

1

00:00:00.000 --> 00:00:04.425

Alright, so we're down to our, uh, final presentation.

2

00:00:04.895 --> 00:00:06.705

Clearly saved the best one to last.

3

00:00:07.795 --> 00:00:09.215

No conflict of interest there.

4

00:00:10.115 --> 00:00:13.935

Uh, so oddball, uh, has been,

5

00:00:15.035 --> 00:00:17.455

uh, in flight test with us for 19 years now.

6

00:00:17.995 --> 00:00:22.355

Uh, he's worked on pretty much every airplane

7

00:00:22.355 --> 00:00:26.045

that we've got, including helping us out on some, uh,

8

00:00:26.045 --> 00:00:30.145

7 0 7 testing that we did on, uh, an AAC airplane.

9

00:00:30.925 --> 00:00:33.785

Uh, he's been in aerodynamics

10

00:00:33.785 --> 00:00:35.425

and mostly stability and control.

11

00:00:35.975 --> 00:00:40.025

He's been very active in SFTE and also EAA in the area.

12

00:00:40.915 --> 00:00:44.255

Uh, his favorite airplane was the queen of the skies.

13

00:00:44.255 --> 00:00:45.855

He says the twins are for tots.

14

00:00:46.465 --> 00:00:49.645  
Uh, one other, uh, personal note

15  
00:00:50.995 --> 00:00:53.405  
oddball is a rabid Chicago Bears fan.

16  
00:00:53.585 --> 00:00:56.205  
Oh, I think Ginetti got into my notes here.

17  
00:00:56.785 --> 00:01:01.755  
Um, he's, uh, he's a cheesehead.

18  
00:01:04.715 --> 00:01:07.855  
Uh, you've already been introduced more than enough to me.

19  
00:01:08.025 --> 00:01:09.495  
We'll, we won't worry about that.

20  
00:01:10.185 --> 00:01:12.765  
Uh, so Jerry, uh, a man

21  
00:01:12.765 --> 00:01:14.405  
that really doesn't need any introduction,

22  
00:01:14.425 --> 00:01:16.565  
but, uh, I'm honored to be able to introduce him.

23  
00:01:16.865 --> 00:01:21.075  
Uh, he's only been at this for about 46 years.

24  
00:01:21.735 --> 00:01:26.485  
So, uh, he has been involved

25  
00:01:26.485 --> 00:01:28.725  
with over 20 different programs at Boeing,

26  
00:01:28.945 --> 00:01:32.365  
and then he continues to be adding to that list, working

27  
00:01:32.435 --> 00:01:36.795  
with Aerotech and ir, and the phone always rings for him.

28

00:01:37.055 --> 00:01:41.175

So, uh, he's been a test pilot mentor to many

29

00:01:41.355 --> 00:01:46.055

and, uh, both pilots and FTEs and continues to be that.

30

00:01:46.885 --> 00:01:49.465

And so we all appreciate his mentorship.

31

00:01:50.245 --> 00:01:54.205

Um, one of the, uh, one of the really cool things,

32

00:01:54.405 --> 00:01:58.045

I actually got a, a memory came up yesterday of a bunch

33

00:01:58.045 --> 00:02:01.205

of pictures, uh, from, I think it was seven years ago

34

00:02:01.805 --> 00:02:04.895

that we went to the var hazy and got the royal treatment

35

00:02:04.895 --> 00:02:09.135

because, uh, the docents walked around with us and Jerry

36

00:02:09.235 --> 00:02:12.255

and, uh, we looked at all the, all the different airplanes,

37

00:02:12.255 --> 00:02:13.335

including the dash 80,

38

00:02:13.345 --> 00:02:15.535

which he flew the last flight to get it there.

39

00:02:15.595 --> 00:02:19.185

So, and we're gonna talk,

40

00:02:24.395 --> 00:02:26.425

we're gonna go back 65 years in history.

41

00:02:35.665 --> 00:02:37.775  
First thing I'm gonna say is this project has been

42  
00:02:38.455 --> 00:02:39.835  
in the making for a long time.

43  
00:02:40.955 --> 00:02:45.625  
And I'm gonna upfront give a big shout out to Leon Robert,

44  
00:02:46.005 --> 00:02:48.905  
who really did the bulk of the research on this project.

45  
00:02:49.205 --> 00:02:52.615  
Leon's in the back of the room. And

46  
00:02:54.645 --> 00:02:57.925  
it's a story that a lot of people know, pieces of

47  
00:02:59.470 --> 00:03:01.275  
nobody really has sat down

48  
00:03:01.415 --> 00:03:04.945  
for quite a while to tell the story.

49  
00:03:06.625 --> 00:03:10.805  
So here we go. Green button. Yep.

50  
00:03:13.175 --> 00:03:16.845  
Ah, OJT from somebody

51  
00:03:16.845 --> 00:03:18.205  
who does this a lot more than I do.

52  
00:03:20.025 --> 00:03:21.965  
So what makes this accident familiar to us?

53  
00:03:21.965 --> 00:03:26.115  
Because we still consider Dutch role an issue

54  
00:03:26.295 --> 00:03:27.355  
for stability control.

55

00:03:27.935 --> 00:03:31.405  
We have a regulation in 25, 25, 180 1.

56

00:03:31.495 --> 00:03:36.435  
Bravo says that these things must be

57

00:03:38.845 --> 00:03:41.825  
positively ded controllable without

58

00:03:41.825 --> 00:03:42.865  
exceptional pilot skills.

59

00:03:43.935 --> 00:03:45.185  
That wasn't always the case.

60

00:03:49.735 --> 00:03:50.915  
So we're gonna dig into this

61

00:03:50.915 --> 00:03:54.085  
because we really kind of figured it out.

62

00:03:56.195 --> 00:03:59.215  
But from an aerodynamic perspective, from augmentation,

63

00:03:59.245 --> 00:04:02.735  
from reliability, and sometimes from a flight control system

64

00:04:02.855 --> 00:04:07.385  
architecture such as fly by wire today, we don't have

65

00:04:07.385 --> 00:04:11.385  
to train this because it's really not an issue

66

00:04:11.385 --> 00:04:12.825  
anymore except what it is.

