



1
00:00:10,243 --> 00:00:11,911
>> Good morning.

2
00:00:11,911 --> 00:00:12,912
Good morning, welcome

3
00:00:12,912 --> 00:00:14,247
to the Armstrong
Flight Research Center.

4
00:00:14,247 --> 00:00:17,183
I'm David McBride,
the Center Director.

5
00:00:17,183 --> 00:00:18,885
Welcome, thank you
for coming out today

6
00:00:18,885 --> 00:00:21,955
to hear this great talk
about the 20th anniversary

7
00:00:21,955 --> 00:00:25,258
of our involvement
in TU-144 Program.

8
00:00:25,258 --> 00:00:28,094
I'm glad to have Glenn
Bever back with us to talk

9
00:00:28,094 --> 00:00:31,164
about his experiences
on the program.

10
00:00:31,164 --> 00:00:34,067
Glenn Bever is the former
Deputy Director for Research

11
00:00:34,067 --> 00:00:36,970

and Engineering here
at the Center.

12
00:00:36,970 --> 00:00:40,006
Previously served as the Chief

13
00:00:40,006 --> 00:00:41,508
of the Flight Instrumentation
Branch,

14
00:00:41,508 --> 00:00:44,644
Chief of the Flight Systems
Branch here at Armstrong.

15
00:00:44,644 --> 00:00:47,180
He developed embedded
systems for research aircraft

16
00:00:47,180 --> 00:00:50,016
at Armstrong for most
of his 42 years at NASA.

17
00:00:50,016 --> 00:00:52,685
He also served as
Project Chief Engineer

18
00:00:52,685 --> 00:00:54,988
for the Automated
Aerial Refueling Project

19
00:00:54,988 --> 00:00:59,025
and as Chief Engineer for the
C-17 Research Flight Computing

20
00:00:59,025 --> 00:01:00,693
Systems Project.

21
00:01:00,693 --> 00:01:04,564
Glenn has worked on at least
17 different aircraft platforms

22

00:01:04,564 --> 00:01:08,701

here at the Center including
the F-104, F-16XL, CV-990,

23

00:01:08,701 --> 00:01:17,310

the SR-71, F-15D, high deck,
FBF-116 -- or FBF-111, F-18,

24

00:01:17,310 --> 00:01:24,951

F-15, A-37, C-17, KC-135, C-140
Jetstar, Army OV-1 and TU-144

25

00:01:24,951 --> 00:01:27,287

and a few others that
aren't on the list.

26

00:01:27,287 --> 00:01:30,857

For 16 years, Glenn was
the NASA representative

27

00:01:30,857 --> 00:01:33,059

to the [Inaudible] AGARD
Flight Test Techniques Group

28

00:01:33,059 --> 00:01:35,862

responsible for publications
associated

29

00:01:35,862 --> 00:01:39,532

with flight test techniques and
flight test instrumentation.

30

00:01:39,532 --> 00:01:43,002

Glenn authored the AGARDograph
Digital Signal Conditioning

31

00:01:43,002 --> 00:01:44,370

for Flight Test.

32

00:01:44,370 --> 00:01:48,441

Between 1995 and 1999, Glenn
spent much of his time in Russia

33

00:01:48,441 --> 00:01:51,578

as the U.S. Instrumentation
and On-Site Engineer

34

00:01:51,578 --> 00:01:54,848

for the TU-144L High-Speed
Research project

35

00:01:54,848 --> 00:01:57,317

which he will be
talking about here today.

36

00:01:57,317 --> 00:02:00,220

Glenn's currently retired
but holds the position

37

00:02:00,220 --> 00:02:03,723

of America's Engineer here at
NASA Armstrong, the first person

38

00:02:03,723 --> 00:02:06,726

to hold an America's Engineering
position here at the Center.

39

00:02:06,726 --> 00:02:09,496

So please Glenn a warm welcome.

40

00:02:09,496 --> 00:02:15,568

[Applause]

41

00:02:26,045 --> 00:02:27,647

>> It wasn't mine.

42

00:02:31,384 --> 00:02:36,723

First of all, I'd like to

note that my son Sam is here.

43

00:02:36,723 --> 00:02:38,491

He was not alive

for these events

44

00:02:38,491 --> 00:02:40,593

so he has a [laughter] chance

45

00:02:40,593 --> 00:02:44,631

to see what his old man did

before he was the center

46

00:02:44,631 --> 00:02:46,599

of our lives.

47

00:02:46,599 --> 00:02:50,803

For that matter, how many

people have even heard

48

00:02:50,803 --> 00:02:54,908

of this project prior

to the presentation?

49

00:02:54,908 --> 00:02:58,411

Okay, good [laughter].

50

00:02:58,411 --> 00:03:01,481

This is not a big

Cold War secret.

51

00:03:01,481 --> 00:03:06,319

How many people actually

worked on the program?

52

00:03:06,319 --> 00:03:13,092

I see Becky back

there, and Bob Curry,

53

00:03:15,128 --> 00:03:18,665
and some other people
watching, I think, from afar.

54
00:03:18,665 --> 00:03:26,739
Well, 20 years ago, on
November 29, 1996 to be exact,

55
00:03:26,739 --> 00:03:29,342
it was the day after
Thanksgiving

56
00:03:29,342 --> 00:03:31,377
so we spent Thanksgiving Day

57
00:03:31,377 --> 00:03:35,315
on an airplane eating delta
rubber chicken on our way

58
00:03:35,315 --> 00:03:39,419
to Moscow to watch the first
flight of this program.

59
00:03:39,419 --> 00:03:43,089
It didn't break the
sound barrier that day

60
00:03:43,089 --> 00:03:45,959
but it broke a barrier
of a different kind.

61
00:03:45,959 --> 00:03:49,329
It was the first
American-Russian collaboration

62
00:03:49,329 --> 00:03:52,899
on an aeronautics
flight research project.

63
00:03:52,899 --> 00:03:55,735

And as far as I know, it's
the only one that we ever did.

64

00:03:55,735 --> 00:03:57,604
It hasn't happened since.

65

00:03:57,604 --> 00:04:00,807
So we were breaking
a lot of new ground.

66

00:04:00,807 --> 00:04:08,014
I had a front row seat
because I was the boots

67

00:04:08,014 --> 00:04:11,150
on the ground there.

68

00:04:11,150 --> 00:04:17,590
This story is a story partly
about the program but mostly

69

00:04:17,590 --> 00:04:20,526
about my experiences there which
I find the more interesting.

70

00:04:20,526 --> 00:04:23,997
It was the most interesting
part to me in trying

71

00:04:23,997 --> 00:04:26,733
to get this thing
literally off the ground.

72

00:04:31,037 --> 00:04:33,940
So what was the program
all about?

73

00:04:33,940 --> 00:04:36,709
Well the NASA High-Speed
Research Office

74

00:04:36,709 --> 00:04:39,779

out of Langley funded a program

75

00:04:39,779 --> 00:04:41,881

to gather some quantitative

information

76

00:04:41,881 --> 00:04:47,053

on a passenger class supersonic

aircraft with the goal

77

00:04:47,053 --> 00:04:48,721

of feeding that data

into the design

78

00:04:48,721 --> 00:04:52,225

of the next generation

supersonic aircraft.

79

00:04:52,225 --> 00:04:54,694

These things go in

cycles and this is a cycle

80

00:04:54,694 --> 00:04:56,763

where Boeing was

once again interested

81

00:04:56,763 --> 00:04:58,298

in pursuing something like that.

82

00:04:58,298 --> 00:05:01,868

But there are only two vehicles

that existed at the time

83

00:05:01,868 --> 00:05:06,205

that fit that class of aircraft,

the TU-144 and the Concorde.

84

00:05:06,205 --> 00:05:11,077

The TU-144 is known to

Westerners sometimes

85

00:05:11,077 --> 00:05:15,381

as the Concordski much to

the chagrin of the Russians.

86

00:05:15,381 --> 00:05:17,950

They really hated

that avolation.

87

00:05:23,323 --> 00:05:26,592

So what was going on

in Russia at the time?

88

00:05:26,592 --> 00:05:29,395

The Soviet Union had just

fallen a couple of years before,

89

00:05:29,395 --> 00:05:32,365

1991 -- it had ceased to exist.

90

00:05:32,365 --> 00:05:35,101

It was now the Russian

Federation.

91

00:05:35,101 --> 00:05:37,637

The Russian economy

was in bad shape.

92

00:05:37,637 --> 00:05:42,942

It was a closed economy.

93

00:05:42,942 --> 00:05:45,478

They didn't have hard currency.

94

00:05:45,478 --> 00:05:48,915

A lot of people had

jobs but no pay

95

00:05:48,915 --> 00:05:50,650

so how they survived

with no pay?

96

00:05:50,650 --> 00:05:52,385

Well, it was largely

a barter economy.

97

00:05:52,385 --> 00:05:54,987

It took us a while

to figure that out.

98

00:05:54,987 --> 00:05:57,123

Some of the people I worked

with were not getting paid

99

00:05:57,123 --> 00:05:58,791

for the work that

they were doing.

100

00:05:58,791 --> 00:06:03,696

But their apartments were

free, things like that.

101

00:06:03,696 --> 00:06:06,399

Russian aviation was

in bad shape also

102

00:06:06,399 --> 00:06:12,004

because their customer base

was essentially all in Russia.

103

00:06:12,004 --> 00:06:17,243

And now the Russians were

able to buy Western aircraft.

104

00:06:17,243 --> 00:06:21,247

At least that possibility

was open to them.

105

00:06:21,247 --> 00:06:24,016

And so in Tupolev, the
Tupolev Design Bureau

106

00:06:24,016 --> 00:06:28,755

that designed the TU-144
found their customer base

107

00:06:28,755 --> 00:06:30,123

severely limited.

108

00:06:30,123 --> 00:06:34,160

There was a lot of interest in
Western -- anything Western.

109

00:06:34,160 --> 00:06:36,529

You know, the wall
had come down.

110

00:06:36,529 --> 00:06:39,031

The door had opened.

111

00:06:39,031 --> 00:06:42,668

They were very happy to
see people from the West.

112

00:06:42,668 --> 00:06:44,971

Most Russians had never
been out of the country,

113

00:06:44,971 --> 00:06:49,041

had never met anybody from
outside of the country.

114

00:06:49,041 --> 00:06:54,947

And they needed --
they needed money.

115

00:06:54,947 --> 00:06:59,585

They were interested in buying
anything Western or obtaining,

116

00:06:59,585 --> 00:07:04,223

whether we're talking about
blue jeans, or if we're talking

117

00:07:04,223 --> 00:07:10,163

about McDonald's restaurants,
or Pizza Hut, which they had,

118

00:07:10,163 --> 00:07:14,767

and TGI Friday that literally
spelled that way in Cyrillic.

119

00:07:14,767 --> 00:07:19,439

I ate at a few of those places.

120

00:07:19,439 --> 00:07:23,810

And even Western
religion, you know,

121

00:07:23,810 --> 00:07:28,414

the Russian traditionally
was Russian Orthodox.

122

00:07:28,414 --> 00:07:33,853

Under Communist Russia,
they had not fared too well

123

00:07:33,853 --> 00:07:35,221

but they still existed.

124

00:07:35,221 --> 00:07:39,091

A lot of the cathedrals had
been turned into storage sheds

125

00:07:39,091 --> 00:07:40,359

and they were in the process

126

00:07:40,359 --> 00:07:43,930

of being turned back

into cathedrals.

127

00:07:43,930 --> 00:07:45,331

That was actually

a point of friction

128

00:07:45,331 --> 00:07:46,866

with some Russians I had met.

129

00:07:46,866 --> 00:07:50,937

They didn't appreciate that

aspect of Western coming in.

130

00:07:54,073 --> 00:07:56,008

But it was kind of

a chaotic time

131

00:07:56,008 --> 00:07:57,977

because they didn't

know what was going on

132

00:07:57,977 --> 00:07:59,779

and what was going to happen.

133

00:07:59,779 --> 00:08:03,883

One Russian described it to

me as "Chicago in the 1920s".

134

00:08:05,284 --> 00:08:09,021

Moscow was a pretty secure city

before that, as you might expect

135

00:08:09,021 --> 00:08:13,459

with a dictatorship,

and hierarchical regime

136

00:08:13,459 --> 00:08:16,062

and the secret police,

and so forth.

137

00:08:16,062 --> 00:08:19,765

All that was swept away

at least for the time.

138

00:08:19,765 --> 00:08:24,804

And now they had such nice

things as murder in the subway

139

00:08:24,804 --> 00:08:27,440

and Czechian separatists

setting off bombs

140

00:08:27,440 --> 00:08:31,477

in public transportation, all

in places that I frequented

141

00:08:31,477 --> 00:08:36,015

so that was where it had

personal interest to me.

