we'd like to have the high gain, and when we get that, well, we'll start a dump, and we will start your updates.
- 03 15 40 43 CDR Okay, how about reading us the pad, and we'll try to get you the high gain. What do I have to do to get to the high gain, Bill?
- 03 15 40 49 LMP Give me a VERB 64, will you?
- 03 15 40 55 CDR Ken, read us off the pad; in case we can't get the dump in, we can still do it. Which way now?
- 03 15 41 02 CC Roger; I got them right here.
- 03 15 41 04 LMP Well, let's see; I'm trying to figure it out. Well, roll right for sure.
- 03 15 41 08 CDR Roll right.
- 03 15 41 12 LMP That would probably do it, the way you're pointing.
- 03 15 41 20 CC Okay, Apollo 8. The first pad I have is TEI 10.

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Day 4

211

- 03 15 41 25 CDR Go ahead.
- 03 15 41 28 CC Alright, TEI 10, SPS G&N: 45597, minus 040, plus 157, 089:19:1567, plus 35186, minus 01512, minus 00520 --
- 03 15 42 20 LMP A little yaw - -
- 03 15 42 21 CMP Hush!
- 03 15 42 22 CC -- 180, 007, 000, November Alfa, plus 00186, 35223, 318, 35018, 42, 0924, 253; Scorpii Delta, down 069, left 45, plus 0748, minus 16500, 12994, 36300, 146, 5005; primary star, Sirius; secondary, Rigel; 129, 155, 010, four-quads 15-seconds ullage; horizon on 3.2-degree mark at T minus 3; use high-speed procedure with minus Mike Alfa. Over.
- 03 15 44 18 CDR How you coming?
- 03 15 44 19 LMP Just stand by a second, Jim. Just stand by - just stand by.
- 03 15 44 22 CMP Stand by 1 second.
- 03 15 44 26 LMP There you go. Turn the LOCK, UP. Got him locked up yet? Okay, you got it.
- 03 15 44 32 CDR You got the high gain now, Ken.
- 03 15 44 35 CMP Houston, Apollo 8. How do you read?
- 03 15 44 40 CC Loud and clear.
- 03 15 44 41 CMP Roger. Maneuver pad, TEI 10.
- 03 15 44 45 CC Apollo 8, we would like to have you go to POO and ACCEPT, and we would like to take the recorder at this time. Then I will copy your pad.
- 03 15 44 59 CDR Okay. You got it - -
- 03 15 45 00 CMP You have POO and ACCEPT.
- 03 15 45 02 LMP And the recorder.
- 03 15 45 03 CMP And you have the recorder.
- 03 16 09 47 CC Apollo 8, Houston. The tape recorder is yours. I have your PTC attitude.

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Day 4

212

- 03 16 09 55 CDR Roger; go ahead.
- 03 16 09 58 CC Okay, PTC attitude will be pitch 10, yaw 45. This begins at 92 hours. Over.
- 03 16 10 11 CDR Is that pitch 10 and yaw 45?
- 03 16 10 14 CC Affirmative, and looks like that will go with the entry REFSMMAT; begins at 92 hours.
- 03 16 10 24 CDR Thank you. We've got a lot of good things going here. Every time I start to do that, somebody interrupts. You know, we've got to get a new REFSMMAT and the whole bloody works right after we --
- 03 16 10 31 CC Apollo 8, would you put your UP TELEMETRY to BLOCK, please?
- 03 16 10 40 CMP In BLOCK.
- 03 16 11 03 LMP Okay, AUTO. Time me 10 seconds, somebody -
- 03 16 11 08 CMP Okay.
- 03 16 11 10 LMP When I say hack: 2, 3, 1 -
- 03 16 11 12 LMP HACK.
- 03 16 11 22 CMP MARK.
- 03 16 11 23 LMP Right on the money.
- 03 16 11 26 CDR What is the DELTA-V - Is it in there now? Let's double-check each other.
- 03 16 11 31 CMP DELTA-V<sub>c</sub>.
- 03 16 11 32 LMP 3501.
- 03 16 12 27 CDR Boy, that sun is bright.
- 03 16 12 29 LMP Hot?
- 03 16 12 30 CDR Yes. Right in the eye.
- 03 16 12 35 CDR You want to put down pitch and yaw attitude, gimbal lock (laughter) for, you know, PTC: 10 and 45. Yaw is 45, Jim.

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213

03 16 12 52 CMP After 92 hours, though.  
03 16 12 59 CDR Okay, you've got your burn time now there, Bill?  
03 16 13 04 LMP No, I didn't get it. Oh, I got the - I haven't got the updated one yet; what have you got?  
03 16 13 08 CDR We got to add 3.7 seconds to what they gave us because this motor hasn't been performing like it should.  
03 16 13 14 LMP Yes.  
03 16 13 16 CMP What's the pitch?  
03 16 13 18 LMP 4 seconds.  
03 16 13 19 CDR 10.  
03 16 13 21 LMP So we got a burn time of 322 now?  
03 16 13 29 CDR 3 -  
03 16 13 41 CMP It's 318 -  
03 16 13 43 LMP Plus 4.  
03 16 13 44 CDR 318 plus 4.  
03 16 13 51 LMP So, we're going to - You still going to ignite on 19:15?  
03 16 13 55 CDR Uh huh.  
03 16 13 57 LMP And it would be 322?  
03 16 14 00 CMP That'd be 19:16.  
03 16 14 02 LMP A second later?  
03 16 14 05 CMP That's what you gave me, wasn't it?  
03 16 14 06 LMP 16, because it's 0.67.  
03 16 14 10 CMP Oh, okay.  
03 16 14 12 LMP So it's 67 - 0.57 you mean?  
03 16 14 15 CDR 15.67; make it a second.

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Day 4

214

- 03 16 14 18 LMP Okay.
- 03 16 14 32 LMF Okay, shutdown will be at 40 then, right?
- 03 16 14 37 CMP 37: I have 21.
- 03 16 14 42 LMP I mean emergency shutdown will be at 40.
- 03 16 14 43 CDR Yes, oh.
- 03 16 14 44 CMP Yes, okay.
- 03 16 14 46 LMP Starting at 89:19:16, burning 322, shutting down at -
- 03 16 14 51 CDR 2 seconds early. Go ahead.
- 03 16 14 57 CC Okay. On the helium tank TEMP's: that's not recorded on LOW bit rate, and looking over our tape dumps, most of this stuff we have on the backside there is LOW bit rate. So we won't be able to give you an exact number, but looking at what we have every time we go out of sight and come back over the hill, it looks like you can expect about 82 to 84 degrees as a nominal temperature.
- 03 16 15 21 CDR Thank you.
- 03 16 15 22 LMP Shit, we got a lot to do.
- 03 16 15 23 CDR Huh?
- 03 16 15 24 LMP That's the worst one we've had here.
- 03 16 15 27 CDR That's worse?
- 03 16 15 40 LMP Well, you know the colder, the better.
- 03 16 15 43 CMP They last longer, huh?
- 03 16 15 49 CMP Are you going to pull out PITCH 2 and YAW 2 circuit breakers?
- 03 16 15 52 CDR Yes.
- 03 16 16 05 CDR I'm trying to get in place so you can get some sighting going.
- 03 16 16 12 CMP Get some sighting going?
- 03 16 16 13 CDR Sighting - you know, for P52.

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Day 4

215

03 16 16 18 CMP Oh, P52 - Yes, we're going into it. North is down.  
03 16 16 24 CDR Are we? Man, look at that. There you go.  
03 16 16 30 CMP Huh?  
03 16 16 31 CDR Get a P52, will you? Let me have a flight plan.  
03 16 16 39 CMP Do you need the book?  
03 16 16 48 CMP Which way is my optics pointing?  
03 16 16 51 CDR Pointed at the - pretty - should be --  
03 16 16 53 LMP What is our spacecraft weight?  
03 16 16 55 CMP Have you stopped the rate?  
03 16 16 58 CDR Bill, Jim's got it. Yes.  
03 16 17 00 LMP You got it, Jim?  
03 16 17 01 CMP Yes.  
03 16 17 02 CDR 45 something, Bill.  
03 16 17 03 LMP 45, okay -  
03 16 17 04 CMP 45597. Okay, may I --  
03 16 17 07 CDR Yes, ENTER that. You didn't get it?  
03 16 17 13 CMP Oh, you did ENTER it?  
03 16 17 14 CDR Yes, I ENTERED it.  
03 16 17 15 CMP Okay, I'm sorry.  
03 16 17 20 LMP Based on helium pressure, I get 46 - 50.  
03 16 17 24 CDR Based on what?  
03 16 17 26 LMP Helium pressure.  
03 16 17 27 CDR Oh, good.  
03 16 17 33 CMP (Singing)

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Day 4

216

- 03 16 17 37 CMP 27. 27 is Alkaid.
- 03 16 18 31 CMP 31. 31 is Arcturus.
- 03 16 18 36 CDR Well, you got two good ones, huh?
- 03 16 18 37 CMP Yes.
- 03 16 18 57 LMP We would have enough there to blow it down, wouldn't we?
- 03 16 19 00 CDR Just a minute, let me add it.
- 03 16 19 02 LMP Oh.
- 03 16 19 18 CMP All balls; want to record that?
- 03 16 19 23 CDR Yes, I've got it.
- 03 16 19 26 CMP Proceed. Gimbal angles: minus three zeros 40, plus four zeros 2, plus three zeros 48.
- 03 16 19 42 CDR Okay.
- 03 16 19 43 CMP Can I torque?
- 03 16 19 44 CDR You may. Torque that way.
- 03 16 19 47 LMP I'm not sure we can blow it quite all the way. We can blow it for the time to get - I think we can blow it for over - for about 190 seconds down to 70 psi; if you want to go a little lower, you might as well go to chug; why, you can probably do it all the way.
- 03 16 20 05 CDR Okay.
- 03 16 20 09 CMP It's finished.
- 03 16 20 11 CDR Okay.
- 03 16 20 12 LMP If we do have - if we do get one tank stuck, I'm going to shut the other one off, and blow them both off together.
- 03 16 20 18 CDR What do you mean by that, Bill?
- 03 16 20 20 LMP If we get - one tank's not getting pressurized, I'll shut off the other one, so you don't get a big DELTA-P between them.

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Day 4

217

03 16 20 26 CDR Alright, good.  
03 16 20 29 CDR Okay, let's go - Start through the checklist. Shall we?  
03 16 20 36 CMP Okay, first of all, the external DELTA-V, right?  
03 16 20 39 CDR I'm getting my little library squared away here.  
03 16 20 53 CMP Want me to go through P30?  
03 16 20 56 SC (Yawn)  
03 16 20 57 CMP Because then you can start right then with P40. Okay,  
here's the burn stuff.  
03 16 21 01 CDR Alright, go ahead.  
03 16 21 09 CMP 89:19:1567.  
03 16 21 12 CDR Right.  
03 16 21 14 CMP Okay, plus 35186.  
03 16 21 16 CDR Right.  
03 16 21 18 CMP Minus - what was that? - 01512.  
03 16 21 21 CDR Right.  
03 16 21 22 CMP Minus 00520.  
03 16 21 24 CDR Right.  
03 16 21 25 CMP Okay.  
03 16 21 31 CMF Okay, 6 11 - this is not applicable here, okay?  
03 16 21 37 CDR Yes.  
03 16 21 38 CMP Counting down.  
03 16 21 39 CDR Alright.  
03 16 21 43 CMP If you set it at three counting up, I think you'd have  
it. Wouldn't you?  
03 16 21 45 CDR Yes.