67

00:04:13.365 --> 00:04:17.405  
So we'll take the subject aircraft

68

00:04:19.475 --> 00:04:23.135  
in 1959, vintage area play.

69  
00:04:23.235 --> 00:04:28.195  
Era brand flew combat, five

70  
00:04:28.415 --> 00:04:31.015  
or four eighties straight wing twin.

71  
00:04:32.345 --> 00:04:34.925  
And they had just gotten into Lockheed RAs

72  
00:04:34.995 --> 00:04:37.045  
because they were starting to fly internationally

73  
00:04:37.505 --> 00:04:39.485  
and they wanted to go over there faster

74  
00:04:39.705 --> 00:04:41.685  
and wanted to be part of the, the new wave

75  
00:04:41.825 --> 00:04:44.285  
and be positive forward feeding people.

76  
00:04:44.745 --> 00:04:46.365  
And so they went to the 7 0 7.

77  
00:04:47.665 --> 00:04:50.085  
Nobody had any experience in swept guts.

78  
00:04:53.645 --> 00:04:56.275  
First flight was June 11th, 1959.

79  
00:04:59.185 --> 00:05:01.685  
So we look at the airplane of that day.

80  
00:05:03.265 --> 00:05:05.125  
And air spec was a 2, 2 7,

81  
00:05:05.135 --> 00:05:07.565  
which was a slightly different airplane than

82

00:05:07.565 --> 00:05:10.605

what the standard oh seven 100 was at the time

83

00:05:11.145 --> 00:05:13.245

had bigger engines because they were flying routes into

84

00:05:13.245 --> 00:05:15.365

South America where it was hotter and higher.

85

00:05:20.075 --> 00:05:24.835

So on October 19th, 1959, there was a

86

00:05:25.475 --> 00:05:26.515

customer demo flight.

87

00:05:26.925 --> 00:05:30.665

First time that Braniff had their pilot on the airplane.

88

00:05:31.645 --> 00:05:34.495

Well, since we're gonna do that, we'll, it's a little bit

89

00:05:34.495 --> 00:05:38.605

of a training, little bit of a customer demo, little bit

90

00:05:38.605 --> 00:05:40.365

of a flight test, uh, customer demo.

91

00:05:41.265 --> 00:05:44.485

And the rules were a bit looser in those days, shall we say.

92

00:05:45.205 --> 00:05:47.665

So on board we had a brand of captain.

93

00:05:48.285 --> 00:05:51.915

We had a Boeing test pilot slash instructor pilot,

94

00:05:53.175 --> 00:05:54.495

a Boeing flight engineer

95

00:05:54.955 --> 00:05:57.605  
or flight engineer as an instructor to the, uh,

96  
00:05:58.625 --> 00:05:59.795  
bran engineer.

97  
00:06:01.305 --> 00:06:04.445  
The airline captain was pilot trainee being demonstrated to

98  
00:06:06.005 --> 00:06:07.925  
a technical guy for Braniff,

99  
00:06:08.695 --> 00:06:11.715  
who you'll hear the words from general will talk to later.

100  
00:06:13.725 --> 00:06:15.705  
And a Boeing test pilot, Mr.

101  
00:06:15.785 --> 00:06:16.865  
Bill Allsop, who was

102  
00:06:17.365 --> 00:06:19.345  
around when I first came to work for Boeing.

103  
00:06:19.345 --> 00:06:22.505  
And a lot of us know who was there

104  
00:06:23.465 --> 00:06:24.685  
and it's a bit fuzzy.

105  
00:06:24.905 --> 00:06:28.525  
Was he there? Because to train the Boeing, uh,

106  
00:06:28.535 --> 00:06:31.725  
instructor pilot, was he there for oversight?

107  
00:06:31.785 --> 00:06:35.045  
Was he there for quality control? Was he there for safety?

108  
00:06:35.785 --> 00:06:37.725  
Little unclear. Plus there was an FAA



109

00:06:37.725 --> 00:06:41.565

or carrier operations inspector on board had a number

110

00:06:41.565 --> 00:06:44.085

of people for a first, uh, first flight demo.

111

00:06:51.365 --> 00:06:54.875

Okay, alright, so there's eight people on this airplane.

112

00:06:55.435 --> 00:06:56.645

They took off from Renton

113

00:06:56.825 --> 00:06:59.815

and they flew north just a routine training flight.

114

00:07:01.485 --> 00:07:03.535

They didn't get off the ground till about three o'clock.

115

00:07:03.635 --> 00:07:06.455

And I think some of that may have fed into what happened.

116

00:07:07.085 --> 00:07:11.915

Um, so Russ Baum was the Boeing instructor, did a bunch

117

00:07:11.915 --> 00:07:15.355

of maneuvers and then handed over to Jack Burke

118

00:07:15.355 --> 00:07:16.875

to demonstrate the same maneuvers.

119

00:07:19.705 --> 00:07:23.685

And so as they got over Oso Washington, uh,

120

00:07:24.295 --> 00:07:27.695

which is a name probably familiar to a lot of you,

121

00:07:27.735 --> 00:07:29.615

I think it's been about 10 or 12 years

122

00:07:29.795 --> 00:07:32.455  
or 10 years ago, that they had a huge landslide there.

123  
00:07:33.125 --> 00:07:35.625  
Uh, that was actually just within a mile

124  
00:07:35.625 --> 00:07:37.065  
or two of, of this incident.

125  
00:07:38.235 --> 00:07:42.835  
Um, so the Boeing instructor started some Dutch rolls

126  
00:07:43.335 --> 00:07:47.795  
and, uh, then having the Braniff pilot recover from them.

127  
00:07:49.595 --> 00:07:53.575  
And at some point he started a Dutch roll

128  
00:07:54.645 --> 00:07:57.415  
that, uh, the, the Boeing guidance was

129  
00:07:57.435 --> 00:07:59.535  
to not exceed 25 degrees a bank.

130  
00:08:00.325 --> 00:08:03.025  
The witnesses say it was somewhere between 45 degrees,

131  
00:08:03.365 --> 00:08:06.265  
or it was definitely more than 45 degrees, could have been

132  
00:08:06.285 --> 00:08:08.785  
as much as 60 degrees a bank that he put in.