142

00:08:38,651 --> 00:08:41,721

So how did the program

get started?

143

00:08:41,721 --> 00:08:48,594

Well, the Vice-President Gore

and Prime Minister Chernomyrdin

144

00:08:48,594 --> 00:08:52,265

of Russia formed a Joint

Commission to study ways

145

00:08:52,265 --> 00:08:56,235

of collaborating between the

United States and Russia.

146

00:08:56,235 --> 00:09:00,406

It was a historic opportunity
and one that they didn't want

147

00:09:00,406 --> 00:09:05,545

to get by them, all kinds
of concerns about, you know,

148

00:09:05,545 --> 00:09:07,780

proliferation of
nuclear materials

149

00:09:07,780 --> 00:09:09,015

and other things like that.

150

00:09:09,015 --> 00:09:11,751

But pertinent to this
discussion is in the context

151

00:09:11,751 --> 00:09:17,590

to that they endorsed the
TU-144LL program in 1993.

152

00:09:17,590 --> 00:09:20,760

And in 1994, agreements
were signed

153

00:09:20,760 --> 00:09:24,697

with the affected parties
most of which are listed

154

00:09:24,697 --> 00:09:29,569

at the bottom there, NASA
Langley, NASA Dryden,

155

00:09:29,569 --> 00:09:32,138

NASA Lewis which
is now NASA Glenn

156

00:09:32,138 --> 00:09:36,943

and we're now Armstrong
were involved.

157

00:09:36,943 --> 00:09:40,780
Boeing, Douglas and Rockwell
-- Boeing gobbled up Douglas

158

00:09:40,780 --> 00:09:44,050
and Rockwell in the middle
of this program, by the way.

159

00:09:44,050 --> 00:09:46,619
So that things were
always changing.

160

00:09:46,619 --> 00:09:50,089
General Electric and Pratt
Whitney had an engine testing

161

00:09:50,089 --> 00:09:52,792
and experiment that was run.

162

00:09:52,792 --> 00:09:57,330
Tupolev Design Bureau which
owned the aircraft and IBP

163

00:09:57,330 --> 00:10:01,534
which is a small company out of
England that had all the rights

164

00:10:01,534 --> 00:10:05,905
to the contract passed
through to Tupolev.

165

00:10:08,007 --> 00:10:12,445
So I got involved in
1994 and I was sent

166

00:10:12,445 --> 00:10:15,781
to the Defense Language

Institute up in Monterey

167

00:10:15,781 --> 00:10:18,684

which is a place where they

train military personnel

168

00:10:18,684 --> 00:10:22,555

in all sorts of languages,

mostly for listening posts

169

00:10:22,555 --> 00:10:25,257

and things like that

during the Cold War.

170

00:10:25,257 --> 00:10:26,392

Well, the Cold War had ended

171

00:10:26,392 --> 00:10:28,227

and these people were

struggling a bit also,

172

00:10:28,227 --> 00:10:31,430

in what their future held.

173

00:10:31,430 --> 00:10:32,999

And so we contract with them

174

00:10:32,999 --> 00:10:36,168

to teach a small

group of us Russian.

175

00:10:36,168 --> 00:10:42,441

It's a 46-week course which they

crammed into four [laughter].

176

00:10:45,011 --> 00:10:49,415

Yes [laughter], that was one of

the more humiliating experiences

177

00:10:49,415 --> 00:10:52,385
of my life, being poured out of
that place with an expectation

178
00:10:52,385 --> 00:10:54,854
of knowing something
about Russian.

179
00:10:54,854 --> 00:10:57,490
And I did get an overall
structure of the language

180
00:10:57,490 --> 00:11:04,196
and it was helpful but
it was not optimal.

181
00:11:05,564 --> 00:11:08,100
The flights ran from 1996,

182
00:11:08,100 --> 00:11:12,872
20 years ago this
month, to April of 1999.

183
00:11:12,872 --> 00:11:17,476
27 flights in all, 14 of
which were supersonic.

184
00:11:17,476 --> 00:11:21,147
And they were all flown
out of Zhukovsky Air Base.

185
00:11:21,147 --> 00:11:24,183
This was a NASA program
which was never flown

186
00:11:24,183 --> 00:11:26,152
in this country much
less this continent.

187
00:11:26,152 --> 00:11:29,055

They were all flown
out of Zhukovsky.

188

00:11:33,025 --> 00:11:37,997
This is the only chart I'm
going to show you so take heart.

189

00:11:37,997 --> 00:11:41,367
But this is just to show kind
of how people fit together.

190

00:11:41,367 --> 00:11:44,370
And this is my view of it.

191

00:11:44,370 --> 00:11:46,338
The High Speed Research
HSR Office

192

00:11:46,338 --> 00:11:48,340
up in Langley had
the program money

193

00:11:48,340 --> 00:11:55,214
and they funded Boeing Seattle
to be the prime contractor

194

00:11:55,214 --> 00:11:57,950
to have a contract with
the Tupolev Design Bureau,

195

00:11:57,950 --> 00:12:00,119
the people of the airplane
but as I say it passed

196

00:12:00,119 --> 00:12:04,523
through IBP to make that happen.

197

00:12:04,523 --> 00:12:11,230
Dryden, shown prominently
in red there,

198

00:12:11,230 --> 00:12:14,266

was funded from the High

Speed Research Office

199

00:12:14,266 --> 00:12:18,304

but we essentially worked

as a subcontractor to Boeing

200

00:12:18,304 --> 00:12:22,641

to handle the flight

instrumentation issues, support

201

00:12:22,641 --> 00:12:24,276

and flight test management.

202

00:12:24,276 --> 00:12:26,412

We had a project management

office here that was managing

203

00:12:26,412 --> 00:12:28,013

that part of the program.

204

00:12:28,013 --> 00:12:31,317

Ross Barber was the

head of that activity.

205

00:12:31,317 --> 00:12:35,221

After that it got very squishy

206

00:12:35,221 --> 00:12:40,960

because the data coming

off the aircraft flew --

207

00:12:40,960 --> 00:12:43,996

came back to Dryden.

208

00:12:43,996 --> 00:12:48,100

We processed the data, applied

the calibrations and so forth.

209

00:12:48,100 --> 00:12:50,603

Put it in our data archive

and made it available

210

00:12:50,603 --> 00:12:55,474

to U.S. team members

for analysis.

211

00:12:55,474 --> 00:12:58,844

But essentially all of the

working issues on the ground

212

00:12:58,844 --> 00:13:03,549

in Moscow with the exception

of a team from Langley

213

00:13:03,549 --> 00:13:08,387

for a cabin noise

experiment, was all really run

214

00:13:08,387 --> 00:13:11,490

through Dryden and that

meant largely through me

215

00:13:11,490 --> 00:13:13,959

because I was often

the only guy --

216

00:13:13,959 --> 00:13:18,831

the only American on site there

for large parts of this program.

217

00:13:18,831 --> 00:13:23,169

So this is the TU-144.

218

00:13:23,169 --> 00:13:25,704

This is a picture at

Zhukovsky Air Base.

219

00:13:25,704 --> 00:13:33,445

It's, and I think there's snow
on the ground in this picture,

220

00:13:33,445 --> 00:13:36,148

it was painted white twice

221

00:13:36,148 --> 00:13:37,516

because the first
time they painted it,

222

00:13:37,516 --> 00:13:40,119

they did such a poor job of
priming it that it was --

223

00:13:40,119 --> 00:13:43,989

the paint was coming off in very
large clumps even before it ever

224

00:13:43,989 --> 00:13:46,158

got in the air.

225

00:13:46,158 --> 00:13:52,998

So they named the plane the
[inaudible] which means Moscow.

226

00:13:57,002 --> 00:13:59,238

And by the way, the LL
designation at the end

227

00:13:59,238 --> 00:14:02,808

of TU-144, that stood for
[Inaudible] Laboratoria

228

00:14:02,808 --> 00:14:06,245

which means Flight
Laboratory in Russian.

229

00:14:06,245 --> 00:14:08,914
I always make the distinction.

230
00:14:08,914 --> 00:14:13,586
This was the only LL aircraft.

231
00:14:13,586 --> 00:14:20,626
By contrast, here's a
picture of the Concorde.

232
00:14:20,626 --> 00:14:21,927
It's kind of a poor
quality picture

233
00:14:21,927 --> 00:14:23,395
because this is a screen capture

234
00:14:23,395 --> 00:14:26,332
from a videotape
that I shot in Paris.

235
00:14:26,332 --> 00:14:29,935
This happened to be a
Concorde that I flew in a year

236
00:14:29,935 --> 00:14:31,503
after the program ended.

237
00:14:31,503 --> 00:14:35,074
I had so many frequent flyer
miles from flying to Russia,

238
00:14:35,074 --> 00:14:38,744
I got two free flights
on the Concorde going

239
00:14:38,744 --> 00:14:40,346
to some meeting -- to
and from some meetings

240

00:14:40,346 --> 00:14:41,714

that I had in Paris.

241

00:14:41,714 --> 00:14:45,684

And it's a real interesting

experience landing before you

242

00:14:45,684 --> 00:14:46,385

take off.

243

00:14:46,385 --> 00:14:48,921

It's a fast airplane.

244

00:14:52,091 --> 00:14:55,995

But in comparing the two,

the airplane in red --

245

00:14:55,995 --> 00:15:00,966

whoops, is the TU-144 and the

Concorde is the one in blue.

246

00:15:00,966 --> 00:15:02,468

So you'll see side by side,

247

00:15:02,468 --> 00:15:06,305

they are almost exactly

the same size.

248

00:15:06,305 --> 00:15:11,410

The TU-144 is a little bit

longer, a little bit taller.

249

00:15:11,410 --> 00:15:12,811

The wing shape you

see is different.

250

00:15:12,811 --> 00:15:15,981

The placement of the

engines is different.

251

00:15:15,981 --> 00:15:22,421

TU-144 is a little

bit heavier as well.

252

00:15:22,421 --> 00:15:25,724

The ceiling was a

little bit higher.

253

00:15:25,724 --> 00:15:29,929

And even the speed was a little

bit faster than the Concorde.

254

00:15:29,929 --> 00:15:33,065

But the Concorde

had a bigger range.

255

00:15:34,199 --> 00:15:36,669

Now, when we started

our program,

256

00:15:36,669 --> 00:15:42,341

they replaced the engines

with the NK-321 turbofans.

257

00:15:42,341 --> 00:15:44,810

Those were engines out of

the Russian Blackjack bomber.

258

00:15:44,810 --> 00:15:51,550

The original engines for the

TU-144 are no longer available.

259

00:15:51,550 --> 00:15:53,852

And one of my favorite

stories about that, you know,

260

00:15:53,852 --> 00:15:56,522

after they re-engined it and

changed the inlet configurations

261

00:15:56,522 --> 00:15:57,890

and so forth to make them fit,

262

00:15:57,890 --> 00:16:02,895

and one of their supersonic

flights, they boomed the factory

263

00:16:02,895 --> 00:16:05,431

where the engines were

manufactured and broke a lot

264

00:16:05,431 --> 00:16:10,169

of windows [laughter]

-- payback.

265

00:16:10,169 --> 00:16:13,872

This is a picture of

the Concorde or the --

266

00:16:13,872 --> 00:16:15,741

excuse me, the TU-144 cockpit

267

00:16:15,741 --> 00:16:19,178

and after it was all

put back together.

268

00:16:19,178 --> 00:16:21,080

The thing that strikes

me about this is it looks

269

00:16:21,080 --> 00:16:24,783

to me all the world like one

of our engineering simulators.

270

00:16:26,051 --> 00:16:29,655

It's very boxy, very functional.

271

00:16:29,655 --> 00:16:35,694

The aircraft itself was
very stiff to handle.

272

00:16:35,694 --> 00:16:41,200

But the Russians built
things that last.

273

00:16:41,200 --> 00:16:44,770

Just to cite an example,
on a typical fighter,

274

00:16:44,770 --> 00:16:46,672

they put the inlets
on top of the wings

275

00:16:46,672 --> 00:16:50,342

so that it doesn't suck up all
the fog on the crappy runways.

276

00:16:50,342 --> 00:16:53,078

And the reasoning is we're
fighting in a battle.

277

00:16:53,078 --> 00:16:54,179

We're not going to have --

278

00:16:54,179 --> 00:16:55,748

we're going to have
battlefield conditions.

279

00:16:55,748 --> 00:16:58,951

We don't -- we're not going
to have pristine runways.

