

WEBVTT

1

00:00:00.000 --> 00:00:00.885

Test safety workshop.

2

00:00:02.235 --> 00:00:03.445

Without further ado, I'd like

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00:00:03.445 --> 00:00:06.165

to introduce the afternoon session chair, Mr.

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00:00:06.165 --> 00:00:09.525

Steve Wright. He is a, another distinguished graduate

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00:00:09.525 --> 00:00:11.005

of the United States Naval Academy.

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00:00:11.835 --> 00:00:14.085

He's got a, uh, master's in neuro engineering from, uh,

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00:00:14.085 --> 00:00:15.765

post grad school out in Monterey, which I hear is really,

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00:00:16.105 --> 00:00:17.965

really arduous duty.

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00:00:19.945 --> 00:00:21.885

He did, uh, 24 years in the Navy

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00:00:21.905 --> 00:00:23.445

as a P three driver by trade.

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00:00:24.025 --> 00:00:28.645

Uh, graduated from, uh, US Naval TPS class number 1 0 1.

12

00:00:28.875 --> 00:00:31.325

Somehow he lucked into five flying tours at pacs,

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00:00:31.325 --> 00:00:33.245

which I'm not sure how anybody could get fly

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00:00:33.275 --> 00:00:34.445
five flying tours anywhere.

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00:00:34.545 --> 00:00:36.525
And five at p sounds pretty fantastic.

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00:00:37.065 --> 00:00:40.245
He was an instructor at the school, commanded, uh, VX 20,

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00:00:40.285 --> 00:00:41.725
I think it was still called VX 20 at that point.

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00:00:42.625 --> 00:00:45.245
And, uh, now he's the chief pilot for KBR Wiley.

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00:00:45.275 --> 00:00:46.765
He's got, uh, over 5,000 hours

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00:00:46.785 --> 00:00:49.005
and 65 different type model series aircraft.

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00:00:57.955 --> 00:00:58.965
Good afternoon, everybody.

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00:00:59.065 --> 00:01:01.005
Uh, it's a pleasure to be here today, uh,

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00:01:01.005 --> 00:01:02.405
at the flight test safety workshop,

24

00:01:02.405 --> 00:01:03.605
serving as a session chairman.

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00:01:04.245 --> 00:01:06.365
I, I had the good fortune of doing this also last

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00:01:06.365 --> 00:01:07.405
year at, at Melbourne.

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00:01:07.905 --> 00:01:10.525

And, uh, I just, I really like this forum.

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00:01:10.805 --> 00:01:15.125

I, I love the opportunity to share lessons, uh,

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00:01:15.775 --> 00:01:18.925

among representatives for different companies, uh,

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00:01:19.645 --> 00:01:22.125

domestically, internationally, those kinds of things.

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00:01:22.235 --> 00:01:24.245

It's a just a great forum to be able to do that.

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00:01:24.385 --> 00:01:27.085

And I think, uh, this workshop this year has been no

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00:01:27.085 --> 00:01:28.685

exception, and I'm sure it will continue.

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00:01:29.345 --> 00:01:33.725

Um, so the last speaker that we had was Turbo, of course,

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00:01:33.865 --> 00:01:37.685

and Turbo, uh, told us that he was not a very good singer,

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00:01:37.885 --> 00:01:39.085

a very good dancer, and,

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00:01:39.105 --> 00:01:41.845

and not a very good drawer, um, or artist.

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00:01:42.505 --> 00:01:44.245

Uh, but I was at Anaheim last year

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00:01:44.505 --> 00:01:46.485

and, uh, I did see him sing and dance,

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00:01:46.485 --> 00:01:47.965

and he actually did a pretty darn good job.

41
00:01:48.025 --> 00:01:49.805
And his drawing today I thought was pretty good as well.

42
00:01:50.545 --> 00:01:53.005
So I, I can assure you, I'm not gonna sing or dance.

43
00:01:53.105 --> 00:01:54.245
I'm not wearing a Batman or

44
00:01:54.245 --> 00:01:55.685
Superman shirt or anything like that.

45
00:01:56.385 --> 00:02:00.405
Um, and, and I'd even suggest that, uh, I'm gonna thank Tur.

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00:02:00.405 --> 00:02:02.205
Where are you? Turbo? Anyway, raise your hand.

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00:02:02.265 --> 00:02:04.725
Are you still here? Or did you ditch? Uh, he, he's out.

48
00:02:05.225 --> 00:02:07.405
But, you know, on Turbo's scale, he had that, uh,

49
00:02:08.675 --> 00:02:10.245
that knowledge versus skill

50
00:02:10.245 --> 00:02:14.405
or knowledge versus stupidity, um, metric when he was trying

51
00:02:14.405 --> 00:02:15.845
to talk about his human quality rating.

52
00:02:16.585 --> 00:02:18.645
And even though he is not here, I'm gonna thank Turbo

53
00:02:18.645 --> 00:02:20.765
for not using stupidity on that scale,

54
00:02:20.765 --> 00:02:23.285

because he also had something about left, right.

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00:02:23.505 --> 00:02:24.845

You know, do you have the left stuff?

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00:02:24.845 --> 00:02:26.165

Do you have the right stuff? And by virtue

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00:02:26.165 --> 00:02:29.845

of my last name being right, I'd really like to be able

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00:02:29.845 --> 00:02:31.685

to say, but I can't, that I have the right stuff

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00:02:31.685 --> 00:02:34.045

because I've spent my entire life misspelling my name.

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00:02:34.075 --> 00:02:37.405

It's a w instead of an R. So it, it just doesn't work.

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00:02:37.945 --> 00:02:42.205

Um, anyway, uh, it's apparent that

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00:02:42.825 --> 00:02:45.805

the lessons learned from the past keep repeating themselves.

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00:02:46.345 --> 00:02:49.005

Uh, and, and I think it's really important

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00:02:49.715 --> 00:02:52.245

that we don't lose sight of those lessons learned, even

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00:02:52.345 --> 00:02:53.885

as technology advances

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00:02:53.885 --> 00:02:56.005

and we push the envelope with fly by wire systems

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00:02:56.225 --> 00:02:58.165

and aircraft instead of airplanes

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00:02:58.185 --> 00:03:00.365
or rotor and those kinds of things.

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00:03:01.145 --> 00:03:02.365
Um, we still have

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00:03:02.365 --> 00:03:05.165
to keep those lessons from the past, uh, in our focus.

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00:03:05.465 --> 00:03:07.885
And there's a lot of folks here, uh,

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00:03:08.095 --> 00:03:09.405
Jerry Whites is among them.

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00:03:09.405 --> 00:03:13.285
There's many others, uh, who have been longtime, um,

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00:03:13.685 --> 00:03:15.165
participants in this forum

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00:03:15.185 --> 00:03:18.325
and other forums, uh, who have heard those kinds

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00:03:18.325 --> 00:03:20.405
of lessons learned and applied them to test teams

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00:03:20.425 --> 00:03:22.085
and shared them with, with the newer faces.

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00:03:23.155 --> 00:03:25.565
Also, at this workshop, there are those, those newer faces.

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00:03:25.595 --> 00:03:27.525
Perhaps there's, uh, just show of hands,

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00:03:27.625 --> 00:03:29.965
how many people are here for the flight test safety

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00:03:30.065 --> 00:03:31.565

for workshop for the very first time?

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00:03:31.755 --> 00:03:34.605

Show of hands, there's a lot of hands up there, almost half,

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00:03:34.855 --> 00:03:36.685

maybe two fifths or so.

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00:03:37.585 --> 00:03:40.605

So my challenge to you, uh, as a representative

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00:03:40.605 --> 00:03:43.405

of the Flight Test Safety Committee as well, is to A,

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00:03:43.805 --> 00:03:46.485

continue coming to these kinds of forums and to b

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00:03:46.665 --> 00:03:49.005

and b, to be an active, uh,

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00:03:49.075 --> 00:03:52.085

participant in spreading the word, if you will, um,

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00:03:52.265 --> 00:03:54.525

in your organizations, in the, in the test teams

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00:03:54.585 --> 00:03:56.525

and engineering disciplines that you're involved in,

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00:03:56.525 --> 00:03:58.045

because it's really important that we do this.

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00:03:58.785 --> 00:04:03.245

Um, things that stuck struck me, uh, during the course

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00:04:03.245 --> 00:04:05.205

of the last, uh, several technical sessions.

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00:04:05.365 --> 00:04:06.485

I heard things like,

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00:04:06.915 --> 00:04:09.005

when the impossible happens, are you gonna be ready?

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00:04:09.425 --> 00:04:11.325

Are we really thinking about what might happen

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00:04:11.385 --> 00:04:13.565

or what, uh, what could happen?

98

00:04:13.985 --> 00:04:17.125

And I don't know about you, but I remember way back in TPS,

99

00:04:17.265 --> 00:04:20.685

uh, back in the early nineties when somebody said,

100

00:04:20.955 --> 00:04:22.805

that can't happen, or it will never happen.

101

00:04:23.505 --> 00:04:25.365

The hair on the back of your neck should be standing up

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00:04:25.365 --> 00:04:26.925

right away, because that,

103

00:04:26.935 --> 00:04:29.125

those things do happen, and they happen a lot.

104

00:04:29.585 --> 00:04:31.285

Smells is a, is a Kevin Gross

105

00:04:31.345 --> 00:04:34.165

who gave the presentation about the ship and the missile.

106

00:04:34.345 --> 00:04:36.925

Uh, you know, it's alarming that stuff like that can happen.

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00:04:37.505 --> 00:04:40.165

How do we respond in time critical situations?