133  
00:08:10.305 --> 00:08:15.225  
So, uh, Allsop said, uh,

134  
00:08:15.725 --> 00:08:18.345  
Hey Russ, you're pushing it, you're exceeding the limits.

135  
00:08:19.815 --> 00:08:24.165  
And uh, Russ just left it off in Allsup's words.

136

00:08:24.725 --> 00:08:28.455

He said, don't worry about it. And so they continued.

137

00:08:28.995 --> 00:08:32.345

And uh, so that was one of the, one

138

00:08:32.345 --> 00:08:33.585

of the first Dutch rolls they did.

139

00:08:33.585 --> 00:08:36.265

And then he just kept going as much or more.

140

00:08:37.715 --> 00:08:40.595

So when he implemented the Dutch roll,

141

00:08:40.615 --> 00:08:42.035

it was over 45 degrees.

142

00:08:43.285 --> 00:08:46.515

Uh, Jack Burke tried to recover

143

00:08:47.485 --> 00:08:50.145

and so it was a nose right that was on.

144

00:08:50.685 --> 00:08:53.765

And he mistimed his input.

145

00:08:54.025 --> 00:08:55.590

And so the right wing was going down

146

00:08:55.590 --> 00:08:58.575

and he put a bunch of right aler on him and made it worse.

147

00:08:59.705 --> 00:09:02.445

Um, at that point SAP says, you know, Jack,

148

00:09:02.675 --> 00:09:04.045

Jack Burke was a good guy,

149

00:09:04.545 --> 00:09:08.985  
but he just, I don't know, I saw

150  
00:09:08.985 --> 00:09:11.065  
that left knee go down on the pedal.

151  
00:09:11.165 --> 00:09:12.985  
And I thought, oh boy, here we go.

152  
00:09:13.685 --> 00:09:18.595  
So Burke put a lot of, a lot of left p pedaling

153  
00:09:18.875 --> 00:09:22.495  
'cause he was surprised by the, the amount

154  
00:09:22.495 --> 00:09:23.735  
of roll he was getting to the right.

155  
00:09:24.935 --> 00:09:27.435  
And in the narratives that we found, they said

156  
00:09:27.435 --> 00:09:31.065  
that it put it into almost a snap roll.

157  
00:09:32.255 --> 00:09:34.905  
And, and so

158  
00:09:35.765 --> 00:09:38.025  
the wings were pretty much perpend the ground

159  
00:09:39.485 --> 00:09:41.945  
and it went into a 90 degree bank and yard.

160  
00:09:42.405 --> 00:09:45.175  
Uh, so he tried to stop that roll

161  
00:09:45.945 --> 00:09:48.445  
by jamming the controls opposite direction

162  
00:09:48.445 --> 00:09:50.165  
with his aileron went full aileron.

163

00:09:51.105 --> 00:09:54.635

And, uh, so it went from, from rolling hard left

164

00:09:54.635 --> 00:09:55.635

to rolling hard, right?

165

00:09:56.095 --> 00:10:00.505

And at that point, um, engines one, two,

166

00:10:00.765 --> 00:10:02.825

and four all departed the airplane,

167

00:10:03.775 --> 00:10:05.275

ripped them right off the pylon.

168

00:10:05.275 --> 00:10:08.115

It was a very high roll rate reversal.

169

00:10:09.715 --> 00:10:14.615

And the third engine was not hanging in its right spot.

170

00:10:14.615 --> 00:10:15.655

It's not, and it wasn't healthy.

171

00:10:15.755 --> 00:10:17.175

And so the pylon had damage,

172

00:10:17.175 --> 00:10:19.875

it was hanging at a weird angle, um,

173

00:10:20.825 --> 00:10:24.865

which would probably be enough room for concern.

174

00:10:26.085 --> 00:10:29.035

Uh, problem is the fuel tank was also damaged.

175

00:10:30.225 --> 00:10:31.365

And so the wing caught fire.

176

00:10:32.415 --> 00:10:35.195  
So they're now down to a single engine and they're on fire.

177  
00:10:37.005 --> 00:10:40.505  
So we click here, all the circuit breakers had popped.

178  
00:10:41.795 --> 00:10:43.335  
Uh, Allsop said, you know,

179  
00:10:43.435 --> 00:10:45.375  
all those circuit breakers had had blown,

180  
00:10:46.005 --> 00:10:48.855  
nothing was working except we had control

181  
00:10:48.855 --> 00:10:50.535  
of the elevators, at least for a little while.

182  
00:10:51.885 --> 00:10:53.505  
But eventually that must have burned through

183  
00:10:53.505 --> 00:10:54.905  
or something because we lost that.

184  
00:10:56.025 --> 00:10:57.245  
And so we got to a point

185  
00:10:57.245 --> 00:10:59.405  
where the only thing they had was rudder trim

186  
00:10:59.745 --> 00:11:01.415  
and they were still flying the airplane.

187  
00:11:04.365 --> 00:11:08.505  
So they talked some about ditching in Lake Kavanaugh.

188  
00:11:09.595 --> 00:11:11.465  
Seems like maybe they didn't have enough control

189  
00:11:11.465 --> 00:11:12.745  
to even line up with the lake.

190

00:11:13.125 --> 00:11:15.505

And so they continued past Lake Kavanaugh

191

00:11:16.005 --> 00:11:17.905

and they're able to get a right hand turn in

192

00:11:18.365 --> 00:11:21.835

and there's that, uh, rectangular

193

00:11:23.365 --> 00:11:26.055

spot here just to between the road and the river.

194

00:11:27.345 --> 00:11:29.365

And it's a big field, a big open field,

195

00:11:29.365 --> 00:11:31.405

and they're pretty sure they were trying to make that field.

196

00:11:34.585 --> 00:11:37.565

So at that point, Allsop says There's no sense in hanging

197

00:11:37.565 --> 00:11:39.245

around here in the cockpit.

198

00:11:40.045 --> 00:11:43.095

It's not gonna be any fun up here at all. They'll hit first.

199

00:11:44.575 --> 00:11:48.415

So as, as Russ wrestled to bring the damage

200

00:11:48.415 --> 00:11:51.285

and burning jet under control and try

201

00:11:51.285 --> 00:11:54.565

and land in that field there, there was three other men

202

00:11:54.565 --> 00:11:55.965

that stayed in the cockpit with him.