280

00:16:58,951 --> 00:17:04,156

So they approached things
often differently than we did.

281

00:17:04,156 --> 00:17:07,726

Here's another screen capture

of the Concorde in flight.

282

00:17:07,726 --> 00:17:12,798

I actually was in the cockpit

during Mach 2 flight taking this

283

00:17:12,798 --> 00:17:16,402

picture, actually taking

a whole series of videos

284

00:17:16,402 --> 00:17:18,470

of which this is

a screen capture.

285

00:17:18,470 --> 00:17:21,974

This is, you know, a

year-and-a-half before 9-11.

286

00:17:21,974 --> 00:17:24,576

And a flight attendant

actually came up and asked me

287

00:17:24,576 --> 00:17:28,680

if I wanted a tour of

the cockpit in flight.

288

00:17:28,680 --> 00:17:31,417

So I took my video camera,

went up and I spent a long time

289

00:17:31,417 --> 00:17:34,520

up there videotaping the

gauges and the pilot activity

290

00:17:34,520 --> 00:17:37,589

and putting my hand on the

bulkhead, feeling the heat

291

00:17:37,589 --> 00:17:40,159

from the Mach 2 flight

happening.

292

00:17:40,159 --> 00:17:42,795

Where the flight engineer

has his hand is close

293

00:17:42,795 --> 00:17:48,400

to a gap behind the console

where at Mach it's expanded

294

00:17:48,400 --> 00:17:51,537

by like, I think, about an

inch or inch-and-a-half just

295

00:17:51,537 --> 00:17:54,973

from the friction, the

heat from the Mach flight.

296

00:17:58,210 --> 00:18:01,046

So what were we actually

measuring on this airplane?

297

00:18:01,046 --> 00:18:04,049

This is like -- and selected out

of a whole group of experiments,

298

00:18:04,049 --> 00:18:06,018

this was what was selected.

299

00:18:06,018 --> 00:18:09,388

There are six experiments

listed there.

300

00:18:09,388 --> 00:18:13,459

And we added a seventh

in phase two flight,

301

00:18:13,459 --> 00:18:16,061

the quality of pilot assessment.

302

00:18:16,061 --> 00:18:20,132

But quantitatively, we had a
handling quad as experiment.

303

00:18:20,132 --> 00:18:21,700

A boundary layer experiment --

304

00:18:21,700 --> 00:18:23,469

you can see it listed
some pressures

305

00:18:23,469 --> 00:18:27,005

like we had pressure strip of
tubing on the starboard wing.

306

00:18:27,005 --> 00:18:30,509

We had thermal couples and
RTDs and heat flux gauges

307

00:18:30,509 --> 00:18:34,713

on the port wing for surface
structure equilibrium test.

308

00:18:34,713 --> 00:18:37,049

Ask Greg Stevens
about that sometime.

309

00:18:37,049 --> 00:18:39,718

He was -- that was
his experiment.

310

00:18:39,718 --> 00:18:43,755

Engine air flow and heat,
slender wing ground effect.

311

00:18:43,755 --> 00:18:45,090

Ask Bob Curry about that.

312

00:18:45,090 --> 00:18:46,391

He's in the back
of the room there.

313

00:18:46,391 --> 00:18:50,395
That was an experiment he
was interested in which led

314

00:18:50,395 --> 00:18:54,500
to some other stories
hopefully, I'll get to later.

315

00:18:55,534 --> 00:19:01,607
So 722 PCM data channels
but those --

316

00:19:01,607 --> 00:19:05,210
and oh, I forgot to mention
the cabin noise experiment

317

00:19:06,178 --> 00:19:07,279
mostly inside.

318

00:19:07,279 --> 00:19:10,482
That was principally
a Langley experiment

319

00:19:10,482 --> 00:19:12,684
with some participation
from Boeing.

320

00:19:12,684 --> 00:19:19,758
So we were majoring all that
as well various air data.

321

00:19:19,758 --> 00:19:24,363
You can see where the
sensors were placed

322

00:19:24,363 --> 00:19:27,432
which is pretty far aft

from where the inlets where.

323

00:19:27,432 --> 00:19:31,470

So we had some significant

lags due to that.

324

00:19:31,470 --> 00:19:35,207

And they're also using

Armenian sensors.

325

00:19:35,207 --> 00:19:37,676

And whenever I asked them, what

sensors they use and they'd say,

326

00:19:37,676 --> 00:19:42,047

"Armenian," and then

they'd laugh [laughter].

327

00:19:42,047 --> 00:19:47,719

Okay, it turns out that

Armenian to them was like made

328

00:19:47,719 --> 00:19:50,556

in Japan was here in the 1960s.

329

00:19:50,556 --> 00:19:52,991

They were considered

poor quality instruments

330

00:19:52,991 --> 00:19:54,560

and they were a joke.

331

00:19:54,560 --> 00:19:57,396

It was no laughing

matter to me because I had

332

00:19:57,396 --> 00:20:00,732

to analyze the data coming

off of those sensors.

333

00:20:00,732 --> 00:20:04,703

And the characteristics of a
fine sensor was a saw tooth.

334

00:20:04,703 --> 00:20:05,938

You'd go up an altitude.

335

00:20:05,938 --> 00:20:08,907

You continue up an altitude,
continue up an altitude.

336

00:20:08,907 --> 00:20:12,411

So the calibration curve was
constantly changing slope

337

00:20:12,411 --> 00:20:15,881

and there's hysteresis at those
points so you could not predict

338

00:20:15,881 --> 00:20:17,015

where it was going to happen.

339

00:20:17,015 --> 00:20:20,352

I had to go and by hand
in the data and figure

340

00:20:20,352 --> 00:20:22,788

out where those points were so
I could apply the calibration

341

00:20:22,788 --> 00:20:24,089

curve to make that change.

342

00:20:24,089 --> 00:20:25,524

And if that change
happened in the middle

343

00:20:25,524 --> 00:20:29,828

of a flight test

point, not optimal.

344

00:20:29,828 --> 00:20:32,631

So I got tired of it finally

and designed my own system

345

00:20:32,631 --> 00:20:36,535

and put it on board so I

didn't have to mess with that.

346

00:20:37,936 --> 00:20:42,808

This is a screenshot of a chart

I made showing all the flights.

347

00:20:42,808 --> 00:20:47,713

The phase one and phase

two from 1996 to '99,

348

00:20:47,713 --> 00:20:49,548

these were all the flights

where they happened.

349

00:20:49,548 --> 00:20:51,183

And if you can see

the red on there,

350

00:20:51,183 --> 00:20:53,919

those are the supersonic

flights.

351

00:20:53,919 --> 00:20:56,688

We had some gaps to

handle some reconfiguration

352

00:20:56,688 --> 00:21:00,525

and aircraft issues

and converting

353

00:21:00,525 --> 00:21:02,961

from phase one to phase two.

354

00:21:02,961 --> 00:21:07,099

Right here, you see

U.S. evaluation flights.

355

00:21:07,099 --> 00:21:09,534

That was for these two guys.

356

00:21:09,534 --> 00:21:12,137

Most of you will recognize

the guy on the left

357

00:21:12,137 --> 00:21:14,239

as our own Gordo Fullerton.

358

00:21:14,239 --> 00:21:19,177

Gordo was a bulldog in making

sure this flight happened.

359

00:21:19,177 --> 00:21:22,347

He really wanted to

fly this airplane

360

00:21:22,347 --> 00:21:25,517

and he really pushed it.

361

00:21:25,517 --> 00:21:27,552

Rob Rivers is the

other pilot there.

362

00:21:27,552 --> 00:21:28,687

He's out of Langley.

363

00:21:28,687 --> 00:21:31,823

You can see the degree

of his commitment also

364

00:21:31,823 --> 00:21:36,328

because you might notice that

he's sporting a cane there.

365

00:21:36,328 --> 00:21:38,764

The reason for that was

a month or two prior

366

00:21:38,764 --> 00:21:41,266

to that, he broke his leg.

367

00:21:41,266 --> 00:21:45,203

And he was not 100%

healed frankly

368

00:21:45,203 --> 00:21:46,705

and hobbled around on that cane.

369

00:21:46,705 --> 00:21:48,774

But he managed to convince

doctors on both sides

370

00:21:48,774 --> 00:21:51,643

of the Atlantic that he was

fit enough to fly [laughter].

371

00:21:53,011 --> 00:21:54,012

And remember what he said

372

00:21:54,012 --> 00:21:56,148

about the stiff handling

of the TU-144.

373

00:21:56,148 --> 00:22:00,218

It was not an easy aircraft

to fly if you were not 100%.

374

00:22:00,218 --> 00:22:03,322

But he did.

375

00:22:03,322 --> 00:22:06,291

So what's coming

next is a video.

376

00:22:06,291 --> 00:22:09,695

This is about three-and-a-half

minutes long.

377

00:22:09,695 --> 00:22:14,633

And this is video

that was shot by --

378

00:22:14,633 --> 00:22:17,969

mostly by Lori Losey

here so we sent her --

379

00:22:17,969 --> 00:22:21,239

Jim Ross and her to

Moscow for these flights

380

00:22:21,239 --> 00:22:24,443

to get us some decent pictures.

381

00:22:24,443 --> 00:22:28,647

And this is Gordo's

first flight.

382

00:22:28,647 --> 00:22:30,015

There's the takeoff.

383

00:22:30,015 --> 00:22:35,454

You can see the Snoopy ears

there deployed, the winglets --

384

00:22:35,454 --> 00:22:37,155

that's something the

Concorde did not have

385

00:22:37,155 --> 00:22:39,391

but they had a [inaudible]

problem with this aircraft

386

00:22:39,391 --> 00:22:42,227

and they had to put those on

there to balance things out.

387

00:22:42,227 --> 00:22:45,263

And you'll also notice

the drooped nose.

388

00:22:45,263 --> 00:22:48,633

Someone called this

the sad dragon face.

389

00:22:49,968 --> 00:22:52,003

But it's drooped down

12-and-a-half degrees

390

00:22:52,003 --> 00:22:55,741

so the pilots can see the

runway on takeoff and landing.

391

00:22:56,975 --> 00:23:00,011

Something else the

Concorde also did.

392

00:23:04,116 --> 00:23:07,853

It was a beautiful aircraft.

393

00:23:07,853 --> 00:23:09,521

But that aircraft was --

394

00:23:09,521 --> 00:23:12,758

this particular one was the

17th off the assembly line.

395

00:23:12,758 --> 00:23:16,595

It was the last TU-144 built.

396

00:23:16,595 --> 00:23:18,563

They had like 82 flight hours.

397

00:23:18,563 --> 00:23:21,266

It was retired in 1989.

398

00:23:21,266 --> 00:23:23,835

From commercial service, it

retired, I think, about '79

399

00:23:23,835 --> 00:23:26,338

but they did some other

testing up until '89.

400

00:23:26,338 --> 00:23:28,540

And then it sat there.

401

00:23:28,540 --> 00:23:30,308

So there were no

flyable aircraft

402

00:23:30,308 --> 00:23:31,743

at the time we started

the programming

403

00:23:31,743 --> 00:23:35,213

and the Russians

resurrected this one.

404

00:23:36,581 --> 00:23:39,684

And they had high hopes that

we would continue the program

405

00:23:40,852 --> 00:23:42,754

and make more use out of that.

406

00:24:02,007 --> 00:24:04,209

It's coming in for

a landing here.

407

00:24:05,677 --> 00:24:08,713

Those aircrafts or one of its
sister ships famously crashed

408

00:24:08,713 --> 00:24:11,483

in 1973 Paris Air Show

409

00:24:11,483 --> 00:24:15,120

under rather controversial
circumstances.

410

00:24:15,120 --> 00:24:17,722

You can Google it on the
internet sometime and find

411

00:24:17,722 --> 00:24:21,426

out all the different
opinions about that.

412

00:24:21,426 --> 00:24:26,898

But it pretty well killed
its commercial viability,

413

00:24:26,898 --> 00:24:28,099

at least in the Western world.

414

00:24:28,099 --> 00:24:31,236

And it spent the rest of
its commercial life flying

415

00:24:31,236 --> 00:24:34,940

within the Soviet Union
from Siberia and back again.

416

00:24:45,617 --> 00:24:47,018

The handling quality,
by the way,

417

00:24:47,018 --> 00:24:50,589

are considerably different

expectation in the U.S. pilots

418

00:24:50,589 --> 00:24:52,190

than the Russian pilots.

419

00:24:52,190 --> 00:24:54,326

When you talk to -- with

Borisov [assumed spelling],

420

00:24:54,326 --> 00:24:58,897

the chief pilot of the TU-144

came out here and flew an F-18.