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00:04:41.105 --> 00:04:42.485

How do we risk mitigate

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00:04:42.985 --> 00:04:45.765

and, uh, incorporate daily ORM into our test hazard

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00:04:46.125 --> 00:04:49.005

analysis, uh, for the test, as well as for that crew with

111

00:04:49.005 --> 00:04:52.205

that weather on that, uh, air vehicle with

112

00:04:52.205 --> 00:04:53.645

that maintenance history on that day.

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00:04:53.905 --> 00:04:57.085

It all plays into the overall, uh, level of success

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00:04:57.085 --> 00:04:58.085

or failure for that day.

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00:04:59.005 --> 00:05:01.365

Somebody said, I think it was the auto GC folks, um,

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00:05:02.325 --> 00:05:05.845

planting seeds in an informal forum like this can help to

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00:05:06.985 --> 00:05:11.605

run a parallel course to perhaps, um, take a,

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00:05:12.315 --> 00:05:15.165

incorporate new technology in an informal way,

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00:05:15.165 --> 00:05:17.365

or to get inertia going in an informal way,

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00:05:17.585 --> 00:05:19.925

rather than just lying on the formal bureaucracy.

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00:05:19.945 --> 00:05:21.965

So, so these forms are important for that as well.

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00:05:22.595 --> 00:05:25.205
Rehearsal, simulation, simulation,

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00:05:25.225 --> 00:05:26.685
not necessarily being representative

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00:05:26.685 --> 00:05:28.045
of flight test and vice versa.

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00:05:28.055 --> 00:05:29.645
These are all things that we've heard before.

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00:05:30.505 --> 00:05:32.845
How about this one? The whole team approach, um,

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00:05:33.175 --> 00:05:34.525
individual preparation.

128

00:05:34.585 --> 00:05:36.405
You go to school, you get an education.

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00:05:36.405 --> 00:05:37.805
Maybe you go to test pilot school

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00:05:37.865 --> 00:05:39.325
or you, you learn from somebody else

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00:05:40.025 --> 00:05:42.245
and you do everything that you can do to be the best person

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00:05:42.245 --> 00:05:45.085
that you can be, but who's watching out for the whole team?

133

00:05:45.475 --> 00:05:49.085
It's not just the pilots, it's not just the, you know,

134

00:05:49.105 --> 00:05:50.365
the air crew in the back.

135

00:05:50.365 --> 00:05:51.885

If you're in a multi-play aircraft.

136

00:05:52.145 --> 00:05:54.405

How about the monitoring engineers and the test conductor

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00:05:54.405 --> 00:05:55.765

and the training for all those different things?

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00:05:56.045 --> 00:05:57.685

Somebody's gotta be paying attention to all that stuff.

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00:05:58.385 --> 00:06:03.125

Um, and lastly, small changes like, uh, in the, uh,

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00:06:03.125 --> 00:06:05.125

steep approach, uh, presentation we had,

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00:06:05.375 --> 00:06:07.085

small changes can result in,

142

00:06:07.105 --> 00:06:08.885

in big changes in the overall outcome.

143

00:06:08.985 --> 00:06:11.645

So there's a lot of lessons that we need to, to, uh,

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00:06:11.645 --> 00:06:12.885

to continue to pay attention to.

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00:06:13.545 --> 00:06:15.925

Uh, and I'm gonna be here today just to help facilitate

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00:06:15.925 --> 00:06:17.045

and get these speakers out so

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00:06:17.045 --> 00:06:18.965

that you can hear about what they've got to present.

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00:06:19.625 --> 00:06:22.245

Our first speaker today is Lieutenant Colonel Tom Fields.

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00:06:22.745 --> 00:06:25.485

Um, he tells me his real name is Dale, but he goes by Tom.

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00:06:25.865 --> 00:06:28.085

Um, there's probably a story there. He's a Marine.

151

00:06:28.435 --> 00:06:30.125

He's currently the government flight test director

152

00:06:30.185 --> 00:06:33.205

for the F 35 at the VX at VX 23 down at Pax River.

153

00:06:33.875 --> 00:06:36.485

He's got a bs, aerospace Engineering from Virginia Tech.

154

00:06:36.905 --> 00:06:38.285

Uh, he's been all over the world.

155

00:06:38.665 --> 00:06:43.125

He was, uh, commissioned, I guess in, uh, 19 90, 19 98, yep.

156

00:06:43.705 --> 00:06:45.685

Uh, designated as an aviator in 2000.

157

00:06:46.145 --> 00:06:47.765

He did his initial training in F 18.

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00:06:47.885 --> 00:06:50.885

Hornets, uh, served in Iwa Kuni with VMFA two 12.

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00:06:51.505 --> 00:06:53.085

Uh, he went on to Camp Lejeune

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00:06:53.085 --> 00:06:55.885

and the 24th Marine Expeditionary Unit, uh,

161

00:06:56.085 --> 00:06:59.245

deployed overseas, uh, to Sandy, dusty places there.

162

00:07:00.185 --> 00:07:02.925

Um, he also went to Oceana, served with the, uh,

163

00:07:03.285 --> 00:07:06.725

F-R-S-V-F-A 1 0 6 for the, uh, F 18, uh,

164

00:07:06.805 --> 00:07:08.405

FRS there in Oceana.

165

00:07:09.425 --> 00:07:11.285

Uh, let's see. He's been to Edwards,

166

00:07:11.365 --> 00:07:12.525

the Air Force Test Pilot School.

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00:07:12.525 --> 00:07:14.845

He's been to China Lake with the VX 31 Dust Devils.

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00:07:14.845 --> 00:07:16.525

He's been to Beaufort. Um,

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00:07:17.185 --> 00:07:20.245

and now he's at Pax River with VX 23, as I said,

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00:07:20.245 --> 00:07:21.525

as a government flight test director,

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00:07:21.525 --> 00:07:22.845

and formerly as the operations Officer.

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00:07:23.625 --> 00:07:26.245

Uh, let's see. He's a graduate of Top Gun.

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00:07:26.395 --> 00:07:28.965

He's got over 2,500 flight hours and 30 aircraft,

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00:07:28.965 --> 00:07:30.485

and he is a member of SETP,

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00:07:30.785 --> 00:07:33.365

and he is gonna talk to us today about flight test,

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00:07:33.365 --> 00:07:34.445
continuation criteria,

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00:07:34.635 --> 00:07:37.645
lessons learned in the F 35 flight test program.

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00:07:38.025 --> 00:07:39.325
Please welcome Tom Fields.

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00:07:51.355 --> 00:07:52.655
Thanks for the introduction.

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00:07:52.835 --> 00:07:54.695
Uh, good news, bad news story.

181

00:07:55.435 --> 00:07:56.975
We all just, uh, shoved a bunch

182

00:07:56.975 --> 00:07:59.135
of food in our faces now sitting down in our stomach.

183

00:07:59.795 --> 00:08:01.495
And, uh, man, that tasted good,

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00:08:01.495 --> 00:08:03.495
but bad news is the coma is gonna hit soon.

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00:08:04.035 --> 00:08:05.695
So, uh, I come prepared.

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00:08:06.185 --> 00:08:08.495
First guy who, uh, gets tired, raise your hand.

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00:08:08.495 --> 00:08:11.335
I'll run this out to you. And, uh, we'll keep going

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00:08:11.335 --> 00:08:12.935
through for the rest of us.

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00:08:13.075 --> 00:08:14.815

Uh, we're gonna have to power through marine style

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00:08:15.115 --> 00:08:16.175

and, uh, see what we can do.

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00:08:17.485 --> 00:08:20.215

Alright, so, uh, I'm really here just to share.

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00:08:20.395 --> 00:08:23.055

Uh, so a couple events that, uh, that we've seen in,

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00:08:23.075 --> 00:08:25.815

in the last 12 months in F 35 test in, uh, PAX River,

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00:08:26.205 --> 00:08:29.455

that have really changed the way that I'll approach, uh,

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00:08:29.455 --> 00:08:31.135

flight test continuation criteria.

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00:08:31.635 --> 00:08:33.815

And, uh, hopefully in the process, you guys will, uh,

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00:08:33.815 --> 00:08:35.055

get something to walk away with.

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00:08:37.005 --> 00:08:39.575

Okay, so, flight test continuation criteria.

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00:08:39.575 --> 00:08:43.375

What are we talking about? Um, this is not a, a novel idea,

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00:08:43.435 --> 00:08:45.375

but, uh, I personally called

201

00:08:45.375 --> 00:08:46.415

it something different in the past.

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00:08:46.515 --> 00:08:48.135

But we're really using, uh,

203
00:08:48.635 --> 00:08:52.135
or developing tools to, uh, use an envelope expansion.

204
00:08:52.595 --> 00:08:56.405
So identifying safety of, uh, safety of flight parameters

205
00:08:56.785 --> 00:09:00.285
and, uh, using predictions and, uh, test background

206
00:09:00.285 --> 00:09:03.845
and, uh, test history to, uh, uh, line up tolerances

207
00:09:03.845 --> 00:09:06.405
that are gonna keep us within, within thresholds.

208
00:09:06.465 --> 00:09:09.165
So if you hit a threshold, you may be entering into a safety

209
00:09:09.165 --> 00:09:11.485
of flight or a danger area.

210
00:09:12.145 --> 00:09:14.045
And then if you hit those tolerances, uh,

211
00:09:14.045 --> 00:09:16.005
establishing a get well plan, uh,

212
00:09:16.005 --> 00:09:18.685
whether we continue the flight test today or we stop

213
00:09:18.825 --> 00:09:20.205
and we come back again another day

214
00:09:22.515 --> 00:09:25.605
Down at the integrated test force in, uh, PAX River.

