APOLLO 13
ONBOARD VOICE
TRANSCRIPTION
(U)
RECORDED ON THE
COMMAND MODULE
ONBOARD RECORDER
DATA STORAGE EQUIPMENT
(DSE)
APRIL 1970

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONFIDENTIAL
SECURITY CLASSIFICATION

The material contained herein has been transcribed into a working paper in order to facilitate review by interested MSE elements. This document, or portions thereof, may be declassified subject to the following guidelines:

Portions of this document will be classified CONFIDENTIAL, Group 4, to the extent that they: (1) define quantitative performance characteristics of the Apollo Spacecraft, (2) detail critical performance characteristics of Apollo crew systems and equipment, (3) provide technical details of significant launch vehicle malfunctions in actual flight or reveal actual launch trajectory data, (4) reveal medical data on flightcrew members which can be considered privileged data, or (5) reveal other data which can be individually determined to require classification under the authority of the Apollo Program Security Classification Guide, SCG-11, Rev. 1, 1/1/66.
INTRODUCTION

This document is the transcription of the Apollo 13 flightcrew communications as recorded on the command module (CM) data storage equipment (DSE), and subsequently transmitted (dumped) to Manned Space Flight Network stations. Magnetic tapes containing dumped voice and onboard-recorded ground elapsed time 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.

In the text, a series of three dots (...) is used to designate those portions of the communications that 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.

The Apollo 13 mission was flown April 11 to 17, 1970.

Speakers in the transcript are identified as follows:

Spacecraft:

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<th>CDR</th>
<th>Commander</th>
<th>James A. (Jim) Lovell, Jr.</th>
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<tr>
<td>CMP</td>
<td>Command module pilot</td>
<td>John L. (Jack) Swigert, Jr.</td>
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<td>LMP</td>
<td>Lunar module pilot</td>
<td>Fred W. Haise, Jr.</td>
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<td>SC</td>
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<td>MS</td>
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Mission Control Centers:

| CC  | Capsule communicator (CAP COMM) |
| LCC | Launch control center |

The transcript is divided into three columns—time, speaker, and text. The time column consists of four two-digit pairs for days, hours, minutes, and seconds (e.g., 04 22 3h 14). The speaker column indicates the source of a transmission; the text column contains the verbatim transcript of the communications.
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DAY 1

-00 00 00 10 LCC 10, 9, 8, 7, 6,
-00 00 00 05 LCC IGNITION -
00 00 00 00 LCC 4, 3, 2, 1, 0 -
00 00 00 01 LCC LIFT-OFF.
00 00 00 02 CDR The clock is running. ...
00 00 00 03 CMP Yes.
00 00 00 05 CMP Yaw program.
00 00 00 10 LCC Clear the tower.
00 00 00 11 CDR Clear tower.
00 00 00 14 CDR The yaw complete and roll program.
00 00 00 16 CC Houston; Roger roll.
00 00 00 19 CDR 2000 feet.
00 00 00 30 CC 13, Houston. GO at 30 seconds.
00 00 00 32 CMP Okay, you're right on, Jim. You're right on trajectory.
00 00 00 34 CDR Roll complete and we're pitching.
00 00 00 37 CC Roger that. Stand by for Mode I Bravo.
00 00 00 42 CC I Bravo.
00 00 00 43 CMP I Bravo.
00 00 00 44 CDR RCS COMMAND.
00 00 00 45 CMP I Bravo.
00 00 00 48 CDR One-and-a-half g's. Okay, high Q coming up.
00 00 00 52 CMP Okay.

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00 00 00 55 LMP Cabin's coming down.
00 00 00 57 CDR ALT is looking good.
00 00 01 02 CMP Okay, you're right on --
00 00 01 03 CC 13, Houston. GO at 1. We show the cabin relieving.
00 00 01 05 CMP Yes.
00 00 01 06 CDR 13; Roger.
00 00 01 07 CMP You're right on, Jim.
00 00 01 09 CDR Coming up on 2g's. ALT is looking good.
00 00 01 17 CDR Two g's.
00 00 01 26 CDR ALT is looking good.
00 00 01 31 CMP Okay, you're right on at 01:30. 10 ¼ -- a little bit high -- we're a little bit high, about 0.4 of a mile.
00 00 01 37 CDR Got to speak louder.
00 00 01 39 CMP Okay.
00 00 01 40 LMP Cabin's looking good.
00 00 01 43 CDR Two-and-a-half g's and we're looking good in alpha.
00 00 01 50 CDR 40 000.
00 00 01 55 CC 13, Houston. Stand by for Mode I Charlie.
00 00 01 57 CDR Roger.
00 00 01 58 CC ... I Charlie.
00 00 01 59 CDR MARK.
00 00 02 00 CDR I Charlie.
00 00 02 01 CMP/LMP I Charlie.
Day 1