421

00:24:58,897 --> 00:25:03,635

They actually chased the SR-71

on one flight and Borisov said,

422

00:25:03,635 --> 00:25:06,505

"Well, I've chased an SR once

before but it's over the Baltic

423

00:25:06,505 --> 00:25:08,340

and I couldn't catch it."

424

00:25:10,275 --> 00:25:13,178

But he said the F-18,

its sensitivity,

425

00:25:13,178 --> 00:25:16,381

it was just way too

sensitive an aircraft.

426

00:25:16,381 --> 00:25:18,884

And he talked to the American

pilots flying the TU-144

427

00:25:18,884 --> 00:25:23,722

and saaid, "The thing

handled like a truck."

428

00:25:23,722 --> 00:25:26,691

And the, notice he hangs onto
his jacket through all this.

429

00:25:26,691 --> 00:25:32,030

This is a very Russian
scene here.

430

00:25:37,302 --> 00:25:40,372

But the Russians also said
during one of those things

431

00:25:40,372 --> 00:25:44,175

that the TU-144 flew like
a good fighter should.

432

00:25:44,175 --> 00:25:47,479

So the whole expectation level

433

00:25:47,479 --> 00:25:50,048

between the two countries'
pilots was just

434

00:25:50,048 --> 00:25:52,651

entirely different.

435

00:25:52,651 --> 00:25:55,887

Okay, so as Paul
Harvey used to say,

436

00:25:55,887 --> 00:25:58,823

"Now for the rest of the story."

437

00:25:58,823 --> 00:26:00,559

That's pretty much
it for the program.

438

00:26:00,559 --> 00:26:04,062

What were some of the

challenges we faced there?

439

00:26:04,062 --> 00:26:07,732

Well, import and

export was the big one.

440

00:26:07,732 --> 00:26:10,602

We didn't do a lot of importing

and exporting in those days.

441

00:26:10,602 --> 00:26:13,238

And we certainly didn't

do much to Russia.

442

00:26:13,238 --> 00:26:16,041

There were some Space

Station activity

443

00:26:16,041 --> 00:26:18,910

but NASA didn't really

have a hard and fast policy

444

00:26:18,910 --> 00:26:20,712

about how this is

supposed to happen.

445

00:26:20,712 --> 00:26:22,447

I found myself on

the phone to the guy

446

00:26:22,447 --> 00:26:24,583

at headquarters responsible

for this a lot,

447

00:26:24,583 --> 00:26:26,184

sort of making it

up as we went along.

448

00:26:26,184 --> 00:26:30,021

This is what I want to do,

how do I do it kind of thing.

449

00:26:34,426 --> 00:26:37,295

On top of that, the Russians

didn't have a good set

450

00:26:37,295 --> 00:26:40,865

of consistent policies and they

were constantly changing things

451

00:26:40,865 --> 00:26:43,868

mostly when you weren't

aware of it.

452

00:26:43,868 --> 00:26:45,337

Some of the items like the --

453

00:26:45,337 --> 00:26:48,073

our GPS was used in the

ground effect study.

454

00:26:48,073 --> 00:26:52,611

We wanted to keep limitations

removed that are normally have

455

00:26:52,611 --> 00:26:54,512

to be in place when we

export from a country

456

00:26:54,512 --> 00:26:56,481

and it took 17 levels

457

00:26:56,481 --> 00:26:58,750

of signatures including

the Assistant Secretary

458

00:26:58,750 --> 00:27:01,753

of State's signature to

allow us to export that unit

459

00:27:01,753 --> 00:27:03,989

to Russia for this program.

460

00:27:06,191 --> 00:27:10,295

Long distance travel

was obviously an issue.

461

00:27:10,295 --> 00:27:13,465

It's a 7000-miles great

circle distance from here.

462

00:27:13,465 --> 00:27:16,768

It's an 11-hour time

zone difference

463

00:27:16,768 --> 00:27:20,071

which meant there was no common

workday between here and there.

464

00:27:20,071 --> 00:27:25,577

The language and communication

was certainly a big one.

465

00:27:25,577 --> 00:27:30,215

Few Russians on the program knew

any English and none of them

466

00:27:30,215 --> 00:27:32,617

that I worked with did

467

00:27:32,617 --> 00:27:35,687

which meant given my

meager Russian skills,

468

00:27:35,687 --> 00:27:38,056

I worked with a full-time

technical interpreter

469

00:27:38,056 --> 00:27:39,724

who was quite good.

470

00:27:39,724 --> 00:27:44,562

Any Russian that

was on the program

471

00:27:44,562 --> 00:27:47,565

that spoke English found

themselves off the program

472

00:27:47,565 --> 00:27:50,635

pretty quickly because their

skills were in short supply

473

00:27:50,635 --> 00:27:53,672

in the rest of the

Russian industry.

474

00:27:53,672 --> 00:27:55,507

And that was a skill

that they could market

475

00:27:55,507 --> 00:28:00,045

and actually get paid for.

476

00:28:00,045 --> 00:28:03,348

Interpersonal relationships,

it was initially a challenge --

477

00:28:03,348 --> 00:28:08,953

initially at least a challenge

in getting to know the Russians

478

00:28:08,953 --> 00:28:12,791

and develop enough trust

that we could move forward

479

00:28:12,791 --> 00:28:14,025

with the project.

480

00:28:14,025 --> 00:28:17,028

It was also an issue at home

because we were spending

481

00:28:17,028 --> 00:28:18,196

that much time overseas.

482

00:28:18,196 --> 00:28:19,564

You can ask any serviceman

483

00:28:19,564 --> 00:28:22,600

on overseas deployment

how easy it is

484

00:28:22,600 --> 00:28:26,304

to maintain personal

relationships back at home.

485

00:28:26,304 --> 00:28:28,740

So that could be

a challenge also.

486

00:28:28,740 --> 00:28:31,710

Zhukovsky Air Base --

487

00:28:35,613 --> 00:28:39,217

Remember I talked about how

abysmal the Russian economy was?

488

00:28:39,217 --> 00:28:43,188

If you square that and that's

the infrastructure problems

489

00:28:43,188 --> 00:28:44,689

at the air base itself.

490

00:28:44,689 --> 00:28:46,958

To give you some idea, when

we first arrived out there

491

00:28:46,958 --> 00:28:49,928

and someone asked to use

the restroom, they pointed

492

00:28:49,928 --> 00:28:54,599

to the woods [laughter]

because the restrooms were

493

00:28:54,599 --> 00:28:57,168

in really, really bad shape.

494

00:28:57,168 --> 00:28:58,236

The lights were out.

495

00:28:58,236 --> 00:29:01,206

The plumbing was gone.

496

00:29:01,206 --> 00:29:02,941

You were glad the lights were

out because you didn't want

497

00:29:02,941 --> 00:29:05,477

to see what was in there.

498

00:29:05,477 --> 00:29:09,414

The Russians were embarrassed

about some of these things.

499

00:29:09,414 --> 00:29:12,383

The dogs roaming the hallways

500

00:29:12,383 --> 00:29:14,285

and leaving little

presents everywhere.

501

00:29:14,285 --> 00:29:18,957

It was -- when some foreign

press made note of this

502

00:29:18,957 --> 00:29:21,993

in the early days, the
Russians were not amused.

503

00:29:24,696 --> 00:29:31,469

Heat -- Russia is not known
for being a balmy place.

504

00:29:31,469 --> 00:29:34,539

And when it's 40 below
and you have no heaters,

505

00:29:34,539 --> 00:29:36,007

you know it's 40 below.

506

00:29:36,007 --> 00:29:39,110

They had heaters but they
had no fuel for them.

507

00:29:39,110 --> 00:29:42,013

They couldn't afford it.

508

00:29:42,013 --> 00:29:46,885

So in the laboratory, we
had a home-brew space heater

509

00:29:46,885 --> 00:29:49,420

which would have our
safety people cringe.

510

00:29:49,420 --> 00:29:50,655

That was the only source of heat

511

00:29:50,655 --> 00:29:53,591

in the laboratory
in the wintertime.

512

00:29:53,591 --> 00:29:54,893

And even the phone lines.

513

00:29:54,893 --> 00:29:56,427

This is in the days, you know,

514

00:29:56,427 --> 00:30:00,298

mid-90s before cell

phones were ubiquitous.

515

00:30:00,298 --> 00:30:05,203

Just getting a phone line

between Zhukovsky Air Base

516

00:30:05,203 --> 00:30:10,642

to Moscow 20 miles away, we had

to walk three buildings over

517

00:30:10,642 --> 00:30:13,278

and up about two flights of

stairs into a back office

518

00:30:13,278 --> 00:30:17,182

and get a phone line which

had a lot of static problems.

519

00:30:17,182 --> 00:30:19,517

That was our phone

line to Moscow.

520

00:30:19,517 --> 00:30:26,057

Boeing had hired a Russian to

be sort of their eyes and ears.

521

00:30:26,057 --> 00:30:27,258

They issued him a cellphone

522

00:30:27,258 --> 00:30:29,961

and he was the most

popular guy in the air base.

523

00:30:32,197 --> 00:30:35,800

Structurally, the Russians

are very hierarchical and many

524

00:30:35,800 --> 00:30:37,569

of us were using

-- used to operate

525

00:30:37,569 --> 00:30:39,938

in a more matrix-type

of environment.

526

00:30:39,938 --> 00:30:41,973

Western business

practices that are things

527

00:30:41,973 --> 00:30:43,141

that are just de rigueur

528

00:30:43,141 --> 00:30:46,878

to us were often not the

way the Russians worked.

529

00:30:46,878 --> 00:30:49,614

Things like contracts,

statements of work,

530

00:30:49,614 --> 00:30:51,883

managers wanting details

of schedules, deliverables

531

00:30:51,883 --> 00:30:54,819

and costing -- just try

to get that information

532

00:30:54,819 --> 00:30:56,221

out of the Russians, you know.

533

00:30:56,221 --> 00:30:57,722

You ask them what
the schedule is like.

534

00:30:57,722 --> 00:30:59,524
"We will fly in March!"

535

00:30:59,524 --> 00:31:01,459
"Okay. Any problems?"

536

00:31:01,459 --> 00:31:03,995
"No! No problems!"

537

00:31:05,196 --> 00:31:08,933
Until the end of February
[laughter] when you find

538

00:31:08,933 --> 00:31:11,436
out what the problems
actually were.

539

00:31:11,436 --> 00:31:14,505
This drove our managers crazy
and I was usually the guy

540

00:31:14,505 --> 00:31:18,643
on the ground that
had to deal with that.

541

00:31:18,643 --> 00:31:21,412
Russian business
practices, by the same token,

542

00:31:21,412 --> 00:31:23,448
they largely operated,
in my experience,

543

00:31:23,448 --> 00:31:25,250
through summaries of discussion.

544

00:31:25,250 --> 00:31:27,986

This was something that at the
end of each series of meetings

545

00:31:27,986 --> 00:31:32,090

or each visit, you would write
out that everybody would agree

546

00:31:32,090 --> 00:31:33,324

to yes, this is what
we talked about.

547

00:31:33,324 --> 00:31:34,893

This is what we're
going to do next.

548

00:31:34,893 --> 00:31:37,962

So it was sort of an incremental
contract what their next

549

00:31:37,962 --> 00:31:39,864

priority was.

550

00:31:39,864 --> 00:31:41,833

And I wrote those things.

551

00:31:41,833 --> 00:31:44,302

We didn't really understand
initially how important they

552

00:31:44,302 --> 00:31:48,907

were to the Russians and what
force of law they had with them.

553

00:31:48,907 --> 00:31:52,176

But we -- we came to
understand that pretty quickly.

554

00:31:53,344 --> 00:31:54,779

And it was a major trust

555

00:31:54,779 --> 00:31:57,448

that initially we would

write those things out both

556

00:31:57,448 --> 00:31:59,350

in Russian and English.

557

00:31:59,350 --> 00:32:00,551

We would both read those.

558

00:32:00,551 --> 00:32:04,789

We would sign the other

copies and after a while,

559

00:32:04,789 --> 00:32:06,724

the interpreter would

just read the --

560

00:32:06,724 --> 00:32:09,961

translate the English

version to Russian verbally

561

00:32:09,961 --> 00:32:13,598

and the Russians and we would

all sign the English copy.

562

00:32:13,598 --> 00:32:15,533

Then it got to a point where the

Russian would say, "You know,

563

00:32:15,533 --> 00:32:19,304

if you put the signature

page by itself,

564

00:32:19,304 --> 00:32:21,506

if we had to make any changes,

we wouldn't have to resign it."