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Day 4

218

03 16 21 57 CMP (Singing)  
03 16 22 02 CDR We've got to get some of that Murine out; my eyes are --  
03 16 22 04 CMP Yes, mine have been bothering me, too.  
03 16 22 20 CDR Okay, try it again.  
03 16 22 25 CDR Okay?  
03 16 22 26 CMP Yes.  
03 16 22 28 CDR You alright?  
03 16 22 29 CMP Proceed. 87, 00, ENTER.  
03 16 22 34 LMP You want to take a look at this, too?  
03 16 22 36 CDR No, I don't think so; it just keeps you guys from seeing it, doesn't it?  
03 16 22 39 LMP Yes, a little. Let's just - do you ever want it?  
03 16 22 42 CDR No, I don't ever seem to have ever --  
03 16 22 43 LMP It's in my stowage bag if you think you - if you ever want to get it.  
03 16 22 46 CDR Alright, let's check the DAP.  
03 16 22 48 CMP Well, let's --  
03 16 22 49 CDR Oh, is that in the checklist?  
03 16 22 50 CMP Yes.  
03 16 22 52 CDR Alright, then let's go with Bill.  
03 16 22 53 CMP The checklist.  
03 16 22 54 LMP Have you completed P30?  
03 16 22 56 CDR Yes.  
03 16 22 57 LMP Okay, let's go to P40: P30, complete; CMC, ON.  
03 16 23 04 CDR CMC is ON.

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Day 4

219

- 03 16 23 06 LMP ISS, ON; spacecraft - SCS, operating.
- 03 16 23 08 CDR Right.
- 03 16 23 10 LMP Test the CAUTION/WARNING lamp; EMS MODE, STANDBY.
- 03 16 23 13 CDR Yes.
- 03 16 23 14 LMP FUNCTION, DELTA-V set.
- 03 16 23 15 CDR Right.
- 03 16 23 16 LMP And have you set 1586.8?
- 03 16 23 18 CDR Right.
- 03 16 23 20 LMP Okay, EMS MODE, STANDBY; set DELTA-V<sub>c</sub>.
- 03 16 23 25 CDR 3501.8.
- 03 16 23 27 CMP I'll check: 3501.8.
- 03 16 23 30 CDR Okay.
- 03 16 23 31 LMP EMS FUNCTION, DELTA-V; NONESSENTIAL BUS, MAIN B; cycling cryo fans - good a time to do it as any.
- 03 16 23 48 LMP BMAG MODE, three, RATE 2.
- 03 16 23 50 CDR RATE 2.
- 03 16 23 52 LMP DELTA-V<sub>cg</sub>, CSM.
- 03 16 23 53 CDR CSM.
- 03 16 23 54 LMP CMC MODE, FREE.
- 03 16 23 55 CDR FREE.
- 03 16 23 57 LMP AUTO RCS select, 16, as required for ullage.
- 03 16 23 59 CDR Okay, we only need 12, I think. Right?
- 03 16 24 04 LMP 12? — 31.
- 03 16 24 06 CDR We don't need the Y thrusters.
- 03 16 24 08 CMP Four-jet ullage?

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Day 4

220

- 03 16 24 14 CMP (Yawn)
- 03 16 24 15 CDR You've got all - We got all we need.
- 03 16 24 18 LMP Okay. Load the DAP.
- 03 16 24 19 CMP Load the DAP. Okay, four jets: one, two, three, four jets. Okay?
- 03 16 24 29 CDR Right.
- 03 16 24 32 CMP 45601, 45597. Good.
- 03 16 24 36 CDR Right.
- 03 16 24 37 LMP Just going over Copernicus.
- 03 16 24 41 CMP Minus three balls 40, plus two balls 157, right?
- 03 16 24 46 CDR Right.
- 03 16 24 47 LMP I don't know - Is that right?
- 03 16 24 48 CDR Yes.
- 03 16 24 53 CDR Okay, DAP is loaded.
- 03 16 24 56 LMP Okay, ROTATIONAL CONTROL POWER NORMAL, both, AC/DC.
- 03 16 25 01 CDR NORMAL, AC/DC.
- 03 16 25 02 LMP Got your DET set?
- 03 16 25 04 CDR Set and counting.
- 03 16 25 06 LMP VERB 37, ENTER; 00, ENTER.
- 03 16 25 07 CMP Yes, we have that.
- 03 16 25 09 LMP Spacecraft control, CMC and AUTO.
- 03 16 25 12 CDR CMC and AUTO.
- 03 16 25 13 LMP VERB 62, ENTER.
- 03 16 25 16 CDR VERB 62, ENTER.
- 03 16 25 17 LMP VERB 49, ENTER.

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Day 4

221

03 16 25 19 CDR VERB 49, ENTER.  
03 16 25 21 LMP 6 22: load desired maneuver pad gimbal angle.  
03 16 25 25 CDR 180.  
03 16 25 26 CMP Plus 1800.  
03 16 25 27 LMP Pitch is plus 7 --  
03 16 25 28 CMP Zero, zero.  
03 16 25 29 LMP -- 007, right?  
03 16 25 30 CMP Okay.  
03 16 25 31 LMP Yaw is all zeros.  
03 16 25 32 CMP Okay.  
03 16 25 33 LMP Proceed?  
03 16 25 34 CDR Proceed.  
03 16 25 35 LMP 50 18: auto maneuver - you want it?  
03 16 25 37 CDR Yes.  
03 16 25 38 LMP Okay, CMC and AUTO.  
03 16 25 40 CDR Right.  
03 16 25 41 LMP Okay, RATE 2, proceed.  
03 16 25 44 CDR Okay.  
03 16 25 50 CDR (Singing, yawn)  
03 16 25 52 LMP You know, it might be worth putting our flight plans up.  
03 16 25 55 CDR I got mine up.  
03 16 25 56 CMP I've got to get down there and take a boresight star, though.  
03 16 26 45 LMP We'll run over that entry tomorrow once and Thursday once. Okay?  
03 16 26 49 CMP Okay.

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Day 4

222

- 03 16 26 50 CDR Okay.
- 03 16 26 52 LMP You know, this kitchen down here's a pretty good deal.
- 03 16 26 54 CDR Yes, ...
- 03 16 26 58 CMP Brings sort of honey atmosphere here.
- 03 16 27 02 LMP Yes. How do you like your cryo, medium or well? Let me know when you get there.
- 03 16 27 11 CDR It takes a long time to get there.
- 03 16 27 12 LMP Okay.
- 03 16 27 17 CDR I'll tell you what, I'll hurry it up so Jim can check the boresight star while we're in the dark.
- 03 16 27 22 CMP No, don't forget I got the earth - or the moon. If you're going back again, will you make a meal?
- 03 16 27 53 LMP That's a pretty good checklist now, isn't it?
- 03 16 27 55 CMP Yes.
- 03 16 28 14 LMP Can you still see the earth over there?
- 03 16 28 16 CDR Yes, very distinct - half the earth.
- 03 16 28 22 LMP I thought someone told me we weren't going to have any when we - hardly any of the earth when we came back.
- 03 16 28 27 CMP Well, we won't I don't think, because we're going to be way out - -
- 03 16 28 29 CC Apollo 8, we would like to have the tape recorder for about 5 minutes for one last look.
- 03 16 28 34 CMP Roger, Houston. You're getting it.
- 03 16 28 36 CDR Does that mean they need the high gain?
- 03 16 28 38 LMP Yes.
- 03 16 28 40 CDR Well, I'll stop right here then.
- 03 16 28 43 LMP Well, you're getting - -

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Day 4

223

03 16 28 44 CC Thank you. And I guess we still have a cryo stir ahead of us, and we've checked your PIPA bias, and there's no change.

03 16 28 51 CDR Roger; and we're stirring the cry - -

03 16 31 48 LMP Well, now they're moving again.

03 16 31 56 LMP Can y'all hear those - -

03 16 31 57 CC Apollo 8, the tape recorder is yours. We have your double-umbra update - -

03 16 32 04 CDR Okay (laughter).

03 16 32 05 CDR I'll get it.

03 16 32 06 CC - - 89:07:15.87.

03 16 32 08 CDR Roger; copy.

03 16 32 12 CMP What's a double umbra?

03 16 32 13 CC Roger; and no change on your AOS time.

03 16 32 20 CDR Say that again, will you, Ken?

03 16 32 21 LMP Can't believe it.

03 16 32 24 CC There's no change on your AOS time.

03 16 32 29 CDR Yes, what was it?

03 16 32 32 CMP Oh, I got it. I got it.

03 16 32 35 LMP It was in the flight plan. I read it - -

03 16 32 36 CC Okay, with TEI: 89:28:39.

03 16 32 37 CMP 89:28:39; 89:28:39.

03 16 32 40 CDR Thank you.

03 16 32 50 CMP Yes, they might as well not build simulators any other way than they've been doing it. You're laying on your back in this thing no matter what you do.

03 16 32 57 LMP Think so? I feel like I'm sitting straight up.

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Day 4

224

03 16 32 58 CDR      Do you?

03 16 33 00 LMP      Yes.

03 16 33 01 CMP      You do?

03 16 33 02 CDR      I feel like I've been in the whole time like I've been here in the simulator.

03 16 33 04 CMP      Yes, that's right; me too.

03 16 33 05 CDR      I've been lying on my --

03 16 33 06 CMP      The only difference is that this is --

03 16 33 07 LMP      I feel like I'm in the DCPS.

03 16 33 08 CDR      Oh, really?

03 16 33 09 LMP      Yes.

03 16 33 13 CMP      Okay --

03 16 33 14 LMP      ... little bit.

03 16 33 24 LMP      I'm giving these an extra little whack here just so there won't be any surprises.

03 16 33 35 CMP      (Singing)

03 16 33 52 CMP      42 is a pretty small star, too: Peacock.

03 16 34 19 CMP      Why don't you let the old DAP take it from here?

03 16 34 21 CDR      I'm going to. As soon as we get in close, I'm going to give it to the DAP. It's going faster than the DAP can take ... roll ... it's going the way we want it to go.

03 16 34 30 CMP      You going to align the GDC here? (Yawn)

03 16 34 35 CDR      Yes. I left it this way so we can tell where we're pointing.

03 16 34 39 CMP      Oh.

03 16 34 40 CDR      I left her in ORB RATE.