215
00:09:26.505 --> 00:09:29.045
Our approach is with our FQ team owns these,

216
00:09:29.225 --> 00:09:30.925

uh, owns these criteria.

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00:09:31.315 --> 00:09:32.325

They establish 'em.

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00:09:32.325 --> 00:09:36.085

We referenced some in our test plans, um, some good examples

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00:09:36.185 --> 00:09:39.805

of of quantitative, uh, tolerances that we're gonna look to,

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00:09:40.185 --> 00:09:41.485

you know, where your CG is,

221

00:09:41.485 --> 00:09:43.165

where our control margin is for the day.

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00:09:43.505 --> 00:09:46.325

Air data quality hinge moments for loads, uh,

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00:09:46.395 --> 00:09:47.685

tail temperatures if you're going

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00:09:47.685 --> 00:09:49.605

after high speed testing, um,

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00:09:49.945 --> 00:09:51.765

you're gonna be an afterburner for a long time.

226

00:09:52.665 --> 00:09:56.525

And then you get into more squishy areas like handling

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00:09:56.525 --> 00:09:59.045

qualities, system evals, handling qualities.

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00:09:59.045 --> 00:10:00.685

We're gonna add in handling quality ratings.

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00:10:00.685 --> 00:10:03.205

So five or greater PIO ratings of three or greater.

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00:10:03.665 --> 00:10:06.485
And again, recognizing that those are gonna come

231
00:10:07.065 --> 00:10:09.405
at different ratings from different pilots under different

232
00:10:09.405 --> 00:10:11.765
days system evals.

233
00:10:12.425 --> 00:10:15.405
So we don't have hard criteria in our flight test, uh,

234
00:10:15.405 --> 00:10:17.645
continuation criteria for system evals.

235
00:10:17.865 --> 00:10:21.485
Uh, but we do reference workload system integrity system

236
00:10:21.485 --> 00:10:23.445
performance to identify when we're

237
00:10:23.605 --> 00:10:24.845
reaching, uh, a tolerance.

238
00:10:28.665 --> 00:10:32.045
So, specifically, we'll, we'll talk to, uh, editor fueling,

239
00:10:32.265 --> 00:10:36.805
uh, with the, uh, KC 1 35 boom drug assembly, uh, for those

240
00:10:36.805 --> 00:10:39.605
of us in, uh, naval aviation, also known as the Iron Maiden.

241
00:10:40.145 --> 00:10:43.045
Uh, and we're looking to expand the envelope to be able

242
00:10:43.045 --> 00:10:46.565
to use the afterburner on the F 35 to be able to go higher

243
00:10:46.785 --> 00:10:48.845

and heavier and, uh, slower.

244

00:10:49.545 --> 00:10:51.205

Uh, we'll also talked to some, uh,

245

00:10:51.205 --> 00:10:53.045

night system evals we did on, uh,

246

00:10:53.205 --> 00:10:56.685

L-H-A-A-U-S-S America, uh, last November.

247

00:10:57.265 --> 00:11:00.405

Uh, so on our third developmental test period at sea, uh,

248

00:11:00.405 --> 00:11:04.205

looking to, uh, clear, uh, the aircraft for aided, uh,

249

00:11:04.205 --> 00:11:06.725

takeoff of the landings with, uh, the gen three helmet.

250

00:11:10.955 --> 00:11:12.925

Alright, first, we'll start talking, uh,

251

00:11:12.925 --> 00:11:16.925

with the editor fueling, uh, we'll talk to our systems, uh,

252

00:11:16.925 --> 00:11:19.565

the systems, uh, under test, uh, task description,

253

00:11:19.785 --> 00:11:21.645

and then some of our safety considerations

254

00:11:21.665 --> 00:11:22.725

and our game plan.

255

00:11:23.065 --> 00:11:25.565

And then we'll, uh, we'll, we'll, uh, take,

256

00:11:25.565 --> 00:11:27.005

watch some videos of our testing.

257

00:11:27.865 --> 00:11:30.605

Uh, so system, uh, to be, uh,

258

00:11:31.295 --> 00:11:33.285

first from the KC 1 35 perspective.

259

00:11:33.905 --> 00:11:36.885

Uh, for those of us that are, are unfamiliar, uh,

260

00:11:36.885 --> 00:11:39.605

they basically modified the boom, uh, center line boom

261

00:11:39.605 --> 00:11:42.765

for a KC 1 35 by, uh, placing a, uh,

262

00:11:42.765 --> 00:11:46.005

large metal knuckle right here, attaching a huge, uh, hose

263

00:11:46.025 --> 00:11:47.405

to it, about nine feet long.

264

00:11:47.535 --> 00:11:50.245

Think, uh, fire hose type of material.

265

00:11:50.865 --> 00:11:54.605

Uh, another knuckle here, uh, where you attach a, uh,

266

00:11:54.605 --> 00:11:56.525

heavy basket to a lot of rubber

267

00:11:56.785 --> 00:11:58.005

and a lot of weight right there.

268

00:11:58.625 --> 00:12:00.485

Uh, so, uh, three things that, uh,

269

00:12:00.485 --> 00:12:01.605

have a lot of weight to 'em.

270

00:12:01.705 --> 00:12:03.005

Uh, one short hose

271

00:12:03.505 --> 00:12:06.685

and a lot of things to bang your canopy, uh, air data system

272

00:12:06.825 --> 00:12:09.045

and, uh, lose prob on,

273

00:12:09.045 --> 00:12:10.725

or maybe introduce some extra

274

00:12:10.725 --> 00:12:12.245

ingredients into your engine there.

275

00:12:13.345 --> 00:12:17.045

Um, for the, uh, additional consideration,

276

00:12:17.195 --> 00:12:19.845

this picture is taken from the boom, uh, dr.

277

00:12:19.905 --> 00:12:22.165

Uh, operator's, uh, perspective.

278

00:12:22.675 --> 00:12:24.885

They're flying the boom while, uh,

279

00:12:24.895 --> 00:12:26.085

while you're trying to plug in it.

280

00:12:26.505 --> 00:12:29.605

Uh, this works great for heavier aircraft where they've got,

281

00:12:30.105 --> 00:12:31.925

you know, move the boom around,

282

00:12:32.035 --> 00:12:35.045

they're flying it using a stick, uh, a controller.

283

00:12:35.265 --> 00:12:37.965

And then these, uh, control surfaces, uh, move that boom,

284

00:12:37.995 --> 00:12:41.765
left and right, up and down, um, from the F 35,

285

00:12:41.765 --> 00:12:44.485
we'll talk more specifically to the system, uh, in a second.

286

00:12:44.865 --> 00:12:47.125
And the tasks that we're really looking to accomplish,

287

00:12:47.125 --> 00:12:49.925
pretty straightforward, uh, come in, uh,

288

00:12:49.945 --> 00:12:52.245
do a wake survey at each condition, uh,

289

00:12:52.245 --> 00:12:53.565
behind the basket itself.

290

00:12:53.745 --> 00:12:56.805
Uh, assess the pre-contact, uh, condition,

291

00:12:56.805 --> 00:12:59.525
so you're just short of, uh, of getting ready to plug.

292

00:12:59.865 --> 00:13:02.645
And then assess the, uh, task of plugging

293

00:13:02.705 --> 00:13:04.245
and then maintain the fuel transfer zone.

294

00:13:04.505 --> 00:13:06.365
You'll do that straight and level then

295

00:13:06.365 --> 00:13:07.925
to 15 degrees angle bank,

296

00:13:07.925 --> 00:13:10.925
then 30 degrees angle bank in both directions.

297

00:13:11.705 --> 00:13:16.685

Um, So couple

298

00:13:16.685 --> 00:13:19.445

things to consider from the F 35 perspective placement

299

00:13:19.465 --> 00:13:20.965

of the, uh, refueling probe.

300

00:13:21.315 --> 00:13:22.325

Just off the right side

301

00:13:22.325 --> 00:13:23.685

of the nose, which is pretty standard.

302

00:13:24.225 --> 00:13:26.885

Uh, what's not necessarily standard is that, uh,

303

00:13:26.885 --> 00:13:28.965

what's directly between the eye side of the pilot

304

00:13:29.265 --> 00:13:32.125

and the, uh, the probe itself is a canopy bow,

305

00:13:32.585 --> 00:13:33.925

so it's, uh, perfectly placed.

306

00:13:34.025 --> 00:13:35.165

So you can't see the,

307

00:13:35.165 --> 00:13:37.005

the probe without moving your, hel your head.

308

00:13:37.705 --> 00:13:42.165

Um, and then, uh, the relative position of the probe to, uh,

309

00:13:42.165 --> 00:13:46.365

the pilot's v vision produces some challenges in terms of,

310

00:13:46.905 --> 00:13:48.485

uh, assessing where the probe is

311
00:13:48.485 --> 00:13:49.845
and then predicting where it's going

312
00:13:49.845 --> 00:13:51.885
to go based on your current inputs.

313
00:13:52.625 --> 00:13:54.925
Uh, additionally, we're, we're using, we're planning

314
00:13:54.945 --> 00:13:56.365
to use afterburn in these tests.

315
00:13:57.065 --> 00:14:00.125
So the standard, uh, throttle configuration is you have a,

316
00:14:00.205 --> 00:14:03.085
a at the mill D tent, you have resistance on the throttle,

317
00:14:03.085 --> 00:14:04.605
you push forward up and through that,

318
00:14:04.865 --> 00:14:05.965
and then you're in a burner

319
00:14:05.965 --> 00:14:08.205
and you feel a little kick in the seat of the pants.