203

00:11:56.955 --> 00:11:59.365  
The other four decided to leave.

204  
00:12:00.635 --> 00:12:03.615  
So Ssop said, the last thing I heard is I left the cockpit,

205  
00:12:03.615 --> 00:12:06.135  
was Jack starting to do something, the brain of pilot.

206  
00:12:07.495 --> 00:12:08.675  
And Russ hollered at him

207  
00:12:08.675 --> 00:12:09.795  
and said, you've done enough already.

208  
00:12:09.795 --> 00:12:11.195  
Now just sit there and shut up.

209  
00:12:12.705 --> 00:12:14.095  
So, uh,

210  
00:12:15.185 --> 00:12:17.945  
probably not the best CRM example we have today.

211  
00:12:19.715 --> 00:12:21.855  
So four of the eight men made their way to the back

212  
00:12:21.855 --> 00:12:24.375  
of the airplane, said it was really difficult

213  
00:12:24.375 --> 00:12:27.975  
because they were at a really steep bank angle.

214  
00:12:28.115 --> 00:12:29.255  
It wasn't flying straight.

215  
00:12:30.025 --> 00:12:32.515  
They estimated as much as 45 degrees of bank.

216  
00:12:33.365 --> 00:12:36.815  
They pulled themselves to the back by using the seat backs



217

00:12:36.915 --> 00:12:38.935

and kept just dragging themselves to the back.

218

00:12:39.595 --> 00:12:41.925

They didn't have enough time to get into any seats

219

00:12:42.025 --> 00:12:43.365

and, and strap in.

220

00:12:43.365 --> 00:12:45.445

So they were just holding on the seat belts when they hit

221

00:12:52.385 --> 00:12:53.985

witnesses on the ground, said even

222

00:12:55.485 --> 00:12:57.505

before they could make out the plane,

223

00:12:57.505 --> 00:12:58.545

that they could see the glow

224

00:12:58.545 --> 00:13:00.025

of fire in the air over the trees.

225

00:13:01.985 --> 00:13:04.165

The four survivors said they could feel the heat

226

00:13:04.425 --> 00:13:06.525

and see the smoke from the fires on the wings.

227

00:13:07.445 --> 00:13:09.665

At 20 after four, one of the men in the back

228

00:13:09.665 --> 00:13:11.225

of the plane knew he was going to die.

229

00:13:13.635 --> 00:13:15.055

He was holding onto a seatbelt

230

00:13:15.355 --> 00:13:17.295  
and they were in the very back as far as they could go.

231  
00:13:17.355 --> 00:13:18.535  
The left wing was on fire.

232  
00:13:18.715 --> 00:13:20.335  
The jet had lost all electrical power

233  
00:13:21.675 --> 00:13:24.095  
and at by this point, the fourth engine,

234  
00:13:24.295 --> 00:13:26.735  
the number three engine had been shut down so

235  
00:13:26.735 --> 00:13:28.015  
that they could get back to wings level

236  
00:13:28.115 --> 00:13:29.735  
and have a better chance at a landing.

237  
00:13:31.185 --> 00:13:33.915  
So Alsup, his final comment was, he said,

238  
00:13:33.955 --> 00:13:35.235  
I heard the jet hit the trees.

239  
00:13:35.695 --> 00:13:36.955  
And then I remember thinking,

240  
00:13:36.995 --> 00:13:38.195  
I can't take much more of this.

241  
00:13:39.095 --> 00:13:40.615  
I was getting beat around pretty bad.

242  
00:13:40.885 --> 00:13:42.495  
Next thing I know, everything was quiet.

243  
00:13:43.315 --> 00:13:46.405  
When I woke up, I looked out that little window in the door

244

00:13:46.625 --> 00:13:48.045  
and all I could see was gravel.

245

00:13:49.035 --> 00:13:51.695  
And I thought, oh no, I'll probably burn to death here.

246

00:13:52.605 --> 00:13:54.645  
I didn't realize that we'd tumbled away from the rest

247

00:13:54.645 --> 00:13:57.165  
of the aircraft and I was still groggy, groggy.

248

00:13:57.555 --> 00:13:59.245  
Then someone yelled, Hey, it's open up here.

249

00:13:59.345 --> 00:14:03.165  
And we crawled up. So the nose section was torn off,

250

00:14:04.135 --> 00:14:06.855  
fuselage was swung crossways, the tail section

251

00:14:07.885 --> 00:14:09.955  
ended up in the middle of the river on its side,

252

00:14:09.955 --> 00:14:13.995  
and that's where those four survivors crawled out

253

00:14:13.995 --> 00:14:15.075  
the front of this tail section.

254

00:14:19.205 --> 00:14:20.225  
Two local men came

255

00:14:20.225 --> 00:14:21.665  
and helped the four survivors struggle

256

00:14:21.665 --> 00:14:23.665  
through waste deep water to get them to shore.

257

00:14:24.585 --> 00:14:25.585

Um,

258

00:14:27.155 --> 00:14:29.935

They were, they were significant, uh,

259

00:14:32.445 --> 00:14:37.065

although ambulatory issues, uh, the bill was down

260

00:14:37.065 --> 00:14:40.195

for quite a while, uh, flew again

261

00:14:41.055 --> 00:14:42.355

and was flying at the time.

262

00:14:42.515 --> 00:14:43.515

I believe he was still flying.

263

00:14:43.515 --> 00:14:45.955

But the time I came to work for the company, at least he was

264

00:14:45.955 --> 00:14:47.435

around, around the office.

265

00:14:48.835 --> 00:14:52.105

And uh, it's very interesting.

266

00:14:53.605 --> 00:14:57.745

Here's the very important statement from the

267

00:14:57.825 --> 00:15:00.365

CAB at the time.

268

00:15:00.505 --> 00:15:04.745

And this is, uh, June 13th, 1960, uh, report

269

00:15:07.955 --> 00:15:10.635

structural failure to the improper recovery

270

00:15:10.635 --> 00:15:11.675

attempt from a Dutch roll.

271

00:15:13.345 --> 00:15:15.685

And it exceeded the limits set by the company.

272

00:15:20.295 --> 00:15:23.985

So let's talk about the norm a bit. Go ahead.