00 00 02 02 CC And, 13; you're GO for staging.
00 00 02 04 CDR GO for staging. Roger.
00 00 02 05 CMP We're EDS, manual.
00 00 02 07 CDR Okay.
00 00 02 08 CC ... that.
00 00 02 11 CDR Three-and-a-half g's.
00 00 02 15 CDR Inboard. ...?
00 00 02 27 CC Confirm inboard out, 13; you're looking good.
00 00 02 29 CDR Roger.
00 00 02 42 CDR Coming up on 4g.
00 00 02 45 CMP Got a little flash out the window.
00 00 02 48 CDR S-II ignition.
00 00 02 50 CMP ...
00 00 02 51 LMP Yes.
00 00 02 52 CDR We have half a g; looks good.
00 00 02 57 CMP Okay, 3 min. That's the babe.
00 00 03 00 CC 13, Houston. Trajectory is good; thrust is good.
00 00 03 03 CDR Roger.
00 00 03 04 CMP She's right on, Jim.
00 00 03 06 LMP Stand by for tower JETT.
00 00 03 14 CMP Skirt SEP.
00 00 03 16 LMP Okay, tower JETT.
00 00 03 17 CDR Roger.
00 00 03 18 LMP/CDR Tower JETT.
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00 00 03 19  CMP  Beautiful.
00 00 03 20  CC   Confirm skirt SEP; Roger tower JETT; Mode II, Jim. Looking good.
00 00 03 22  LMP  Look at that.
00 00 03 24  CDR  Mode II.
00 00 03 28  LMP  Look at the horizon out there.
00 00 03 29  CMP  Yes. There it comes.
00 00 03 32  LMP  That plume!
00 00 03 33  CDR  Guidance initiate.
00 00 03 34  LMP  That plume! Boy, is she boiling. That really --
00 00 03 38  CMP  Here.
00 00 03 39  LMP  -- points away, there. Window is not too bad.
00 00 03 43  CC   13, Houston. Guidance is good, and the CMC is GO.
00 00 03 46  CMP  Okay. Thank you.
00 00 03 47  CDR  13; Roger.
00 00 03 49  CMP  Okay, we're Mode II; I'm set for staging.
00 00 03 52  CDR  Mode II. Got them all RATE COMMAND and hang on.
00 00 04 00  CDR  Four minutes.
00 00 04 03  CMP  Okay, Jim, we're right on.
00 00 04 04  CDR  Okay.
00 00 04 05  CMP  Trajectory's looking good.
00 00 04 06  CDR  Want a little bit more light?
00 00 04 07  CMP  No, no. That's it --
00 00 04 08  CDR  How's this?
00 00 04 09  CMP  Yes. That's fine.
00 00 04 12  CDR  04:11.
00 00 04 13  LMP  Cabin's settled out very nicely.
00 00 04 14  CMP  Yes.
00 00 04 15  CDR  Okay.
00 00 04 16  CC   13, Houston. You're GO at 4 minutes. The little red lines are right on the little white lines down here.
00 00 04 22  CDR  Sounds good.
00 00 04 30  CDR  Coming up on one g.
00 00 04 31  CMP  Boy, we're right on. We're about a mile and two-tenths high, though, but we're right on $V_I$ and right on H-dot.
00 00 04 36  CDR  That's ... One g. You could walk around here.
00 00 04 51  CMP  I bet I never had such a view. Fred-o ... --
00 00 04 55  CC   13, Houston. Coming up 5 minutes; you're looking perfect. Over.
00 00 04 59  CDR  13, Roger. Coming to gimbal motors.
00 00 05 04  CMP  Okay. Watching 8.
00 00 05 32  CMP  Inboard.
00 00 05 36  CC   We confirm inboard out.
00 00 05 38  CDR  That shouldn't have happened.
00 00 05 40  CMP  No. That's 7:42. That's 2 minutes early.
00 00 05 44  CC   13, Houston. Stand by for S-IVB to COI capability.
00 00 05 48  CDR  S-IVB to COI. Roger.
00 00 05 49  CC   Roger. You've got it now, Jim.
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00 00 05 52  CDR  We've got S-IVB to COI.
00 00 05 53  CMP  Okay. Gim [sic] motors, Jim. Set 1.
00 00 05 55  CDR  Okay. PITCH 1.
00 00 05 57  CMP  Good.
00 00 05 58  CDR  YAW 1.
00 00 05 59  CMP  Good. PITCH 2.
00 00 06 00  CDR  PITCH 2.
00 00 06 01  CMP  Good.
00 00 06 02  CDR  YAW 2 --
00 00 06 03  CC  You're GO at 6 minutes, 13.
00 00 06 06  CDR  GO at 6. And, Houston, what's the story on engine 5?
00 00 06 14  CC  Jim, Houston. We don't have a story on why the inboard out was early, but the other engines are GO and you're GO.
00 00 06 21  CDR  Roger.
00 00 06 24  IMP  Okay. We're - we're a little bit low on H-dot, now, but that's to be expected.
00 00 06 28  CDR  Okay. We're Mode II, gentlemen, Mode II.
00 00 06 41  CC  13, Houston. You're still looking good; your gimbals are good; trim is good.
00 00 06 45  CDR  Roger. We just checked the trim. It doesn't fit.
00 00 06 53  CC  13, Houston. Level sense arm time, 8 plus 38, nominal; S-II cut-off time, 9 plus 48. Over.
00 00 07 01  CDR  Roger. Nominal on the level sense arm, 09:48 on the S-II cut-off.
00 00 07 06  CMP  It's going to run --
Affirmative, and stand by for S-IVB to orbit. You have S-IVB to orbit, Jim.

Roger. We have S-IVB to orbit.

Didn't like that inboard.

Okay, we're 1400 feet a second low on $V_I$. That's not too bad.

Watch the trajectory closely, Jack.

Yes, ...

We're right at 8 ... - H-dot is a little bit low; $V_I$ is low, but that's understandable.

Okay.

You're S-IVB to orbit capability now.

13, Houston. Looking good at 8 minutes.

13; Roger. How's those systems, Fred? Are there any --

They're looking good.

Okay, now, H-dot is low, Jim. ... S-IVB ought to pick you up.

Yes. Hey, I got a -- We got a funny vibration ...

Yes. Yes, there was a bit of noise, there. Yes.

Right on 8; good on H-dot; 200 feet a second low on $V_{Isp}$.

Remember, we're Mode IV now.

Yes, I got that. Mode IV.

Looks good --

What?

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LMP 00 00 10 51   Everything looks good.

CDR 00 00 10 54   Everything looking good.

LMP 00 00 10 57   We're looking good, Jim; trajectory's looking good.

CDR 00 00 11 00   Okay, ...

CMP 00 00 11 15   ...

CDR 00 00 11 19   What?

LMP 00 00 11 23   Okay, going to ... deadband now, guys. We're 102.5 - shutdown velocity -

CDR 00 00 11 32   25 562.

CC 00 00 11 34    Apollo 13, Houston. You're GO at 11-1/2, and predicted cut-off time is 12 plus 34. Over.

CDR 00 00 11 41   Understand; 12 plus 34, predicted cut-off time.

CC 00 00 11 45    ... affirm.

LMP 00 00 11 46   25 562 looks good.

CMP 00 00 11 58   Okay - Do we shut down at - Fred-o?

IMP 00 00 12 02   Yes.

CMP 00 00 12 03   What's - Shutdown is when?

LMP 00 00 12 05   ... you get the last page, Jack; you got the cleanup stuff.

CDR 00 00 12 14   Stand by for SECO.

LMP 00 00 12 15   All the systems stuff. You got to ... SECO.

CMP 00 00 12 18   Yes.

LMP 00 00 12 20   I'm going to just jump right in ...

TIME SKIP

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Hey, you guys, are you ready? I've done my other item there; I'm ready to give you - ... 

Well, all right, fine. Let's just get this one done first.

