Fifty years ago, NASA was on the precipice of mankind's most historic small steps.

EGS Program Chief Engineer verify no constraints to launch.

3, 2, 1, and lift-off!

Welcome to Space.

Today we take you inside the Control Room and onto the ocean during the Apollo 11 mission.

We're taking a look back at the work done here on Earth to ensure our heroic astronauts succeeded on mankind's most daring adventure.

In a few minutes, we'll hear from Milt Heflin and Melissa Jones on oceanic-recovery activities.

But first up, we have Bob Sieck.

He was one of the engineers on console in the Launch Control Center for Apollo 11 and went on to serve as the Space Shuttle Launch Director in the '80s and '90s.
I am now in the booth with Bob Sieck.

Bob, thanks for joining me.

Pleasure to be here and to continue the acknowledgement of the Apollo Program and the accomplishments.

Yes, so, obviously, we brought you in for a very special reason -- because you have a very long history with NASA and the Space Program.

So I wanted to let you just kind of give us a really quick kind of flyby of your career, if you would.

Well, okay.

So, graduated from college with an Electrical Engineering degree, 1960.

We had just invented transistors.

A chip was still something you carved off of a block of wood.
In '63, came down here to Florida to make it my home and be part of the great adventure.

After a year as a contractor, I got on with NASA in 1964, Journeyman Engineer in Gemini spacecraft, responsible for the biomedical instrumentation that the astronauts had.

We didn't know much about the effects of space on the body back then, so they were heavily instrumented -- best way to put it, just like the spacecraft and rocket -- lots of instruments on the astronauts to see how the body reacted to all the rigors of spaceflight -- did that through Gemini.

In Apollo, I was responsible -- I was Testing -- Spacecraft Testing Integration Engineer, which meant you are like a technical test conductor for the tests on the Lunar Module and the Command Service Module, and held that responsibility all through Apollo, got in on the ground floor of the Shuttle Program with, essentially, the same responsibility, and then a couple years in, got promoted to Launch Director in '83, '84 -- had about a
dozen missions then and was then elevated, if that's the term, to the Director of Shuttle Operations at the Cape.

Challenger happened -- a lot of realignment and changing the organization, obviously,

and after Challenger, I successfully lobbied to go back to being Launch Director.

I felt that was my strongest suit, so to speak, to help with the return to flight effort and

the continuation of the program and enjoyed that for a number of years -- total of 50-some missions that I'm thankful there was a landing for all of those.

Yeah.

And then was, again, promoted to the Director of Shuttle Operations to handle the transition,

more the responsibility to the contractor and the new contractor at the time -- retired in '99.

Still connected with the people in the business through some NASA Advisory Panels.
Yeah, and we always love hearing from you and having you back.

We could fill probably days with all of the stories and kind of the wisdom that you have to share on space, but we wanted to kind of dwell on the '60s.

So, going back to '61, Alan Shepard is flying on a suborbital flight into space.

Do you remember this moment?

Yes, I do, and the fact that we did it was -- Regardless of what the Russians had already done, the fact that we did it first step, literally.

A lot of people think of the Lunar Landing, first step on the Moon.

I think of the first step as Alan Shepard going up, and maybe, in hindsight, the first step was the Russians putting Sputnik up that kind of ignited our resolve to do something about this in sort of a competitive way at first, and, thankfully, the visionaries in
Washington saw to that, and that ended with the challenge of putting a man on the Moon and returning them safely—never want to forget that part—

Yeah.

[Chuckles]

...by the Kennedy Administration and starting that great adventure.

And what's that like for you personally?

'Cause at this point, I think you said you're finishing up college, Sputnik's flying, we're getting Alan Shepard off the ground.

Is NASA like this fierce kind of wonderful thing that's unattainable, or is it like, "Let's be America, let's go do this"?

I think it's the latter.

NASA was obviously given the baton to do this, the responsibility, and the sense was that there was commitment behind that task or that resolve or our resolution—whatever you
want to call it -- in the political environment, which was important.

So I said, "Well, I want to be at the front end of this adventure."

Yeah.

Obviously, contractors were hiring, also, but it was obvious to me it's a government responsibility, so I'm gonna go with the government team and see what I can do to be part of it.

And so as we kind of fast-forward a few years, how did you end up with NASA?

Was this just like another job you were applying for or was this, somehow, a special kind of opportunity?

Oh, I looked at it as an opportunity for sure.

I took it to heart that this was now a resolve that our nation had put forward and decided to accept it.

So I didn't look at it as just a job.
It was kind of like, I'm on a mission.

Our government's on a mission, our country's on a mission, so I'm gonna be part of the team that accepts the challenge and the responsibility of doing the things that need to be done,

as Kennedy said, "not because they're easy, but because they're hard."

Yeah.

Do you think that everyone kind of came in with that team mentality?

I would say yes.

Most of us that worked in the early years of the Space Program had spent time in the military.

Okay.

Mandatory draft back then, so –

- So not even just the astronauts, but the engineers on the floor?
00:07:27,038 --> 00:07:28,038
Right.

00:07:28,038 --> 00:07:29,038
Oh, yeah.

00:07:29,038 --> 00:07:30,038
Yeah.

00:07:30,038 --> 00:07:35,778
I would sit at the console next to people that sat in foxholes in Korea or flew B-17s in World War II, and this is a -- We felt -- and I think we were looked at -- as we're

00:07:35,778 --> 00:07:43,930
a national resource on a government mission here.

00:07:43,930 --> 00:07:48,090
We're not wearing uniforms anymore like most of us did.

00:07:51,110 --> 00:07:52,110
Yeah.

00:07:52,110 --> 00:07:53,110
Wow.

00:07:53,110 --> 00:07:58,699
But we understand responsibility and accountability, and we've been charged that this is our mission,

00:07:58,699 --> 00:08:05,419
and so we took it seriously and, of course, proceeded accordingly.