565

00:32:21,506 --> 00:32:27,078

[Laughter]

566

00:32:27,078 --> 00:32:30,882

So since I was writing them, I

was okay with that [laughter].

567

00:32:30,882 --> 00:32:33,851

And I found a lot of

Russians would come in

568

00:32:33,851 --> 00:32:36,955

and they would sign the

signature page and then leave

569

00:32:36,955 --> 00:32:40,124

without ever hearing what

the summary discussion said.

570

00:32:40,124 --> 00:32:42,660

And that's when I knew

that I had their trust.

571

00:32:46,397 --> 00:32:48,967

August was a lost month

because of holidays.

572

00:32:48,967 --> 00:32:52,403

The weather was often

bad in the wintertime.

573

00:32:52,403 --> 00:32:58,242

The work pace was slower than

we would have liked it to be.

574

00:32:58,242 --> 00:33:06,084

The technology was -- I've got

a story about technology later.

575

00:33:06,084 --> 00:33:10,989

But let's just say
it was probably 20

576
00:33:10,989 --> 00:33:13,658
or 30 years behind what
we were used to seeing.

577
00:33:13,658 --> 00:33:17,061
And there's always the
issue of flight research

578
00:33:17,061 --> 00:33:19,831
versus flight test and
the quality of data

579
00:33:19,831 --> 00:33:21,499
which is no different there.

580
00:33:21,499 --> 00:33:25,203
Now I can't have a
discussion about Russia

581
00:33:25,203 --> 00:33:28,206
without talking about vodka.

582
00:33:28,206 --> 00:33:31,909
I don't have time to
talk a lot about vodka,

583
00:33:31,909 --> 00:33:35,446
but vodka was central
to toasting,

584
00:33:35,446 --> 00:33:40,585
and toasting was central to
the way Russians operate.

585
00:33:40,585 --> 00:33:45,656
Very, very cultural but spill a
great deal over in the business.

586

00:33:45,656 --> 00:33:50,461

And virtually every meeting that

I ever went to, every luncheon,

587

00:33:50,461 --> 00:33:54,032

every snack, vodka

was available.

588

00:33:54,032 --> 00:33:57,235

And everybody was

expected to toast.

589

00:33:57,235 --> 00:34:01,939

And toasting in the Russian

tradition is where everybody

590

00:34:01,939 --> 00:34:07,145

in turn is expected to stand

up and utter some piece

591

00:34:07,145 --> 00:34:12,950

of poetic wisdom to commemorate

the occasion or something.

592

00:34:12,950 --> 00:34:14,919

They could toast whatever

they wanted to but they had

593

00:34:14,919 --> 00:34:17,388

to come up with something.

594

00:34:18,456 --> 00:34:22,160

And so the larger

the meeting you had,

595

00:34:22,160 --> 00:34:28,032

the more toasting you had

because everybody had to toast.

596

00:34:28,032 --> 00:34:31,402

And I once saw that the

[inaudible], the chief designer,

597

00:34:31,402 --> 00:34:36,040

Professor Pukhov [assumed

spelling] knock back 21 shots

598

00:34:36,040 --> 00:34:40,645

in a row for every person

that was in the room.

599

00:34:40,645 --> 00:34:45,316

Now after observing this in the

initial days of the program,

600

00:34:45,316 --> 00:34:49,220

when the American management

would come out and not

601

00:34:49,220 --> 00:34:53,825

to be outdone, they would

be, you know, right in line.

602

00:34:53,825 --> 00:34:57,595

The next day, they couldn't

function [laughter].

603

00:34:57,595 --> 00:35:01,933

And I did some fast

thinking and said, "You know,

604

00:35:01,933 --> 00:35:03,334

I'm going to be here a lot.

605

00:35:03,334 --> 00:35:05,970

I've got actual work to do.

606

00:35:05,970 --> 00:35:07,705

I can't afford to do that."

607

00:35:07,705 --> 00:35:09,207

So I just set the ground rule

608

00:35:09,207 --> 00:35:13,444

from the beginning

that I didn't drink.

609

00:35:13,444 --> 00:35:15,546

Now the Russians thought

that was kind of peculiar

610

00:35:15,546 --> 00:35:17,882

and maybe a little suspicious.

611

00:35:17,882 --> 00:35:20,751

I mean, after all, if you

don't want to get drunk,

612

00:35:20,751 --> 00:35:23,087

you must be a spy, right?

613

00:35:24,622 --> 00:35:26,591

But they got used to it.

614

00:35:26,591 --> 00:35:29,160

It was a source of amusement.

615

00:35:29,160 --> 00:35:31,696

But they tolerated it.

616

00:35:31,696 --> 00:35:35,333

And I still toasted with water

which looks just like vodka.

617

00:35:35,333 --> 00:35:38,369

In fact, there's only one letter

difference in the Russian word

618

00:35:38,369 --> 00:35:40,271

for it -- [inaudible]

versus vodka.

619

00:35:40,271 --> 00:35:44,575

Not that I was fooling

anybody but nevertheless,

620

00:35:44,575 --> 00:35:47,979

you went through a ritual

of toasting and so forth.

621

00:35:52,016 --> 00:35:55,987

That by the way is

[inaudible], Golden Ring Vodka.

622

00:35:58,990 --> 00:36:00,725

That B is actually

a V. There's a lot

623

00:36:00,725 --> 00:36:03,528

of interesting differences

like that.

624

00:36:03,528 --> 00:36:06,864

This was a dinner

-- my final dinner

625

00:36:06,864 --> 00:36:09,133

with Professor Pukhov who's

sitting there at the end

626

00:36:09,133 --> 00:36:11,702

with a coat and tie and his

wife sitting next to him.

627

00:36:11,702 --> 00:36:15,239

It was the first time we've met

his wife in this entire program.

628

00:36:15,239 --> 00:36:18,576

They didn't usually mix personal
and professional that way.

629

00:36:18,576 --> 00:36:24,715

The thing that sticks out of my
mind most about this dinner was

630

00:36:24,715 --> 00:36:29,420

when Professor Pukhov's wife
turned to him and berated him

631

00:36:29,420 --> 00:36:31,722

for not being more
like me [laughter].

632

00:36:34,525 --> 00:36:37,195

He drinks too much.

633

00:36:37,195 --> 00:36:37,995

I don't drink at all.

634

00:36:37,995 --> 00:36:39,363

You should be more like him.

635

00:36:39,363 --> 00:36:43,067

What do you do with that?

636

00:36:43,067 --> 00:36:46,871

Smile and keep quiet mostly.

637

00:36:46,871 --> 00:36:48,773

But Russians would
also say things like,

638

00:36:48,773 --> 00:36:50,575

"You're every Russian
woman's dream!

639

00:36:50,575 --> 00:36:52,210

A man that doesn't drink."/b>

640

00:36:52,210 --> 00:36:53,911

But then they have

to ask themselves,

641

00:36:53,911 --> 00:36:55,813

why isn't he drinking?

642

00:36:58,049 --> 00:37:00,218

So that's vodka.

643

00:37:01,552 --> 00:37:02,820

Technical challenges.

644

00:37:02,820 --> 00:37:06,057

Well, remember this

is the mid-'90s.

645

00:37:07,391 --> 00:37:09,393

Internet was still

kind of in its infancy.

646

00:37:09,393 --> 00:37:14,532

There wasn't -- it was there

but the entire data link for all

647

00:37:14,532 --> 00:37:18,102

of the American teams in Moscow

was a one-and-a-half megabit per

648

00:37:18,102 --> 00:37:21,606

second data link, a T1 link.

649

00:37:21,606 --> 00:37:22,907

That's not a band -- you know,

650

00:37:22,907 --> 00:37:25,142

by contrast, I checked

last night.

651

00:37:25,142 --> 00:37:30,248

My internet at home is

70 megabits per second.

652

00:37:30,248 --> 00:37:35,286

This was one-and-a-half for

all of the city of Americans

653

00:37:35,286 --> 00:37:39,724

in the same so it wasn't

bandwidth to support web access

654

00:37:39,724 --> 00:37:41,125

so we didn't have that.

655

00:37:41,125 --> 00:37:45,062

When I transferred data back, it

was at 10 kilobits per second.

656

00:37:45,062 --> 00:37:48,099

It literally took all

night to transfer a flight

657

00:37:48,099 --> 00:37:53,504

of 120 megabytes back

to the machines here.

658

00:37:53,504 --> 00:37:55,239

The only email I

had originally was

659

00:37:55,239 --> 00:37:57,608

through a local internet

service provider.

660

00:37:57,608 --> 00:38:03,781

Telephone costs at the
hotel were \$7.50 a minute.

661

00:38:03,781 --> 00:38:10,187

Now the per diem at the time
for overseas was \$7 a day.

662

00:38:13,424 --> 00:38:17,895

And the phone system,
as I mentioned before,

663

00:38:17,895 --> 00:38:20,364

was not optimal in
the first place.

664

00:38:20,364 --> 00:38:22,800

In fact, if we had telecons
between Russia and here,

665

00:38:22,800 --> 00:38:25,803

it usually took 10 or 15 minutes
just to set up the telecom,

666

00:38:25,803 --> 00:38:28,906

and every half-hour like
clockwork, it would drop off

667

00:38:28,906 --> 00:38:31,208

and you would have to start
the process all over again.

668

00:38:31,208 --> 00:38:35,946

And that was outside of
the common workday as well.

669

00:38:39,950 --> 00:38:43,054

In data processing, this
one fell heavily on me

670

00:38:43,054 --> 00:38:48,559
because I received the data -- I
received the calibration files.

671
00:38:48,559 --> 00:38:51,829
They did some funny things

672
00:38:51,829 --> 00:38:55,766
with their data using what's
called ratio metric calibrations

673
00:38:55,766 --> 00:38:58,669
because the power supplies
were of such poor quality

674
00:38:58,669 --> 00:39:01,105
that you had to measure the
power supply at the same time

675
00:39:01,105 --> 00:39:04,075
as the data so you
could ratio those things

676
00:39:04,075 --> 00:39:06,577
to make sure you knew
what the output was.

677
00:39:06,577 --> 00:39:11,215
We hadn't done that in probably,
I don't know, 30 years here.

678
00:39:11,215 --> 00:39:12,583
We just improved
our power supplies.

679
00:39:12,583 --> 00:39:18,522
So none of our calibration
systems would deal with that.

680
00:39:18,522 --> 00:39:26,997

The data that I got on
disk was not compatible

681
00:39:26,997 --> 00:39:28,933
with the way we did
things in our range.

682
00:39:28,933 --> 00:39:30,801
And so bit by bit, I found

683
00:39:30,801 --> 00:39:34,372
that I replaced the
entire Dryden system

684
00:39:34,372 --> 00:39:37,108
with programs that I wrote.

685
00:39:37,108 --> 00:39:40,578
Data coming off the aircraft,
doing a software decommutation

686
00:39:40,578 --> 00:39:42,713
to dealing with the embedded
system time which, by the way,

687
00:39:42,713 --> 00:39:50,554
ran backwards sometimes,
to select any calibrations

688
00:39:50,554 --> 00:39:53,157
to formatting them,
and compressed

689
00:39:53,157 --> 00:39:55,893
for a format applying
the calibrations to that,

690
00:39:55,893 --> 00:39:59,430
and then depositing it
directly into [inaudible].

691

00:39:59,430 --> 00:40:01,565

So from end to end, I just

[inaudible] from the Russians

692

00:40:01,565 --> 00:40:03,334

through my programs

into our archive

693

00:40:03,334 --> 00:40:04,902

where it still sits today.

694

00:40:04,902 --> 00:40:09,039

So that was a challenge.

695

00:40:12,643 --> 00:40:16,280

For some reason, when the

Russians came to Williamsburg,

696

00:40:16,280 --> 00:40:18,616

they visited Langley and I

took them to Williamsburg.

697

00:40:18,616 --> 00:40:21,051

I couldn't get them

into the Stocks.

698

00:40:24,855 --> 00:40:26,090

So I took one for the team

699

00:40:26,090 --> 00:40:29,460

and had their picture

taken that way.

700

00:40:29,460 --> 00:40:32,696

But we took them to Langley.

701

00:40:32,696 --> 00:40:37,435

The first thing they want to do

is go to Wal-Mart [laughter].

702

00:40:37,435 --> 00:40:40,304

One guy wanted to get

a prescription glasses.

703

00:40:40,304 --> 00:40:42,573

Everybody else was running

around buying blue jeans

704

00:40:42,573 --> 00:40:46,043

and shoes like they're

going out of style.

705

00:40:46,043 --> 00:40:49,180

They're actually just

going into style in Russia.