Okay.

What else do you have to do here?

Okay. Going BIT RATE.

TIME SKIP

Okay.

Okay. The pressure's okay?

Yes. Let's see now, Jim, there's one more reading there; you gave me the - you gave me the helium pressure 4100. What's the manifold pressure on that one?

The manifold pressure is reading about 80.

Eighty? Okay, give me the number 1, then.

Okay, number 1. And helium temperature is 80, helium pressure is 4100, and the manifold pressure is about 100.

Manifold's about 100. Okay.

Okay, Fred-o. Have a look - the cabin and suit doing? Before we -

They're both pretty equal, now, at about 5/5.

Okay.

Well, let's - We'll break the ...

Okay, let's do it. Fred-o, here's your bag.

Okay. Jim.
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Okay, for that item, those two I can check off. You got the V-torquing angle?

Yes.

I've checked the caution and warning; you've done that. We're up - we're up to item 9.

How we doing time line?

We're a little behind, but it's the kind of stuff that we can catch up lickety-split with.

Okay.

Okay. Let me get - make sure I got this item. I want A, SIMPLEX. Hell, it was already there. B to OFF. No, it wasn't. It's just a hard switch again. They really fake you out, these switches --

Yes. I've noticed --

-- they move so hard.

I've noticed that, Fred.

Compared with the simulator. Okay, let me check item 13 off; I've completed that one. Let's see.

Yes. I've got --

Jack, be careful in your movements now.

Yes. I'm not having any problems so far.

Okay.

PCM BIT RATE is LOW. I did the COMMAND RESET in NORMAL. I'll do it again, just to make sure. I have an A, SIMPLEX, and B, OFF. That's great. Jack, could you hand me one thing?

What - what would you like?

One of those spring jobbers, there. I can --

Yes.
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00 00 26 01 LMP -- flip across --

00 00 26 02 CMP I was going to ask you, if you wanted one of those, Fred.

00 00 26 03 LMP Yes. Okay. Now that'll take care of my check-list for me.

00 00 26 15 CMP A springy jobber coming up.

00 00 26 17 LMP Thank you. No, no; you got one of the other ones with the hook?

00 00 26 24 CMP I got the wrong kind?

00 00 26 25 LMP Yes. It's a little longer one with the hook.

00 00 26 28 CMP Are they in the same - They in the same - ...?

00 00 26 35 LMP Now that's a good question.

00 00 26 37 CMP Well, I'll tell you - Let me - I don't see them down here, now.

00 00 26 41 LMP Sure enough. It really is zero g.

00 00 26 47 CDR Well, gentlemen, I'll break out my two gold pens.

00 00 26 50 LMP The longest Napierian trajectory in the world.

00 00 26 56 CMP Yes. We had - I had a long boost ride, didn't we?

00 00 26 59 LMP Man!

00 00 27 00 CDR Twelve minutes and 30-some seconds.

00 00 27 01 LMP I'll tell you, gang, I was a little worried for a pinch or two.

00 00 27 04 CDR When I called, "Inboard," I was - It was natural; then I looked at the time --

00 00 27 07 CMP Yes --

00 00 27 08 CDR -- and I said, "That's not natural."

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We were 2 minutes early. Five minutes and 32 seconds, if you want to write that down.

Okay, good. Okay, my helmet coming off.

Shoot, if they recorded that --

-- (Laughter) Yes --

-- it'd be heck.

(Laughter) I know it.

Well, you know, I think I'll just - I'll just let this thing pull right up to the top.

You haven't found that other one, yet, have you?

No, Fred; I haven't -

What are you looking for?

A clamp. Oh --

I think those are down - those are in one of the lower -

Okay. You want to give me that other one back here, I'll see if I - Trouble is, I got no hooks that are the right length apart for my goddamn ... Fiddle with it. I'll just hang on to it tight and ...
I'm glad we checked PGNCS.

Say, I never thought - You guys want to take a look - look at - Excuse me a second. I'm going to turn out those floodlights. I wanted to show ... - When I turn out all the lights in just a second, you can see thunder and lightning on the horizon.

Sure as hell can.

And also, you might be able, if your eyes become accustomed to it - you might be able to see the - the airglow. There, you can. You can see the airglow.

Yes. I sure can.

See that airglow?

I can see that lightning, too.

Oh, I - I won't be able to see ...

Hey, that's -

El Scorpio, isn't it?

Yes, but see the - Antares is in the airglow layer.

Yes, it is. Right in it.

And then right below that, way - about a half a degree, that's -

The next star down there?

Yes.

Yes.

So, if you lift the lights, we'll see again.

Okay, I'm ready for the main REG check, Fred, if you're ready.
00 00 29 30  LMP  Okay. Go ahead. I'll tell you when. ... just call it on.
00 00 29 35  CMP  Okay. MAIN REG B going closed. EMERGENCY CABIN PRESSURE selector 1, PUSH TO TEST.
00 00 29 45  LMP  Did you PUSH TO TEST?
00 00 29 46  CMP  Yes. There it is.
00 00 29 47  LMP  Good.
00 00 29 48  CMP  Okay.
00 00 29 49  LMP  Good.
00 00 29 50  CMP  MAIN REG B valve, OPEN; A going closed.
00 00 29 54  LMP  Closed. Next step?
00 00 29 55  CMP  CABIN - CABIN PRESSURE selector 2, PUSH TO TEST.
00 00 30 00  LMP  Okay, that's good.
00 00 30 02  CMP  MAIN REG valve B - or A, OPEN, and EMERGENCY CABIN PRESSURE selector, closed. Okay, Jim. I got to get to - to those ... here.
00 00 30 14  CDR  Okay.
00 00 30 23  CDR  Okay.
00 00 30 24  CMP  ... down there?
00 00 30 27  LMP  Up in L-2, Jack.
00 00 30 28  CMP  Yes, that's where I'm looking.
00 00 30 32  LMP  You're kidding. I thought you said the helmet was tough to get in this bag. Piece of cake. Have you got - have you got one of those big helmets?
00 00 30 41  CMP  Yes - No, I don't think - unless I got a bigger head.
00 00 30 44 LMP  You don't have a Borman special, do you?
00 00 30 46 CMP  No.
00 00 30 47 CDR  We all have Borman specials.
00 00 30 48 CMP  Really?
00 00 30 49 CDR  Yes.
00 00 30 50 CMP  Maybe your damn bag won't fit anymore with that one ... have to slip it in this one.
00 00 30 51 LMP  Yes. ... a little bit. I got a ...
00 00 31 06 CDR  Okay. Got a ...?
00 00 31 09 CMP  Yes.
00 00 31 12 CDR  Well, is there anything else we can be doing right now? Like COAS?
00 00 31 14 LMP  Yes.
00 00 31 15 CMP  You can --
00 00 31 16 CDR  Yes.
00 00 31 17 CMP  -- you can get out the ORDEAL box, if you could --
00 00 31 18 CDR  Yes --
00 00 31 19 CMP  -- could you do that, Jim?
00 00 31 20 CDR  I'm going to try it right now.
00 00 31 21 CMP  That would save me a trip down under there.
00 00 31 22 CDR  Okay, that's right.
00 00 31 25 CMP  Okay. Okay --
00 00 31 28 CDR  You got to watch the time right now for --
00 00 31 29 CMP  Yes.
Okay.