320
00:14:08.825 --> 00:14:11.325
Uh, just for your awareness, there's about four stages

321
00:14:11.465 --> 00:14:14.165
of afterburner and the F 35, no indication

322
00:14:14.265 --> 00:14:17.005
to you in the cockpit of what stage you're in, uh,

323
00:14:17.065 --> 00:14:18.245
but see of the pants feel

324
00:14:18.465 --> 00:14:20.325

and the combined with movement on the throttle.

325

00:14:20.905 --> 00:14:22.365

And, uh, you have a pretty good feel

326

00:14:22.385 --> 00:14:25.325

for when you're hitting a new stage of afterburner.

327

00:14:27.185 --> 00:14:30.285

Uh, so what we'll do is look at a quick video here.

328

00:14:30.545 --> 00:14:33.365

Um, and this is just a, a plug on a KC 1 35,

329

00:14:33.365 --> 00:14:36.325

but on a long, uh, hose off one of the wingtip pods.

330

00:14:36.785 --> 00:14:37.845

Uh, uh, and, but

331

00:14:37.845 --> 00:14:40.165

what we can see is a perspective from a pilot,

332

00:14:40.745 --> 00:14:43.445

and then, uh, you can look at, uh, closure rates

333

00:14:43.745 --> 00:14:45.365

and the movement of the pilot's head

334

00:14:45.385 --> 00:14:46.725

as we get close to plugging.

335

00:14:52.665 --> 00:14:55.405

So, real quick, uh, HMD displays,

336

00:14:55.405 --> 00:14:57.045

you look forward, it stabilizes.

337

00:14:57.105 --> 00:14:59.925

So it presents to you a similar picture like a HUD would.

338

00:15:00.385 --> 00:15:03.285

Off the left side, you've got, uh, airspeed, uh,

339

00:15:03.285 --> 00:15:06.165

right side altitude, flight path marker, velocity vector,

340

00:15:06.165 --> 00:15:08.285

depending on, uh, what language you speak.

341

00:15:08.945 --> 00:15:11.365

And then, uh, XXLD, cell Q

342

00:15:11.905 --> 00:15:13.925

and, uh, some other references for us.

343

00:15:15.635 --> 00:15:18.445

Here we go. Be aware.

344

00:15:18.445 --> 00:15:20.285

This, uh, this picture itself is a little

345

00:15:20.305 --> 00:15:21.805

skewed in terms of the helmet.

346

00:15:21.805 --> 00:15:24.325

Camera is about three to four inches above eyesight,

347

00:15:24.545 --> 00:15:27.205

so it's looking right at the canopy bow the whole time.

348

00:15:27.225 --> 00:15:29.725

But this'll, this will come in discussions later,

349

00:15:50.235 --> 00:15:50.525

Okay.

350

00:15:50.545 --> 00:15:52.045

Say, good news, no drama there.

351

00:15:52.185 --> 00:15:55.725

Uh, but very nice controlled approach, good handling, good,

352

00:15:55.725 --> 00:15:59.965

uh, flying qualities of the aircraft in the, uh, air,

353

00:15:59.965 --> 00:16:01.085

air, uh, refueling arena.

354

00:16:01.865 --> 00:16:04.005

So, concerns we had during this test.

355

00:16:04.145 --> 00:16:05.885

As we approached, uh, the test,

356

00:16:05.885 --> 00:16:09.965

obviously we're concerned about, uh, lag in our, uh,

357

00:16:10.235 --> 00:16:13.365

four af control with, uh, selecting afterburner coming in

358

00:16:13.365 --> 00:16:14.445

and out of it under different

359

00:16:14.445 --> 00:16:16.205

conditions in and out of turns.

360

00:16:16.345 --> 00:16:19.285

And then we're also concerned about at slower speeds

361

00:16:19.285 --> 00:16:23.005

and higher altitude, uh, controlled deflections, uh, uh,

362

00:16:23.395 --> 00:16:25.805

exceeding, um, that nine foot hose

363

00:16:26.145 --> 00:16:28.925

and putting us in a position where we may damage the, uh,

364

00:16:29.145 --> 00:16:32.685

our aircraft, the tanker, or possibly something worse.

365

00:16:33.585 --> 00:16:36.525

So we're stuck with our, uh, gen generic game plan.

366

00:16:36.525 --> 00:16:40.045

Our, our, uh, established plan of using HQ R'S PIO ratings

367

00:16:40.305 --> 00:16:43.165

to let us know when it's time to take a break from test

368

00:16:43.185 --> 00:16:47.365

or, uh, but we also added in, uh, pre-contact evaluations,

369

00:16:47.905 --> 00:16:49.925

uh, for each condition prior to continuing.

370

00:16:50.785 --> 00:16:54.485

Uh, the intent was let's identify from pre-contact if it's,

371

00:16:54.505 --> 00:16:57.245

if it's a possible to even tanking under these conditions,

372

00:16:58.005 --> 00:17:01.165

straighten level and a turn, and in both directions.

373

00:17:01.745 --> 00:17:05.165

And then, uh, that way, uh, if we, we don't perceive it,

374

00:17:05.225 --> 00:17:06.765

it is possible to do.

375

00:17:07.025 --> 00:17:08.405

And that's an edge of the envelope,

376

00:17:08.465 --> 00:17:10.005

and we'll come back and assess that later.

377

00:17:11.305 --> 00:17:12.605

So it seems like at the time,

378

00:17:12.605 --> 00:17:14.125

we felt like we had a pretty good game plan.

379

00:17:14.535 --> 00:17:18.805

Let's, uh, look at, let's second flight test, uh, with the,

380

00:17:19.065 --> 00:17:20.285

uh, afterburner.

381

00:17:24.685 --> 00:17:28.665

We got a F 35 C here, fully loaded air ground, uh, uh,

382

00:17:28.725 --> 00:17:32.225

gun pod and, uh, bombs and, uh, weapons across the wings.

383

00:18:02.715 --> 00:18:04.765

Okay. You can see he's working kind of, uh,

384

00:18:05.715 --> 00:18:07.125

he's working kind of hard there.

385

00:18:07.825 --> 00:18:11.765

Um, and, uh, just as a, uh, as someone who's done it,

386

00:18:11.765 --> 00:18:13.685

you're sweating pretty heavily when you're right there

387

00:18:13.685 --> 00:18:16.765

behind the, the, the, uh, iron Maiden itself.

388

00:18:17.345 --> 00:18:19.805

So, another feature that I hadn't mentioned yet, uh,

389

00:18:19.985 --> 00:18:21.565

as we started this day of flight test,

390

00:18:21.565 --> 00:18:24.685

our second flight test, the KC 1 35 autopilot failed.

391

00:18:25.065 --> 00:18:27.405

And, uh, we had to make a decision,

392

00:18:27.465 --> 00:18:29.565

do we continue without the autopilot?

393

00:18:29.945 --> 00:18:30.965

And we said, of course.

394

00:18:31.445 --> 00:18:33.685

I mean, why would you wanna limit the envelope to,

395

00:18:33.825 --> 00:18:34.965

uh, autopilot only?

396

00:18:35.545 --> 00:18:40.125

Uh, now I've flown a KC 1 35 once and was heavily coached

397

00:18:40.305 --> 00:18:42.685

and, uh, ended the flight very sweaty and frustrated.

398

00:18:43.225 --> 00:18:47.205

So, uh, I can only imagine, uh, what these guys were like.

399

00:18:47.225 --> 00:18:48.765

But as a point of reference,

400

00:18:49.025 --> 00:18:52.125

the tanker pilots were fatigued, ran out of energy

401

00:18:52.125 --> 00:18:54.445

before the test pilots did,

402

00:18:54.785 --> 00:18:56.965

and we had to stop testing this day to do

403

00:18:56.965 --> 00:18:58.005

to tanker pilot fatigue.

404

00:18:58.665 --> 00:19:01.125

Um, so we're gonna continue this.

405

00:19:01.235 --> 00:19:03.885

Something to take a look at as we can continue.

406

00:19:03.885 --> 00:19:05.805

The video is the horizontal stabs,

407

00:19:06.225 --> 00:19:08.445

and then hopefully you'll be able to hear the, uh, calm,

408

00:19:13.405 --> 00:19:14.405

Continue transfer, standby.

409

00:19:22.075 --> 00:19:23.855

Is there any reason to continue control?

410

00:19:37.365 --> 00:19:38.545

So, I dunno if you could hear that or not,

411

00:19:38.685 --> 00:19:41.505

but, uh, the test pilot eventually came up

412

00:19:41.505 --> 00:19:43.425

and said, uh, do you have see any reason

413

00:19:43.525 --> 00:19:44.585

to continue control?

414

00:19:45.165 --> 00:19:47.145

And, uh, I think they came back and said, no.

415

00:19:47.565 --> 00:19:49.745

But, uh, an interesting point there.

416

00:19:49.845 --> 00:19:51.625

He had reached control saturation.

417

00:19:51.625 --> 00:19:54.625

So as he's moving the stick, uh, for aft, uh,

418

00:19:54.625 --> 00:19:56.825

the controls cannot keep up with his inputs.

419
00:19:57.085 --> 00:19:58.465
And so we've reached a corner there.

420
00:19:59.005 --> 00:20:01.585
Uh, but no one, no one said anything from the control room.

421
00:20:01.765 --> 00:20:03.265
And the pilot didn't say anything either

422
00:20:03.395 --> 00:20:05.065
until he stopped sweating for a second.

423
00:20:05.645 --> 00:20:07.585
Uh, so we obviously have reached the corner

424
00:20:08.045 --> 00:20:10.585
and we, our, our continuation criteria

425
00:20:10.615 --> 00:20:11.705
game plan has failed us.