00:08:05,418 --> 00:08:08,839
But we knew there was a lot of attention to what we were doing.

00:08:08,839 --> 00:08:16,138
It would be a very visible thing, but most of us didn't look at that being the big deal, so to speak.

What was the big deal was -- we're responsible for accomplishing this as an individual and as a member of a team, and we're gonna get it done.

Do you feel like there's an emotional element to it?

And kind of the thought behind that question is, thinking about if -- I think my tendency is to think of the military as being very, like, objective and focused, and we execute.

That's what we do.

Do you feel like that's really similar to how NASA was operating or was there a more emotional component to it that kind of was like this feeling and that commitment and way beyond just tasks?

Well, I think it was a combination of both.

Obviously the discipline responsibility, accountability
thing factored into it, but, also, I remembered

00:09:05,440 --> 00:09:11,850
getting the briefings from the NASA managers
when a journeyman first came on board was,

00:09:11,850 --> 00:09:17,920
"Okay, now you're responsible for this task
and maybe this set of hardware has these boundary

00:09:17,919 --> 00:09:22,169
conditions and whatever, and this is your
system, and you're gonna interact with that

00:09:22,169 --> 00:09:23,269
system" -- technical stuff.

00:09:23,269 --> 00:09:24,269
Sure.

00:09:24,269 --> 00:09:30,990
But the other part of it was -- the message
that came loud and clear was, now, in addition

00:09:30,990 --> 00:09:37,220
to that responsibility, this is all about
the crew and the mission -- number-one priority

00:09:37,220 --> 00:09:38,399
is the crew and the mission.

00:09:38,399 --> 00:09:41,458
We talk about getting off the ground with
the rocket.

00:09:41,458 --> 00:09:48,469
Yeah, you can cheer that, but it's all about
getting these astronauts through their missions,

00:09:48,470 --> 00:09:54,889
successfully accomplish landing them, and
continuing on with the program.

00:09:54,889 --> 00:09:59,000
So the emphasis was always on you're responsible
for their safety.

00:09:59,000 --> 00:10:04,220
This is your system, but if you get in a fuzzy area about responsibility, never forget the number-one priority is the crew and their mission.

00:10:04,220 --> 00:10:08,009
How does that impact you and the people around you when we lose the crew Apollo 1, then?

00:10:08,009 --> 00:10:13,328
'Cause, obviously, like, that's got to be hard.

00:10:13,328 --> 00:10:15,399
It is hard.

00:10:15,399 --> 00:10:16,399
It is tough.

00:10:16,399 --> 00:10:29,528
The initial feeling is, we failed, and the challenge of that is getting over the -- First, there's the shock and the grief and the guilt.

00:10:29,528 --> 00:10:33,088
You know, what went wrong?

00:10:33,089 --> 00:10:34,819
What did we do wrong?

00:10:34,818 --> 00:10:40,099
What did I do wrong as a member of the team, if anything?

00:10:40,100 --> 00:10:47,610
And then you get into that aspect of, okay, technically what happened here?
What did we do?

And then that gets broader into, well, are there cultural issues here?

What went wrong there?

Then you get on with fixing everything.

And you can take this to a level lower.

When you made mistakes as a journeyman engineer -- and we did.

You're human.

Yeah, that makes sense.

We're doing stuff for the first time, and we're developing the hardware for the first time, the procedures to test it, and the approach of management was, well, okay, Bobby -- in this case -- assume, okay, you made a mistake.

Scoot up and tell it like it is.

Now, you won't make that mistake anymore as a journeyman engineer, but the fellow coming
in tomorrow or one that's on second shift, or whatever, coming in, they're gonna potentially do the same thing, 'cause you're a responsible person, and this was not an irresponsible act on your part.

So what did we -- management speaking from their viewpoint, what did we do to not set you up to succeed, if that makes a difference?

Is it the training we gave you?

Is it the tools?

Is it the procedures?

Because that's management's responsibility to set you people doing this work up to be successful and to develop a high-quality product -- whatever it is.

So let's talk about that.

Understand the root cause and get on with what we're chartered to do.

It was a great environment to work in, really.
Was there ever a sense that you felt like it was too much -- like the pace was too much, the risk was too much, like it just wasn't gonna happen?

The short answer is no.

We were confident that we were gonna make progress, and we saw that after each mission when things went well.

There were always things in the early missions that didn't go well, but there was enough progress that, no, we're continuing on.

We're gonna get this done, and the work was -- it was an incredible lot of fun.

In fact, you'll hear from a number of the workers it never felt like they really worked at the Space Center.

It was, "Oh, boy."
I got second shift tomorrow, and we're running this test and whatever.

00:13:08,980 --> 00:13:14,879
So I'm gonna work overtime today to brush up on the procedures so I know that when I

00:13:14,879 --> 00:13:20,639
come in here tomorrow, put on my headset, and hook things up, that I'm ready to hit

00:13:20,639 --> 00:13:26,069
the ground running," and, of course, that drug into long days, long nights, long weeks,

00:13:26,070 --> 00:13:30,980
and long months, and I always characterized the whole effort of getting to the Moon, in

00:13:30,980 --> 00:13:33,759
my case, as a seven-year marathon.

00:13:33,759 --> 00:13:36,198
Yeah.

00:13:36,198 --> 00:13:39,659
Man, that's a good way to put it.

00:13:39,659 --> 00:13:42,078
So, Apollo 8, are you in the Control Room for flying the first humans on Saturn V?

00:13:42,078 --> 00:13:43,479
Yes, yes.

00:13:43,479 --> 00:13:53,089
That was my first manned Apollo mission, and I was somewhat surprised that it was only

00:13:53,089 --> 00:13:59,459
three months after Apollo 7 when we flew the astronauts for the first time in an Apollo

00:13:59,458 --> 00:14:06,149
capsule on a smaller Saturn rocket and a previous
Saturn V launch with an unmanned rocket, which

had been sometime months before that was not all that successful.