03 16 34 51 LMP      Where's the earth; can you see it?

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Day 4

225

1 03 16 34 53 CDR No. Oh, it's out here, Bill - up this way.  
03 16 34 57 LMP Okay. Getting the right antenna.  
03 16 35 01 CMP Okay, so what we are going to do is pitch down this way, huh?  
03 16 35 37 LMP We've got an earthset picture for *Life* magazine!  
03 16 35 40 CDR We're there!  
03 16 35 42 LMP Okay, are you there?  
03 16 35 44 CDR Yes.  
03 16 35 46 LMP Okay, you want AUTO trim?  
03 16 35 50 CDR Yes, a little AUTO trim.  
03 16 35 54 LMP Okay, CMC and AUTO.  
03 16 35 55 CDR Right.  
03 16 35 56 LMP Proceed.  
03 16 35 57 CDR Right.  
03 16 35 58 LMP Boresight and sextant star check.  
03 16 36 00 CDR Okay.  
03 16 36 01 LMP You're kind of in deep trouble for doing that.  
It's impossible.  
03 16 36 05 CDR You're looking right at the moon.  
03 16 36 06 LMP Yes, you have to wait awhile.  
03 16 36 09 CDR Gee, that's a pretty interesting view, isn't it?  
That earthshine is bright.  
03 16 36 12 CMP Let me take a look.  
03 16 36 14 LMP When the earth sets, then we'll have enough --  
03 16 36 15 CDR Look down here.  
03 16 36 17 CMP Huh!

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Day 4

226

- 03 16 36 20 CDR See it?
- 03 16 36 21 CMP Oh, yes, I see it quite well.
- 03 16 36 26 LMP Oh, I might be able to get a star up there, though.  
What was the - what was my star?
- 03 16 36 30 CMP Your star was Scorpia Delti - Delta.
- 03 16 36 34 LMP And which way was it?
- 03 16 36 38 CMP Okay, it was down 06.9 -
- 03 16 36 44 LMP Yes.
- 03 16 36 46 CMP And left 4.5.
- 03 16 36 48 CDR Oh, you'll never get that.
- 03 16 36 49 LMP Well, how in the hell would you ever get it?
- 03 16 36 50 CDR Well, there are some stars up here, see, that just - -
- 03 16 36 51 LMP Yes.
- 03 16 36 53 CMP Yes. But Scorpio is - -
- 03 16 36 54 LMP You're not going to be able to get it until damn  
near just prior to ignition.
- 03 16 37 00 CDR That's an inertial star.
- 03 16 37 02 LMP Yes, but you've got an inertial moon in your way.
- 03 16 37 04 CMP Well, if it - if the COAS - if you set the COAS  
and it doesn't hit the moon, then it's okay.
- 03 16 37 10 LMP That's right. It's kind of hard not to hit it though  
(laughter), looking down at it like this.
- 03 16 37 19 CMP I think you're looking at Saturn.
- 03 16 37 20 LMP Well, I can't even see ... I'm not getting in your way, am I?
- 03 16 37 26 LMP (Laughter) You guys - really bad!
- 03 16 37 31 CDR Alright, I'm going to put this thing INERTIAL - INERTIAL  
POWER, OFF; lighting, OFF; select one - IMU.

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Day 4

227

- 03 16 37 50 CMP I could - I guess I could get out the optics and set the thing all the way up. All I'd have to do is wait until we get there.
- 03 16 38 03 CMP You guys could go ahead with the checklist without me in case I don't pick it up right away.
- 03 16 38 09 LMP Look at that red star going down there.
- 03 16 38 10 CDR I was trying to figure out what that was, too, Bill.
- 03 16 38 12 CMF It might be Antares.
- 03 16 38 16 LMP Boy, they set in a hurry, don't they?
- 03 16 38 21 CDR They sure do.
- 03 16 38 24 LMP Well, it's Scorpio, maybe it was - Yes?
- 03 16 38 30 CMP That wouldn't be setting now, would it?
- 03 16 38 32 CDR Yes, it would be. If it's going to be part of the boresight star, it's got to be near the horizon - near the plus-X axis.
- 03 16 38 46 CDR Okay, Bill, that should complete it.
- 03 16 38 48 LMP Okay.
- 03 16 38 54 CDR I won't be able to get a boresight star because we'll be in the daylight.
- 03 16 38 59 LMP What about Jim?
- 03 16 39 00 CDR Well, I don't know; I hope he can.
- 03 16 39 04 CDR Are you going to do that before we press on, Jim?
- 03 16 39 07 LMP When we get - when we get - -
- 03 16 39 10 CMP Why don't I just set - -
- 03 16 39 11 LMP -- your double umbra, why, you can do it then.
- 03 16 39 13 CMP What's this double umbra?
- 03 16 39 15 LMP Double shadow. When the earth sets, then you will be able to - you'll be looking at 90 degrees back and you can look right down on it.

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Day 4

228

- 03 16 39 25 CMP When the earth sets?
- 03 16 39 26 LMP Yes, the umbra is the shadow.
- 03 16 39 27 CMP Oh, yes, okay.
- 03 16 39 30 LMP So we're in the shadow of the sun; that's the umbra of the moon, and when we're in the shadow of the earth, that's the umbra. You should be able to get a boresight star pretty soon, because we're going to come to the end of the -
- 03 16 39 41 CMP Are we? Okay, I'll go down there and set it up.
- 03 16 39 43 LMP Wait a minute. Where in the hell are we?
- 03 16 39 45 CDR Confusing.
- 03 16 39 48 CMP We're pitching down this way.
- 03 16 39 51 LMP We aren't doing anything - are we? Are we maneuvering?
- 03 16 39 54 CMP No, we're not. We're holding steady, but - -
- 03 16 39 55 CDR Here, let me show you - -
- 03 16 39 56 LMP Yes, that's right; we're not 90 degrees from our burn - from our burn place yet. If we're 90 degrees from our burn place, we'll be looking straight at the moon - -
- 03 16 40 03 CMP We're over here.
- 03 16 40 07 LMP We're coming this way.
- 03 16 40 08 CMP Yes, I know. And we're not upside down like that. We're - Well - You have - Your optics are up.
- 03 16 40 18 LMP Optics are posigrade. They'll go to up.
- 03 16 40 28 CDR We're going right through here.
- 03 16 40 58 CMP Okay, Bill, when do you start reading the 6-minute checklist?
- 03 16 41 03 LMP 6 minutes.
- 03 16 41 04 CMP What's that time in GET?

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Day 4

229

- 03 16 41 07 LMP Well, let's see here. 89:19 we'll call it; let's make it 89:13, okay? And the 5 one will be at 89:14, and the 2 will be at 89:17 - 35 -
- 03 16 42 08 CMP I'm just looking where the PITCH 2 and YAW 2 circuit breakers are. I want to make sure you pull the right one.
- 03 16 42 14 CDR YAW 2 and PITCH 2.
- 03 16 42 16 CMP Okay.
- 03 16 42 26 CDR I'm really screwed up. It looks to me we ought to be going the other way.
- 03 16 42 30 CMP Yes, I know.
- 03 16 42 31 CDR Huh? Yes, well, look. Well, here we are right here.
- 03 16 42 34 CMP Oh boy!
- 03 16 42 35 CDR What's wrong?
- 03 16 42 36 CMP I should have got down here a long time ago.
- 03 16 42 39 CDR Here's where we're going to be when we burn, right?
- 03 16 42 40 LMP Yes, and we're right here now. See? And we're looking straight down at the moon, and the earth is over here.
- 03 16 42 54 CDR Are you doing your star check?
- 03 16 42 56 CMP Yes, right in a crater!
- 03 16 42 59 LMP Okay, you're not going to be able to do it until we get past this - -
- 03 16 43 04 CMP Now, if I can't do it until real late, go - Start without me.
- 03 16 43 10 LMP You'll be able to do it - You're 15 minutes - 20 minutes out of the burn.
- 03 16 43 42 CMP I wonder if the moon is made out of basically the same material as the earth is.
- 03 16 43 46 CDR I don't know.
- 03 16 43 48 LMP Probably is.

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Day 4

230

- 03 16 43 52 CDR Anders is going to tell you when he alights from the first LM - Pick up all the gold.
- 03 16 44 07 CMP I think he doesn't have to; he knows it all right now. Didn't you hear him? Ye geologists of the world: I see a few grabens, a few slipped discs.
- 03 16 44 39 LMP There's a strange light down there.
- 03 16 44 45 CDR Is it a bonfire?
- 03 16 44 47 LMP It might be campfires.
- 03 16 45 03 CMP How does it look?
- 03 16 45 07 LMP I think you're going to be able to see it pretty soon.
- 03 16 45 14 CMP Well, I'll put it in and wait for it.
- 03 16 45 16 CDR Okay.
- 03 16 45 20 CMP Do I have the computer?
- 03 16 45 22 CDR Yes, ENTER the -
- 03 16 45 30 CMP Are you going to read this off to me?
- 03 16 45 32 CDR Yes, what is it?
- 03 16 45 34 CDR Bill?
- 03 16 45 35 LMP Okay, I'm getting the timer.
- 03 16 45 42 LMP Oh boy, we're going to get that damned thing to 10 again.
- 03 16 45 50 LMP Okay. Have that time -
- 03 16 46 01 LMP You got a star, Jim?
- 03 16 46 02 CDR No, he needs it read off to him.
- 03 16 46 04 LMP Okay, OPTIC MODE, CMC.
- 03 16 46 07 CMP Okay.
- 03 16 46 08 LMP In zero OFF.
- 03 16 46 09 CMP Zero OFF.

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Day 4

231

- 03 16 46 10 LMP VERB 41, NOUN 91, ENTER. Okay, we're going to lose them here pretty soon.
- 03 16 46 23 CMP Okay. The shaft is 09240, plus - -
- 03 16 46 33 LMP You want me to write - to log this?
- 03 16 46 34 CMP 09240. Okay. ENTER. And the trunnion is plus 25300. Plus 25300. ENTER.
- 03 16 47 14 LMP There's no trouble reading by earthshine.
- 03 16 47 19 CMP Oh, I don't have anything yet.
- 03 16 47 21 CDR Have you got the earth - the moon, I mean?
- 03 16 47 25 CMP I can't see either.
- 03 16 47 35 CMP I think I'm still on the earth - or the moon.
- 03 16 47 41 LMP What is your - what's your shaft and trunnion? Jim?
- 03 16 47 48 CMP Shaft is 02940.
- 03 16 47 51 LMP 02940, yes.
- 03 16 47 52 CMP Left 25.3 degrees trunnion.
- 03 16 47 55 LMP Oh, well, you're looking down at its eye. You've got to wait until you get down past the 90-degree point.
- 03 16 48 04 CMP I think I see it coming up.
- 03 16 48 09 CC Apollo 8, Apollo 8, Houston; 3 minutes LOS; all systems are GO. Over.
- 03 16 48 14 CDR Roger. Thank you, Houston; Apollo 8.
- 03 16 48 40 CMP I see the limb, and I see the stars coming up.
- 03 16 49 02 LMP Have you got optics power, zero - Oh, you haven't done that yet, huh?
- 03 16 49 06 CMP No, I'm waiting until I - until I see the star.
- 03 16 49 08 LMP Yes.
- 03 16 49 26 CMP How much time do we have?