426
00:20:13.905 --> 00:20:17.175
Let's look for, uh, our final test event with the case 1 35.

427
00:20:18.075 --> 00:20:20.615
Uh, this is another, uh, endpoint,

428
00:20:20.955 --> 00:20:22.895
and we declared testing complete after this,

429
00:20:47.025 --> 00:20:49.165
So we'll watch that, uh, one more time.

430
00:20:49.345 --> 00:20:52.765
But, uh, something to consider to take a look at is, uh,

431
00:20:52.765 --> 00:20:54.405
there was interesting interaction there

432
00:20:54.405 --> 00:20:57.285

between the boom operator and the test aircraft.

433

00:20:57.825 --> 00:20:59.365

The test aircraft makes 'em maneuver.

434

00:20:59.395 --> 00:21:01.965

It's a little uncomfortable in terms of the hose is

435

00:21:01.965 --> 00:21:05.765

between the basket and they, uh, and the canopy.

436

00:21:06.225 --> 00:21:07.965

And then the boom operator makes what

437

00:21:08.545 --> 00:21:12.005

is probably a smart maneuver to assist in, uh, uh, fixing

438

00:21:12.005 --> 00:21:13.165

that, uh, situation.

439

00:21:13.465 --> 00:21:17.005

And as the, uh, test bot corrects the knuckle where the,

440

00:21:17.385 --> 00:21:19.885

the boom, uh, meets the hose, comes fairly close

441

00:21:19.885 --> 00:21:24.325

to his canopy, and then the boom operators had enough pulls

442

00:21:24.325 --> 00:21:26.045

away, breaks the, uh, probe tip off,

443

00:21:26.665 --> 00:21:28.725

and, uh, the probe tip fails its design,

444

00:21:28.865 --> 00:21:30.325

no FOD ingested in the engine,

445

00:21:30.385 --> 00:21:32.205

but, uh, we've reached an end point.

446

00:21:59.135 --> 00:22:00.675

So, uh, obviously our, our,

447

00:22:00.675 --> 00:22:04.275

our FTCC game plan has not had the desired results.

448

00:22:04.735 --> 00:22:06.875

Uh, the good news is we had seen enough of the envelope

449

00:22:06.875 --> 00:22:08.635

that we felt like we had something very useful

450

00:22:08.635 --> 00:22:10.315

for the fleet, and there wasn't a need

451

00:22:10.315 --> 00:22:11.675

to return to a test here.

452

00:22:14.185 --> 00:22:17.315

Okay, so moving on to our, uh, evaluation on the ship.

453

00:22:18.055 --> 00:22:19.875

Uh, we'll talk to the system

454

00:22:20.295 --> 00:22:22.275

and, uh, task description very shortly.

455

00:22:22.615 --> 00:22:25.235

The system itself that we're worried about is the helmet,

456

00:22:25.655 --> 00:22:27.355

and, uh, we've got a decent breakdown

457

00:22:27.355 --> 00:22:30.875

that in the next slide, the flying qualities, uh, the F 35

458

00:22:31.495 --> 00:22:34.635

had, uh, fairly, uh, comfortable with those at the ship.

459

00:22:34.635 --> 00:22:36.475

This will be our third, this was our third trip in

460

00:22:36.475 --> 00:22:37.555
developmental test to the ship.

461

00:22:38.175 --> 00:22:40.915
And this was also simultaneously the second trip

462

00:22:40.935 --> 00:22:43.595
for operational test in the F 35.

463

00:22:44.215 --> 00:22:46.155
So, uh, uh, the performance

464

00:22:46.155 --> 00:22:49.155
of the aircraft in the still ball environment is, uh,

465

00:22:49.155 --> 00:22:50.155
fairly established,

466

00:22:50.335 --> 00:22:52.715
and we're comfortable with its ability to take off on land

467

00:22:52.715 --> 00:22:53.875
during day and night conditions.

468

00:22:54.465 --> 00:22:56.915
Unaided, uh, the task, uh,

469

00:22:56.915 --> 00:22:59.835
for the night is a very straightforward executed deck.

470

00:22:59.985 --> 00:23:01.635
Eval, the lighting on the, uh, ship,

471

00:23:02.375 --> 00:23:05.395
and then once, uh, if the air crew is comfortable,

472

00:23:05.785 --> 00:23:09.475
execute a short takeoff, execute multiple, uh, uh,

473
00:23:09.535 --> 00:23:11.475
low approaches until you've reached a fuel state,

474
00:23:11.475 --> 00:23:14.635
which we can hover and then, uh, desal to a hover

475
00:23:14.635 --> 00:23:15.675
and a, a vertical landing.

476
00:23:19.215 --> 00:23:22.955
So for the, uh, gen three helmet, um, this is just, uh,

477
00:23:22.955 --> 00:23:23.995
for our generic essay.

478
00:23:23.995 --> 00:23:25.875
It's designed to be one stop shopping.

479
00:23:26.515 --> 00:23:29.275
I have in one helmet, I have off or site capability.

480
00:23:29.755 --> 00:23:32.555
I have, uh, uh, HMD that provides a, uh,

481
00:23:32.795 --> 00:23:34.835
a hu a light display when facing forward.

482
00:23:35.295 --> 00:23:37.995
And as the conditions change outside, I don't have

483
00:23:37.995 --> 00:23:38.995
to take off my visor

484
00:23:39.055 --> 00:23:41.715
and put on, uh, vis nine mbg

485
00:23:41.815 --> 00:23:43.555
to have a night vision capability.

486
00:23:44.175 --> 00:23:46.205

Uh, we've got two cameras that assist in that.

487

00:23:46.205 --> 00:23:48.565

There's a camera on the dash forward of the pilot,

488

00:23:49.225 --> 00:23:50.645

and there's a camera on your helmet.

489

00:23:51.035 --> 00:23:53.045

This camera, uh, forward of the pilot's designed

490

00:23:53.065 --> 00:23:55.565

to capture a, uh, a view forwarder view

491

00:23:55.565 --> 00:23:58.885

that allows the pilot to see through the canopy itself,

492

00:23:58.945 --> 00:24:01.045

the canopy bow itself, uh,

493

00:24:01.065 --> 00:24:03.645

and then the helmet, uh, cams also, uh,

494

00:24:03.725 --> 00:24:06.605

similar our capabilities also collecting images for you,

495

00:24:06.665 --> 00:24:08.285

and then projecting, processing

496

00:24:08.285 --> 00:24:10.005

and projecting those images on the visor.

497

00:24:13.825 --> 00:24:16.325

So things we're worried about here, ship lighting control

498

00:24:16.325 --> 00:24:18.565

and adjustment, not the simplest thing to do in the world.

499

00:24:18.755 --> 00:24:21.925

Most, uh, aircraft around the L-H-A-L-H-D rotary, uh,

500
00:24:22.205 --> 00:24:23.845
aircraft will, will wear s nines,

501
00:24:23.845 --> 00:24:25.285
do aided landings and takeoffs.

502
00:24:25.665 --> 00:24:28.245
And so you want, uh, covert lighting, uh,

503
00:24:28.505 --> 00:24:31.045
and then adjusting those to overt conditions to allow

504
00:24:31.045 --> 00:24:33.045
for AV eight Bs to land either aided

505
00:24:33.045 --> 00:24:34.965
or unaided, is not a simple process.

506
00:24:35.575 --> 00:24:38.085
Think, uh, top of the line, uh,

507
00:24:38.405 --> 00:24:40.565
riostat production from 1947,

508
00:24:41.065 --> 00:24:42.725
and that's what you're getting in your brand new

509
00:24:42.805 --> 00:24:44.045
L-H-A-U-S-S America.

510
00:24:44.585 --> 00:24:46.565
Uh, some things don't change very quickly.

511
00:24:47.465 --> 00:24:49.845
Uh, it would take us something along, uh,

512
00:24:50.265 --> 00:24:52.125
10 knobs on those rear stats to adjust,

513
00:24:52.125 --> 00:24:53.325

depending on lighting conditions.

514

00:24:53.395 --> 00:24:55.245

Plus two more control stations

515

00:24:55.385 --> 00:24:56.765

to adjust the lighting on the deck.

516

00:24:57.065 --> 00:24:59.605

And between aided and on unaided landings,

517

00:25:00.375 --> 00:25:02.045

we're also concerned about cliffs

518

00:25:02.045 --> 00:25:03.285

and system performance in the helmet.

519

00:25:03.665 --> 00:25:07.125

The helmet had not been tested very, uh, thoroughly in terms

520

00:25:07.145 --> 00:25:08.885

of numbers of hours airborne,

521

00:25:09.025 --> 00:25:11.085

and we had seen some degradations of performance

522

00:25:11.085 --> 00:25:12.165

that we were concerned about.

523

00:25:12.985 --> 00:25:15.405

So we established a mitigation plan in our buildup to the,

524

00:25:15.465 --> 00:25:17.925

the, uh, the actual debt itself.

525

00:25:17.945 --> 00:25:20.805

And then once we're out on the ship, uh, we,

526

00:25:20.905 --> 00:25:24.965

our mitigation plan consisted of doing unaided, uh, uh,

527
00:25:24.965 --> 00:25:26.805
night landings under lowlight conditions

528
00:25:26.825 --> 00:25:27.885
and highlight conditions,

529
00:25:28.265 --> 00:25:29.805
and then starting aided, uh,

530
00:25:29.805 --> 00:25:31.165
landings under highlight conditions

531
00:25:31.165 --> 00:25:32.445
and transitioning to lowlight.