I don't - I got to go stow my water wings. You guys got your water wings on?

No. I don't think I'm going to fiddle with that right now, Jack. They're not in my way.

Yes. I'll trade. We can get that later.

Hell, yes.

Well, I'll tell you what - I blew mine on 8.

Did you?

Yes. But you were the guy that - Jack should take his off. He's the guy moving around.

You're right.

Okay. I'll take mine off.

... really want ...

Man, I'll tell you, that first stage -

...

When that shut down, man, I thought I was going through the instrument panel. I'll tell you, that was - I was so surprised ... I had heard about it.

I should have warned you.

(Laughter)

Yes, well. Something else --

Well --

-- you got to get into.

... right in ...
Okay, let's see. Confirm normal, we've done that. We've stowed the water wings. Now it's the TSB is the only item left outstanding there.

Okay, I have the ORDEAL in place. Now, do you want the camera bracket?

Yes, you better leave that camera bracket up there.

Yes. Yes, I can feel a little bit of the zero-g effect, a little flushing in the face.

Yes.

Yes, that's that - Your blood rushes to your head because your heart doesn't have anything to pump against.

Yes, I can feel that, too.

Okay, I have the camera bracket.

Okay, have you got the - the ORDEAL mounted? I have --

The ORDEAL is mounted.

-- ... --

Okay, Jim. Are you ready to get busy on getting the RADs on the line?

I sure am.

GLYCOL RESERVOIR BYPASS valve, OPEN.

Okay, GLYCOL RESERVOIR BYPASS valve to OPEN.

Okay, OUT valve, CLOSE.

OUT valve, CLOSE.

The IN valve, CLOSE.

The IN valve going CLOSE.
Okay, now we need a little bit of quantity in the ACCUM - not the ACCUM, but we need the fuel valve on for about 5 percent on down to 45 percent. That's about what it was in the ..., too.

Okay, what I'm going to do is --

CAP COMM said they wanted 50.

-- ... the ORDEAL, then. The number 1 ball. Did you check the VERB 82?

Yes, I did. I wrote it down.

Okay.

I did that whole thing.

And we got the secondary RAD leak check to go. We got the "Unstow and mount TSB."

Yes. I ... done that, too.

And I got water wings in my lap here. That's it on that item - that page; it's done. So we're hanging up here. Let me proceed ahead and see what I can. I can do a purge. There are not any left for another 12 minutes or so.

Let me get the --

...

I got to get --

EPS monitor check, I can do ... I've been looking ahead to see what Jim can do. It says a GDC ailine somewhere in this thing.

Okay, I'm setting the ORDEAL right now.

Okay, well, that's the next thing you can do is a GDC ailine. Okay, you may - you may get some MASTER ALARMS here, gang. I'm going to be doing a purge check. I'll just do the --
Day 1

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00 00 34 55  CMP  Fred-o.
00 00 34 56  LMP  Yes.
00 00 34 57  CMP  Look what I got.
00 00 34 58  LMP  What have you got?
00 00 34 59  CMP  One with a hook on the end of it.
00 00 35 01  LMP  Beautiful.
00 00 35 02  CMP  Spring jobber-do.
00 00 35 03  LMP  Thank you.
00 00 35 09  CDR  Now, is there anything I can be doing?
00 00 35 10  CMP  I am giving you the sequence camera here, Jim.
00 00 35 13  CDR  Okay.
00 00 35 14  CMP  I tell you, I haven't checked the setting.
00 00 35 16  CDR  How about your optics?
00 00 35 17  CMP  I've got them unstowed. Now. ... that'd be 32.
00 00 35 32  CMP  ... camera. Here's the power cable.
00 00 35 36  CDR  Thank you. Okay, 18 millimeter, f:8, and 250th.
00 00 35 47  CMP  Now, let's see. Let me give you a - it's f:8, 250th, 7 feet, 12 frames per second.
00 00 35 54  CDR  Okay. Go.
00 00 35 55  CMP  Magazine A.
00 00 35 56  CDR  Magazine A is on.
00 00 35 58  LMP  Hey, Jack, where'd you find these?
00 00 36 00  CMP  I found it right down in - Fred, in this stowage -
00 00 36 03  LMP  Do you have any longer ones?

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00 00 36 04  CMP  No.
00 00 36 05  LMP  (Laughter)
00 00 36 06  CMP  No. It --
00 00 36 07  LMP  But that wasn't quite that long.
00 00 36 08  CMP  Yes, I know they do. And I'll tell you where it is; it's down in --
00 00 36 10  LMP  Okay.
00 00 36 11  CMP  -- A-8. Can you make do with that for a minute?
00 00 36 13  LMP  Yes. I ...
00 00 36 14  CMP  Until I get -- Okay, have you got ORDEAL -- You got ORDEAL mounted?
00 00 36 22  CDR  I -- I have ORDEAL mounted.
00 00 36 24  CMP  There we go.
00 00 36 25  LMP  Okay --
00 00 36 26  CMP  I got to get --
00 00 36 27  LMP  -- right after -- When did we insert, gang? Twelve something?
00 00 36 31  CDR  12:32 ...
00 00 36 33  LMP  Okay. I'm looking for where I put the first line heater on, so it was roughly about 14 minutes. We've been -- we've been 20 minutes. Yes. ... Okay ...
00 00 36 43  CDR  Don't forget I still got the radiators bypassed here.
00 00 36 45  LMP  Yes. Okay, what I need though, Jim, is to -- We got to pump up the - You want to - Let's finish that item. I need to pump up the accumulator a little bit. I mean use the accumulator to -- Yes -- to get it up to 50 percent.
Okay, you tell me what you want me to do here and I'll -

Can you reach the PRIM ACCUM FILL valve, right there on your left?