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Day 4

232

03 16 49 30 CDR Half an hour.  
03 16 49 49 CMP There's our friend out there.  
03 16 49 51 LMP You can really see Australia or something down there on  
the earth. ... I get earthset here in just a second.  
03 16 50 08 CDR Any luck, Jim?  
03 16 50 11 CMP It's coming up, but I think I can almost verify it right  
now because I have Gruis, and Peacock is in line with  
the bottom parts of Gruis, and this optics --  
03 16 50 18 CDR We're not in any hurry.  
03 16 50 19 CMP -- is exactly in line with it. I know, I was just  
saying that we can almost verify it right now.  
03 16 50 56 LMP This is a pretty --  
03 16 50 57 CC All systems are GO, Apollo 8.  
03 16 50 58 LMP Look at that, look at that, Frank.  
03 16 50 59 CDR Thank you.  
03 16 51 00 LMP Look at the earth.  
03 16 51 03 CDR Yes.  
03 16 51 04 CMP Setting?  
03 16 51 05 CDR Yes.  
03 16 51 08 LMP Yes, we're down in Carnarvon.  
03 16 51 10 CMP Huh?  
03 16 51 11 LMP Yes, we're down in Honeysuckle; that was Australia.  
03 16 51 20 LMP You don't see that very often, do you?  
03 16 51 47 CDR Okay?  
03 16 51 50 CMP No, the moon's still there. I see it coming up. Stars  
are coming up, but the moon is still there. Now, if you  
guys want to go on a little further, go ahead without me.

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Day 4

233

- 03 16 51 59 CDR Oh, we got a lot of time.
- 03 16 52 05 CMP I should see Peacock rise over ~~that~~. I'm just amazed the way this thing operates.
- 03 16 52 24 CDR It's been a pretty fantastic week, hasn't it?
- 03 16 52 29 CMP It's going to get better.
- 03 16 52 31 CDR Yes.
- 03 16 53 09 CMP This is utterly fantastic, though. This pawl line is lined up exactly with Gruis.
- 03 16 53 27 CDR You know what I think made me sick that night?
- 03 16 53 29 LMP What?
- 03 16 53 30 CDR That damned pill I took.
- 03 16 53 32 LMP What pill did you take?
- 03 16 53 34 CDR Seconal - one of the big ones.
- 03 16 53 36 LMP Oh, is that right?
- 03 16 53 37 CDR I didn't know you had small ones. I'd have taken one of those.
- 03 16 53 42 LMP Maybe you just had the flu.
- 03 16 53 44 CDR Maybe I did, I don't know, but it seems like you guys would have gotten it.
- 03 16 53 50 CMP Well, I think that basically your stomach was just upset - because you can get it very easily - There's nothing wrong, you know.
- 03 16 53 54 CDR Yes, I know, but I never had it before, not even in zero-g airplane, which is a - a real -
- 03 16 54 39 LMP I hope this baby holds out for another 2-1/2 days. It sure has performed admirably, hasn't it?
- 03 16 54 44 CDR Yes.
- 03 16 54 52 CMP Gentlemen, Peacock should be rising above the moon right now.

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Day 4

234

- 03 16 55 12 CMP And there it is. Just a minute, and I'll verify it.
- 03 16 55 33 CMP Okay, I confirm Peacock.
- 03 16 55 35 CDR Okay, Bill, checklist.
- 03 16 55 36 LMP Okay.
- 03 16 55 41 CDR You can leave that off - Looks like we're going to be burning in the daylight anyway.
- 03 16 55 47 LMP Okay. Drive trunnion if less than 5 degrees.
- 03 16 55 51 CMP Okay. Optics, zero, zero.
- 03 16 55 53 LMP And G&N POWER OPTICS, OFF.
- 03 16 55 55 CMP Optics, zero. Don't hit the IMU switch; OPTICS, OFF.
- 03 16 56 02 LMP Okay, why don't you - Frank, you can have your lights up, I guess - Unless you wanted to check your star.
- 03 16 56 09 CMP Too late, I'm not checking --
- 03 16 56 10 LMP Frank, let me come down the other side.
- 03 16 56 12 CDR I doubt if I'll be able to.
- 03 16 56 13 LMP No, I mean around the other side.
- 03 16 56 17 LMP I guess you probably won't; you'll be pitched into the moon, won't you?
- 03 16 56 18 CDR Yes, that's the trouble, I - I just barely get - and then when I do see it, I see a lit horizon.
- 03 16 56 27 LMP Okay, VERB 37, ENTER; 40, ENTER.
- 03 16 56 35 LMP BMAG MODE, three, RATE 2.
- 03 16 56 36 CMP Just a minute.
- 03 16 56 43 CDR BMAG, RATE 2.
- 03 16 56 46 LMP SPACECRAFT CONTROL, CMC.
- 03 16 56 49 CDR CMC.

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Day 4

235

03 16 56 50 LMP CMC MODE, AUTO.  
03 16 56 51 CDR AUTO.  
03 16 56 52 LMP Proceed.  
03 16 56 54 CDR Okay.  
03 16 56 59 LMP Okay, align spacecraft roll to GDC. You got -  
03 16 57 09 CDR Okay.  
03 16 57 10 LMP 16 minutes. Do you want to wait awhile to do this?  
03 16 57 13 CDR Well, it's already aligned. I'll do it now, Bill - I don't think I'll have to do much - Put in a little bit of yaw that way.  
03 16 57 29 LMP Okay, align spacecraft roll and GDC aligned. We'll trim it again here - before the burn.  
03 16 57 36 LMP STABILITY CONTROL SYSTEM's circuit breakers, panel 8, CLOSED.  
03 16 57 40 CDR Alright. Now, let's watch this, Jim.  
03 16 57 43 LMP Direct ullage -  
03 16 57 44 CDR Don't want to leave that out.  
03 16 57 45 LMP I'm going to check mine over here, too.  
03 16 57 51 CDR They're all CLOSED.  
03 16 57 52 LMP Okay, SPS circuit breakers CLOSED except for gaging.  
03 16 57 57 CDR Gaging OPEN, okay; PITCH 1, YAW - 2, PITCH - YAW 1, YAW 2. They're in.  
03 16 58 06 CMP They're in - okay.  
03 16 58 10 CDR Okay.  
03 16 58 11 LMP I'm just checking all mine here.  
03 16 58 15 CDR Don't push on them when you've got ...  
03 16 58 20 LMP I'll get them.

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**CONFIDENTIAL**

Day 4

236

03 16 58 26 LMP Okay, DEADBAND, MIN.  
03 16 58 29 CDR DEADBAND going to MINIMUM - MINIMUM!  
03 16 58 31 LMP RATE, LOW.  
03 16 58 32 CDR LOW.  
03 16 58 33 LMP LIMIT CYCLE, ON.  
03 16 58 34 CDR ON.  
03 16 58 36 LMP MANUAL ATTITUDE, three, RATE COMMAND.  
03 16 58 37 CDR RATE COMMAND.  
03 16 58 39 LMP BMAG MODE, three; ATT 1/RATE 2.  
03 16 58 42 CDR ATT 1/RATE 2.  
03 16 58 44 LMP ROTATIONAL CONTROL POWER DIRECT, both, OFF.  
03 16 58 47 CDR DIRECT. Okay, that's OFF.  
03 16 58 50 LMP SCS TVC, two, RATE COMMAND.  
03 16 58 53 CDR SCS TVC, two, RATE COMMAND.  
03 16 58 56 LMP TVC GIMBAL DRIVE: PITCH and YAW, AUTO.  
03 16 58 59 CDR AUTO.  
03 16 59 00 LMP And here's where we stop -  
03 16 59 01 CDR Alright.  
03 16 59 02 LMP For 13 minutes.  
03 16 59 27 LMP Boy, it's blacker than pitch out here.  
03 16 59 29 CDR Yes, I know it.  
03 16 59 37 CMP Okay, (yawn) you're going to burn with the lights on  
anyway, aren't you, because you've got to get sunlight.  
03 16 59 40 CDR Probably will, yes.

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**CONFIDENTIAL**

Day 4

237

- 03 16 59 44 CMP Yes, I watched the sun - I watched that star rise, and I could just see the black horizon - the moon fade away and the star come up and - right on it.
- 03 17 00 11 LMP Okay, if we get a MAIN A or an AC 1 failure, you change gimbal drives, right?
- 03 17 00 16 CDR Okay.
- 03 17 00 19 LMP You get a MAIN B or an AC 2 failure, don't change gimbal drives or do anything, except put your gimbals to - from AUTO to 1.
- 03 17 00 36 CMP (Singing)
- 03 17 01 24 LMP Do you see anything hanging around that could come down?
- 03 17 01 28 CDR I hope not.
- 03 17 01 53 CDR Tell you one thing these flights are good for: an old fatty like me, I bet I've lost a lot of weight. I didn't eat much those first two days, and I didn't - didn't even get much to eat today.
- 03 17 02 23 CDR When is the ignition, 89:19, huh?
- 03 17 02 27 LMP Yes.
- 03 17 02 29 LMP Pretty sunrise.
- 03 17 02 32 CDR Yes.
- 03 17 02 47 CMP I'm doing a P23 right after we leave this place, huh?
- 03 17 02 51 CDR Yes.
- 03 17 03 04 CDR Is it boiling, Bill?
- 03 17 03 06 LMP No, I hope not. It looks low. It's just cold in there.
- 03 17 03 21 CMP It does look a little low. When did I say I had the star?
- 03 17 03 28 CDR What time?
- 03 17 03 29 LMP Huh?
- 03 17 03 30 CMP Because we still have 60 degrees to go then, if we want to be parallel - perpendicular - horizontal to the horizon.

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Day 4

238

- 03 17 03 39 LMP Perpendicular (laughter)! ...
- 03 17 03 40 CMP The horizontal, because I was 60 degrees down and I - I just saw the --
- 03 17 03 47 LMP We're still looking at the moon - flat at the moon.
- 03 17 03 53 CMP Well, not really.
- 03 17 03 54 LMP Not flat at it.
- 03 17 03 55 CMP I hope not.
- 03 17 03 56 CDR Oh, no, not flat at it, but - Boy, it's black out there.
- 03 17 04 33 LMP If you don't get G&N ignition, what are you going to do?
- 03 17 04 36 CDR Go right to SPS.
- 03 17 04 38 LMP Wouldn't it be smart to take it around again?
- 03 17 04 40 CDR Why? If we didn't get it this time, why would we get it better the next time?
- 03 17 04 47 LMP The burn ... --
- 03 17 04 48 CDR There's a 10-degree excursion on this thing.
- 03 17 04 53 LMP Make sure you hit the corridor.
- 03 17 05 14 CDR You're right. It would be smart to take it around again.
- 03 17 05 18 LMP Get set up to do an SPS burn, huh?
- 03 17 05 20 CDR AUTO SPS.
- 03 17 05 23 LMP I haven't looked at your G - you might still be able to get --
- 03 17 05 27 CDR Wait a second; let me check it.
- 03 17 05 28 LMP -- to get G&N errors.
- 03 17 05 38 CMP (Singing, whistling)
- 03 17 06 17 LMP Now, you should see something - Yes, there it comes.
- 03 17 06 20 CDR Where do you see it?