Okay.

But then there was enough confidence in where we were in our development and acceptance

of this new system and confidence in it that we can go ahead and commit to put three astronauts

on top of it and go around the Moon after what had happened only just a few years before

with Apollo 1, and since then, other than a couple of those unmanned Saturn V launches,

and another one on the Saturn I, we committed to put our three astronauts in a spacecraft

and send them to the Moon.

Yeah.

So we see Apollo 8, 9, and 10 go, for all intents and purposes, pretty well.

We're getting ready for Apollo 11.

Is this different?
Does it feel different from a processing perspective?

I think it did not.

The process of getting it ready was the same as the previous ones, and it was well -- and we looked at it as where we were in the system.

Okay, we accomplished what we had to on this one, Apollo 8.

Apollo 9 got this done.

It was in Earth orbit.

Okay, Apollo 10 got this done.

Now it's in lunar orbit.

So next step is, yeah, let that Lunar Module go all the way down there and let the guys accomplish the objective.

And my take on schedule pressure and that sort of thing was -- it was kind of coincidental.

that it happened when it did.
[Chuckles] Coincidental?

Really.

Yeah.

Because, well, it just did.

It ended up playing out that way, but we followed the progression of events.

We made some modifications along the way as we found problems and fixed them and developed more confidence in the system, and it ended up -- but the approach, again, always from our management was, "Hey, you just do the job right, accomplish all the requirements and objectives, and then you look up at the clock or the calendar, in this case, and say, 'Okay, now we're ready for the next step."

In that case, the next step was Apollo 11, and that first step.

So, for the launch of Apollo 11, where are you and kind of what are you doing during this time?
Okay.

So my primary assignment is Apollo 12. I worked Apollo 10, and then we jumped -- And we always had at least two missions in flow down here.

We had the hardware for that, which was a lot of hardware.

Yeah.

You know, three, actually four stages of the rocket.

Yeah.

Two payloads -- the spacecraft, the Lunar Module, Command Service Module, and all the stuff that hooked them together -- most important payload, of course, being the flight crew.

Sure.

So we kind of cycled back and forth, and so I was on the even-numbered missions in terms
of the campaign of the launch count itself
when our hardware was in Operations and Checkout

00:17:04,400 --> 00:17:05,400
Building.

00:17:05,400 --> 00:17:10,350
We moved back and forth to different spacecraft
doing particular tests, depending on our expertise.

00:17:10,349 --> 00:17:19,549
But when it came to Apollo 11, the primary
launch team guy for my position was in the

00:17:19,549 --> 00:17:22,440
Control Center in the Operations and Checkout
Building.

00:17:22,440 --> 00:17:27,440
If we were not part of the primary launch
time process, if we needed to come in as a

00:17:27,440 --> 00:17:31,190
backup or scrub the next day-type thing, you
had an assignment.

00:17:31,190 --> 00:17:32,509
But I was not in the Control Room.

00:17:32,509 --> 00:17:36,879
In fact, all of us that were not part of that
were advised to stay home...

00:17:36,880 --> 00:17:37,880
Huh.

00:17:37,880 --> 00:17:43,520
...and take some compensatory time, annual
leave, or whatever, and be a spectator, which,

00:17:43,519 --> 00:17:50,519
and, therefore, to not add to the huge traffic
jam which occurred every Apollo mission by

00:17:50,519 --> 00:17:54,460
the way, but it was more so because this one was Apollo 11.

But that was kind of lost on us.

Apollo 10, which we just finished, was just as important, and Apollo 12 will be just as important.

This is the next one in the queue, and they're just gonna do more on their mission than we did the previous, which had been the legacy up to now.

So I got to be a spectator.

I got to watch with my wife and toddler from Titusville, where I lived, which was the first one I was able to watch, by the way.

All the rest of them, I had been in the Control Room and watching with my little 8-inch black-and-white television set.

I couldn't wait to get home to watch the replays on my 18-inch black-and-white TV set.

[ Laughs ] So was that really the life of that Control Room Engineer?
Your job is to watch your eight-inch screen?

That's it, and handle the discrepancies and anomalies that come up as they often did back then -- take over the process of sorting out whether this isn't going well.

Is it the procedures?

Is it the hardware?

It was seldom the software because we didn't have any software back then, or the requirements were asking this hardware to do too much, 'cause it really can't accomplish those specifications in that environment.

But that was my primary job as a Test Engineer for the Command Service Module Spacecraft.

And did you have any sort of function once lift-off happened?

Were you guys involved with the actual landing operations or the Moon walks?

No, once it was "Tower clear," literally, our next responsibility came in as participants.
in the recovery, but we had a Control Room active, on call in the event of an anomaly.

or somebody needed information from the experience of the hardware and the testing at the Cape.

We were there to respond to that, yes.

And, of course, that happened on Apollo 13.

Sure.

So I'm assuming that you would have just been one of the 600 million people worldwide getting to watch on television.

Exactly.

Yes.

Okay.

I still remember on the grainy black-and-white TV set the landing process in the afternoon,

and, of course, that night I made it mandatory -- the kids weren't that old yet, but required that they be in the living room with mom and I watching the first step.
That seems like a good way to spend an evening.

Well, it was for me.

There's kind of an anxiety because we know -- As engineers, you think about all the things that could go wrong.

So every time something went right, it was kind of one of these, "Eh, yeah. Okay. Okay, yeah. That worked. Yeah, there's another good, you know, type of thing."

So we're probably more into it than the average spectator, if that makes sense.

But the way I look at it, and the way everybody else did, too -- hey, we're all part of a team here to accomplish this.

You don't have to be doing the highly visible
thing on launch day to be an important member of the team.

You think about it.

Somebody that does a final-recovery parachute rigging.

That happened in the "O" and "C" Building weeks, month before launch, and then they stamp a procedure that says, "Oh, I did this correctly, and I'm certifying it was done right."