532
00:25:33.085 --> 00:25:35.205
Additionally, working from our most experienced

533
00:25:35.305 --> 00:25:40.005
to our least experienced pilots, Uh,

534
00:25:40.225 --> 00:25:43.125
one aspect of the helmet that has always been advantageous

535
00:25:43.125 --> 00:25:47.045
to us is ible controls on what's displayed in your helmet.

536
00:25:47.585 --> 00:25:50.525
So if I want to turn my night vision system off,

537
00:25:50.765 --> 00:25:53.445
I just click right castle, right on the right on the stick,

538
00:25:53.865 --> 00:25:56.365
and I'll turn it off back to unaided display.

539
00:25:56.585 --> 00:26:00.565
If I want it back, I, I can, uh, uh, quickly, uh, command

540
00:26:00.565 --> 00:26:01.965

that and it's available to you.

541

00:26:02.115 --> 00:26:05.485

This has come in as a mitigating feature in air,

542

00:26:05.485 --> 00:26:10.005

air fueling at night, and also in f CLPs at the field.

543

00:26:11.585 --> 00:26:12.765

So let's get to the videos

544

00:26:13.105 --> 00:26:15.045

and, uh, we'll talk through a couple things here.

545

00:26:19.195 --> 00:26:21.445

Okay. What we're looking at here is,

546

00:26:23.415 --> 00:26:24.685

shoot, I missed it again.

547

00:26:27.035 --> 00:26:29.885

Highlight conditions, very highlight conditions as it was.

548

00:26:29.995 --> 00:26:33.245

This is a, uh, super moon during our debt.

549

00:26:33.945 --> 00:26:36.125

Uh, the brightest, the moon's been in 50 years.

550

00:26:36.525 --> 00:26:39.485

I don't know how that happens, you

551

00:26:39.485 --> 00:26:41.845

know, But it did.

552

00:26:42.035 --> 00:26:45.005

It's really bright. And so what you're looking at forward

553

00:26:45.105 --> 00:26:48.925

of you just, uh, this is the image from the FAM overlaid.

554

00:26:48.955 --> 00:26:51.645

It's a picture and picture type of, uh, presentation.

555

00:26:51.905 --> 00:26:56.365

And is the F cam's, uh, field of, uh, view is ceases now.

556

00:26:56.365 --> 00:26:57.765

You can see the canopy bill off to the right.

557

00:26:58.565 --> 00:27:00.805

HMD symbol is available to you in the FCA

558

00:27:01.185 --> 00:27:03.365

and still available to you as you look off ForSight.

559

00:27:03.825 --> 00:27:06.325

Uh, currently a pilot's in a hover next to the ship.

560

00:27:06.475 --> 00:27:08.925

He's gonna transition over the ship, uh,

561

00:27:09.325 --> 00:27:11.245

stabilize over spot seven and then land.

562

00:27:26.985 --> 00:27:28.765

And my apologies, I falsely advertised.

563

00:27:28.765 --> 00:27:29.965

He was gonna land, he did land.

564

00:27:30.225 --> 00:27:32.085

We cut it outta the video, 'cause it, it wanted

565

00:27:32.085 --> 00:27:34.325

to minimize time here, but you can see the image.

566

00:27:34.325 --> 00:27:37.725

It's pretty good. Uh, very easy to tell where you are

567

00:27:37.985 --> 00:27:39.645

and relative to the ship's tower

568

00:27:39.785 --> 00:27:41.845

and where you are relative to the tram line, the,

569

00:27:41.845 --> 00:27:42.885

the center of the landing area.

570

00:27:43.425 --> 00:27:46.605

Uh, keep in mind as we look at these videos, this imagery

571

00:27:46.605 --> 00:27:49.205

where we record in the aircraft is a little bit better than

572

00:27:49.205 --> 00:27:50.365

what you see in the helmet.

573

00:27:52.105 --> 00:27:55.965

So the, the next night after that, we flew again, super Moon

574

00:27:56.465 --> 00:27:58.685

and transitioned into low light.

575

00:27:59.345 --> 00:28:02.365

Uh, on the following night, uh, we were at low light,

576

00:28:02.585 --> 00:28:05.565

and it was slowly the moon was starting to come up

577

00:28:05.785 --> 00:28:06.965

as we started our test.

578

00:28:07.945 --> 00:28:10.365

And this is, uh, this'll pick up with the, uh,

579

00:28:10.365 --> 00:28:11.725

pilot has taken off.

580

00:28:12.185 --> 00:28:14.125

Now he's done multiple low approaches

581
00:28:14.505 --> 00:28:16.805
and he is approaching, uh, the, uh,

582
00:28:16.805 --> 00:28:18.085
landing area from the stern.

583
00:28:18.585 --> 00:28:21.325
So we, a couple of mitigations that we added on is

584
00:28:21.325 --> 00:28:22.365
to do a straight in approach

585
00:28:22.365 --> 00:28:23.725
of the stern of the, of the ship.

586
00:28:23.725 --> 00:28:27.405
Instead of transitioning, uh, from, uh, just, uh, left

587
00:28:27.405 --> 00:28:29.805
of the ship over the landing area, it was a little bit

588
00:28:29.805 --> 00:28:31.565
of a simpler maneuver and more automated.

589
00:28:50.665 --> 00:28:52.885
So the imagery is obviously a little bit different here.

590
00:28:53.905 --> 00:28:57.245
And, uh, he's slowly approaching forward.

591
00:28:57.265 --> 00:28:59.005
You can see on the rat out he's a little bit

592
00:28:59.005 --> 00:29:00.085
lower than he normally would be.

593
00:29:00.485 --> 00:29:02.765
Normally be like, uh, more like 40, 50 feet here.

594
00:29:04.385 --> 00:29:07.485

And he's looking down at the right trying to establish

595

00:29:07.485 --> 00:29:09.925

where he is for apt on the, uh, ship.

596

00:29:12.595 --> 00:29:15.295

That's the tower itself where the LSO sits.

597

00:29:20.845 --> 00:29:23.265

And right there are two generators that he walked by

598

00:29:23.405 --> 00:29:24.785

as he walked out to his aircraft.

599

00:29:24.805 --> 00:29:27.345

So he knew where those were on the, uh, Ship deck.

600

00:29:47.345 --> 00:29:51.165

And now he's landed. I think his words

601

00:29:51.165 --> 00:29:54.365

after that were something, uh, along the lines of control.

602

00:29:54.365 --> 00:29:55.685

You're gonna have to gimme a compelling

603

00:29:55.685 --> 00:29:57.245

reason to do that again.

604

00:29:58.875 --> 00:30:02.125

Yeah, There were some other words later on that day.

605

00:30:03.945 --> 00:30:06.285

Um, I do have another video here.

606

00:30:06.315 --> 00:30:07.565

It's gonna take us right up to the end,

607

00:30:07.565 --> 00:30:09.805

but I think I can get through our conclusions fairly quick.

608
00:30:09.975 --> 00:30:12.685
These are comments, interviews with members

609
00:30:12.685 --> 00:30:14.765
of the control room there, and we'll get

610
00:30:14.765 --> 00:30:16.045
to why this is relevant.

611
00:30:16.255 --> 00:30:17.685
It'll be Billy, it'll be fairly okay.

612
00:30:17.685 --> 00:30:19.285
Camp got into the jet and started doing his startup.

613
00:30:19.345 --> 00:30:21.725
And once he got started up and was flipping through NVC

614
00:30:21.725 --> 00:30:22.765
to kind of see how it would look,

615
00:30:22.765 --> 00:30:24.485
he started giving us his comments on

616
00:30:24.485 --> 00:30:26.085
how he thought the NVC was performing

617
00:30:26.145 --> 00:30:28.805
by the time he got the deck lighting set, how he wanted to,

618
00:30:28.805 --> 00:30:31.365
with, with pride flies, with pride flies assistance.

619
00:30:31.865 --> 00:30:34.205
Uh, he was comfortable with the conditions

620
00:30:34.205 --> 00:30:35.205
that he was owing off in.

621
00:30:35.465 --> 00:30:39.445

As the controller engineers, when we hear that, we default

622

00:30:39.465 --> 00:30:40.925
to pilot's comfortable.

623

00:30:40.925 --> 00:30:42.885
He's a test pilot, he's experienced, so a lot

624

00:30:42.885 --> 00:30:44.685
Of what we're paying attention to are his comments about

625

00:30:44.825 --> 00:30:47.325
how the night vision camera impact his ability

626

00:30:47.325 --> 00:30:48.645
to do the task of flying the

627

00:30:48.805 --> 00:30:49.805
Airplane. As soon as he

628

00:30:49.805 --> 00:30:51.125
took off, and he, the way he talked,

629

00:30:51.245 --> 00:30:52.685
I was like, this is, this is not good.

630

00:30:52.815 --> 00:30:54.485
There is something obscuring my

631

00:30:54.645 --> 00:30:56.285
HMD was the first one I heard.

632

00:30:56.385 --> 00:30:58.605
I'm like, this doesn't sound like anything we've heard

633

00:30:58.605 --> 00:30:59.685
to date with the night testing

634

00:30:59.695 --> 00:31:00.845
we've done on this detachment.

635

00:31:01.225 --> 00:31:02.925

It was almost like a fog for him.

636

00:31:03.185 --> 00:31:05.565

So, you know, he got up and out and went up

637

00:31:05.565 --> 00:31:07.165

and started kind of troubleshooting that.

638

00:31:08.065 --> 00:31:10.845

And, you know, at that point I became uncomfortable

639

00:31:11.145 --> 00:31:15.735

and I was waiting for what do we do next? The fact

640

00:31:15.735 --> 00:31:17.135

That he kept referring to it,

641

00:31:17.135 --> 00:31:18.735

and it was a, a frequent thing.