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Day 4

239

03 17 06 21 CMP 6 minutes to recheck.  
03 17 06 22 CDR Oh, yes, it ...  
03 17 06 24 LMP I see it off the side of the terminator from sunrise.  
03 17 06 34 CMP I wonder if that - that sort of a zodiacal light was  
a glare off the optics, or something.  
03 17 06 40 LMP ... You ought to draw a little picture of it, and people  
could tell you what it was.  
03 17 06 49 CDR You got the gimbal thing handy right off the bat?  
03 17 06 53 LMP Yes, why don't we write that down?  
03 17 06 54 CDR Minus 0 --  
03 17 06 55 CMP/LMP -- 40 plus 157.  
03 17 07 00 CDR Is it 157? Not 151?  
03 17 07 06 CMP I'll check on the 11 pad. 157.  
03 17 07 10 CDR Okay.  
03 17 07 11 CMP ... in there.  
03 17 07 13 LMP I bet we had the - The weight hadn't - the trim hadn't  
changed any since the last time. (Laughter) Getting  
worried there for a minute.  
03 17 07 21 CMP We've been eating a lot of food.  
03 17 07 24 CDR Let's see now, that's 2 - 2 minutes and 13 seconds, is  
that what we said? 2:18.  
03 17 07 31 CDR 138 seconds.  
03 17 07 34 CMP 2:18 must give you a slow return home.  
03 17 07 35 CDR Yes, ...  
03 17 07 37 LMP You got your strut in?  
03 17 07 41 CDR Yes, it's in.

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Day 4

240

- 03 17 07 44 LMP Probably, one of the things we've been hearing is these oxygen masks snapping up and down.
- 03 17 08 02 LMP Boy, it took three acts of Congress to get those little strings.
- 03 17 08 07 LMP Oh, that - that's peculiar, isn't it?
- 03 17 08 12 CDR Yes, looks to me like we're going right at it. Doesn't it look like that to you?
- 03 17 08 19 CMP Why is it we do all these burns upside down?
- 03 17 08 21 CDR So you can see.
- 03 17 08 23 CMP (Laughter) You want to look at that?
- 03 17 08 25 CMP/CDR (Laughter)
- 03 17 08 28 LMP If it makes you feel bad, look out the side windows.
- 03 17 08 31 CDR Yes, I think it would look better.
- 03 17 08 39 CDR I've got - coming up on 10 minutes.
- 03 17 10 12 CDR Okay, 9 minutes, right now on -
- 03 17 10 17 CDR MARK.
- 03 17 10 27 CMP (Singing)
- 03 17 10 42 LMP Hey, don't forget your ullage.
- 03 17 10 43 CDR Yes, gees, don't let me forget that!
- 03 17 10 45 LMP How many seconds do you need?
- 03 17 10 47 CDR 15 seconds.
- 03 17 10 48 CMP Four-jet ullage.
- 03 17 10 49 LMP Okay, we better write that down.
- 03 17 10 55 LMP Ullage will be at 89:19:01. Okay?
- 03 17 11 02 CDR Yes. You're going to call it off, right?
- 03 17 11 07 LMP Well, I'll try to remember - Got it in here.

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Day 4

241

- 03 17 11 11 CDR Oh, yes.
- 03 17 11 14 CMP Yes, "ullage as required" down there, I got. You'll see the 15 seconds right on here.
- 03 17 11 20 LMP 15 seconds.
- 03 17 11 23 CDR Yes.
- 03 17 11 24 CMP ...
- 03 17 11 59 CMP All it does is let you see whether it is there or not; then if it is, it doesn't do anything.
- 03 17 12 03 LMP Yes, I know, but it drifts off a little. The deadband affects it, I guess.
- 03 17 12 07 CMP Oh.
- 03 17 12 16 LMP Boy, you think you're going to burn right into the water - I mean, right into the sand.
- 03 17 12 18 CMP Did you have trouble scooping up those type of rocks? You said you went up to West Texas for that.
- 03 17 12 24 CDR 7 minutes, coming up on 6 minutes.
- 03 17 12 27 LMP Okay.
- 03 17 12 28 CDR Let's go ahead and start.
- 03 17 12 39 LMP Okay, MAIN BUS ties are coming ON.
- 03 17 12 40 CDR Okay.
- 03 17 12 44 LMP A is ON; B is ON.
- 03 17 12 51 LMP Okay. SPS, TVC, two, RATE COMMAND; and TVC GIMBAL DRIVE, PITCH and YAW in AUTO. Recheck them.
- 03 17 13 01 CDR RATE COMMAND and AUTO.
- 03 17 13 02 LMP Okay, TVC SERVO POWER 1, AC 1, MAIN A.
- 03 17 13 05 CDR AC 1, MAIN A.
- 03 17 13 06 LMP 2, AC 2, MAIN B.

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Day 4

242

03 17 13 09 CDR Right.  
03 17 13 10 LMP TRANSLATIONAL CONTROL POWER, ON.  
03 17 13 12 CDR TRANSLATIONAL CONTROL POWER, ON.  
03 17 13 14 LMP ROTATIONAL CONTROL POWER NORMAL 2, AC.  
03 17 13 17 CDR AC.  
03 17 13 18 LMP ROTATIONAL HAND CONTROLLER number 2, ARMED.  
03 17 13 22 CDR ARMED.  
03 17 13 28 LMP Stand by to start the GIMBAL MOTORS.  
03 17 13 30 CDR Okay.  
03 17 13 34 CDR Should I pull the circuit breakers?  
03 17 13 35 LMP No, not yet!  
03 17 13 37 CDR Okay, just checking.  
03 17 13 46 LMP Okay, let's start PITCH 1 and YAW 1.  
03 17 13 48 CDR Alright, ready; PITCH 1.  
03 17 13 50 LMP Got it.  
03 17 13 51 CDR YAW 1.  
03 17 13 52 LMP Got it.  
03 17 13 53 CDR Okay.  
03 17 13 54 LMP Okay, clockwise.  
03 17 13 55 CDR Clockwise.  
03 17 13 56 LMP Verify no MTVC.  
03 17 13 57 CDR No MTVC.  
03 17 14 00 LMP Okay. Start PITCH 2 and YAW 2.  
03 17 14 03 CDR PITCH 2.

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Day 4

243

03 17 14 04 LMP Got it.  
03 17 14 06 CDR YAW 2.  
03 17 14 07 LMP Got it.  
03 17 14 09 CDR Okay.  
03 17 14 10 LMP Set GPI trim.  
03 17 14 11 CMP Okay, minus 40, plus 157.  
03 17 14 16 LMP Got it.  
03 17 14 18 LMP Verify MTVC.  
03 17 14 20 CDR MTVC.  
03 17 14 21 LMP TRANSLATIONAL HAND CONTROLLER, NEUTRAL.  
03 17 14 23 CDR NEUTRAL.  
03 17 14 25 LMP GPI returns to zero.  
03 17 14 27 CDR Zero.  
03 17 14 28 LMP ROT CONTROL POWER NORMAL 2, AC/DC.  
03 17 14 31 CDR AC/DC.  
03 17 14 32 LMP Want to trim? Yes.  
03 17 14 34 CDR Yes.  
03 17 14 35 LMP Okay. BMAG MODE, three, RATE 2.  
03 17 14 37 CDR RATE 2.  
03 17 14 38 LMP S - SPACECRAFT CONTROL, CMC and AUTO.  
03 17 14 40 CDR Right.  
03 17 14 41 LMP Proceed.  
03 17 14 42 CMP Proceed.  
03 17 14 45 CDR Okay.

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Day 4

244

03 17 14 47 LMP Okay, BMAG MODE, three, ATT 1/RATE 2.  
03 17 14 50 CDR ATT 1/RATE 2.  
03 17 14 51 LMP ENTER.  
03 17 14 52 CMP ENTER.  
03 17 14 54 LMP Okay. Gimbal test option, ACCEPT; SPACECRAFT CONTROL, CMC; verify.  
03 17 15 00 CDR Proceed, huh?  
03 17 15 01 LMP Proceed.  
03 17 15 02 CDR Right.  
03 17 15 03 CMP Proceed.  
03 17 15 04 LMP Call them out.  
03 17 15 05 CDR Alright. 20, minus 20, 00, 02, 0 minus 2, 00.  
03 17 15 20 CMP Whew!  
03 17 15 21 LMP 60 40; check your clock.  
03 17 15 24 CDR 60 40; clock is good.  
03 17 15 26 LMP ROT CONTROL POWER DIRECT, both, MAIN A, MAIN B.  
03 17 15 29 CDR MAIN A, MAIN B.  
03 17 15 30 LMP SPS HELIUM VALVES, both, AUTO.  
03 17 15 32 CDR Verified.  
03 17 15 34 LMP LIMIT CYCLE, OFF.  
03 17 15 36 CDR LIMIT CYCLE, OFF.  
03 17 15 37 LMP FDAI scale, 50/15.  
03 17 15 39 CDR 50/15.  
03 17 15 40 LMP Pull PITCH 2 and YAW 2.  
03 17 15 42 CDR Alright, watch this.

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Day 4

245

- 03 17 15 43 CDR PITCH 2; YAW 2.
- 03 17 15 47 LMP Stand by for 2 minutes.
- 03 17 15 50 CDR Okay.
- 03 17 15 51 LMP How's your boresight star?
- 03 17 15 54 CDR Hey, listen. It looks to me like I'm going to burn right into the ground. Oh! There's the horizon. Hurray! We're going the right way.
- 03 17 16 02 LMP Boy, you sure can't tell when you're --
- 03 17 16 03 CMP 3.2 degrees at  $T_{ig}$  minus 3.
- 03 17 16 07 CDR What is it?
- 03 17 16 08 CMP 3.2 degrees at  $T_{ig}$  minus 3 - right about now.
- 03 17 16 11 CDR Okay, I can - It looks good.
- 03 17 16 18 CDR We've got to arm this TRANSLATIONAL HAND CONTROLLER. Did you tell me to do that?
- 03 17 16 24 CDR Then, we've got to ullage.
- 03 17 16 25 LMP Yes.
- 03 17 16 40 CDR Okay, coming up on 2-1/2 minutes.
- 03 17 16 47 LMP Okay, 5 seconds after you start, get DELTA-V THRUST B, ON, okay?
- 03 17 16 52 CDR Okay, yes. Then I'm all set.
- 03 17 16 56 LMP Don't forget to start your watch, Jim. Reset it now.
- 03 17 16 59 CMP Yes, it's all reset.
- 03 17 17 03 LMP Okay, DELTA-V THRUST A, NORMAL.
- 03 17 17 06 CDR NORMAL.
- 03 17 17 07 LMP TRANSLATIONAL HAND CONTROLLER, ARMED.
- 03 17 17 09 CDR ARMED.