Well, they just gave a "Go" for launch just as important as the one that somebody does in the Control Room with a headset on at T-minus whatever minutes and all the attention and visibility that that got, so...

And the important thing is, that person -- using that example, that parachute rigging -- knew that what they were doing was important and that it had to work, and that's what made every member of the team feel like I'm part of a something that's much bigger than me.
because people are giving those go's for launch
all around the center, in some places elsewhere

around the program just like I am right now.

So they should naturally celebrate and take
pride in that first step, so to speak.

Did you find a similar mentality with your
coworkers at the time -- just kind of that,
like, at least a moment to kind of just, "We
did it."

We accomplished the task.”

Oh, yeah.

Absolutely.

And, of course, you know, we're considered
to be, well, you're the launch team.

You get it off the ground, and then after
that, okay, your responsibility is over, and

that sort of thing, but the way we look at
it is the way I explained earlier with the

Chief Engineer.
He said, "No, it's not done until the crew gets out, gets back on Earth, and then you can really celebrate."

Sure.

So we're now five decades removed from that historic moment -- those historic moments.

As you reflect back, what's your takeaway?

Like, how do you process that today?

Well, it's -- I think it's a reason to be kind of celebratory over the accomplishment,

and, from a personal standpoint, we felt, okay, we're on a mission with the work we do.

Every day or night we go to work, again, I'm looked upon by the public and the Administration at that time as I'm on a mission that the country has decided to embark upon.

So what I do is important, and the fact that Apollo 11 happened to be the one where the mission planner said, "Okay.
Now it's the one.

We're ready to actually go out on the Moon" was not from the standpoint of looking at

It was not a big deal.

You know, it was important now in hindsight, 50 years later.

Well, okay, it was a big deal, but we never got -- and I feel I'm speaking for the others

-- got caught up in, at the time, in that euphoria, that, oh, boy, this one's Apollo

You know, well, I know it's Apollo 11, but Apollo 12 -- You know, you're only as good

as your next mission.
Yeah, that's good and that's important and we got it done.

Yay.

Now, don't lose sight of the ball.

Yeah.

Any words of wisdom for those that are working on the next giant leap for mankind?

Well, never lose sight of the number-one priority.

That's first and foremost, which is the crew and their mission and accomplishing that safely,

and then you can enjoy the mission success.

Be patient.

Never get caught up in the rush to meet a milestone or worry about the cost, and that

was another one of the things that made Apollo successful.

As journeyman engineers, we said, now, you don't worry about schedules.
You need a realistic schedule, and if this is not realistic, you tell us and don't worry about what it costs because we're going to the Moon.

This is a national resolve.

So don't make a decision based on worrying about what this is gonna cost.

If this is the right way to go, this is the way you do it.

And you have to approach that the same way if you're working.

Don't compromise what will work and is safe just because you're worried about what it will cost in terms of schedule or the bucks, and it's a -- And enjoy what you're doing.

Be a member of the team.

I think that's more difficult nowadays than it was then.

We didn't have the technology where you could communicate by e-mails and cellphones.

If you wanted to talk to somebody, you usually got up and went over and talked to that person.
because there weren't that many involved in the process down here, and we didn't have the communications capabilities we have today, and communication is important in a team effort, and then you build more cohesiveness if you get together, sit down across the table, or in big meetings, and we had a lot of meetings. We had a lot of meetings. 'Cause we didn't have the other way to communicate. So everybody had a feel for everyone else who was a participant and their responsibilities, and you wanted them to be successful just like you wanted to be successful. Because if they weren't set up to succeed, then nobody succeeds, if that makes sense. So be a team player for sure. Do your homework and never lose sight of the primary objective. Apollo was -- It was hard because even though
we had a lot of people involved, technology

399
00:27:24,849 --> 00:27:28,250
didn't streamline things like it does today.

400
00:27:28,250 --> 00:27:31,529
It wasn't there.

401
00:27:31,529 --> 00:27:35,609
So there was a lot of human face-to-face interface.

402
00:27:35,609 --> 00:27:37,229
You spent long hours, long weeks.

403
00:27:37,230 --> 00:27:38,309
It was hard on families.

404
00:27:38,309 --> 00:27:39,309
Yeah.

405
00:27:39,309 --> 00:27:41,009
You got to make that point.

406
00:27:41,009 --> 00:27:43,720
The term I use -- “Only the strong survive.”

407
00:27:43,720 --> 00:27:47,380
And credit those families, particularly the spouses of the workers, and most of us were

408
00:27:47,380 --> 00:27:54,330
guys back then, that did keep the family unit together.

409
00:27:54,329 --> 00:28:01,829
And I think another item to consider is, if we're comparing back to the '60s, we are a

410
00:28:01,829 --> 00:28:06,359
more risk-adverse society today than we were back then.

411
00:28:06,359 --> 00:28:09,549
Now, that could be the view of a guy getting
old and cynical...

412
00:28:09,549 --> 00:28:10,609
[ Laughs ]

413
00:28:10,609 --> 00:28:19,519
...but we are, and there's a difference between measuring and assessing a risk and gambling.

414
00:28:19,519 --> 00:28:20,900
Yeah.

415
00:28:20,900 --> 00:28:28,150
And so you don't want to get in the gamble part of it, particularly when human lives

416
00:28:28,150 --> 00:28:31,610
are involved.

417
00:28:31,609 --> 00:28:33,299
You just -- You don't.

418
00:28:33,299 --> 00:28:38,690
But, on the other hand, don't be afraid to accept the risk after you've looked at every

419
00:28:38,690 --> 00:28:45,851
aspect of it technically, and the other side effects of it and decide that -- and have

420
00:28:45,851 --> 00:28:50,690
others look at it to accept the risk.

421
00:28:50,690 --> 00:28:56,850
Again, if the goal is worth the risk, stop worrying about it and go do it.