I'll try.

Yes, that's the PRIMARY. How are you doing, Jack?

Okay.

My countdown under way already?

Yes. But, you want to have a few ...?

Yes.

Okay, I'm putting the cable for you.

Excuse me a second; I want to ... the O₂ flow. Okay. Looks good. But if we get a MASTER ALARM, it'll come on with the H₂. Okay? Fuel cell 2. O₂ flow.

When it comes up flow, the H₂ banks up there like crazy. Looks like the simulator. The O₂ isn't like the simulator. Yes, it gets up there real slow. That old H₂ - Stand by for another MASTER ALARM. It banked up there like nothing flat. Okay. They're all back down to --

Before I get the --

-- normal.

-- TSBs out, can I get P52 ... program start?

Yes. Go ahead.

Yes.
00 00 38 29  CDR  Get it to cover one that that doesn't.
00 00 38 31  CMP  Yes.  I'll ...
00 00 38 34  MS  ...
00 00 38 35  CDR  That's the fourth, Jack.  Better do that.
00 00 38 37  LMP  Okay.  It's all optic tracking.  I've done that.
ZERO ... G&N POWER OPTICS, on, up.  OPTICS MODE,
MANUAL.  ... DIRECT ... HIGH.  OHC, MAX right.
00 00 39 01  CDR  Okay, do I have a tool there someplace?  Can I
use an E tool?
00 00 39 09  LMP  ...
00 00 39 11  CDR  You got it uncovered?
00 00 39 13  LMP  Got tool E?
00 00 39 14  CDR  Yes, until I get that up for a fit.
00 00 39 15  LMP  Okay ...
00 00 39 17  CDR  Now, Fred, what do you want me to do?
00 00 39 19  LMP  Okay, next - next thing is to - ... back -
page - I need to find the ... fuel valve on.
You can't take your eye off it.  I got him
out the window.  Is that it?  I got the
airglow there.
00 00 39 43  CDR  Okay.
00 00 39 52  LMP  Make sure you get the right one, Jim.  PRIMARY
ACCUM - -
00 00 39 54  CDR  Yes.  I got it - I got - I got my - If I can
get my hand down there, I got it made.
00 00 40 01  CMP  Let me know when you turn them on.  I only need
about 5 percent; I don't need much.
00 00 40 13  CDR  Okay.  Coming ON.
Day 1

CONFIDENTIAL

00 00 40 17  CMP  Good. That's good. ... OFF.
00 00 40 19  CDR  OFF.
00 00 40 20  CMP  Okay, let me look a minute, here; I have to stabilize.
00 00 40 23  LMP  ... up there.
00 00 40 25  CMP  Okay. About one more shot.
00 00 40 27  CDR  ...
00 00 40 31  CMP  ... slowly, that really ...
00 00 40 32  CDR  Okay, how's that?
00 00 40 33  CMP  That's good. OFF.
00 00 40 35  LMP  ... back down there ... go to OFF.
00 00 40 38  CMP  It's right at 50, though; the hell with it, that's good.
00 00 40 40  CDR  Is it good?
00 00 40 41  CMP  Yes; that's about 49.9.
00 00 40 45  CDR  Okay.
00 00 40 46  CMP  It is definitely OFF, right?
00 00 40 47  CDR  Yes.
00 00 40 49  CMP  ECS RAD CONTROL; let me go to POWER. Okay, PRIM GLYCOL TO RADs out, Jim; NORMAL, push - NORMAL, push in.
00 00 40 59  CDR  Okay.
00 00 41 03  CMP  Oh, I know - Hey, how about giving me - Do I have G&N POWER at 8:21?
00 00 41 07  LMP  Yes, sir.
00 00 41 08  CMP  Okay.

CONFIDENTIAL
00 00 41 09 LMP You got it.
00 00 41 10 CMP Okay.
00 00 41 12 LMP I'll get it ready for you ... stars out there.
00 00 41 20 CMP I've got a star in the --
00 00 41 22 CDR Sextant?
00 00 41 23 CMP -- sextant, but I have nothing in the --
00 00 41 26 CDR Well, it might take awhile to do it with the scanning telescope, because your eyes have to get accustomed to it. It might not be where there are stars.
00 00 41 36 CMP Well, I've got one in the -- I've got one in the --
00 00 41 40 CDR What star did you pick?
00 00 41 43 CMP 24.
00 00 41 44 CDR 24, that's -- Gienah. Is it right on in the sextant?
00 00 41 52 CMP ...
00 00 41 54 LMP Okay, while you got the tool and you're over there, Jim, do you think you could get the secondary RAD loop check done?
00 00 41 59 CDR Yes.
00 00 42 00 LMP That's the guy way down there, the very --
00 00 42 04 CMP ... --
00 00 42 05 CDR We'll run through it, Jack, if you could --
00 00 42 10 CMP ...
00 00 42 14 CDR Mark it ... Okay, GLYCOL TO RADIATOR, SECONDARY?
00 00 42 18 CMP ...

CONFIDENTIAL.
Yes, but it's to - RAD NORMAL. Let me know when. I'll start my watch.

Hey, there - there we go. Now I got stars. I don't think they ... until just now.

Okay, I'm going to take her to NORMAL now.

Beautiful, gang.

All right.

Oh, I don't know if I did it or not.

You - you turned it?

I don't think so, I think ... right in there.

Spica's right in there, you guys.

Okay.

I - You know, I can get down there good, but I'm always on -

Well, you'd know if you got the screw in the slot.

Okay, now.

Okay. Starting my watch. It's on SECONDARY.

No, it's NORMAL now.

Okay, you've got to leave it there for 30 seconds.

Okay. Could you tell?

What's that?

Could you tell?

Tell what?