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Day 4

246

03 17 17 10 LMP ROTATIONAL HAND CONTROLLER, both, ARMED.  
03 17 17 12 CDR ARMED.  
03 17 17 14 LMP TAPE RECORDER. --  
03 17 17 24 CDR Okay.  
03 17 17 39 LMP How's it look?  
03 17 17 40 CDR Good.  
03 17 17 43 LMP I'm going forward (laughter).  
03 17 17 46 LMP Well, ... --  
03 17 17 48 CDR ... a hell of a kick in the pants now, I'll tell you that.  
03 17 17 54 CDR The DSKY blanks at 35 seconds, right?  
03 17 17 56 LMP Right, it comes back on at 30; 15 seconds later you give it the ullage.  
03 17 18 05 CDR What'll I have?  
03 17 18 07 LMP TRANSLATION CONTROL.  
03 17 18 16 LMP You got one DELTA-V THRUST, ON?  
03 17 18 17 CDR One ON, one ON.  
03 17 18 18 LMP Okay.  
03 17 18 19 LMP A, ON.  
03 17 18 20 CDR A is ON.  
03 17 18 25 LMP Don't forget the -  
03 17 18 27 CDR 5 seconds.  
03 17 18 28 LMP 2 to 5 seconds.  
03 17 18 29 CMP Right.  
03 17 18 41 CDR Okay, she blanked.  
03 17 18 42 CMP She blanked.

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Day 4

247

03 17 18 43 CDR Okay.  
03 17 18 45 LMP EMS MODE, AUTO.  
03 17 18 46 CDR AUTO.  
03 17 18 47 LMP FLIGHT RECORDER going to RECORD,  
03 17 18 48 CMP Stand by to start ullage.  
03 17 18 50 LMP Proceed.  
03 17 18 51 CMP Proceed.  
03 17 18 55 LMP I'll give you a mark for ullage.  
03 17 18 56 CDR Okay.  
03 17 18 58 CMP He's got it right here.  
03 17 19 00 LMP 17, 16 -  
03 17 19 02 CMP MARK.  
03 17 19 03 LMP Ullage!  
03 17 19 06 LMP Proceed when you need to.  
03 17 19 12 CMP Proceed.  
03 17 19 13 CDR I'm proceeding.  
03 17 19 16 LMP Two valves. Good shape --  
03 17 19 21 CDR Two valves.  
03 17 19 22 LMP Four valves.  
03 17 19 32 CMP Pressure's holding.  
03 17 19 43 LMP It's looking real good.  
03 17 19 45 CDR Pressure ...  
03 17 20 16 LMP Burned for 1 minute.  
03 17 20 18 CDR Okay.

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23

- |               |   |
|---------------|---|
| 03-17-20-31-1 | It's 10:45 AM.  |
| 03-17-20-31-1 | And we're still here.                                 |
| 03-17-20-31-1 | Carrying on in Portillo.                              |
| 03-17-20-31-1 | Right.  |
| 03-17-20-31-1 | I'm carrying on.                                      |
| 03-17-20-31-1 | We're going to do this.                               |
| 03-17-20-31-1 | Keep it up, guys.                                     |
| 03-17-20-31-1 | Boy, those girls are hot. I like them. I like them.   |
| 03-17-20-31-1 | Okay, we're carrying on in Portillo.                  |
| 03-17-20-31-1 | We've got to finish this, and, like,                  |
| 03-17-20-31-1 | Right.  |
| 03-17-20-31-1 | Second try.   |
| 03-17-20-31-1 | 5, 4, 3, 2, 1.  |
| 03-17-20-31-1 | Start.  |
| 03-17-20-31-1 | ...go.  |
| 03-17-20-31-1 | Well, that wasn't much of a start, but, like,         |
| 03-17-20-31-1 | It can go right.                                      |
| 03-17-20-31-1 | Okay, let's go.                                       |
| 03-17-20-31-1 | Okay. Right away, right away, right away, right away. |
| 03-17-20-31-1 | That's a good one.                                    |
| 03-17-20-31-1 | 25.1.   |
| 03-17-20-31-1 | ... = 25%.  |
| 03-17-20-31-1 | 25.1. And that's a good one.                          |
| 03-17-20-31-1 | Okay, I think I'm gonna do another one.               |

## CONTINUATION

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Day 4

249

03 17 23 02 CDR 1, OFF.  
03 17 23 03 LMP Got it.  
03 17 23 04 CDR 2, OFF.  
03 17 23 05 LMP Got it.  
03 17 23 06 CDR 3, OFF.  
03 17 23 07 LMP Got it.  
03 17 23 08 CDR 4, OFF.  
03 17 23 09 LMP Got it.  
03 17 23 10 CDR Okay.  
03 17 23 11 LMP TVC SERVO POWER, 1 and 2, OFF.  
03 17 23 13 CDR OFF.  
03 17 23 14 LMP FLIGHT RECORDER's OFF; MAIN BUS ties, going OFF; A is OFF --  
03 17 23 20 CMP There we go.  
03 17 23 22 LMP -- B is OFF.  
03 17 23 23 LMP Proceed.  
03 17 23 24 CDR Wait a minute. Did you get all this, Jim?  
03 17 23 26 CMP Yes.  
03 17 23 28 LMP You ready to proceed?  
03 17 23 29 CMP Proceed. I'll get these --  
03 17 23 31 LMP Okay, null residuals. Record DELTA-V --  
03 17 23 33 CMP Minus 54 --  
03 17 23 34 CDR That 0.5?  
03 17 23 36 CMP Yes, 0.5.  
03 17 23 37 LMP You don't have to do a thing to that.

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Day 4

250

03 17 23 39 CDR Just record it.  
03 17 23 41 LMP Record DELTA-V<sub>c</sub>.  
03 17 23 43 CDR Minus - that's up here - minus 26.4.  
03 17 23 49 CMP I got 26.4, and the burn time was --  
03 17 23 52 CDR Minus 26.4.  
03 17 23 53 CMP -- I have it; burn time was 2 minutes (cough) and 23 seconds.  
03 17 23 58 CDR Okay, can we proceed out of here, then? You got all this?  
03 17 24 01 CMP I have all that.  
03 17 24 02 CDR Proceed.  
03 17 24 03 LMP EMS - just a minute, EMS FUNCTION, OFF.  
03 17 24 06 CDR OFF.  
03 17 24 07 LMP EMS MODE, STANDBY.  
03 17 24 08 CDR STANDBY.  
03 17 24 09 LMP BMAG MODE, three, RATE 2.  
03 17 24 10 CDR RATE 2.  
03 17 24 11 LMP DEADBAND, MAX.  
03 17 24 12 CDR DEADBAND, MAX.  
03 17 24 13 LMP TAPE RECORDER's going to STOP --

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251

DAY 7

06 02 36 53 LMP ROT CONTROL POWER DIRECT, both, MAIN A/MAIN B.  
06 02 36 55 CMP TAPE RECORDER, you got that?  
06 02 36 56 LMP Roger. Horizon check.  
06 02 36 58 CMP He's doing that now.  
06 02 37 00 LMP Pitch needle error goes toward zero, approaching  
zero at 0.5g time.  
06 02 37 03 CDR Okay.  
06 02 37 04 CMP Okay.  
06 02 37 05 LMP Don't forget MANUAL ATTITUDE, three, to RATE COMMAND.  
06 02 37 07 CMP -MAND, that's right.  
06 02 37 08 CDR Yes. Okay, but tell me that later, okay?  
06 02 37 09 LMP Yes, right. Don't forget it.  
06 02 37 10 CMP You've got to do it in checklist ... as we go.  
06 02 37 11 CDR I've got to have that; just tell me later, okay?  
06 02 37 13 CMP We're stopped right there.  
06 02 37 14 CDR How's your evaporator?  
06 02 37 15 LMP It's - it seems to be hanging in there, but it's awfully low  
steam pressure. I'll - I'll manually feed it if I have to.  
06 02 37 20 CDR Alright.  
06 02 37 28 CDR See where this baby wants me to fly? The pitch is way up.  
06 02 37 33 CMP See if ... of the alpha meter.  
06 02 37 35 CDR Now, as we come close to the horizon - we're going to ...  
06 02 37 38 CMP ...  
06 02 37 40 CDR As we come closer to the --

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Day 7

252

- 06 02 37 44 CMP Yes. Well, this thing came in long before I thought it was going to at 45 degrees, where 152 is the nominal entry attitude.
- 06 02 37 54 CDR Boy, it did come in wrong, didn't it?
- 06 02 37 59 CMP Sure. See, I was waiting for that thing to come in. I didn't think it would come in until about 200 degrees.
- 06 02 38 01 CDR How come we came in so soon?
- 06 02 38 03 CMP I don't know.
- 06 02 38 07 LMP Okay, evaporator's GO.
- 06 02 38 08 CMP Good.
- 06 02 38 10 LMP I'm pretty sure.
- 06 02 38 12 CDR I keep wanting to yaw off the right here; it must be because we're boiling.
- 06 02 38 17 LMP We're really boiling.
- 06 02 38 22 CMP Okay, all - We're standing by now - You've got MANUAL ATTITUDE, three, RATE COMMAND when you get time. That's - We're down to there, and we are going to have a CMC GO or NO-GO check. We've got two things to do: either the DAP's NO-GO, which we'll find out when he flies it; if the CMC is NO-GO, he'll fly the E.S.
- 06 02 38 36 LMP You got the 0.05g and EMS ROLL, ON.
- 06 02 38 41 CDR And that's an 0.05 change.
- 06 02 38 43 CMP That's right.
- 06 02 38 44 LMP Okay, it looks like we got the evaporator.
- 06 02 38 53 CMP How's that needle doing?
- 06 02 38 56 CDR Fine.
- 06 02 38 58 CMP The horizon hard to find?
- 06 02 38 59 CDR No.
- 06 02 39 13 CDR I wish you'd keep checking my yaw for me there, will you?