422
00:28:56,849 --> 00:28:57,849
Cool.

423
00:28:57,849 --> 00:29:00,199
Bob, it's a pleasure to have you.

424
00:29:00,200 --> 00:29:01,200
Thanks for stopping by.

426
00:29:02,200 --> 00:29:03,200
Well, I enjoyed it.

427
00:29:03,200 --> 00:29:04,200
Yeah.

428
00:29:04,200 --> 00:29:07,990
I look forward to the next piece of the great adventure, which has already started because we've been given a goal, right?

429
00:29:07,990 --> 00:29:11,130
Absolutely.

430
00:29:11,130 --> 00:29:16,889
We tracked down Milt Heflin, one of the guys who worked Recovery Operations in the Pacific Ocean when Apollo 11 returned from the Moon.

432
00:29:16,890 --> 00:29:20,970
And he brought along one of his colleagues -- actually, the NASA Landing and Recovery Director for Exploration Ground Systems, Melissa Jones.

436
00:29:32,349 --> 00:29:36,500
Director for Exploration Ground Systems, Melissa Jones.
All right.

I'm in the booth now with Milt Heflin and Melissa Jones.

Thank you both for joining me today.

Thanks for having us.

You bet.

So, I want to kind of go back a little bit.

So, Milt, you actually worked Recovery for the Apollo Program back in the '60s.

Correct?

I did.

I was on the primary recovery ship for the splashdowns of eight Apollo missions.

Man.

So, let's go back a little bit further than that.

What's it like kind of growing up -- 'Cause when you were growing up, there were no astronauts.
So, what's that like to kind of get into the world of NASA and get a job working on plucking astronauts out of the ocean?

Well, [Laughs] I had not planned to come to work for NASA. I was going to continue school, Oklahoma State University, working on my Master's, but a good friend of mine, who had relatives in Houston, came down during spring break of our senior year, and he got hired.

He just showed up on site, and they had tables set up, and he came back and said, "They're looking for people."

So that's how I started, how I got involved. So I didn't have a clue what I was getting into when I started except I knew I would be working -- associated with landing and recovery for Apollo.

And I don't think I ever -- I don't think I ever worried about the fact that I didn't
know what the hell I'm doing, but I'm learning it as I go along, and there was plenty of room to do that.

Now, is that how life was at NASA in the '60s? I mean, that's what I hear is that it's kind of like people got hired and they were like, "We think we're gonna do this, go figure it out."

We had free rein, basically.

go over a number of tests where I was involved in during those days where there was no Test Review Board.

In some cases, there were no procedures other than we wanted to go do this and try that, and if that didn't work, and it was a piece of hardware or something, take it back to the shop, go grind on it, bring it back out, put it on the capsule, run a test, and see
if it worked, and then when you're done, you
know -- I don't remember -- I don't remember

everything followed up with a drawing, either.

[ Laughs ] So, were you an engineer?

Were you a technician?

Like, how would you have described yourself?

I was a Recovery Engineer -- a degree in Physics
and Math, but I was categorized as a Recovery

Engineer, and I worked in a section that was
System Suitability Section -- a weird name,

but, basically, our job was to take the hardware
that was being built to recover the Apollo

and test its suitability for doing that job.

So it was called the System Suitability Section.

So everything to connect with splashdown and
recovery we got involved with some way and

either tested -- Well, we tested in a water
tank there at the Johnson Space Center -- Manned

Spacecraft Center back then, and then we were
close to the Gulf of Mexico, so we would go

out.

We had our own boat that we used to take the capsules out into the Galveston Bay or out

in the Gulf and do tests.

Is there a typical day?

Is this kind of like a just, hey, we know what the ultimate goal is and just whatever

it takes to get it done?

Yes, the last thing you said, Josh, I think is exactly what that was about.

We had an idea, and we were free to just go grab a handful of technicians, folks who would

be involved in setting up a test, and, a lot of times, just making it up as we went along.

But we had a concept that we wanted to get to, and we weren't exactly clear how we're

gonna do that, but we didn't spend a lot of time thinking about it other than just going
and starting to do it and do it as we went along.

Did you feel a sense of pressure or a sense of -- I guess I ask the question like, was there pressure that we had to kind of be done by the end of ‘69?

I don't think that I -- You know, I don't think I ever thought in terms of pressure.

You know, I was learning the trade, basically, and I had a mentor, and so I just basically would follow him around and learn on how things were being done back in that timeframe.

We didn't spend a lot of time thinking about -- I think spending a lot of time worrying about the future more than what we had to do today to do what needed to be done that day or that week and get it done.

That's just what we did.

So, Melissa, certainly not to leave you out of the conversation, but definitely kind of setting a stage there.
As you've worked with Milt and as you've spent time kind of working on Recovery Operations for Orion -- or doing testing now, getting ready for the future -- how are the stories that you hear -- how do you relate to those with our culture today?

That's so funny that you would ask that 'cause, so, first I'd say that having Milt on the team is really like a breath of fresh air a lot of the time. He's very encouraging, and the team loves him and to hear his stories and that kind of stuff, and he will frequently say that this is a magnitude harder than what they tried to do on Apollo, and we have a lot more people on the team, I think, who have their fingers in discussions and a lot more paperwork and traceability and the types of things that I think maybe have the freedom to do differently. One of the examples, right now, I would say, we're working on a strobe objective.
We're trying to -- There's a strobe that goes on the capsule so that you can see it in event of an emergency landing, or if you land at night.

Okay.

And I think, Milt, you had a strobe, as well, and we're trying to develop the test plan, understand all the parameters, and get all the permissions, and, you know, Milt's told me that they just sit on top of the roof at JSC and make sure they can see the light from Galveston Bay, and here we are.

[ Laughs ]

We're trying to put all these procedures and plans and timelines and schedules and stuff together to do a 45-minute test.