273

00:15:24.325 --> 00:15:28.005

You wanna take this? Okay. Alright.

274

00:15:28.425 --> 00:15:30.725

So it was a very different norm and,

275

00:15:30.785 --> 00:15:33.925

and it was still, there was still remnants of that.

276

00:15:33.995 --> 00:15:37.805

When I came to work in the company in 1970, uh,

277

00:15:38.145 --> 00:15:40.365

I'd say I came to the company in about 1975

278

00:15:40.705 --> 00:15:44.125

as an Air Force guy and you could still see those sort

279

00:15:44.125 --> 00:15:46.965

of cultural norms around from different things.

280

00:15:47.755 --> 00:15:51.145

Uh, there was this little bit of a, there were those guys,

281

00:15:51.245 --> 00:15:53.385

the old guys were the self scarf attitude.

282

00:15:53.385 --> 00:15:55.865

There was this young wave of, of guys like Leon

283

00:15:55.965 --> 00:15:57.745

and myself, Frank Santoni, uh,

284

00:15:57.745 --> 00:16:00.065  
Joe McDonald all came in about the same time.

285  
00:16:00.165 --> 00:16:01.385  
We had a little different vibe

286  
00:16:01.385 --> 00:16:05.115  
because we were just different, you know,

287  
00:16:05.275 --> 00:16:06.635  
I guess we were gen gen.

288  
00:16:06.635 --> 00:16:09.315  
Somethings not Gen Xs or Gen Y or any of that stuff.

289  
00:16:09.315 --> 00:16:10.915  
We were gen different, I guess.

290  
00:16:12.125 --> 00:16:16.475  
And so other things were, that changed a little bit about

291  
00:16:16.475 --> 00:16:20.055  
how we thought there were no simulators

292  
00:16:20.195 --> 00:16:21.415  
at the time of this accident.

293  
00:16:22.265 --> 00:16:24.655  
Everything you taught, you taught in the airplane.

294  
00:16:25.075 --> 00:16:28.095  
In fact, I don't think I saw a motion based simulator

295  
00:16:28.385 --> 00:16:31.575  
until 7, 5, 7, 7, 6, 7 for a check ride.

296  
00:16:33.295 --> 00:16:38.165  
And pilots were the

297  
00:16:38.165 --> 00:16:39.165  
initials stretches where you,

298

00:16:39.235 --> 00:16:41.605  
they would do the flight test program

299

00:16:42.105 --> 00:16:45.365  
and then you would transit into an instructor role

300

00:16:46.055 --> 00:16:48.225  
because you knew the airplane and you could teach.

301

00:16:48.285 --> 00:16:49.985  
Now, not of those guys were instructors,

302

00:16:50.175 --> 00:16:52.545  
obviously from the words you heard here,

303

00:16:55.125 --> 00:16:58.055  
some instructor for flamboyant, others were really good.

304

00:16:58.715 --> 00:17:02.035  
And the in level of instruction, often times

305

00:17:04.085 --> 00:17:07.545  
was the perceived capability of your student.

306

00:17:08.865 --> 00:17:12.915  
If you got a 30,000 hour airline pilot that comes dead,

307

00:17:12.935 --> 00:17:13.995  
ah, he knows this stuff.

308

00:17:17.875 --> 00:17:20.345  
Not always true. Straightway airplanes,

309

00:17:20.345 --> 00:17:21.825  
were not swap wing airplanes.

310

00:17:24.355 --> 00:17:26.695  
And every airplane has its own sequences.

311

00:17:26.955 --> 00:17:30.165  
And these were handled through procedural training

312  
00:17:30.185 --> 00:17:33.645  
or practice because it was like your car in the day

313  
00:17:33.975 --> 00:17:35.885  
where you would go out and start your car

314  
00:17:36.345 --> 00:17:37.565  
and you had to use the choke.

315  
00:17:39.005 --> 00:17:42.525  
What's a choke who, who pulls the choke in their car today?

316  
00:17:43.205 --> 00:17:44.925  
Probably not many of you. Well, I had to pump the throttle.

317  
00:17:45.035 --> 00:17:48.825  
Yeah, just for brand new

318  
00:17:49.965 --> 00:17:51.565  
aircraft had odd characteristics

319  
00:17:52.025 --> 00:17:54.485  
and they were typically handled by training crew procedures.

320  
00:17:54.695 --> 00:17:57.725  
Again, no simulators. Standards were about there.

321  
00:18:02.385 --> 00:18:03.555  
Hazardous attitudes.

322  
00:18:04.255 --> 00:18:07.245  
I pre, I predict not knowing,

323  
00:18:07.345 --> 00:18:09.405  
but just something tells me that Jim Danit,

324  
00:18:09.405 --> 00:18:11.605  
who was the chief pilot at the time, probably asked Bill,



325

00:18:11.715 --> 00:18:13.045  
bill s have to go on the flight

326

00:18:13.045 --> 00:18:14.845  
because he had a n\*\*\*\*e about

327

00:18:16.395 --> 00:18:18.335  
the instructor pilot at the time.

328

00:18:21.225 --> 00:18:23.135  
After the accident, things changed,

329

00:18:27.095 --> 00:18:29.625  
more emphasis on the procedures limitations.

330

00:18:29.745 --> 00:18:32.305  
CRM training didn't come around until 1966.

331

00:18:32.785 --> 00:18:34.495  
I think it's the earliest.

332

00:18:34.915 --> 00:18:38.545  
And it was an airline function.

333

00:18:38.555 --> 00:18:42.435  
Never crept into flight test at all for many years later.

334

00:18:50.725 --> 00:18:52.545  
Why did we train on the airplane? Why do they train?

335

00:18:52.545 --> 00:18:55.585  
Because it was part of the purchase price of the airplane.

336

00:18:57.795 --> 00:18:59.605  
Sell the airplane. You train the airplane.

337

00:19:04.275 --> 00:19:07.605  
Today's standards are different. We use level D simulators.

338

00:19:08.735 --> 00:19:11.025

Lateral directional characteristics are better.

339

00:19:11.335 --> 00:19:13.825

Audi ERs are redundant, much more allowable.

340

00:19:13.995 --> 00:19:16.225

Reversible flight controls are much less common.

341

00:19:16.315 --> 00:19:18.545

7 0 7 reversible flight controls.