642

00:31:18.735 --> 00:31:20.415

And it wasn't something that was just a,

643

00:31:20.765 --> 00:31:22.135

like a momentary glitch.

644

00:31:22.315 --> 00:31:24.735

It was something that was there and it wasn't going away.

645

00:31:25.415 --> 00:31:28.455

I think that's when we realized that it wasn't quite

646

00:31:28.565 --> 00:31:30.455

what we were expecting to have happen. This is

647

00:31:30.455 --> 00:31:31.815

The point where anytime I talk about it,

648

00:31:31.815 --> 00:31:33.735

I started getting the heebie-jeebies hairs on the back

649

00:31:33.735 --> 00:31:35.095

of my neck, start, start sanding up.

650

00:31:35.235 --> 00:31:37.735

So when, once he got into the hover

651

00:31:37.735 --> 00:31:39.855

and then crossed over the spot, it became very clear

652

00:31:39.855 --> 00:31:43.215

that the picture he was working with was unsatisfactory

653

00:31:43.235 --> 00:31:44.255

for doing any sort

654

00:31:44.255 --> 00:31:46.775

of operation in the very close vicinity of the ship.

655

00:31:47.845 --> 00:31:50.375

Okay, I'm gonna stop it there, but you guys get the point.

656

00:31:50.725 --> 00:31:54.735

They knew in the control room something was not right. Um,

657

00:32:01.115 --> 00:32:03.335

So how did we do that?

658

00:32:04.315 --> 00:32:07.415

We took a pilot, uh, threw him out in the deep end,

659

00:32:08.075 --> 00:32:11.055

and, uh, he found himself in a position where he had

660

00:32:11.055 --> 00:32:13.775

to recover on the ship, elected to proceed.

661

00:32:14.195 --> 00:32:17.575

No one told him to stop it. And, uh, he made it happen.

662
00:32:18.375 --> 00:32:19.855
I think his words later on were,

663
00:32:20.185 --> 00:32:21.735
screw you ship, I'm landing on you.

664
00:32:22.395 --> 00:32:26.535
And, uh, we got lucky. There's, there's no way around it.

665
00:32:26.955 --> 00:32:28.415
We got very lucky that night.

666
00:32:29.075 --> 00:32:32.855
Now, part of this, uh, is many factors apply in this,

667
00:32:33.355 --> 00:32:35.495
and one of the major ones that I walked away from is,

668
00:32:35.515 --> 00:32:38.095
and I think turbo hit on this, is the same things

669
00:32:38.095 --> 00:32:42.045
that make you a good pilot, uh, that I can hack it mentality

670
00:32:42.825 --> 00:32:44.925
can, uh, really get in the way when you need

671
00:32:44.925 --> 00:32:46.685
to make decisions early on whether

672
00:32:46.685 --> 00:32:48.365
or not I should be continuing this test.

673
00:32:48.865 --> 00:32:51.005
And that plays into air of fueling,

674
00:32:51.005 --> 00:32:53.805
definitely played into our work at the ship at night.

675
00:32:54.305 --> 00:32:57.125

And, uh, my dad plays a lot of golf.

676

00:32:57.145 --> 00:32:59.125

He likes to say it's better to be lucky than good.

677

00:32:59.505 --> 00:33:00.845

Uh, but in this case, uh,

678

00:33:01.025 --> 00:33:02.965

we really felt like there's some things that we need

679

00:33:02.965 --> 00:33:04.405

to do better as an organization.

680

00:33:05.145 --> 00:33:06.805

Uh, so I'm guilty of it.

681

00:33:06.925 --> 00:33:08.645

I went out behind the, the tanker right

682

00:33:08.645 --> 00:33:10.405

after one of our younger pilots did.

683

00:33:10.405 --> 00:33:13.965

And I was, you know, didn't, didn't wanna, uh, say anything

684

00:33:13.965 --> 00:33:14.965

to him until I'd done it.

685

00:33:15.225 --> 00:33:17.885

And I spent a good five minutes in pre-contact sweating

686

00:33:18.065 --> 00:33:19.205

and working hard and,

687

00:33:19.265 --> 00:33:21.165

and thinking, I think I can make this happen.

688

00:33:21.665 --> 00:33:22.725

You know, you know, Dutch

689

00:33:22.745 --> 00:33:23.965

did it the other day, I can do this.

690

00:33:24.585 --> 00:33:27.565

And, uh, and that's, it's a funny thing. I got briefed.

691

00:33:27.765 --> 00:33:30.125

Everyone reminded, everyone, reviewed it with everyone,

692

00:33:30.365 --> 00:33:32.045

reviewed the test teams, and I'm still

693

00:33:32.045 --> 00:33:33.285

susceptible to the same threats.

694

00:33:34.505 --> 00:33:36.485

Uh, and, uh, no doubt,

695

00:33:37.065 --> 00:33:39.725

but that bit us when we went out to the ship, uh,

696

00:33:39.725 --> 00:33:44.005

that pilot was seeing some stuff that was unusual, difficult

697

00:33:44.005 --> 00:33:45.445

to interpret, uh,

698

00:33:45.445 --> 00:33:47.885

and yet he still elected to continue with the approach.

699

00:33:48.345 --> 00:33:51.485

And our test teams, uh, saw some indications in

700

00:33:51.585 --> 00:33:53.285

inside their, uh, control room.

701

00:33:53.875 --> 00:33:55.885

They were worried, but we didn't

702

00:33:55.885 --> 00:33:57.245

clearly communicate that on the radio.

703

00:33:57.985 --> 00:34:00.005

Uh, so there was some interesting stuff there.

704

00:34:00.875 --> 00:34:02.085

What are we walking away from?

705

00:34:02.665 --> 00:34:06.045

Um, I think it's really important to build a flight test,

706

00:34:06.045 --> 00:34:09.165

continuation game plan that has a quantifiable crosscheck.

707

00:34:09.785 --> 00:34:12.405

So, uh, allows you

708

00:34:12.405 --> 00:34:14.925

to objectively assess how are we doing?

709

00:34:15.225 --> 00:34:16.605

Are we doing as well as I think we are?

710

00:34:17.065 --> 00:34:20.165

Uh, does my, you know, do my personal traits,

711

00:34:20.225 --> 00:34:21.485

you know, that may get in the way.

712

00:34:21.505 --> 00:34:22.805

Are they still, uh, treat me?

713

00:34:22.825 --> 00:34:25.285

Are they still an advantage to us?

714

00:34:26.205 --> 00:34:27.405

Practice communication and training.

715

00:34:28.245 --> 00:34:30.005

Communication's not easy. It's not easy

716
00:34:30.225 --> 00:34:32.605
for an engineer two years outta school to raise his hand

717
00:34:33.025 --> 00:34:35.005
and say, Hey, this flight test event

718
00:34:35.005 --> 00:34:38.125
that we've been working 14, 16 hours a day on,

719
00:34:38.295 --> 00:34:39.765
there is a lot of pressure to complete,

720
00:34:39.985 --> 00:34:41.125
and we're out here on the ship.

721
00:34:41.445 --> 00:34:42.765
I want you to stop everything you're doing.

722
00:34:43.195 --> 00:34:45.405
It's not an easy thing, but if you're practice it,

723
00:34:45.405 --> 00:34:48.685
it makes it a more, a more likely condition to occur.

724
00:34:49.615 --> 00:34:52.035
And identifying better timing in both conditions.

725
00:34:52.115 --> 00:34:54.955
I, I think we had decent timing identified in air or fueling

726
00:34:55.255 --> 00:34:57.475
and the, uh, shipboard event that,

727
00:34:57.475 --> 00:34:59.035
that decision should have been made well

728
00:34:59.035 --> 00:35:00.715
before desing to the hover.

729
00:35:01.215 --> 00:35:03.955

And, uh, we didn't provide them with quantifiable tools

730

00:35:04.185 --> 00:35:07.115

that is saying, Hey, if you can't identify certain, uh,

731

00:35:07.185 --> 00:35:08.235

certain aspects

732

00:35:08.235 --> 00:35:09.955

of the ship on the downwind, then we're not landing.

733

00:35:10.375 --> 00:35:11.555

We obviously did after that

734

00:35:11.975 --> 00:35:14.555

and restricted ourselves from conducting any more, uh,

735

00:35:14.565 --> 00:35:17.915

aided landings and, uh,

736

00:35:17.975 --> 00:35:20.075

and then acknowledged that, hey, we, the same things

737

00:35:20.075 --> 00:35:22.675

that make us good pilots can also make us bad testers.

738

00:35:23.255 --> 00:35:25.955

Uh, so I think that, uh, the ability

739

00:35:25.975 --> 00:35:28.195

and the willingness to hack it has gotten,

740

00:35:28.295 --> 00:35:29.555

gotten me through OCS.

741

00:35:29.555 --> 00:35:30.635

It's gotten me through flight school,

742

00:35:30.635 --> 00:35:32.915

gotten me qua on the carrier the first time.

743
00:35:33.495 --> 00:35:36.075
No kidding. Rolling in behind the, like, uh, back deck

744
00:35:36.075 --> 00:35:37.845
of a big deck carrier and a T 45.

745
00:35:38.685 --> 00:35:41.045
I didn't think this was gonna work out well at all,

746
00:35:41.385 --> 00:35:43.325
you know, but I was like, I think we can do it.

747
00:35:43.385 --> 00:35:45.605
My buddy just did it. I've been doing it in practice.

748
00:35:45.865 --> 00:35:47.485
I'm gonna do it now. And we made it happen.

749
00:35:47.915 --> 00:35:50.725
That same thing, I can come back and bite you.