That I'm in NORMAL?
CONFIDENTIAL

00 00 43 15 LMP Yes.
00 00 43 26 CMP ... Good old Antares.
00 00 43 33 LMP Okay, that's it; put it back to close or off or wherever it --
00 00 43 36 CDR BYPASS.
00 00 43 37 LMP BYPASS. Good. ... BYPASS?
00 00 43 40 CDR ... BYPASS.
00 00 43 41 CMP Well, he didn't show anything ... --
00 00 43 43 CDR Okay, how is it? Okay?
00 00 43 44 CMP Yes. Looks good.
00 00 43 46 LMP Okay, I'm on page 2-14; coming up to EPS monitor check --
00 00 43 50 CDR Okay, just be sure you --
00 00 43 51 LMP -- EPS. Checking them off.
00 00 43 53 CDR Check them all off, and ... --
00 00 43 56 LMP You got to do a GDC aline --
00 00 43 58 CDR I'll do that right now.
00 00 43 59 LMP You've got the sequence camera bracket and the ORDEAL, right?
00 00 44 02 CDR And those are all mounted, and we're all running on --
00 00 44 04 LMP Okay, ORDEAL --
00 00 44 05 CMP Hey, guys? Sorry.
00 00 44 07 LMP ...
00 00 44 08 CDR Yes. Okay, better record this down ... --
CONFIDENTIAL

00 00 44 10  CMP  I ain't got - I ain't going to let that pass, man - -
00 00 44 13  CDR  No?
00 00 44 14  CMP  -- ... triangle bigger than hell.
00 00 44 15  CDR  I'll give you a gold - gold star.
00 00 44 19  LMP  ... got all that in your book, Jack?
00 00 44 21  CMP  Yes. I'm going to write it on a ... here.
00 00 44 22  LMP  Okay.
00 00 44 23  CDR  I'll do a GDC aline now, Fred.
00 00 44 25  LMP  Okay. Now I'm here, I'm going to go ahead and ...
                    ... the secondary loop. Okay, SECONDARY LOOP is coming on line, gang; AC 1 -
00 00 44 37  CMP  Okay. Do we have to wait for MSFN to torque this?
00 00 44 40  LMP  That's that little extra whining you hear, and it's the SECONDARY LOOP.
00 00 44 43  CDR  Okay.
00 00 44 46  LMP  Okay. ... go to the ...    
00 00 44 49  CDR  I can see the sludges in the ... burn.
00 00 44 53  LMP  Yes.
00 00 44 56  CMP  Damn! Sort of lost him.
00 00 45 01  LMP  Okay. So that one is done, done --
00 00 45 04  CMP  Okay --
00 00 45 05  LMP  -- done, done, done to there --
00 00 45 06  CMP  Jim?
00 00 45 07  CDR  Stand by.
CONFIDENTIAL

00 00 45 08 CMP Do I need a - to get MSFN? I don't need them to torque here, do I?
00 00 45 13 CDR I don't think so - Wait - Where are the torquing angles ...
00 00 45 16 CMP I've got the torquing angles; let's see - ... - and it's 0.162 which is quite a bit less than ...
00 00 45 40 LMP Okay, Jack, did you ever get my MAIN B breaker in down there?
00 00 45 44 CMP Yes, I did, in your COAS?
00 00 45 45 LMP Yes.
00 00 45 46 CMP MAIN B? I did.
00 00 45 47 LMP Yes. That's right.
00 00 45 48 CMP That's done.
00 00 45 49 LMP And - let me verify that the RADs and REACS CB sticks are out, and - off.
00 00 45 53 CMP Okay. ... 
00 00 45 56 LMP Okay. I'll verify the MAIN BUS TIES are OFF -
00 00 45 59 CDR GDC's alined. 46 now. How we doing on the time line, Fred?
00 00 46 06 LMP Let's see, we're not - we're coming up 6 min-
utes - What we got to do is get the cameras - get the TV camera out next. We're about fixed.
00 00 46 18 CDR Okay.
00 00 46 19 LMP 01:05 is when I got to start playing with the TV.
00 00 46 22 CDR Okay.
00 00 46 23 LMP After we get our HSK LOS.
00 00 46 26 CMP ...
If you have time, I would suggest that you adjust your straps and strap it in again for TLI - just to make sure you got them okay.

Okay. Still pressing on in here, and Jack's got to do that ...; I'll circle it.

Okay, what do you have to do?

The RADs and REAC breakers, six of them, out ...

RAD, REAC, REAC, REAC - Okay, I can verify three RADs and three REACs out.

Okay, good show.

MAIN A 1 - MAIN A 2 -

Okay. Bus voltage ...

And, Jack, you want to put tool E down there on the handhold - toward the handhold?

Yes. I haven't got ...

Yes. I think I can get closer than that and ...

Yes, that's right ...

Okay.

Okay, I've got the horizon out there and I've got the airglow layer. ...

Okay, and we got the relay bus selected ... - I got to get this TSB ... Okay, item 15's done. And that makes one outstanding item, and I've got a couple from a few pages back.

Okay.

Right there. Unstow and mount TSBs - they're in A-1. ... down below. Hey, where do these - these guys go? They go right in the pocket of this L-shaped bag, don't they?

... water wings.
I thought they went right behind you.

Right there - Yes.

Oh, yes. ... pockets.

Okay. I'm up the ... monitor - ... look good - H\textsubscript{2} flow - ...

Okay, I ought to be getting down there - ... How you doing, Jack?

Good. Hey, how about that - Do you need - that SECONDARY RAD valve?

I got it.

You got it already; okay.

We got the secondary - we made the secondary check; the filters finally came out a little bit - -

You did the ...

- - and the ORDEAL's already out; the COAS is - -

You got it running?

- - ... little COAS ...

Hey, Fred-o? ... that TSB. Okay?

... We're going to need it.

Jim, do you need a TSB?

... a big one. Let's see; where did we stow TSBs? We want to ...

Here it is.