342

00:19:19.285 --> 00:19:21.745

No full time ya damper.

343

00:19:22.085 --> 00:19:26.585

In fact, it was the center axis

344

00:19:26.645 --> 00:19:28.585

or the rudder axis of the autopilot.

345

00:19:29.045 --> 00:19:30.745

And those of you who flew KC 1 35,

346

00:19:30.745 --> 00:19:31.825

there may be a few around here.

347

00:19:33.215 --> 00:19:34.415

Remember that you had to use the center

348

00:19:34.515 --> 00:19:36.495

of use the rudder axis as a yard ever.

349

00:19:36.495 --> 00:19:38.815

And oh, by the way, as soon as you got on approach, you had

350

00:19:38.815 --> 00:19:40.855

to turn her off because you couldn't move the rudder pedals.

351

00:19:44.685 --> 00:19:47.145

And that was the regime where the Dutch roll was the worst.

352

00:19:48.925 --> 00:19:51.855

Those was, that drove one 30 fives. Got it.

353

00:19:53.505 --> 00:19:56.225

But if you'd never seen it before, different.

354

00:19:56.725 --> 00:19:59.925

So what changes were made to 7 0 7,

355

00:20:00.025 --> 00:20:02.125

we put a full-time rudder boost system in there.

356

00:20:02.145 --> 00:20:03.765

We increased the VIN inside.

357

00:20:04.025 --> 00:20:05.165

We had our ventral fin

358

00:20:06.155 --> 00:20:09.635

and the vintage of airplane that crashed

359

00:20:10.935 --> 00:20:13.635

was only boosted when the rudder moved

360

00:20:15.565 --> 00:20:16.585

10 to 15 degrees.

361

00:20:19.165 --> 00:20:21.745

In that, in that band of 10 to 15 degrees.

362

00:20:22.565 --> 00:20:24.825

It was tap controlled, fully tap controlled, no boost

363

00:20:32.945 --> 00:20:33.165

you

364

00:20:33.165 --> 00:20:34.165

Go. So what

365

00:20:34.165 --> 00:20:36.005  
about the differences in the Dutch

366  
00:20:36.005 --> 00:20:37.125  
roll recovery techniques?

367  
00:20:37.145 --> 00:20:38.725  
Uh, what were they teaching at the time

368  
00:20:38.785 --> 00:20:40.045  
to the braniff pilots?

369  
00:20:40.665 --> 00:20:45.205  
So at the time, uh, they were training them to use rudder

370  
00:20:45.205 --> 00:20:46.645  
to recover from the Dutch roll

371  
00:20:47.505 --> 00:20:50.485  
and, uh, also used the rate of turn indicator.

372  
00:20:51.225 --> 00:20:53.585  
And, uh, later on,

373  
00:20:53.715 --> 00:20:58.545  
after lessons from this crash, uh, they transitioned to,

374  
00:20:58.685 --> 00:21:01.425  
uh, fixing the roll problem and using the wheel.

375  
00:21:02.125 --> 00:21:04.745  
And, uh, they probably also didn't realize some

376  
00:21:04.745 --> 00:21:07.185  
of the tail loads issues that you could encounter

377  
00:21:07.185 --> 00:21:10.345  
with the side slips and the large rudder inputs as well.

378  
00:21:11.355 --> 00:21:15.055  
So the, the wheel input, uh, avoids that issue.

379

00:21:15.645 --> 00:21:18.785

Uh, although as we saw with, uh, this example, uh,

380

00:21:19.325 --> 00:21:20.585

if you use full wheel

381

00:21:20.645 --> 00:21:22.305

and full reversals, uh,

382

00:21:22.445 --> 00:21:27.025

you can definitely rip off the engines by this, uh,

383

00:21:27.255 --> 00:21:30.885

much more intuitive technique, uh, to recover the airplane.

384

00:21:36.145 --> 00:21:39.045

So what changed regulation wise afterwards here?

385

00:21:39.695 --> 00:21:44.245

Uh, 'cause this was 1959, part 25 didn't exist.

386

00:21:44.925 --> 00:21:49.705

So this was a car four B CT basis, uh, which was, uh,

387

00:21:51.535 --> 00:21:54.515

the rules in place, uh, just before and just

388

00:21:54.515 --> 00:21:55.595

after World War ii.

389

00:21:57.155 --> 00:22:00.015

And all it had in there was talking about having a damp

390

00:22:00.015 --> 00:22:02.215

short period for all three axes.

391

00:22:02.315 --> 00:22:06.295

But there was nothing, uh, related to having

392

00:22:06.975 --> 00:22:11.375  
a deral period or any long period, uh, uh, damping

393  
00:22:12.335 --> 00:22:13.635  
of lateral directional.

394  
00:22:15.635 --> 00:22:20.525  
And even when part 25 emerged in the mid sixties, uh,

395  
00:22:20.585 --> 00:22:22.685  
it wasn't until the late seventies

396  
00:22:22.785 --> 00:22:27.325  
before, uh, 25 1 8, 180 1 B was added

397  
00:22:27.785 --> 00:22:29.605  
to include Dutch requirements.

398  
00:22:29.825 --> 00:22:34.775  
And then guidance material around that, uh,

399  
00:22:34.875 --> 00:22:38.055  
didn't really, uh, exist until, uh,

400  
00:22:38.115 --> 00:22:40.775  
AC 25 7 in the mid eighties,

401  
00:22:41.605 --> 00:22:44.485  
although there happened to be a internal FAA order

402  
00:22:44.515 --> 00:22:46.885  
that people were using, uh, in the meantime.

403  
00:22:50.915 --> 00:22:52.855  
So what are the lessons for today's flight testers?

404  
00:22:53.075 --> 00:22:55.575  
And we're all in the room.

405  
00:22:56.605 --> 00:22:58.105  
The expectations of the public.

406

00:22:58.285 --> 00:23:01.635

Uh, our, our products will change with time and get better

407

00:23:01.635 --> 00:23:02.835

and better and safer and safer.

408

00:23:04.515 --> 00:23:08.725

And sometimes we have to understand what we do today

409

00:23:09.785 --> 00:23:14.395

was because what we did in the past was not as good

410

00:23:14.395 --> 00:23:15.915

as we had hoped at the time.