So I would say it's definitely different than some of the things that Milt was able to enact in Apollo with the culture that they had back then.
So -- And this is a question for either of you.

How would I summarize that difference?

Is it a nature of kind of working towards repeatability?

Is it working towards precision?

Like, what's a way to classify that?

Why it's so different?

Yeah.

Like, what's the difference?

Like, if you could summarize it, what's the difference?

I don't -

Oh, Melissa.

That's kind of tough.

I think -- Well, as NASA grew up, right or wrong -- and I hardly judge, but various processes
changed, requirements changed.

We did a lot of things that I would -- I would tell you right now, 'cause I was involved in some -- we did a number of things that we were not safe when we did them.

I mean, when we were doing some work, we were not really safe, and we were fortunate, very fortunate a number of times.

Sure.

Well, throughout the period of time from back then to now, we've all been through tragedies in this program.

Agreed.

And so along the way, new requirements come into play, and there's a greater attempt to do things smartly and safely at the same time, and that sometimes is a real hard thing to do.

But I do think that it's all in a positive effort to have proper traceability, proper
accountability, proper visibility to those who are accepting risk for the certain tests that we're doing or the certain flights that we're doing, and so I think that it's all with the right idea.

I don't believe when Apollo started, you guys had a Safety and Mission Assurance organization, and I think we've grown into that culture as we've had some lessons learned and some tragedies.

So I think it's an effort to kind of bring it all back together and make sure that everyone is comfortable with what we're doing based on some lessons learned we've had.

But I do think that sometimes you can get wrapped up in too many boards to make a simple decision.

So there's probably a balance there that we could probably strike a little bit better.
with some work and analysis on our processes.

The overhead that I've seen that Melissa talks about, they get through pretty doggone good.

I mean, it's there, and with her leadership and others, I mean, they get through these things, and sometimes it's difficult to hear all that going on, but it's not like it -- I don't want to say it slows down what you're really trying to do, but it is a very delicate balance between that, and that's what I've seen Melissa and other leaders in the Land and Recovery -- I mean, I can sense that that's what they're exactly trying to do is do what really needs to be done and recognizing what's involved.

So, Milt, you talk about kind of the safety differences.

So back in the '60s, was it a situation where, like, you recognize, "Hey, this is not the safest way to do this, but we have to go."

We've got to move"?
Is that how this is?

Or is it more in hindsight you're saying like, "Wow."

Like, we got away with some crazy stuff that we didn't realize at the time"?

Well, probably a little bit of all of what you said.

You know, I can think of some things that I was involved in relative to testing, and it's like we got what we needed to get done, and in retrospect, not so much then, but years later, when you think about that, you're thinking, "Well, that was -- You know, we were lucky"

that we didn't really injure somebody when we were doing that," and that's just the way it was.

As we kind of think about this idea of safety, and we kind of mention the idea of crew losses, back in the '60s, obviously there was this race against Russia.

We lost the Apollo 1 crew very tragically.
How did that really impact the progress and the process for you guys?

And then kind of, Melissa, as a follow-up for you, how are you learning from kind of that perspective from the Apollo generation?

Well, so going back to Apollo 1 and the fire, it is remarkable what we did in this nation after that.

I mean, you talk about gutsy work going on.

We -- Apollo 7 first manned flight, and then the gutsiest thing this nation has ever done in manned spaceflight in my opinion is Apollo 8, the second Apollo mission where we put that capsule on top of the big Saturn V, and we went to the Moon -- didn't land on the Moon, but we went to the Moon.

After one manned test flight of Apollo, we did that...
Yeah.

...and that, I think, is what really -- really allowed us to say, you know, once Apollo 8 was done, it was like we're rocking and rolling here.

We know what we need to do.

We set up the management structure back then, set up the right kind of things that had to be done on Apollo 9, Apollo 10, leading up to Apollo 11 -- stepping stones that all worked,

and, Josh, I might have got off the subject of your question, so I'm...

No, that's all right.

No, it's good stuff, 'cause, again, I think it's coming back to that reality of, hey,

how do we, like, honor, sacrifice, and make good decisions for the future, and so, Melissa,

again, over to you kind of asking the question like, how does the team kind of process the

fact that you're gonna go pull astronauts out of the ocean after what is, hopefully,
a very successful flight?

Yes, I would say that I think part of your question was how have we changed maybe from Apollo and how we learned from the loss that we've had, and I think that we've learned a lot from lessons Apollo and the Space Shuttle Program brought us about incremental testing and risk acceptance and redundancy and tolerance and margins and factors of safety and design standards and what we feel is acceptable for putting humans -- human people in a giant rocket that has, you know, explosives and cryogenics and different things in it, right, so that we can get to space, and so I think, you know, we have learned from every single -- not just tragedy, but all of the successes that we've had.

We learn from successes that other people, like ULA and SpaceX and Boeing have had. Any success in the space industry is success for all of us, and we learn things from that. We are excited.
We did go from Apollo to water landings to Space Shuttle land landings, and now we're back into the water landings, and I would say that Milt is the only one on the team that really has any experience with that, because those of us who have human spaceflight experience are from the International Space Station Program or from Shuttle.

Right.

So that's one of the reasons why he's so valuable on the team, and he helps us with a lot of the things that Apollo did in their flight rules and their weather conditions and where did they have issues, and so we're all very excited about what we're doing, but we're trying to be very meticulous with our testing, with our procedures, with our safety culture.

We work with the Navy again just like they worked with the Navy a little bit in a different ship configuration, but there are some similarities to the way that Apollo did recovery to what we're trying to do now.
Milt, were you there when Apollo 11 came back and did you help get the "Eagle" out of the water?

I guess it wasn't the "Eagle," 'cause the "Eagle" is on the Moon.

The "Columbia" was the Command Module --

Well, I had many different jobs back in the Apollo days.

Apollo 11, I met the "Hornet," "USS Hornet" at Pearl Harbor.