Jack, whenever you get time, if you - want to slow down a little bit, well, just come back and we'll take these - lifevests off and get this stowed out of the way.
Day 1

CONFIDENTIAL

00 00 50 26 CMP Okay. I'll be ready to do it whenever you -
00 00 50 46 CDR Once you get one of them in -
00 00 50 53 LMP How you doing, Jack? ... all right down there?
00 00 50 56 CMP Oh, yes. No problems yet. ... kind of worried ...
12.1 down ... 
00 00 51 07 CDR Well, I wouldn't worry about it now. ... go down yet. You're not getting those breakers; that's what you're forgetting.
00 00 51 16 LMP The - Okay, now where - those - you want those where?
00 00 51 20 CMP In front of the L-shaped bag, isn't it?
00 00 51 21 CDR In front of the L-shaped bag is - Why don't you go down there and help him?
00 00 51 25 LMP Wait a minute, Jack; you don't go - I don't think you go that way to get through.
00 00 51 28 CDR I think you come right down here, Jack, but - Yes, there is - there's a ... --
00 00 51 31 CMP Yes, but that's a long, long way to go.
00 00 51 32 CDR -- there's a ... 
00 00 51 34 LMP Okay, you do that - and I'm going to get the Hasselblad out for - this.
00 00 51 38 CDR Okay, now, if my - my hand controller is locked and yours is locked - I'll tell you what, if you can help me scootch over here a second --
00 00 51 45 LMP Yes.
00 00 51 47 CDR -- I'll try and -
00 00 51 49 LMP Okay, I'll put my ..., Jim.
00 00 51 51 CDR Okay. Okay.
00 00 51 54 CMP Okay, I want to go back and see what - I've got

CONFIDENTIAL
to get the TV camera and the Hasselblad out, and --

00 00 52 00 LMP I think we ought to be having AOS, gang; we've got --

00 00 52 02 CDR 56 seconds.

00 00 52 04 LMP Okay. I - Let me call them.

00 00 52 11 LMP Look at me, Jack; I show gain.

00 00 52 13 CMP You show gain?

00 00 52 14 LMP Yes.

00 00 54 35 LMP How you doing?

00 00 54 36 CDR I got ... You got to get it when you're going by.

00 00 54 39 LMP Okay.

00 00 54 40 CMP Yes, I've got - got it in my helmet bag right now.

00 00 54 43 CDR Oh, okay, good.

00 00 54 49 CMP Boy, I'll tell you, that really bothers me ...

00 00 54 54 CDR Does it ...? Did you put it over far enough?

00 00 54 57 CMP Yes, that's where it went - when ... It's looking good ..., and I don't think they jettison until ...

00 00 55 05 CDR Oh.

00 00 55 08 CMP Okay. Now I've got to get the TV camera ..., Fred-o --

00 00 55 11 CDR Okay.

00 00 55 12 CMP -- ...  

00 00 55 13 CDR You want to hand me that book, and I'll take a look in it.
Day 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Call</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>00 00 55 15</td>
<td>CMP</td>
<td>Yes. And also see if I've - all the things that I've done, ..., because I haven't checked them off a couple of places.</td>
</tr>
<tr>
<td>00 00 55 29</td>
<td>CMP</td>
<td>Hey, Fred, what do you want first, TV camera?</td>
</tr>
<tr>
<td>00 00 55 32</td>
<td>LMP</td>
<td>Yes. Just one more - Let me get through one more - system.</td>
</tr>
<tr>
<td>00 00 55 39</td>
<td>CMP</td>
<td>That's off. That ... right down ... on the bulkhead.</td>
</tr>
<tr>
<td>00 00 55 43</td>
<td>LMP</td>
<td>You get done, you're hooking up the cable. You got to do that part, though. We can't ... right there.</td>
</tr>
<tr>
<td>00 00 55 48</td>
<td>CMP</td>
<td>All right. And I'll verify the CB power is off -</td>
</tr>
<tr>
<td>00 00 55 50</td>
<td>LMP</td>
<td>... off.</td>
</tr>
<tr>
<td>00 00 55 53</td>
<td>CDR</td>
<td>I'm going to go back into the - ..., Jack; and look at ...</td>
</tr>
<tr>
<td>00 00 55 59</td>
<td>CMP</td>
<td>Okay.</td>
</tr>
<tr>
<td>00 00 56 00</td>
<td>CDR</td>
<td>...</td>
</tr>
<tr>
<td>00 00 56 02</td>
<td>CMP</td>
<td>Fred-o, you - How about a bracket?</td>
</tr>
<tr>
<td>00 00 56 04</td>
<td>LMP</td>
<td>Well.</td>
</tr>
<tr>
<td>00 00 56 11</td>
<td>CMP</td>
<td>Okay, that's ...</td>
</tr>
</tbody>
</table>

**TIME SKIP**

<table>
<thead>
<tr>
<th>Time</th>
<th>Call</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>00 01 04 58</td>
<td>LMF</td>
<td>Okay, Joe, I just wanted to - put on the TV switch at Honeysuckle to tune her up there.</td>
</tr>
<tr>
<td>00 01 05 18</td>
<td>CDR</td>
<td>Fred, I'll read the pads, or you read the pads, or somebody read the pads.</td>
</tr>
<tr>
<td>00 01 05 22</td>
<td>CMP</td>
<td>Hey, can I get a - a TV ...?</td>
</tr>
<tr>
<td>00 01 05 29</td>
<td>LMF</td>
<td>Oh, yes, Jack. LOS Carnarvon.</td>
</tr>
<tr>
<td>00 01 05 35</td>
<td>CDR</td>
<td>Okay. 1:45, 75 ... LOS at - ...</td>
</tr>
</tbody>
</table>
CONFIDENTIAL

Okay, coming up. ...

Fred, I'll get them when we get all relaxed. I'll do that ...

Hey, Jack, ...

Yes, I can – yes, I can do it, Fred-o. ...

TIME SKIP

... now?

...

... 59 – ...

What was this ...?

...

... and what are your FDAI angles ...?

Okay, 59 – ...?

...

Okay, I've got 59 and 30. How's that? Okay?

... the burn, ...

...

Okay. ... burning, Jim.

Okay. Here, I'll get out the ...

...