411

00:23:16.015 --> 00:23:19.755

And we gotta continue to evolve and evolve and evolve.

412

00:23:21.725 --> 00:23:24.525

And it's not a perfect science

413

00:23:26.555 --> 00:23:29.335

as far as CRM Eagles

414

00:23:29.335 --> 00:23:31.655

overconfidence bringing established limits.

415

00:23:32.325 --> 00:23:34.255

Some guys are will push those corners.

416

00:23:34.255 --> 00:23:36.095

You give 'em a limit that that's, that's their number.

417

00:23:36.485 --> 00:23:40.585

It's not something less than that number. We've all seen it.

418

00:23:41.745 --> 00:23:43.465

I can do this because I can't,

419

00:23:50.435 --> 00:23:55.135  
any new configuration has some what I call dark corner

420  
00:23:56.955 --> 00:23:58.695  
and we see

421  
00:23:58.765 --> 00:24:01.335  
that we have certified the airplane, we get it there.

422  
00:24:01.595 --> 00:24:04.535  
And those of us in flight tests know that sometimes, uh, in,

423  
00:24:04.595 --> 00:24:09.255  
in, in finding those edges that we go, we have to go

424  
00:24:09.255 --> 00:24:10.895  
beyond to set the edge.

425  
00:24:13.175 --> 00:24:16.335  
And so we learn in our testing

426  
00:24:17.395 --> 00:24:18.685  
what we need to mitigate.

427  
00:24:20.765 --> 00:24:22.345  
And it's not always obvious.

428  
00:24:25.095 --> 00:24:28.535  
CFD is a wonderful tool and sometimes it's right.

429  
00:24:29.895 --> 00:24:31.175  
I think we've all heard that term before.

430  
00:24:33.725 --> 00:24:36.595  
EV tools are new to our game.

431  
00:24:38.705 --> 00:24:41.035  
They have corners that we don't even know yet.

432  
00:24:42.595 --> 00:24:44.765  
Some of you do. Some of you have seen them,



433

00:24:44.765 --> 00:24:46.405  
have experienced 'em, gotten that privilege.

434

00:24:47.145 --> 00:24:48.885  
The bulk of this room has not seen them.

435

00:24:49.025 --> 00:24:52.605  
So I really challenge that anybody at EB till committee

436

00:24:53.125 --> 00:24:55.245  
continue to put forward those lessons learned

437

00:24:55.245 --> 00:24:56.445  
that you're learning along the way.

438

00:25:01.945 --> 00:25:03.125  
We don't wanna do this again.

439

00:25:04.895 --> 00:25:09.885  
Having said that, with Boeing Flight tests, Seattle,

440

00:25:10.435 --> 00:25:12.985  
I'll be very parochial about this,

441

00:25:15.125 --> 00:25:16.265  
has applied those lessons

442

00:25:16.445 --> 00:25:18.985  
and has been building on those lessons for 65 years,

443

00:25:19.075 --> 00:25:20.345  
65 years ago,

444

00:25:20.495 --> 00:25:23.465  
October this year was when this accident occurred.

445

00:25:23.835 --> 00:25:27.025  
There has not been a whole loss or fatal accident

446

00:25:27.445 --> 00:25:30.545  
and boring Seattle flight tests in that period of time.

447  
00:25:31.545 --> 00:25:34.565  
That's pretty mindful. Have we been close? Damn right.

448  
00:25:34.565 --> 00:25:37.005  
We've been close. Several people in

449  
00:25:37.005 --> 00:25:38.125  
this room know we've been close.

450  
00:25:39.355 --> 00:25:42.955  
I know we've been close, but

451  
00:25:44.335 --> 00:25:46.005  
lucky or good

452  
00:25:48.545 --> 00:25:51.445  
and they turbo is all given it a presentation

453  
00:25:51.445 --> 00:25:52.685  
called Better Lucky than Good.

454  
00:25:52.685 --> 00:25:53.885  
And I think those of you who've seen

455  
00:25:53.885 --> 00:25:54.925  
it will understand that comment.

456  
00:25:58.055 --> 00:26:01.555  
So we just need to be as good as we can be

457  
00:26:02.395 --> 00:26:04.535  
and cross our fingers that we keep being lucky.

458  
00:26:05.545 --> 00:26:07.655  
I mean, that's the bottom line.

459  
00:26:08.235 --> 00:26:09.935  
I'd like to acknowledge all of these people here.

460  
00:26:10.275 --> 00:26:14.855  
Uh, Felix Spanel, uh, wrote an article in, what was it,

461  
00:26:15.095 --> 00:26:17.655  
1986, I believe.

462  
00:26:18.235 --> 00:26:20.335  
And that's where a lot of the words from the, uh,

463  
00:26:21.075 --> 00:26:24.375  
the testimonial that that, uh, Darren Read came from.

464  
00:26:25.825 --> 00:26:28.165  
Um, Becky Wallick, uh,

465  
00:26:28.495 --> 00:26:30.045  
wrote a book called Growing Up Boeing.

466  
00:26:30.365 --> 00:26:32.285  
A lot of the, the information came from there.

467  
00:26:33.195 --> 00:26:37.425  
Leon gave me a stack of stuff

468  
00:26:38.755 --> 00:26:40.175  
and that we had to filter through.

469  
00:26:40.275 --> 00:26:44.245  
So we'd make this, uh, not a, uh, uh, uh, tutorial,

470  
00:26:44.735 --> 00:26:48.005  
shall we say, uh, and turn it into a 30 minute talk.

471  
00:26:48.345 --> 00:26:52.555  
And thanks to everybody, uh, I'm not,

472  
00:26:52.555 --> 00:26:54.515  
there were no funnies in this that we could keep,

473

00:26:54.665 --> 00:26:55.915  
this was not a funny incident.

474  
00:26:55.945 --> 00:26:59.055  
This is not humor. This is reality. Thank you.

475  
00:27:09.735 --> 00:27:10.735  
Questions.

476  
00:27:17.345 --> 00:27:19.365  
We all start with my own question or comment.