706

00:40:49,180 --> 00:40:50,347

Well, you want to try this on?

707

00:40:50,347 --> 00:40:51,549

No, it doesn't matter.

708

00:40:51,549 --> 00:40:53,284

They were just buying them

for family and friends

709

00:40:53,284 --> 00:40:55,186

and you know, maybe to sell.

710

00:40:55,186 --> 00:41:02,259

We took them to Disneyland and

Universal City when they came

711

00:41:02,259 --> 00:41:05,429

out here in the beach and

some of those kind of places.

712

00:41:05,429 --> 00:41:07,531

And Wilson Van Dyer

[assumed spelling],

713

00:41:07,531 --> 00:41:09,433

who was my immediate predecessor

714

00:41:09,433 --> 00:41:14,839

on this project before

he retired, was driving

715

00:41:14,839 --> 00:41:19,176

and Sergei [Inaudible], our

interpreter, pops open a can

716

00:41:19,176 --> 00:41:21,745

of beer in the back seat.

717

00:41:21,745 --> 00:41:23,848

And Wilson about came unglued.

718

00:41:23,848 --> 00:41:25,015

"You can't do that!"

719

00:41:25,015 --> 00:41:26,150

"You can't do what?"

720

00:41:26,150 --> 00:41:27,985

"You can't open a beer

in a moving vehicle!"

721

00:41:27,985 --> 00:41:30,387

"Well, why not?"

722

00:41:30,387 --> 00:41:34,992

"We have a rule again -- we

have a law against that."

723

00:41:34,992 --> 00:41:36,994

"Well, why?"

724

00:41:37,928 --> 00:41:39,363

What kind of democracy is this?"

725

00:41:39,363 --> 00:41:43,701

They just didn't understand it.

726

00:41:43,701 --> 00:41:46,437

We'd be driving out

in the desert here.

727

00:41:46,437 --> 00:41:51,408

You come to a stop sign

and you stop, right?"

728

00:41:51,408 --> 00:41:54,478

And the Russians

would say [laughter],

729

00:41:55,813 --> 00:41:56,780

"There's nobody coming.

730

00:41:56,780 --> 00:41:57,982

Why did you stop?"

731

00:41:57,982 --> 00:41:59,483

"It's a stop sign.

732

00:41:59,483 --> 00:42:02,820

And they just couldn't

understand that.

733

00:42:02,820 --> 00:42:06,457

And after watching driving

in Moscow sometime later,

734

00:42:06,457 --> 00:42:08,893

I could understand

their confusion.

735

00:42:11,862 --> 00:42:13,931

And then we went to Paris

736

00:42:13,931 --> 00:42:17,768

because they had selected a

French instrumentation system,

737

00:42:17,768 --> 00:42:23,007

the Damien 5 which

was manufactured

738

00:42:23,007 --> 00:42:25,476

in [Inaudible], south of Paris.

739

00:42:25,476 --> 00:42:27,244

And we spent two weeks there

740

00:42:27,244 --> 00:42:30,948

with the Russians learning

the system at the same time.

741

00:42:30,948 --> 00:42:33,984

And so they were kind

of neutral territory.

742

00:42:33,984 --> 00:42:37,388

This is some of the Russians

sitting with me on the couch.

743

00:42:37,388 --> 00:42:40,057

[Inaudible] in the center is

one of those English speakers

744

00:42:40,057 --> 00:42:41,292

that didn't last

long with the program

745

00:42:41,292 --> 00:42:43,894
because well, she spoke English.

746
00:42:45,129 --> 00:42:49,233
Alexander [Inaudible] right
there was my counter --

747
00:42:49,233 --> 00:42:51,001
instrumentation counterpart.

748
00:42:51,001 --> 00:42:54,605
Sergei [Inaudible], one
of our interpreters.

749
00:42:54,605 --> 00:42:56,674
Sergei's smile says it all.

750
00:42:56,674 --> 00:42:58,876
He was a character.

751
00:42:58,876 --> 00:43:01,478
He was a former Russian
Army major.

752
00:43:01,478 --> 00:43:03,480
You ever ask him how many
languages he speaks, he says,

753
00:43:03,480 --> 00:43:04,181
"I speak one, Russian.

754
00:43:04,181 --> 00:43:05,482
The rest I interpret."

755
00:43:05,482 --> 00:43:11,422
[Laughter]

756
00:43:11,422 --> 00:43:14,758
But that was, it was interesting

to get to know the Russians.

757

00:43:14,758 --> 00:43:16,927

This was the first time

I had met many of them

758

00:43:16,927 --> 00:43:18,996

of the working level people.

759

00:43:18,996 --> 00:43:20,965

Because most of the working

level Russians were not allowed

760

00:43:20,965 --> 00:43:24,268

to travel the United States.

761

00:43:24,268 --> 00:43:30,074

But in class, the classes taught

by a Frenchman speaking English

762

00:43:30,074 --> 00:43:34,044

and the interpreter would

translate the English

763

00:43:34,044 --> 00:43:35,312

to Russian.

764

00:43:35,312 --> 00:43:38,515

And sometimes when I would

ask a question in English,

765

00:43:38,515 --> 00:43:41,218

the Frenchman didn't understand

what I was talking about.

766

00:43:41,218 --> 00:43:42,987

He didn't understand me.

767

00:43:42,987 --> 00:43:45,456

So the Russian interpreter
would translate my English

768

00:43:45,456 --> 00:43:49,627
to English [laughter] that the
Frenchman could understand.

769

00:43:49,627 --> 00:43:52,563
So he said we should
pay him extra for that.

770

00:43:52,563 --> 00:43:56,867
As we're walking around Paris,

771

00:43:56,867 --> 00:44:00,537
one of the Russians not
pictured here was going

772

00:44:00,537 --> 00:44:01,705
on about things he observed.

773

00:44:01,705 --> 00:44:04,041
He had never been out of
the Soviet Union before

774

00:44:04,041 --> 00:44:06,710
and he was just buffaloed
by some of the stuff he saw.

775

00:44:06,710 --> 00:44:10,948
He'd see a patch of grass
like a 10 by 10 foot lawn

776

00:44:10,948 --> 00:44:13,817
in somebody's front
yard, and he'd say,

777

00:44:13,817 --> 00:44:14,818
"What a waste of space.

778

00:44:14,818 --> 00:44:15,953

They should plant
vegetables there.

779

00:44:15,953 --> 00:44:17,588

What are they going to
eat in the wintertime?"

780

00:44:17,588 --> 00:44:22,026

It gives you some idea of
what they were used to.

781

00:44:25,763 --> 00:44:31,802

And then it was on to Moscow.

782

00:44:31,802 --> 00:44:36,974

I spent -- I made 19 trips
there in that four-year period.

783

00:44:36,974 --> 00:44:39,643

Average stay was about two weeks
so about every other month,

784

00:44:39,643 --> 00:44:42,246

I was there for half the month.

785

00:44:42,246 --> 00:44:45,949

Total time I spent
there was eight months.

786

00:44:45,949 --> 00:44:48,719

I hit every month of
the year at least once.

787

00:44:48,719 --> 00:44:56,660

It was -- this is a picture in
Moscow so you can get an idea

788

00:44:56,660 --> 00:44:59,897

of the -- you see the
clean car sitting there.

789

00:44:59,897 --> 00:45:03,801

By the way, there was a law
in the city that you had

790

00:45:03,801 --> 00:45:05,169

to keep your car clean.

791

00:45:05,169 --> 00:45:07,104

There was also a law in the city

792

00:45:07,104 --> 00:45:15,012

that you couldn't wash
your car in public.

793

00:45:15,012 --> 00:45:19,149

Seatbelts were required.

794

00:45:19,149 --> 00:45:23,320

The fact to know that seatbelts
worked was immaterial, I guess.

795

00:45:23,320 --> 00:45:25,055

But we'd be driving
down the road

796

00:45:25,055 --> 00:45:26,957

and there'd be a policeman
standing on the side

797

00:45:26,957 --> 00:45:28,525

of the road with a white stick.

798

00:45:28,525 --> 00:45:31,095

If he pointed to the car, they
were supposed to pull over.

799

00:45:31,095 --> 00:45:32,930
The driver would nudge me.

800
00:45:32,930 --> 00:45:35,432
He'd throw a seatbelt
over his lap,

801
00:45:35,432 --> 00:45:38,202
pass the policeman then
throw the seatbelt off.

802
00:45:38,202 --> 00:45:41,338
It didn't work anyway.

803
00:45:41,338 --> 00:45:43,140
But there's no place
I have ever driven

804
00:45:43,140 --> 00:45:48,078
that I needed a seatbelt more
than driving around Moscow.

805
00:45:48,078 --> 00:45:50,547
I mean, if the streets were
clogged, they'd just get out

806
00:45:50,547 --> 00:45:52,983
and drive down the
opposing traffic lanes.

807
00:45:57,121 --> 00:46:00,591
So what was a typical
daily life there like?

808
00:46:00,591 --> 00:46:03,360
I stayed at a very nice hotel.

809
00:46:03,360 --> 00:46:07,865
It was very expensive.

810

00:46:07,865 --> 00:46:13,704

One time I investigated
getting a local sort

811

00:46:13,704 --> 00:46:15,873

of subletting an apartment
which I could have done

812

00:46:15,873 --> 00:46:17,875

for much, much cheaper.

813

00:46:17,875 --> 00:46:18,842

But there was a catch.

814

00:46:18,842 --> 00:46:21,078

I had to do it in cash.

815

00:46:21,078 --> 00:46:23,614

It was very much a
cash carry economy.

816

00:46:23,614 --> 00:46:25,716

So I went to our legal office
and asked them, I said,

817

00:46:25,716 --> 00:46:28,886

"I can save the government a
lot of money if I just do this

818

00:46:28,886 --> 00:46:30,187

but I have to do it in cash."

819

00:46:30,187 --> 00:46:31,955

They looked at me and said,

820

00:46:31,955 --> 00:46:33,323

"Don't try to save
the government money.

821

00:46:33,323 --> 00:46:34,491

It just confuses them."

822

00:46:34,491 --> 00:46:38,695

[Laughter]

823

00:46:38,695 --> 00:46:40,898

So I abandoned that approach.

824

00:46:40,898 --> 00:46:44,234

But frankly, I needed the hotel

communications that was growing

825

00:46:44,234 --> 00:46:47,838

up at this particular

hotel anyway to do my job.

826

00:46:47,838 --> 00:46:49,606

But it was a very nice

hotel and it had a very,

827

00:46:49,606 --> 00:46:51,475

you know, opulent breakfast.

828

00:46:51,475 --> 00:46:54,311

They had people playing

harps in the upper tier.

829

00:46:54,311 --> 00:46:57,014

A lot of out-of-work musicians

running around Moscow.

830

00:46:57,014 --> 00:46:58,849

You'd see string

quartets playing

831

00:46:58,849 --> 00:47:03,053

in the subways, you

know, for money.

832

00:47:03,053 --> 00:47:05,589

Their attitude about

drivers was interesting.

833

00:47:05,589 --> 00:47:09,993

To them, a driver of a car

was like a captain of the ship

834

00:47:09,993 --> 00:47:12,062

and what the captain said, goes.

835

00:47:12,062 --> 00:47:13,964

You know, wherever he decided

to go and when he decided

836

00:47:13,964 --> 00:47:16,300

to go, that was his job.

837

00:47:16,300 --> 00:47:17,401

We viewed it somewhat

differently.

838

00:47:17,401 --> 00:47:20,470

We hired the driver

and the vehicle to go

839

00:47:20,470 --> 00:47:22,639

where we wanted him to go.

840

00:47:22,639 --> 00:47:24,942

And so sometimes, they

come running and say,

841

00:47:24,942 --> 00:47:26,109

"The driver wants to leave."

842

00:47:26,109 --> 00:47:27,110

We'd say, "So?"

843

00:47:27,110 --> 00:47:32,182

He'd just have to wait.

844

00:47:32,182 --> 00:47:38,188

I often found myself with

what I call holding court

845

00:47:38,188 --> 00:47:41,525

because as a liaison,

I would carry requests

846

00:47:41,525 --> 00:47:45,162

from the American team

and issues and requests

847

00:47:45,162 --> 00:47:47,231

from the Russian team back.

848

00:47:47,231 --> 00:47:50,834

And so I'd sit in a conference

room and sort of single file,

849

00:47:50,834 --> 00:47:52,803

one after the other, Russians

would come in and kind

850

00:47:52,803 --> 00:47:56,773

of with hat in hand and

give me their request

851

00:47:56,773 --> 00:47:58,442

or give me some information

and request.

852

00:47:58,442 --> 00:48:00,744

And I kind of felt

like the Godfather.