CONFIDENTIAL
00 02 35 46  CMP  Burning!
00 02 35 48  CDR  Okay. Watch that -
00 02 35 50  CDR  IGNITION, Houston.
00 02 35 54  CC  Copy that, Jim. Good deal.
00 02 35 56  CMP  Okay. ... pitching her down a little bit, right here.
00 02 36 00  CDR  ... There you go.
00 02 36 04  CMP  ... Is that all right?
00 02 36 05  CDR  Okay, you watch the - trajectory thrust?
00 02 36 09  CMP  Yes.
00 02 36 25  CMP  ... burned 14-second velocity $V_I$ and ...
00 02 36 46  CDR  ...?
00 02 36 47  CMP  It's right on $V_I$; we're right on $V_I$.
00 02 36 55  CDR  Got both ... up?
00 02 36 58  LMP  We got to leave these open.
00 02 37 06  CMP  Okay, 01:30. Three minutes and --
00 02 37 07  LMP  0.75.
00 02 37 09  CMP  ...
00 02 37 17  CMP  Right on - right on; ... little bit higher ...
00 02 37 30  CDR  ...
00 02 37 35  CMP  ...
00 02 37 37  CDR  Watch the ...
00 02 37 44  LMP  Okay, Jim, it's 2 minutes ...
00 02 37 51  CDR  Houston, everything looks okay so far.
Houston; Roger.
Okay; we got 02:30 coming ..., Jim?
Right on ... Right on H-dot; we're right on 8.
Three minutes -
...
All right.
3:30, Jim. 3.4.
3.4. Okay.
Okay. We're right on.
Okay. ...
Okay, at 4 minutes. ...
...
...
Okay.
Okay, we'll hold this down; we've got a little vibration.
...
Yes.
No, ... thousand, 200 ...
...
We're looking at 4 point ...
4 point ..., okay.
Right on at 30. A little bit high.
And, Houston, we're noticing a little vibration during this burn.
00 02 40 37  LMP  Five minutes ... 4.6.
00 02 40 41  CDR  Okay.
00 02 40 46  CMP  ... a hundred ...
00 02 40 50  CDR  Okay.
00 02 40 51  CMP  H-dot is a little high ...
00 02 40 54  CDR  Okay.
00 02 40 59  LMP  5:30 - 5 point - ... the same countdown, Jack, and then start counting up.
00 02 41 06  CMP  Okay.
00 02 41 07  LMP  ...
00 02 41 08  CMP  ... V ... I ...
00 02 41 11  CDR  ...
00 02 41 15  LMP  Five seconds.
00 02 41 16  CMP  Five ..., okay.
00 02 41 19  CDR  Better get ...
00 02 41 22  CMP  5.0. ...
00 02 41 28  CDR/CMP/  5 -
00 02 41 29  LMP  4, 3, 2, 1 - 1, 2, 3, 4 -
00 02 41 34  LMP  Okay.
00 02 41 38  CDR  ENGINE OFF. ...
00 02 41 39  LMP  ... is three-quarter overburn.
00 02 41 42  CC  Copy. Engine off.
00 02 41 44  LMP  Freeze the DSKY.
00 02 41 45  CMP  I did.
Okay, and now we'll --
Okay, Jim, it's SCS TVC SERVO POWER 1, OFF.
1's OFF.
PCM BIT RATE, I got LOW. EMS MODE - Wait, let Jack get it. Minus 3.0.
Boy, beautiful.
You got that, Jack?
Yes.
EMS MODE to STANDBY?
...
EMS MODE to STANDBY.
STANDBY. FUNCTION, OFF.
FUNCTION, OFF.
SEQUENCE PYRO ARM, two, SAFE.
SEQUENCE PYRO ARM, two, SAFE.
That's a ..., too.
Okay.
Okay. SEQUENCE - FDAI 1, INERTIAL.
FDAI 1 going INERTIAL.
And lock your hand controller.
Hand controller is locked.
Okay, Jack, you clean up the DSKY and eventually get the POO.
... we'll have you through Hawaii in 3 minutes.
Roger. Through Hawaii in 3 minutes.
Day 1

00 02 42 33  LMP  Okay.
00 02 42 34  CMP  Okay --
00 02 42 35  LMP  So we're standing by until Jack gets through that - jazz -
00 02 42 38  CDR  How does that look, Jack?
00 02 42 40  CMP  Looks good.
00 02 42 45  LMP  Okay, it's a VERB 66 ENTER, Jack, after you get - after you get the FOO. Wait until you get that.
00 02 42 52  CMP  ...
00 02 42 57  LMP  Okay, now you all switch - En route, Jack, you got to do a couple of things.
00 02 43 07  CDR  In Hawaii, we'll get their ... --
00 02 43 12  CMP  Okay. You - let me put this - put this up under here --
00 02 43 17  LMP  Okay.
00 02 43 18  CDR  And we'll have to switch COMM carriers so I can take this suit stuff off.
00 02 43 20  LMP  Yes. We'll have to take the suit power off.
00 02 43 23  CDR  Yes. And we'll --
00 02 43 24  LMP  And what would be nice for you to do, Jack, if you can --
00 02 43 27  CMP  Okay. What do you want me to do?
00 02 43 28  LMP  -- is, first of all, WASTE STOWAGE VENT valve, CLOSED.
00 02 43 30  CMP  Okay. I'll do that right now.
00 02 43 38  LMP  I've got the HIGH GAIN POWER, OFF, and I'm getting - I've got those two breakers in on 225. WASTE STOWAGE VENT valve is CLOSED.
CONFIDENTIAL

Day 1

00 02 43 44    CMP    CLOSED.
00 02 43 45    LMP    Now, get the TV camera out from under there, will you?
00 02 43 47    CMP    Okay.
00 02 43 48    LMP    And I'll be dickering with that -
00 02 43 51    CMP    ... -
00 02 43 52    LMP    ...
00 02 43 54    CMP    TV camera's --
00 02 43 57    LMP    Thank you. May as well get me the monitor and all that jazz.
00 02 44 00    CMP    I'll go do that now.
00 02 44 02    LMP    And the bracket. I'll be fiddling and getting this baby ready.
00 02 44 06    CMP    One bracket.
00 02 44 08    LMP    Thank you.
00 02 44 27    CMP    Okay, Fred-o, now here's the monitor.
00 02 44 37    LMP    Okay. Got a - Thank you. Okay. ...
00 02 44 53    LMP    Okay. Okay. The ... are off - done.
00 02 45 14    CDR    Stand by. ...
00 02 45 21    CMP    It's funny.
00 02 45 25    CDR    Okay, my SUIT POWER's going OFF --
00 02 45 28    CC     ... --
00 02 45 29    CDR    -- ... you got COMM --
00 02 45 30    CC     -- through Hawaii. Over.
00 02 45 32    CDR    Roger, Houston; 13 through Hawaii. How do you read?
Day 1

00 02 45 37 CC 13, Houston. You're weak but clear; it'll probably get better in a second. We're standing by for the burn report.

00 02 45 43 CDR Roger. Jack, we need the burn report just briefly.

00 02 45 45 CMP Okay.

00 02 45 46 IMP Here, I'll get it.

END OF TRANSCRIPTION