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Day 7

253

- 06 02 39 15 CMP I will. You're a little bit left now, or a little right - Go left, just a little bit.
- 06 02 39 24 LMP I think you're slightly rolled - Roll right, Frank.
- 06 02 39 28 CDR I don't care about the rolls.
- 06 02 39 31 CDR Okay, we don't need any of that, Houston.
- 06 02 39 46 CMP Okay.
- 06 02 39 50 CMP Keep the horizon right there.
- 06 02 39 54 CC Apollo 8 through Redstone, you're looking good. Both primary and secondary loops are holding good.
- 06 02 40 00 LMP Roger; looks like we got it reserviced.
- 06 02 40 07 LMP And we've got a good horizon.
- 06 02 40 11 LMP Looks like you are yawing to the left or something.
- 06 02 40 13 CDR No.
- 06 02 40 14 CMP He's just about on, Bill.
- 06 02 40 15 CDR I've got two separate sources in here that tell me my yaw's zero, don't I? Actually, I can just fly those needles, now.
- 06 02 40 26 CC Apollo 8, Apollo 8 through Redstone. Over.
- 06 02 40 31 LMP Go ahead, Houston. This is Apollo 8.
- 06 02 40 33 CC Roger; read you loud and clear. You're looking good.
- 06 02 40 40 LMP Roger.
- 06 02 40 44 CDR The control arming is not too good in this. You get a lot more pitch than you do yaw and roll.
- 06 02 40 49 LMP Hey, there, you're yawing my way.
- 06 02 40 50 CDR Look who's coming there, would you?
- 06 02 40 52 LMP Yes.
- 06 02 40 53 CDR You see it?

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Day 7

254

06 02 40 54 LMP Yes.  
06 02 40 55 CDR Just like they promised.  
06 02 40 56 CMP What?  
06 02 40 57 CDR/LMP The moon.  
06 02 40 58 CMP Oh.  
06 02 40 59 CDR At 6 minutes before, just like it says.  
06 02 41 01 CMP Okay. RRT is 46:13, we're 41:03.  
06 02 41 06 LMP Are you still MIN IMP, Frank?  
06 02 41 07 CDR Yes.  
06 02 41 08 CMP That's right.  
06 02 41 09 LMP Okay.  
06 02 41 11 CMP That's where we stop, MAN ATTITUDE, three, RATE COMMAND.  
06 02 41 21 CDR Well, I'm going to give her to the DAP anyway when we get down.  
06 02 41 24 CMP As soon as you see that needle starts going off the peg, huh?  
06 02 41 26 CDR Yes.  
06 02 41 27 CMP Yes, I would, too. Better see what she does.  
06 02 41 36 CDR Make sure the BMAG's are not changed - they're not.  
It'll be ... if they are.  
06 02 41 48 CDR Well, men, we're getting close.  
06 02 41 54 LMP There's no turning back now.  
06 02 41 57 CMP Old mother earth has us.  
06 02 42 00 LMP We may end up losing our horizon here when that moon goes down.  
06 02 42 05 CMP That's probably what makes your horizon so good is  
the moon background - before it rose.  
06 02 42 11 LMP I wonder if ... would like me to do a little airglow  
photography right now?

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Day 7

255

- 06 02 42 13 CDR Yes.
- 06 02 42 20 CDR Check - doublecheck both balls for me, Jim, so --
- 06 02 42 22 CMP Yes, you're okay.
- 06 02 42 24 CDR -- we're not just reading one ball, okay?
- 06 02 42 25 CMP Yes, this ball's agreeing with that one.
- 06 02 42 30 CMP Well, we're 42:30 --
- 06 02 42 31 CDR Check your other ring, just for sure, Jim.
- 06 02 42 39 CDR There goes a washer; can you grab it?
- 06 02 42 41 CMP Yes, I've been trying to get that washer --
- 06 02 42 42 CDR -- Well, it's too late now.
- 06 02 42 43 CMP Well, 42:02 and 46:13. We're at 42:47, 46:32 -
- 06 02 42 49 CDR We're getting close to 0.05g, too.
- 06 02 43 09 CDR How's the - how high's the voltage?
- 06 02 43 11 LMP Voltage is great; 28 volts.
- 06 02 43 15 CDR Okay.
- 06 02 43 22 CMP Okay, 152 will be the entry pad. Pitch?
- 06 02 43 27 LMP Okay, you're about to lose your moon.
- 06 02 43 32 CMP Okay, your yaw's looking good.
- 06 02 43 37 LMP Got a lot of lightning down there, so you - you'll probably have something.
- 06 02 43 42 CDR I got the old - Bill never saw that.
- 06 02 43 44 LMP What is that?
- 06 02 43 45 CDR Or did you notice? That's the haze level.
- 06 02 43 47 LMP Airglow?
- 06 02 43 48 CDR Airglow.

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Day 7

256

- 06 02 43 49 CDR Good old airglow is what's - -
- 06 02 43 51 LMP I'll look at the airglow next time.
- 06 02 43 53 CMP That's right, you've never seen the airglow. Take a look at it.
- 06 02 43 59 CDR You can't get your pin without seeing the airglow.
- 06 02 44 00 CMP That's right.
- 06 02 44 01 LMP I see it, I see it! (Laughter)
- 06 02 44 04 LMP Let's see, is this where I'm supposed to ask how many g's, Lovell?
- 06 02 44 07 CMP That's right (laughter), you ask how many g's.
- 06 02 44 09 CDR How are we doing?
- 06 02 44 10 LMP We're doing good over here.
- 06 02 44 11 CMP Okay in the middle.
- 06 02 44 13 CMP 44:13; we're 2 minutes away from RRT.
- 06 02 44 30 CDR Now that horizon's getting harder to find.
- 06 02 44 38 CMP You're within 30 degrees of - of the attitude.
- 06 02 44 41 CDR How do you know?
- 06 02 44 42 CMP Well, 152 is it, and you're coming up on it now.
- 06 02 44 45 LMP It's getting a little hazy out here; does that mean anything - every time you fire a thruster.
- 06 02 44 50 CDR We're starting to get some reflection off the - earth, I guess
- 06 02 45 08 LMP Did anybody ever see the service module?
- 06 02 45 10 CDR Yes - No, excuse me.
- 06 02 45 12 CMP Okay, your needle's coming up.
- 06 02 45 14 CDR Okay.
- 06 02 45 15 CC Apollo 8, Houston; 1 minute to RRT.

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Day 7

257

06 02 45 18 LMP Roger. RATE COMMAND.  
06 02 45 19 CMP Ready; 1, 2, 3, RATE COMMAND.  
06 02 45 21 CDR RATE COMMAND.  
06 02 45 22 CMP Okay.  
06 02 45 24 CMP The CMC is AUTO?  
06 02 45 25 CDR I'm going there now, but - Now the CMC has got us.  
06 02 45 29 CMP Okay.  
06 02 45 32 CDR Okay, the pitch error is approaching zero.  
06 02 45 35 CMP Is the DAP GO?  
06 02 45 36 CDR DAP seems to be going.  
06 02 45 37 LMP Okay, --  
06 02 45 38 CDR Did you check out the horizon?  
06 02 45 40 LMP MANUAL ATTITUDE, three, RATE COMMAND?  
06 02 45 41 CDR RATE COMMAND.  
06 02 45 42 CMP You've got the checklist again, Bill.  
06 02 45 43 CDR You got it?  
06 02 45 44 LMP Yes.  
06 02 45 45 CMP Yes.  
06 02 45 46 LMP BMAG, three, RATE 2.  
06 02 45 47 CDR RATE 2.  
06 02 45 48 LMP CMC in AUTO.  
06 02 45 49 CDR CMC in AUTO; well, you don't need AUTO, but I'll put it there and make everybody happy.  
06 02 45 54 CMP Okay, 0.05g is at 46:41 --  
06 02 45 57 LMP You call 0.05g, Jim.

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Day 7

258

06 02 45 58 CMP I'll call 0.05 - I'll tell you when the g starts going --  
06 02 46 00 CDR I've got to start this thing automatic - manually,  
if you don't give it to me, Jim --  
06 02 46 02 CMP Okay.  
06 02 46 03 CDR -- so be sure you call it.  
06 02 46 05 CMP At 0.05g time, right?  
06 02 46 07 CDR Yes. God, it is hazy out there, isn't it? That's  
a different lighting effect, I think.  
06 02 46 14 LMP That's sunrise.  
06 02 46 16 CDR Huh?  
06 02 46 17 CMP Yes, that's the sun --  
06 02 46 18 CDR Oh, here we go.  
06 02 46 19 CMP 146:46:20; we should have 0.05g's.  
06 02 46 22 CDR That's the airglow we are starting to get; that's  
what it is, gentlemen.  
06 02 46 25 CMP Yes.  
06 02 46 26 CMP One - okay, we got the ... --  
06 02 46 28 CDR God damn, this is going to be a real ride; hang on.  
06 02 46 29 CMP ...  
06 02 46 30 CDR I've never seen it this bright before.  
06 02 46 32 CMP Yes. Like you were going --  
06 02 46 33 CDR You got 0.05g yet?  
06 02 46 35 CMP -- ... 0.02, stand by; 38, 39, 40, 41 --  
06 02 46 41 CMP 0.05g!  
06 02 46 42 CDR 0.05g!  
06 02 46 43 LMP Okay, we got it!

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Day 7

259

06 02 46 44 CMP Put the EMS, ON.  
06 02 46 45 CDR Hang on!  
06 02 46 46 LMP 0.05g switch, ON.  
06 02 46 47 CMP 0.05g ROLL to EMS.  
06 02 46 48 CDR Right. Okay, gang.  
06 02 46 53 CMP They're building up.  
06 02 46 59 CDR Call out the g's.  
06 02 47 03 CMP We're lg.  
06 02 47 19 CMP Ohhh!  
06 02 47 21 CDR Okay.  
06 02 47 23 CMP 5!  
06 02 47 41 CMP 6!  
06 02 47 53 CMP 4!  
06 02 48 01 CMP She's doing a great job.  
06 02 48 06 CMP B circular at 48:23.  
06 02 48 24 CDR B circular.  
06 02 48 26 LMP Cabin temperature is still holding real good.  
06 02 48 33 CMP ... Okay, we're 67.  
06 02 49 07 LMP Quite a ride, huh?  
06 02 49 13 CDR Damnedest thing I ever saw.  
06 02 49 16 CDR Gemini was never like that, was it, Jim?  
06 02 49 19 CMP No, it was a little faster than this one.  
06 02 49 27 LMP I assure you I've never seen anything like it.  
06 02 49 32 LMP Cabin temperature's holding real good - up 1 degree.

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Day 7

260

06 02 49 43 LMP Primary evaporator's crapped out; secondary's still working.

06 02 49 51 CMP We're below the 2g's.

06 02 49 56 LMP Temperature's coming up in the primary loop okay.

06 02 50 10 CDR Nice job there, gang.

06 02 50 16 CMP Drogues at - You got them there? 8:16.

06 02 50 23 CDR That's 58:16?

06 02 50 27 CDR No, that's not right. 54 ... right.

06 02 50 46 LMP It's a real glow. I can see our gegenschein --

06 02 50 51 CDR Second pulse coming up.

06 02 50 55 SC (Cough)

06 02 51 08 LMP How much will this one go up, do you think?

06 02 51 11 CMP 3!

06 02 51 29 CMP Okay, we should have COMM.

06 02 51 32 CDR Give them a call.