853

00:48:00,744 --> 00:48:03,046
What could I do for you?

854

00:48:03,046 --> 00:48:07,718
But I got to talk to a lot of
interesting people that way.

855

00:48:07,718 --> 00:48:11,555
People that had designed
systems on the original TU-144

856

00:48:11,555 --> 00:48:14,391
like a guy from Rockwell was
looking at the fuel system

857

00:48:14,391 --> 00:48:16,860
and he asked me, "Well, how's
the fuel system laid out?"

858

00:48:16,860 --> 00:48:18,662
So I asked Tupolev and
they sent in the guy

859

00:48:18,662 --> 00:48:19,930
that designed the fuel system.

860

00:48:19,930 --> 00:48:23,033
And he sits down with a
pencil and paper and sketches

861

00:48:23,033 --> 00:48:25,335
out the whole system and
how the fuel was transferred

862

00:48:25,335 --> 00:48:28,705
and I translated that
as best as I could

863

00:48:28,705 --> 00:48:31,408
and sent it back to the States.

864

00:48:35,512 --> 00:48:39,082

Russian chocolate was a
particular favorite of mine.

865

00:48:39,082 --> 00:48:43,654

And they very quickly
discovered this.

866

00:48:43,654 --> 00:48:45,222

I guess I gave it
away when I said,

867

00:48:45,222 --> 00:48:47,925

"Where do you get this
marvelous chocolate?"

868

00:48:47,925 --> 00:48:49,259

Because I wanted
to buy it myself

869

00:48:49,259 --> 00:48:51,361

and they never would tell me.

870

00:48:51,361 --> 00:48:53,530

But they always took great
delight in making sure

871

00:48:53,530 --> 00:48:55,032

that that chocolate
was available

872

00:48:55,032 --> 00:48:56,967

on a table wherever
I was sitting.

873

00:49:00,904 --> 00:49:04,474

And like I said, the hotel
was expensive and it was.

874

00:49:04,474 --> 00:49:08,445

Most things in the city for a
foreigner were very expensive.

875

00:49:08,445 --> 00:49:10,681

But it was a two-tier structure.

876

00:49:10,681 --> 00:49:14,985

They had, say if you
went to a museum,

877

00:49:14,985 --> 00:49:17,321

the price for a local is
probably 10 times less

878

00:49:17,321 --> 00:49:19,556

than it was for a foreigner.

879

00:49:19,556 --> 00:49:21,625

And one time, we were at a
museum and my interpreter looks

880

00:49:21,625 --> 00:49:23,593

at me and he says,
"You look Russian.

881

00:49:23,593 --> 00:49:24,695

Keep quiet."

882

00:49:24,695 --> 00:49:27,197

And goes over and buys
us two local tickets

883

00:49:27,197 --> 00:49:28,999

for us -- for the museum.

884

00:49:33,036 --> 00:49:37,107

But speaking of museums, one
day I was in a museum by myself.

885

00:49:37,107 --> 00:49:38,342

They have two costs there.

886

00:49:38,342 --> 00:49:42,212

You can go in a museum with

a camera for one price,

887

00:49:42,212 --> 00:49:45,082

without a camera

for a lower price.

888

00:49:45,082 --> 00:49:47,651

I didn't feel like paying extra

money so I left my camera.

889

00:49:47,651 --> 00:49:51,288

I was up on the second or

third floor and I spied

890

00:49:51,288 --> 00:49:54,491

over in the corner,

this pile of junk

891

00:49:54,491 --> 00:49:57,627

but I noticed there was

Air Force markings on them.

892

00:49:57,627 --> 00:49:59,296

So I went over and looked at it.

893

00:49:59,296 --> 00:50:02,299

It was Francis Gary Powers' U-2.

894

00:50:02,299 --> 00:50:05,669

For those of you that don't

know, that was a plane

895

00:50:05,669 --> 00:50:09,606

that was famously shot down
in 1960 over Soviet Russia,

896

00:50:09,606 --> 00:50:12,642

great to the embarrassment of
the Eisenhower administration.

897

00:50:12,642 --> 00:50:16,480

I had occasion just a couple of
days ago to talk to a guy here

898

00:50:16,480 --> 00:50:21,051

in town that had met Francis
Gary Powers and he asked him,

899

00:50:21,051 --> 00:50:24,221

"Why didn't you bite down
on the cyanide capsule?"

900

00:50:24,221 --> 00:50:27,524

And he said, "That's kind of
permanent, don't you think?"

901

00:50:27,524 --> 00:50:36,500

[Laughter]

902

00:50:36,500 --> 00:50:38,135

This is a picture of some
of the people I worked

903

00:50:38,135 --> 00:50:43,106

with in the laboratory
out at Zhukovsky.

904

00:50:43,106 --> 00:50:45,809

That was invariably a
pleasant experience other

905

00:50:45,809 --> 00:50:47,744

than the lack of heat.

906

00:50:47,744 --> 00:50:49,046

Because the people I worked

907

00:50:49,046 --> 00:50:51,415

with were very professional

and very pleasant.

908

00:50:51,415 --> 00:50:55,752

We got along very well, never

had an issue with working

909

00:50:55,752 --> 00:50:58,822

with -- as I've often

discovered in my career,

910

00:50:58,822 --> 00:51:00,991

you get the managers out

of the way, the people tend

911

00:51:00,991 --> 00:51:03,026

to work together pretty well.

912

00:51:05,328 --> 00:51:08,598

And at the time, I

was not a manager.

913

00:51:08,598 --> 00:51:12,636

I was an Indian surrounded by

managers from the U.S. team

914

00:51:12,636 --> 00:51:15,105

when they were there

for drinking vodka.

915

00:51:15,105 --> 00:51:18,041

But otherwise, they were back

home and didn't bother me.

916

00:51:23,413 --> 00:51:27,250
Here are some of the --
some of the U.S. team.

917
00:51:27,250 --> 00:51:28,452
You can guess who one

918
00:51:28,452 --> 00:51:30,954
of the Americans is
wearing the Purdue t-shirt.

919
00:51:30,954 --> 00:51:35,092
That's Steve Rizzi,
Donna Gallagher,

920
00:51:35,092 --> 00:51:37,561
Keith Harris, and myself.

921
00:51:37,561 --> 00:51:40,864
They were here for the
cabin noise experiment.

922
00:51:44,000 --> 00:51:48,004
I got to talk a little bit
about some of the key players.

923
00:51:48,004 --> 00:51:51,441
Bottom right-hand corner is Bill
Adams who's a program manager

924
00:51:51,441 --> 00:51:52,809
from Rockwell.

925
00:51:52,809 --> 00:51:55,679
He was often called the
father of the TU-144 program

926
00:51:55,679 --> 00:52:00,550
because I gather it was his
vision and foresight that led

927

00:52:00,550 --> 00:52:03,687

to the creation of this
program in the first place.

928

00:52:03,687 --> 00:52:08,091

Our own Ken Szalai, who was the
Dryden Director at the time --

929

00:52:08,091 --> 00:52:12,829

very material in made
sure this came about.

930

00:52:12,829 --> 00:52:16,032

And the [Inaudible]
himself, Alexander Pukhov,

931

00:52:16,032 --> 00:52:18,969

the Chief Designer
of Tupolev NTK

932

00:52:18,969 --> 00:52:23,440

which is basically this
joint stock company.

933

00:52:23,440 --> 00:52:28,645

He was the sparkplug
that made things happen

934

00:52:28,645 --> 00:52:30,247

for the Russian side.

935

00:52:30,247 --> 00:52:37,087

He was one of the designers of
the original TU-144, a leader,

936

00:52:37,087 --> 00:52:40,957

diplomat, vodka drinker.

937

00:52:40,957 --> 00:52:44,661

You know, he was a force

to be reckoned with.

938

00:52:44,661 --> 00:52:49,432

But another force to be reckoned

with was Judith De Paul.

939

00:52:49,432 --> 00:52:51,501

Judith was the President and CEO

940

00:52:51,501 --> 00:52:55,539

of that small company I talked

about, IBP which is actually run

941

00:52:55,539 --> 00:52:59,209

out of England but

she was from New York.

942

00:52:59,209 --> 00:53:02,746

Judith had a very

interesting background.

943

00:53:02,746 --> 00:53:08,351

She started her career in show

business as a dancing matchbox

944

00:53:08,351 --> 00:53:13,990

in a cigarette commercial

when she was seven years old.

945

00:53:13,990 --> 00:53:17,594

She later was an opera

singer at the New York Met,

946

00:53:17,594 --> 00:53:19,663

performed with Pavarotti.

947

00:53:19,663 --> 00:53:23,667

I think she did some

shows with Placido Domingo

948

00:53:23,667 --> 00:53:25,035

because she moved

into production

949

00:53:25,035 --> 00:53:29,906

and produced some

plays, musicals --

950

00:53:29,906 --> 00:53:32,342

two of which she

got an Emmy for.

951

00:53:32,342 --> 00:53:36,546

I've seen them at

her place in England.

952

00:53:36,546 --> 00:53:41,017

And -- but she also was brought

into Russia by Armand Hammer

953

00:53:41,017 --> 00:53:44,621

and introduced to a lot

of people in the 1980s.

954

00:53:44,621 --> 00:53:48,391

And she was well-positioned

after the Soviet Union fell

955

00:53:48,391 --> 00:53:51,828

to look at some business

opportunities there.

956

00:53:51,828 --> 00:53:57,000

And she managed to get all of

the rights to Western contracts

957

00:53:57,000 --> 00:53:59,803

to Tupolev which is why we had

to pass through her company.

958

00:53:59,803 --> 00:54:03,373

She got all the film rights

to the Russian film archive

959

00:54:03,373 --> 00:54:08,378

and made a documentary

on Russia's involvement

960

00:54:08,378 --> 00:54:13,116

in World War II during

the program.

961

00:54:13,116 --> 00:54:16,253

She was first and

foremost a businesswoman

962

00:54:16,253 --> 00:54:19,155

who was always looking

for an opportunity.

963

00:54:19,155 --> 00:54:23,426

One of the things she liked to

say was, "Is there money in it?"

964

00:54:23,426 --> 00:54:25,662

But she was very much

a dominant presence

965

00:54:25,662 --> 00:54:27,430

because of her show

business background.

966

00:54:27,430 --> 00:54:29,332

She knew how to make

an entrance.

967

00:54:29,332 --> 00:54:31,434

Whenever Judith came

into a room,

968

00:54:31,434 --> 00:54:33,570

everybody knew Judith was there.

969

00:54:33,570 --> 00:54:36,673

And she was the dominant

presence there.

970

00:54:36,673 --> 00:54:39,409

She once told me that

she never crashed

971

00:54:39,409 --> 00:54:41,211

through the glass ceiling.

972

00:54:41,211 --> 00:54:44,047

She landed on top

of it [laughter]

973

00:54:44,047 --> 00:54:46,182

and that is the best

description of Judith

974

00:54:46,182 --> 00:54:49,986

that I think I've ever

heard -- from her own lips.

975

00:54:49,986 --> 00:54:54,024

And by the way, all

the interpreters

976

00:54:54,024 --> 00:54:55,425

that I had worked for her.

977

00:54:55,425 --> 00:54:59,095

We had a contract

with them for that.

978

00:54:59,095 --> 00:55:02,632

This just shows the

typical office at Zhukovsky.

979

00:55:02,632 --> 00:55:09,406

Very reminiscent, I think,

of a 1950s feel here to me.

980

00:55:09,406 --> 00:55:12,108

Some key players

in there, Borisov,

981

00:55:12,108 --> 00:55:13,810

the Chief Pilot in the center.

982

00:55:13,810 --> 00:55:17,080

The Chief Engineer, the Chief

Instrumentation Engineer,

983

00:55:17,080 --> 00:55:20,984

the Chief Designer, and I'll

be mentioning this character a

984

00:55:20,984 --> 00:55:22,986

little bit later.

985

00:55:22,986 --> 00:55:26,456

A couple of shots

on the aircraft

986

00:55:26,456 --> 00:55:28,425

to show they actually

did do some work

987

00:55:28,425 --> 00:55:30,927

on the aircraft when

I was there.

988

00:55:30,927 --> 00:55:35,398

By the way, just about every

American that came there wanted

989

00:55:35,398 --> 00:55:38,001

to buy one of these

Russian hats.

990

00:55:38,001 --> 00:55:40,470

I never did.

991

00:55:40,470 --> 00:55:45,008

I found them too bulky

and too hard to deal with.

992

00:55:45,008 --> 00:55:47,010

With my little ski

cap, I could do stuff

993

00:55:47,010 --> 00:55:48,978

with my pocket and

I was good to go.