750
00:35:51.065 --> 00:35:52.805
So I think it's good to be, to be aware of it

751
00:35:53.145 --> 00:35:55.245
and, uh, the awareness of that is perishable.

752
00:35:55.505 --> 00:35:58.805
It goes away. All right.

753
00:35:58.885 --> 00:36:00.605
I can, I went over my time successfully.

754
00:36:00.745 --> 00:36:03.245
Uh, most of us stayed awake. Are there any questions for me?

755
00:36:06.455 --> 00:36:08.315
Uh, certainly in the back and in the Commodore,

756
00:36:09.385 --> 00:36:10.715

What, what were your escape options?

757

00:36:10.875 --> 00:36:13.235

I mean, if the engineers were gonna cool, knock it off.

758

00:36:13.465 --> 00:36:15.675

What, what were the options open to the pilot?

759

00:36:16.055 --> 00:36:18.635

Um, can you turn the lights up or can you divert the shore?

760

00:36:19.045 --> 00:36:20.955

Great question. So at the point in the hover,

761

00:36:21.095 --> 00:36:23.115

you cannot divert the shore due to fuel state.

762

00:36:23.735 --> 00:36:25.835

Uh, you're committed to the ship.

763

00:36:26.415 --> 00:36:29.515

Uh, so yes, you can, uh, turn the lights back on

764

00:36:29.515 --> 00:36:31.635

what we perceived to, and that was an option.

765

00:36:32.175 --> 00:36:33.835

Uh, we, I firmly believe that

766

00:36:33.835 --> 00:36:36.515

what saved us here is the stability of the aircraft.

767

00:36:36.975 --> 00:36:38.915

So if you go hands off in that condition,

768

00:36:39.065 --> 00:36:40.435

it's gonna maintain its relative

769

00:36:40.595 --> 00:36:41.715

position over the spot for you.

770
00:36:41.895 --> 00:36:42.995
If all systems are working,

771
00:36:43.535 --> 00:36:46.435
and it did, uh, he did not have a lot of options.

772
00:36:46.435 --> 00:36:48.635
He could turn the helmet off and ask for more lights

773
00:36:48.775 --> 00:36:51.955
and let his eyes adjust, and there was time to do that.

774
00:36:52.455 --> 00:36:55.475
But I think on stem power, that was not an option that came

775
00:36:55.475 --> 00:36:56.635
to, came to mind to him.

776
00:36:57.215 --> 00:37:00.195
Uh, so my real thought is you've gotta make that decision.

777
00:37:01.375 --> 00:37:04.075
We didn't re-arm, you know, we pre-med the teams,

778
00:37:04.095 --> 00:37:06.715
but we didn't re-arm 'em in the brief that night to make

779
00:37:06.715 --> 00:37:07.755
that decision early enough.

780
00:37:08.575 --> 00:37:10.675
Uh, obviously the next night we were fairly

781
00:37:10.705 --> 00:37:14.555
well triggered to do that. Uh, Commodore

782
00:37:15.385 --> 00:37:17.595
Real quick, the videos were shown in the tank.

783
00:37:18.095 --> 00:37:22.355

Uh, how many different test pilots were in those videos?

784

00:37:22.795 --> 00:37:24.755

I think we had everybody in the shop go across, oh,

785

00:37:24.755 --> 00:37:25.915

different test pilots.

786

00:37:25.975 --> 00:37:28.835

Uh, two different ones in those videos.

787

00:37:29.495 --> 00:37:31.755

And then almost every pilot in the shop went across

788

00:37:31.755 --> 00:37:32.955

the back of the tinker.

789

00:37:33.825 --> 00:37:35.635

Okay. Because the, the iron ma,

790

00:37:35.665 --> 00:37:37.995

like you point out it's very high game task.

791

00:37:38.215 --> 00:37:42.395

And, and a, a technique is to move the tails like that

792

00:37:42.615 --> 00:37:43.755

and your jet doesn't move.

793

00:37:43.905 --> 00:37:47.155

Another technique is to just not let the tails move

794

00:37:47.255 --> 00:37:48.555

and the jet still doesn't move.

795

00:37:49.145 --> 00:37:51.915

Yeah, that first pilot you saw was a high game pilot.

796

00:37:52.255 --> 00:37:53.515

Uh, he got the award

797
00:37:53.515 --> 00:37:55.395
for saturating the controls more than anybody else.

798
00:37:55.895 --> 00:37:58.795
He also, uh, had a very marine like reaction

799
00:37:58.795 --> 00:38:01.355
that the ship started to shoot past the spot

800
00:38:01.775 --> 00:38:04.275
and just pulled the stick out of its, uh,

801
00:38:04.275 --> 00:38:06.435
control quadrant trying to slow down the aircraft.

802
00:38:07.015 --> 00:38:09.395
So, uh, you want him on your football team

803
00:38:09.895 --> 00:38:11.595
and he is also a good high gain tester.

804
00:38:12.775 --> 00:38:16.275
And those points were also high altitude, uh, high,

805
00:38:16.925 --> 00:38:18.135
High altitude, heavy weight.

806
00:38:18.515 --> 00:38:20.935
Uh, so the biggest challenge is really transitioning

807
00:38:20.935 --> 00:38:23.735
through the turns and then finding those conditions

808
00:38:23.735 --> 00:38:25.175
where it's just not workable at all.

809
00:38:25.635 --> 00:38:27.735
Uh, which were actually easy to find

810
00:38:27.735 --> 00:38:30.455

with the KC 1 35 not in autopilot.

811

00:38:30.605 --> 00:38:31.605

Okay,

812

00:38:31.995 --> 00:38:32.995

Sir. Probably did need

813

00:38:32.995 --> 00:38:34.095

a jsf behind that.

814

00:38:34.155 --> 00:38:36.205

You could, the same thing with the hornet

815

00:38:36.985 --> 00:38:38.565

or at similar, a similar lesson

816

00:38:39.005 --> 00:38:40.005

I think. So we were really

817

00:38:40.005 --> 00:38:42.325

hoping to avoid that, you know, to,

818

00:38:42.345 --> 00:38:44.765

to find a corner in the tanker like that.

819

00:38:45.215 --> 00:38:47.205

Again, you're getting lucky not to have anybody hurt.

820

00:38:47.265 --> 00:38:49.605

And we've all seen anybody's plugged

821

00:38:49.605 --> 00:38:50.845

along on the Iron Maiden nose.

822

00:38:51.025 --> 00:38:52.085

The the cliffs are steep

823

00:38:52.465 --> 00:38:54.045

and uh, they generate a lot

824
00:38:54.045 --> 00:38:55.765
of fun stories once everybody's on deck.

825
00:38:56.625 --> 00:38:57.845
But along those lines,

826
00:38:58.185 --> 00:39:00.605
are you putting anything in the test monitoring

827
00:39:00.625 --> 00:39:03.085
or on the jet to tell the pilot he's getting the rate limit

828
00:39:03.905 --> 00:39:05.565
and he's saturating your control system?

829
00:39:05.915 --> 00:39:07.885
Well, I think that's exactly what the control room's for.

830
00:39:08.345 --> 00:39:11.525
Uh, they are monitoring your, your control inputs

831
00:39:11.705 --> 00:39:13.365
and you, your flight control conditions.

832
00:39:14.185 --> 00:39:16.165
Uh, no,

833
00:39:16.745 --> 00:39:17.765
No. Knock it off at all.

834
00:39:18.475 --> 00:39:21.005
Yeah, that's, uh, exactly bingo.

835
00:39:21.105 --> 00:39:23.845
And that's one of the, the major learning points from this

836
00:39:23.985 --> 00:39:26.765
is man, our, our test team communication

837
00:39:26.765 --> 00:39:28.645

with the test pilot broke down.

838

00:39:31.665 --> 00:39:34.645

Um, alright, question, did you pointed out

839

00:39:34.645 --> 00:39:36.645

that there was a, a missed court,

840

00:39:37.565 --> 00:39:40.325

a pilot taking a directive action in the room operator.

841

00:39:41.195 --> 00:39:43.215

Did you guys come up with some sort of

842

00:39:44.055 --> 00:39:46.855

enhanced communications to avoid that after

843

00:39:46.855 --> 00:39:47.855

That?

844

00:39:47.915 --> 00:39:50.975

Uh, no. And this is, lemme give you,

845

00:39:51.685 --> 00:39:52.735

this could be a long answer,

846

00:39:52.795 --> 00:39:54.815

but the Air force is, is boom,

847

00:39:55.055 --> 00:39:57.095

operators are not gonna change the way they conduct their,

848

00:39:57.105 --> 00:39:59.895

their work to satisfy a fighter pilot's input.

849

00:40:00.375 --> 00:40:02.175

I can tell you that from many trans packs

850

00:40:02.175 --> 00:40:04.215

and discussions on Wake Island, Hey guys,

851

00:40:04.235 --> 00:40:05.535

how about stop moving that boom?

852

00:40:06.235 --> 00:40:08.175

And they're like, nah, this is just the way we do it.

853

00:40:08.715 --> 00:40:12.895

Um, so no, I don't think we're, that's, that's not a battle.

854

00:40:13.055 --> 00:40:15.695

I want fight 'cause it's not gonna change the way that the,

855

00:40:15.845 --> 00:40:17.895

that 35 tanks on the 1 35.

856

00:40:17.895 --> 00:40:19.175

Does that make sense? Yeah.

857

00:40:21.065 --> 00:40:22.815

Let's, let's defer any other questions until,

858

00:40:22.915 --> 00:40:24.095

uh, the panel discussion?

859

00:40:24.095 --> 00:40:27.575

Because please mad applause. Take your time.

860

00:40:37.115 --> 00:40:38.935

So a couple things, uh, jumped out at me during the.