When the ship got back to Pearl Harbor, I was one of two NASA engineers that oversaw the contractor team that safed the Command Module for air transport back to the United States.

So, for Apollo 11, that's what I did.
I was one of the two team leaders.

We did over about a 48-hour period nonstop, had the contractor team safe the Command Module, and then load it up into a four-engine turboprop cargo carrier.

This is back during the Vietnam time, so this is about the only aircraft that we could use that could make the jump from Hawaii over to the West Coast.

That aircraft, I guarantee you, Josh, I'm surprised the rivets stayed in that airplane when we flew that thing back over here.

[ Laughs ]

That thing shaked, rattled, and rolled the entire time.

So I was the NASA guy on board the airplane that went all the way back to Houston with the Command Module to attach it to the Lunar Receiving Laboratory for further processing when we were done.
So, did you get to see Neil, Buzz, and Michael when they came back?

I saw them being taken off of the ship in a mobile quarantine facility that they had.

Sure.

I saw that happening, but just from down on the deck or down on the dock, seeing them being picked up inside that trailer.

Cool.

That's awesome.

So, Melissa, what's the plan for you as far as with Orion, where are you expecting to be located for Orion Recovery?

So we'll be on a ship, a landing-platform docked ship off the coast of San Diego.

The primary landing location's about 38 to 50 nautical miles off the coast.

I, specifically, will be in the landing area.

They call it the C.I.C.
Combat...

Gosh.

Combat Information Center, I think.

Combat Information Center on the ship.

It's where they run ops on the ship when they have different operations that they run.

So that's where I will be, along with Public Affairs and a few other folks, and we'll have access to the bridge where the captain's at, and we'll have access to the folks who are doing the actual operation in the open water.

So we'll be physically located on the ship when we do the Recovery.

So you thought about what it will be like to greet astronauts coming back from the Moon someday?

[ Chuckles ]

Yes, actually, it's quite mind-blowing to
think about to be perfectly honest, and, you

697
00:47:19,519 --> 00:47:21,469
know, what do you say to them?

698
00:47:21,469 --> 00:47:22,829
Is it, "Welcome home"?

699
00:47:22,829 --> 00:47:27,269
[ Laughter ] You know, just something like
that, knowing that we are there to get them

700
00:47:27,269 --> 00:47:30,911
out as quickly as possible and get them to
medical so that they, you know, can start

701
00:47:30,911 --> 00:47:32,730
to recover from being deconditioned.

702
00:47:32,730 --> 00:47:34,960
But, yes, it's historical.

703
00:47:34,960 --> 00:47:39,210
It's a really exciting thing for me to think
about.

704
00:47:39,210 --> 00:47:48,139
And, Milt, kind of as you've worked with the
team in your current role, what's the one

705
00:47:48,139 --> 00:47:52,339
message that you want to leave to the whole
team to kind of help to -- whether it be encourage

706
00:47:52,340 --> 00:47:59,620
or inspire or support them five decades later
from Apollo 11 and the '60s where we landed

707
00:47:59,619 --> 00:48:00,619
on the Moon?

708
00:48:00,619 --> 00:48:03,980
Well, first of all, Melissa made a comment
a while ago.
The thought came up, and that is, many times as I am participating -- basically, I'm tied into conferences from my home, and occasionally we have face-to-face, but many times she doesn't hear from me, and she doesn't hear from me because I don't have anything to offer at that time because what they're doing makes sense to me.

I mean, I mentioned it a while ago. This recovery of this spacecraft out of the water is an order of magnitude, if not two orders of magnitude more difficult than what we did back in Apollo, and it's very simple.

Because a program sometime ago decided they don't want to take mass into orbit that is gonna be used at the end of the mission only to pick this thing up.

We had a lifting loop on board the Apollo.

This spacecraft is probably 8,000, 10,000 pounds heavier on the water, and it's about 4 feet diameter, also.
It's bigger, and it's like a cork.

It sits on top of the water.

And so they had no way to just get big ol' -- We used bit ol' honking aircraft carriers back in those days.

Right.

And with a crane on board the ship, even though we augmented that crane, and it was an extremely simple operation.

So it's remarkable how they have -- I've watched this develop where you drag in the Orion capsule mock-up into the well deck ship, and, I mean, it has turned out to be a very elegant way to take advantage of physics and be sure that you're tending this 20-some-thousand-pound vehicle as you bring it into the well deck.

I probably got straight off on something there, but that's -- [ Laughs ]
No, I think it's great.

I think that -- What I hear from you is that whether it's good or bad, the long processes are paying off, that we're doing things really well.

Well, so, yeah, and I got away from part of your question there.

The concern that I have - and Melissa knows this, I think, and some of the other key leadership of the team.

They've got a big team, and there's a tendency that everyone wants to play on a big team...

Sure.

And not everybody needs to play on a big team.

Our team was much smaller.

The communications during recovery -- I've often told her.

I said I can recall almost every mission I was on.

We told the captain of the ship that the spacecraft was safe on the water, and then he gave the
command for them dropping swimmers in the water from a helicopter and starting the process,

and the NASA team leaders back then probably didn't say hardly anything during that entire hour, hour-and-a-half process to get both the crew and the Command Module back on the ship.

I mean, there was no go, no-go's.

The helicopter, the swimmers, the deck force all knew what to do, when to do it, and how to do it, and there was no reason to quiz them about anything, and we were fortunate.

In picking this Apollo up, we never had any serious problems.

Well, I should not have said.

Apollo 9, we had a wench problem, and we had to use what was called a Tilly.

It's a big, old crane on board an aircraft carrier that's used to pick up a downed aircraft in the water -- pick it up, and it's on the flight deck.
So we had to use that crane to get the Apollo 9 Command Module back on board, and that was pretty tricky because there's not a good way to tend that thing as it's coming all the way up 40-, 50-some feet.

Awesome.

Melissa, any final thoughts?