477  
00:27:20.025 --> 00:27:22.885  
Uh, one of the things that was interesting that,

478  
00:27:23.155 --> 00:27:26.655  
that interleaved well with, uh, you know, we started

479  
00:27:26.675 --> 00:27:29.655  
by realizing that the 60th anniversary was coming up

480  
00:27:29.655 --> 00:27:33.135  
and tried getting something going for that, uh, and,

481  
00:27:33.435 --> 00:27:34.895  
and didn't get it done in time.

482  
00:27:35.035 --> 00:27:36.705  
But then we also

483  
00:27:38.545 --> 00:27:40.635  
were looking at our emergency procedures

484  
00:27:40.735 --> 00:27:42.315  
for recovering from Dutch rolls.

485  
00:27:43.185 --> 00:27:45.625  
And, um, it was interesting

486  
00:27:45.625 --> 00:27:47.425  
because as we talked to our pilot community,

487

00:27:47.445 --> 00:27:51.115  
we found it was still basically just

488

00:27:51.115 --> 00:27:52.355  
something that was trained.

489

00:27:53.135 --> 00:27:57.475  
And, um, so trying to find like documented procedure on

490

00:27:57.535 --> 00:28:00.985  
how do you properly, um, you know, what's the,

491

00:28:00.985 --> 00:28:03.315  
what's the best, best technique

492

00:28:03.375 --> 00:28:05.315  
for recovering manually from a Dutch roll?

493

00:28:05.815 --> 00:28:08.155  
And it was surprisingly hard to dig out, um,

494

00:28:08.825 --> 00:28:12.155  
even though there's clearly a, a method

495

00:28:12.175 --> 00:28:15.495  
that's much preferred, uh, over the other.

496

00:28:15.795 --> 00:28:18.385  
But, uh, so that was, that was kind of interesting.

497

00:28:18.405 --> 00:28:20.225  
As part of this, we were able to, uh,

498

00:28:22.275 --> 00:28:23.935  
do a much better job at defining

499

00:28:24.325 --> 00:28:26.695  
what we think our best practice is for, uh,

500

00:28:27.155 --> 00:28:28.975  
manual recovery from a Dutch roll.

501  
00:28:34.315 --> 00:28:35.685  
More of a comment than a question,

502  
00:28:35.785 --> 00:28:38.925  
but, uh, Jerry, you were the pilot on my very first test

503  
00:28:38.925 --> 00:28:41.745  
flight and I was really nervous going into this.

504  
00:28:41.965 --> 00:28:45.705  
And I remember walking through the risk mitigations

505  
00:28:45.725 --> 00:28:47.345  
and things with you guys in pre-flight.

506  
00:28:47.345 --> 00:28:48.985  
It gave me a lot of confidence going up

507  
00:28:49.845 --> 00:28:51.705  
and then he almost made me sick doing it.

508  
00:28:51.765 --> 00:28:55.465  
But, but that playing into

509  
00:28:56.045 --> 00:28:57.505  
the safety culture and the management

510  
00:28:57.505 --> 00:28:59.545  
and then this particular accident,

511  
00:28:59.905 --> 00:29:02.905  
I know Riker would bring up repeatedly when we were working

512  
00:29:03.425 --> 00:29:05.025  
anything related to Detrol, he is like,

513  
00:29:05.415 --> 00:29:08.545  
this is not a low risk, no nonsense thing, remember

514

00:29:09.165 --> 00:29:10.625  
is the last time we lost an airplane.

515

00:29:10.845 --> 00:29:13.005  
So I'm, I'm really glad you guys are out there sharing the

516

00:29:13.005 --> 00:29:14.885  
story 'cause it's an important one.

517

00:29:15.795 --> 00:29:17.035  
Yeah, yeah,

518

00:29:19.935 --> 00:29:20.935  
Yeah. I suppose, uh,

519

00:29:20.935 --> 00:29:23.545  
during my test planning for, uh, Dutch rolls,

520

00:29:23.545 --> 00:29:27.785  
uh, the emergency procedures as, uh, Darren, uh, uh, hinted

521

00:29:27.785 --> 00:29:31.005  
to there, uh, I was digging into that

522

00:29:31.185 --> 00:29:33.485  
and, you know, decided to dig a little deeper as like,

523

00:29:33.485 --> 00:29:35.325  
you know, what's the history behind this?

524

00:29:36.055 --> 00:29:38.675  
And, you know, there's gotta be some training material out

525

00:29:38.675 --> 00:29:42.205  
there on it and, uh, started digging in there and, you know,

526

00:29:42.205 --> 00:29:46.825  
because we've, you know, refined the tube with swept wings

527

00:29:46.825 --> 00:29:49.825  
and engines hanging off of the wing, since we've refined

528  
00:29:49.825 --> 00:29:53.575  
that so much, we, we've trained out the, the problem.

529  
00:29:54.595 --> 00:29:56.495  
And so there doesn't really need

530  
00:29:56.495 --> 00:29:58.455  
to be the training material there, uh,

531  
00:29:58.715 --> 00:30:00.175  
for the, the line pilot.

532  
00:30:00.975 --> 00:30:04.765  
And so I had to keep digging back further back in history

533  
00:30:04.775 --> 00:30:07.925  
until I got to 7 2 7 and 7 0 7

534  
00:30:08.625 --> 00:30:11.405  
and, uh, some of that historical material from,

535  
00:30:11.425 --> 00:30:12.925  
uh, the sixties.

536  
00:30:13.345 --> 00:30:17.325  
Uh, and then also digging into technical orders, uh, uh,

537  
00:30:17.545 --> 00:30:19.245  
for, uh, KC 1 35.

538  
00:30:20.785 --> 00:30:25.755  
So, uh, it was a amalgamation that history,

539  
00:30:27.645 --> 00:30:29.975  
uh, got put into our, uh,

540  
00:30:29.975 --> 00:30:32.415  
current emergency procedure that we use.



541

00:30:34.445 --> 00:30:36.915

Maybe I'll just before we go any further, I'll have, uh,

542

00:30:37.555 --> 00:30:41.085

everybody that's going to be on the panel to make your way

543

00:30:41.085 --> 00:30:42.765

to the front and get on the panel.

544

00:30:43.815 --> 00:30:46.405

And we've got, uh, for video,

545

00:30:46.495 --> 00:30:48.205

we're gonna show first if you want to come up.

546

00:30:48.235 --> 00:30:48.925

Okay. Um.