06 02 51 34 CMP Houston, Apollo 8. Over.

06 02 51 45 CDR Houston, Apollo 8. Over.

06 02 51 48 CC Go ahead, Apollo 8. Read you broken and loud.

06 02 51 50 CDR Roger; this is a real fireball; it's looking good.

06 02 51 53 CDR Come on, John Glenn.

06 02 52 06 CDR Don't let me forget those - boost entry.

06 02 52 09 LMP Roger; I got you.

06 02 52 10 CMP Okay.

06 02 52 11 CDR It's almost all over but the shouting now, men.

06 02 52 12 CDR We're in real good shape, Houston.

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Day 7

261

06 02 52 15 CC Real fine.  
06 02 52 18 CMP I think he's going to take Paul Haney's job. (Laughter)  
06 02 52 20 LMP (Laughter) My mother was worried.  
06 02 52 25 LMP A little smell in here.  
06 02 52 27 LMP Don't go to boost entry yet.  
06 02 52 30 CC Apollo 8, Houston. Yorktown has radar on you.  
06 02 52 42 CDR Alright, I'm in boost entry.  
06 02 52 43 LMP Okay.  
06 02 52 44 CDR How's it look --  
06 02 52 45 LMP Looking good.  
06 02 52 47 CDR Is it holding? Cabin pressure?  
06 02 52 50 LMP Yes, it's holding.  
06 02 52 51 CDR Alright. Watch your altimeter, that's going to come up in a hurry here.  
06 02 52 55 CMP Okay.  
06 02 52 56 LMP I'll - I'll give you warning on the steam pressure, if I can see it.  
06 02 53 00 CDR 2g's.  
06 02 53 02 CMP 54:29 should be -  
06 02 53 05 CDR Look's like we're overshooting, according to the EMS.  
06 02 53 07 LMP Yes.  
06 02 53 08 CDR Okay.  
06 02 53 10 CMP 53.  
06 02 53 17 CDR Got anything yet, Bill?  
06 02 53 19 LMP Yes, I'm getting steam pressure. Okay. --

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Day 7

262

06 02 53 22 CMP 54:29.  
06 02 53 23 LMP -- We got steam pressure.  
06 02 53 24 CDR We do?  
06 02 53 25 CMP Okay.  
06 02 53 26 LMP Make sure your heels are locked.  
06 02 53 27 CDR We got a - we got a minute to drogues.  
06 02 53 30 LMP Okay, you're in boost entry?  
06 02 53 31 CDR Yes.  
06 02 53 33 LMP Okay, anything on the altimeter, yet?  
06 02 53 36 CDR Not yet.  
06 02 53 37 LMP Okay, we've got 15 seconds from where - from 90K.  
06 02 53 40 CDR Okay.  
06 02 53 48 LMP Okay.  
06 02 53 49 CDR There she comes.  
06 02 53 50 CMP Okay, she's starting to come.  
06 02 53 52 LMP 30 seconds from 90K.  
06 02 53 55 CC Apollo 8, Houston.  
06 02 53 58 CDR Stand by, Houston.  
06 02 54 00 CC If you get a chance, we'd like to have your DSKY readings before drogues.  
06 02 54 04 CDR Stand by. Can you give him a DSKY reading, before drogues?  
06 02 54 05 CMP Roger; DSKY's reading plus four balls 7, plus two balls 812, minus 16502.  
06 02 54 15 CMP 40K.  
06 02 54 16 LMP Coming up on 40K. You should be at 40K now.

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Day 7

263

06 02 54 19 CMP We're at 40K.  
06 02 54 20 CDR We are.  
06 02 54 21 LMP Okay, call 30K.  
06 02 54 23 CDR I will.  
06 02 54 30 CDR 30K.  
06 02 54 31 LMP ELS -  
06 02 54 32 CDR ELS LOGIC, ON.  
06 02 54 33 LMP Right.  
06 02 54 34 LMP ELS, AUTO.  
06 02 54 35 CDR AUTO.  
06 02 54 38 LMP Stand by for RCS disable. Stand by on the apex cover.  
06 02 54 40 CDR Right.  
06 02 54 46 CDR There goes the apex cover; there go the drogues.  
06 02 54 53 CDR Okay.  
06 02 54 56 CMP 20 000.  
06 02 55 03 LMP Cabin pressure's coming up.  
06 02 55 04 CMP 19 000.  
06 02 55 08 LMP Stand by for 10K.  
06 02 55 20 LMP Should be approaching 10K soon.  
06 02 55 22 CMP 15.  
06 02 55 25 CDR Wonder what that was?  
06 02 55 27 LMP Nothing.  
06 02 55 32 LMP Should be approaching 10K. Stand by with the mains  
in 1 second.  
06 02 55 45 CDR You see it?

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Day 7

264

06 02 55 46 LMP Can't see it.  
06 02 55 47 CDR It should reef pretty soon.  
06 02 55 48 LMP Can't see a thing.  
06 02 55 52 LMP Okay, you got them?  
06 02 55 55 CDR Yes.  
06 02 55 56 LMP FLOAT BAG, three, circuit breakers CLOSED.  
06 02 55 58 CDR CLOSED.  
06 02 55 59 LMP VHF antennas, recovery; VHF AM, simplex.  
06 02 56 03 LMP Beacon's going ON. Get your light ON.  
06 02 56 05 CDR It's ON.  
06 02 56 06 LMP You got your - you got it, Jim.  
06 02 56 08 CMP Huh?  
06 02 56 09 LMP You got the call - give them a call.  
06 02 56 10 CMP Okay.  
06 02 56 14 CMP Houston, Apollo 8. Over.  
06 02 56 15 CDR Okay, standing by for the dump --  
06 02 56 17 AB1 Apollo 8, Airboss 1. Go ahead.  
06 02 56 19 CMP Roger, Air Force 1. We indicate 8000. We can't see  
the chutes, but we're going down very slow.  
06 02 56 25 AB1 Roger, this is Airboss 1. You're sounding very good, very  
good. You have been reported on radar as southwest of the  
ship about 25 miles. Go ahead.  
06 02 56 37 CMP Roger. We are now indicating 7000.  
06 02 56 40 CDR Ask him if he sees our beacon.  
06 02 56 42 CMP Airboss, do you see our flashing beacon?

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Day 7

265

- 06 02 56 44 AB1 This is Airboss 1. Negative. Welcome home, gentlemen, and we'll have you aboard in no time. Go ahead.
- 06 02 56 50 LMP Stand by for the dump, Frank.
- 06 02 56 52 CDR Alright.
- 06 02 56 55 R3 This is Recovery 3. I have a flashing light, my 4 o'clock position, almost level.
- 06 02 57 03 AB1 Recovery 2, sever contact 260 --
- 06 02 57 04 LMP Okay, ready for the dump, Frank?
- 06 02 57 05 CDR Ready.
- 06 02 57 06 LMP CABIN PRESSURE RELIEF valves, both, CLOSED.
- 06 02 57 07 CDR Got that.
- 06 02 57 08 AB1 -- my position at --
- 06 02 57 09 CDR DIRECT O<sub>2</sub>, OPEN.
- 06 02 57 10 AB1 -- 09548.
- 06 02 57 11 CDR OPEN.
- 06 02 57 12 LMP CM RCS LOGIC, ON.
- 06 02 57 13 CDR ON.
- 06 02 57 14 LMP Command module propellant, DUMP.
- 06 02 57 24 R2 Recovery 2, Airboss 2. You are cleared to dispatch for your altitude over clouds. Over.
- 06 02 57 30 R2 Roger ... This is Recovery 2, I see the chutes; I see the light almost directly over Yorktown, level with me at 4000 feet precisely.
- 06 02 57 40 CDR Stand by. Stand by for earth landing!
- 06 02 57 44 AB1 Yorktown, Airboss 1 ... received a message that he sees the chutes, sees the flashing light almost over Yorktown, descending 4000 ... very, very ... Out.
- 06 02 58 04 YORK All aircraft, this is Yorktown ... have capsule in sight. Out.

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Day 7

266

06 02 58 15 LMP Okay! Purge. Purge it.

06 02 58 20 CDR We're purging.

06 02 58 22 LMP Purge complete?

06 02 58 24 AB1 Yorktown, this is Airboss 1. We consider recovery splashdown in your area. Take control recovery helos and vector them.

06 02 58 33 LMP Floodlights to POSTLANDING. ...

06 02 58 34 YORK This is Yorktown. Roger; out.

06 02 58 35 LMP CABIN PRESSURE RELIEF valves, ...

06 02 58 37 R3 This is Recovery 3. Have lost sight of visual light.

06 02 58 40 AB1 ..., Yorktown.

06 02 58 44 LMP Dump - purge the cabin at 3000 feet.

06 02 58 46 AB2 Recovery 2, 'boss 2. You're 22 out.

06 02 58 49 LMP CM RCS propellant, both, OFF.

06 02 58 50 R2 Recovery 2. Roger. Passing 1500 feet, descending --

06 02 58 53 LMP ROTATIONAL CONTROL POWER DIRECT, OFF.

06 02 58 55 CDR DIRECT, OFF.

06 02 58 56 YORK This is Yorktown. Affirmative, we do have him in - capsule in sight. Out.

06 02 59 00 LMP Turn him down. Christ, we can't get anything done.

06 02 59 02 CDR Alright, DIRECT is OFF.

06 02 59 03 R2 This is Recovery 2. Passing 1000 feet.

06 02 59 10 CDR Okay --

06 02 59 11 LMP What's that?

06 02 59 12 CDR Cabin dump.

06 02 59 13 LMP -- okay, cabin dump. Okay, hold it.

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Day 7

267

06 02 59 16 YORK Recovery 3, Yorktown. The module bears 147; 5000 yards.  
Yorktown, over.

06 02 59 23 LMP ... OFF.

06 02 59 25 CDR Alright, anything else we missed?

06 02 59 27 R3 Roger.

06 02 59 28 LMP Negative; just stand by to release the mains.

06 02 59 30 CDR Yes.

06 02 59 32 LMP Stand by for the MAIN BUS ties.

06 02 59 34 LMP Brace yourselves.

06 02 59 36 CDR Well, wait; we've got 2000 feet, yet.

06 02 59 38 CMP I don't know if we have or not. They - reporting  
us as lower.

06 02 59 42 LMP Oh, they were?

06 02 59 47 CDR Who was worried about getting hot?

06 02 59 51 LMP Only because I cooled you down.

06 02 59 58 R2 Recovery 2 is at level 1000.

06 03 00 00 CMP 1500.

06 03 00 01 AB1 Roger, 2. This is ... 3.

06 03 00 03 CDR He called it 1000. Maybe we better get these -

06 03 00 06 R2 Recovery 2, descending through cherubs 5.

06 03 00 08 LMP Okay, Frank, you put them CLOSE whenever you want.  
I'm turning the MAIN BUS ties OFF now.

06 03 00 14 AB1 Recovery 1, this is Airb - -

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