No, I just -- not really.

We're excited about the direction that the agency's moving in with the Moon to Mars Program.

Recovery is ready.

We have our hardware.

We actually are getting ready to move into what we call Operation.

So we've got hardware that's been verified and validated and meets all of our requirements for how we move the capsule around.

It's making sure that we preserve it so that
we can get the data that we need off of it

00:52:45,980 --> 00:52:51,179
to verify that we can fly crew for the first
crewed mission, and so I'm very proud of the

00:52:51,179 --> 00:52:55,049
team.

00:52:55,050 --> 00:52:59,000
I do understand Milt's concern about the size
of the team.

00:53:00,599 --> 00:53:06,358
In fact, I think some of it will shrink a
little bit now that we're getting our hardware

00:53:06,358 --> 00:53:07,358
requirements bought off, but we're excited
and we're ready.

00:53:07,358 --> 00:53:11,119
Awesome.

00:53:11,119 --> 00:53:16,480
Well, Milt, we're super proud of you and the
accomplishments -

00:53:16,480 --> 00:53:18,480
Can I tell you one story if you don't mind?

00:53:18,480 --> 00:53:19,480
Yeah.

00:53:19,480 --> 00:53:23,480
I love the stories.

00:53:23,480 --> 00:53:25,480
I love the stories.

00:53:25,480 --> 00:53:27,480
Milt, fire away, man.

00:53:27,480 --> 00:53:28,480
I'm excited.

00:53:18,480 --> 00:53:19,480
Here it comes.

00:53:19,480 --> 00:53:20,480
I thought about it.

00:53:20,480 --> 00:53:24,010
So back -- I talked about Apollo 8.

00:53:24,010 --> 00:53:28,640
I need to tell you how part of that happened.

00:53:28,639 --> 00:53:31,108
So, setting the scene here.

00:53:31,108 --> 00:53:32,980
This is the Christmas Eve trip around the Moon.

00:53:32,980 --> 00:53:34,480
Christmas Eve, 1968.

00:53:34,480 --> 00:53:35,480
Right.

00:53:35,480 --> 00:53:37,659
It is at the height of the Vietnam War.

00:53:37,659 --> 00:53:38,659
Okay.

00:53:38,659 --> 00:53:46,569
Forces are all over out there across the Pacific, and so assets -- ships, planes -- you know,

00:53:46,570 --> 00:53:51,559
they're just not -- I mean, they're around, but it's not like -- It took some effort to

00:53:51,559 --> 00:53:52,570
pull that together.
Well, the very first flight director, Chris Kraft, was the lead flight director back in those days, and NASA Headquarters wanted him to go out to Pearl Harbor and meet with Admiral John McCain from that family.

So he was the Commander in Chief of the Pacific at that time, and he was to go out there -- Kraft was to go out there and brief him and his team about what's needed for Apollo 8, and so Chris Kraft went out there and gave the briefing, and this is an example of how -- This is something that happened back then that I'm not sure happens today collectively in our country to do some great things.

What happened back then was when Kraft got through giving a briefing to an audience of admirals and generals out there at Pearl Harbor, Admiral McCain looked at Kraft and looked at the audience, and he said, "Great briefing. Give this man what he wants."
And I don't see a lot of that today where we're trying to do great things, and that's the big difference to me.

Is it just this kind of authority to say like, "This is the right thing"...

You betcha.

..."whatever it takes, go do it."

You betcha.

I mean, that was a good example of it -- "Give this man what he wants" -- back in that timeframe.

Awesome.

And I was on the "Yorktown," which was the Apollo 8 recovery.

That was my first time to be on a splashdown of Apollo -- Apollo 8.

What's that feeling like?

You got guys that literally just saw the Moon from up close -- the first guys ever, right?

[ Chuckling ] Yes.
Yes.

Absolutely.

They come back, and you're getting to pull them out of the water.

Yes.

What's that feel like?

Well...

[ Laughs ] When they're safely on board the ship, it really feels good.

[ Laughter ] It really feels good.

And I think Borman was on that crew, if I recall.

I hope that's right.

So once the crew is on board -- Actually, the crew got picked up by helicopter.

That's how we did it back in those days.

Then we got the Command Module on board.
It was several hours after the crew had been on board, I'm down there at the Command Module with the team, and we're safing it and going through and de-stowing stuff and packaging.

The next thing I know is there's two hands on my shoulder, shaking me, and it was Frank Borman just saying, "Looks good, buddy. How we doing?"

You know?

And that was cool.

Oh, man.

That's got to feel special.

You bet.

Absolutely.

Absolutely.

Well, Milt, we're appreciative of your efforts.
in the '60s to help us be successful, and
even today, helping us prepare to be successful once again on our Moon missions.

Melissa, obviously you guys have a big, big task ahead of you.

I know that you are all up to the challenge...

We are.

...and we're excited for everything that is to come.

So thank you all, both, for being here.

This team can recover this spacecraft, I guarantee you, and they're gonna be able to recover the crew, too.

Thank you.

Thank you, Milt.

Thanks for having us.

You heard it here first.

The team is ready.
They're pumped and getting excited for the Moon missions coming up in the next few years.

I’m Joshua Santora, and that's our show.

Thanks for stopping by the "Rocket Ranch."

And special thanks to our guests, Bob Sieck, Melissa Jones, and Milt Heflin.

To learn more about the Apollo 50th Anniversary activities, visit nasa.gov.

For more on Orion Underway Recovery, visit nasa.gov/egs.

For all things Orion, visit nasa.gov/orion.

And to learn more about everything going on at the Kennedy Space Center, go to nasa.gov/kennedy.

Special shout-out to our producer, John Sackman, our soundmen, Lorne Mathre and Michelle Stone,

editor, Michelle Stone, and special thanks to Amanda Griffin.

And remember, on the "Rocket Ranch, even the sky isn't the limit.

[ Bird cries ]