994

00:55:51,981 --> 00:55:55,585

I'll talk a little bit

about safety at Zhukovsky,

995

00:55:55,585 --> 00:56:00,023

in particular -- I kept losing

equipment on the workbench

996

00:56:00,023 --> 00:56:04,994

and I was noticing some

spotty sensor alarms going off

997

00:56:04,994 --> 00:56:06,596

so I measured the

voltage difference

998

00:56:06,596 --> 00:56:09,733

between the power outlet

and the ground on the bench.

999

00:56:09,733 --> 00:56:11,368

It was 90 volts.

1000

00:56:11,368 --> 00:56:15,105

This is not good [laughter].

1001

00:56:16,673 --> 00:56:19,142

But it goes to the

infrastructure again.

1002

00:56:19,142 --> 00:56:21,344

I talked about the

seat belts already.

1003

00:56:21,344 --> 00:56:26,983

The briefings were what I

called dog and pony shows.

1004

00:56:26,983 --> 00:56:31,087

If we went through a flight

readiness review that consisted

1005

00:56:31,087 --> 00:56:32,355

of a bunch of people sitting

1006

00:56:32,355 --> 00:56:35,792

around a table saying,

"We're good to go.

1007

00:56:35,792 --> 00:56:37,193

We're good to go.

1008

00:56:37,193 --> 00:56:37,961

Nyet problem.

1009

00:56:37,961 --> 00:56:39,562

No problem."

1010

00:56:41,030 --> 00:56:45,702

And it wasn't like one of

our flight readiness reviews

1011

00:56:45,702 --> 00:56:48,838

or tech briefs where

we're trying to dig

1012

00:56:48,838 --> 00:56:52,776

into make sure everybody

understands what they don't

1013

00:56:52,776 --> 00:56:55,278

understand and have thought

1014

00:56:55,278 --> 00:56:57,247

about what they need

to think about.

1015

00:56:57,247 --> 00:57:00,116

That was not transparent to us.

1016

00:57:00,116 --> 00:57:01,851

In fact, I was sent one time --

1017

00:57:01,851 --> 00:57:08,324

or commissioned by the managers

here to find out more about that

1018

00:57:08,324 --> 00:57:10,794

because they said -- they

weren't getting the schedule

1019

00:57:10,794 --> 00:57:13,797

and costing information

and all that kind of stuff.

1020

00:57:13,797 --> 00:57:15,465

And after I asked him,

the Chief Engineer,

1021

00:57:15,465 --> 00:57:16,766

some questions he said, "Well,

1022

00:57:16,766 --> 00:57:19,469

I'm surprised you

don't know this stuff."

1023

00:57:19,469 --> 00:57:20,703

One of the other

Russians pointed

1024

00:57:20,703 --> 00:57:23,306

out that they never

invite me to the meetings.

1025

00:57:23,306 --> 00:57:24,441

How am I supposed

to know about that?

1026

00:57:24,441 --> 00:57:27,911

They still never invited

me to the meetings.

1027

00:57:32,182 --> 00:57:33,583

This was a real FRR.

1028

00:57:33,583 --> 00:57:39,389

A bunch of Russians gathered by

the aircraft making the go no --

1029

00:57:39,389 --> 00:57:44,427

no go decisions in

close communication

1030

00:57:44,427 --> 00:57:47,897

because it was cold.

1031

00:57:47,897 --> 00:57:50,467

A few items about some
things that were off nominal.

1032

00:57:50,467 --> 00:57:54,537

I mentioned on the starboard
wing, we had a strip of tubing

1033

00:57:54,537 --> 00:57:56,806

for measuring pressures.

1034

00:57:56,806 --> 00:58:03,480

We had one of those come off at
Mach 2 and peel back and wrap

1035

00:58:03,480 --> 00:58:07,116

around the pressure rigs of
the aft end of the aircraft.

1036

00:58:07,116 --> 00:58:09,819

I had a cockpit window crack.

1037

00:58:09,819 --> 00:58:12,789

And then there are things
that I consider off nominal.

1038

00:58:12,789 --> 00:58:14,491

You know, paying for a
quarter-of-a-million pounds

1039

00:58:14,491 --> 00:58:19,496

of pull with a suitcase of cash
literally is not something we

1040

00:58:19,496 --> 00:58:21,698

typically do around
here [laughter].

1041

00:58:25,001 --> 00:58:27,737

The very first time

I arrived in Moscow,

1042

00:58:27,737 --> 00:58:30,607

I got as far as passport

control.

1043

00:58:30,607 --> 00:58:33,543

And the passport agent was

asking me a bunch of things

1044

00:58:33,543 --> 00:58:35,678

in Russian that I

didn't understand.

1045

00:58:35,678 --> 00:58:37,580

When they finally pointed over

to the section of the floor,

1046

00:58:37,580 --> 00:58:39,048

there's this little square.

1047

00:58:39,048 --> 00:58:40,216

So I went over and I stood

1048

00:58:40,216 --> 00:58:44,087

on this square thinking,

"Now what?"

1049

00:58:44,087 --> 00:58:46,389

My interpreter is on the other

side of the security boundary

1050

00:58:46,389 --> 00:58:48,725

and any other American I was

with was also over there.

1051

00:58:48,725 --> 00:58:53,796

I was by myself, had no

idea what the issue was.

1052

00:58:53,796 --> 00:58:55,298

My interpreter finally managed

1053

00:58:55,298 --> 00:58:58,535

to talk his way past the

security boundary and come over

1054

00:58:58,535 --> 00:59:01,371

and asked the passport

agent what the problem was.

1055

00:59:01,371 --> 00:59:04,474

And it turned out that

the spelling of my name

1056

00:59:04,474 --> 00:59:07,176

on my visa was different

than the spelling of my name

1057

00:59:07,176 --> 00:59:10,079

on their list which

isn't a big surprise

1058

00:59:10,079 --> 00:59:12,815

because it was all

transliterated from our alphabet

1059

00:59:12,815 --> 00:59:16,119

to Cyrillic, and there's a

number of ways you can do that.

1060

00:59:16,119 --> 00:59:18,655

And they just chose two

different ways of doing it.

1061

00:59:18,655 --> 00:59:21,658

And then Sergei followed

all that up

1062

00:59:21,658 --> 00:59:23,560

by asking the passport

agent for a date.

1063

00:59:23,560 --> 00:59:27,463

And that pretty well

defined Sergei.

1064

00:59:27,463 --> 00:59:35,271

[Laughter]

1065

00:59:35,271 --> 00:59:38,007

I wasn't going to core

drill that one too much.

1066

00:59:39,576 --> 00:59:45,281

Okay, some things

scared me a bit.

1067

00:59:45,281 --> 00:59:49,085

And top of the list is what

I called the GPS incident.

1068

00:59:50,453 --> 00:59:53,790

I told Bob Curry a few months

ago that he nearly landed me

1069

00:59:53,790 --> 00:59:55,925

in jail and he didn't know

what I was talking about.

1070

00:59:55,925 --> 00:59:58,728

But what happened was one

morning I'm sitting in my hotel,

1071

00:59:58,728 --> 01:00:02,265

reading the Moscow Times -- this

is an English language paper.

1072

01:00:02,265 --> 01:00:07,070

And there's this little article
there about a Qualcomm engineer

1073
01:00:07,070 --> 01:00:13,176
that had just been arrested
for doing a GPS survey outside

1074
01:00:13,176 --> 01:00:15,845
of a former Soviet
military base.

1075
01:00:15,845 --> 01:00:18,615
My blood kind of ran cold

1076
01:00:18,615 --> 01:00:21,985
because I was doing exactly
the same thing except I was

1077
01:00:21,985 --> 01:00:25,355
on a former Soviet
military base [laughter].

1078
01:00:26,756 --> 01:00:29,325
This is the survey of the field
so that we could get, you know,

1079
01:00:29,325 --> 01:00:32,662
data for the ground effect
to know exactly how far

1080
01:00:32,662 --> 01:00:34,530
above the air field
the plane was

1081
01:00:34,530 --> 01:00:37,600
because the Russian
radar was crappy.

1082
01:00:37,600 --> 01:00:42,672
Now this is one of those cases

1083

01:00:42,672 --> 01:00:44,907

where the Russians

made up a new rule.

1084

01:00:44,907 --> 01:00:47,677

He was officially

arrested for having --

1085

01:00:47,677 --> 01:00:52,915

not having the right import

license for his GPS unit.

1086

01:00:52,915 --> 01:00:54,717

There was no such thing.

1087

01:00:54,717 --> 01:00:59,822

At least it wasn't at the time

that we imported our units.

1088

01:01:01,190 --> 01:01:04,160

So they had me kind of sweating

there for a while wondering

1089

01:01:04,160 --> 01:01:06,562

when the other shoe

was going to drop.

1090

01:01:06,562 --> 01:01:08,131

They eventually released him

1091

01:01:08,131 --> 01:01:09,932

and not much more

was made out of that.

1092

01:01:09,932 --> 01:01:13,736

But other GPS's I don't

have time to go into.

1093

01:01:13,736 --> 01:01:17,006

The streets of Moscow, as
they say, were problematic.

1094

01:01:17,006 --> 01:01:18,341

There were two classes
of drivers,

1095

01:01:18,341 --> 01:01:21,210

the professional drivers
and the amateur drivers.

1096

01:01:21,210 --> 01:01:24,947

And the amateur drivers usually
had no training whatsoever.

1097

01:01:24,947 --> 01:01:28,051

And both types of drivers
drove very aggressively.

1098

01:01:30,820 --> 01:01:34,924

One of our drivers -- it
turns out he was the driver

1099

01:01:34,924 --> 01:01:36,859

of the former head of the KGB.

1100

01:01:36,859 --> 01:01:41,764

In fact, he was the driver
that drove Solzhenitsyn

1101

01:01:41,764 --> 01:01:46,869

out of the country when he was
expelled some years before that.

1102

01:01:46,869 --> 01:01:51,207

One day, I was sitting
in the office

1103

01:01:51,207 --> 01:01:55,078

of Mr. [Inaudible] having lunch.

1104

01:01:55,078 --> 01:01:56,512

We often had lunch

in his office.

1105

01:01:56,512 --> 01:02:02,485

He was not in attendance

that day and we're talking

1106

01:02:02,485 --> 01:02:05,354

about something and I commented

that there was a guy back

1107

01:02:05,354 --> 01:02:06,923

at Dryden that reminded me

1108

01:02:06,923 --> 01:02:10,026

of Mr. [Inaudible]

only Bill was a redneck

1109

01:02:10,026 --> 01:02:12,695

and [Inaudible] was a communist.

1110

01:02:12,695 --> 01:02:14,831

And the Russians got big

saucer eyes and said,

1111

01:02:14,831 --> 01:02:17,500

"How did you know

[Inaudible] was a communist?"

1112

01:02:17,500 --> 01:02:22,038

[Laughter]

1113

01:02:22,038 --> 01:02:23,372

There's a picture of Lenin

hanging on his wall [laughter].

1114

01:02:23,372 --> 01:02:27,043
I thought that was a clue.

1115
01:02:31,280 --> 01:02:33,015
And there's always
cultural mistakes

1116
01:02:33,015 --> 01:02:35,818
that you run across,
most of them small.

1117
01:02:35,818 --> 01:02:39,489
But some of them
larger than others.

1118
01:02:39,489 --> 01:02:44,594
The -- we were in --

1119
01:02:44,594 --> 01:02:47,964
we had dinner at our
interpreter's house one day.

1120
01:02:47,964 --> 01:02:50,333
This was the first and only
time we ever was invited

1121
01:02:50,333 --> 01:02:52,769
into anybody's home there.

1122
01:02:52,769 --> 01:02:57,206
And we arrived -- we decided
it would be a good idea

1123
01:02:57,206 --> 01:02:59,942
to take some roses
for the hostess.

1124
01:02:59,942 --> 01:03:03,613
And so, bought some flowers,
I think it was a dozen roses

1125

01:03:03,613 --> 01:03:06,749

and our interpreter said,

"You know, it's bad luck

1126

01:03:06,749 --> 01:03:10,219

to give someone an even

number of flowers."

1127

01:03:10,219 --> 01:03:12,421

No, didn't know that.

1128

01:03:12,421 --> 01:03:14,423

So we started to

enter and shake hands.

1129

01:03:14,423 --> 01:03:15,424

She says, "Oops, bad luck

1130

01:03:15,424 --> 01:03:17,794

to shake hands across

the threshold.

1131

01:03:17,794 --> 01:03:20,296

You got to come inside

to do that."

1132

01:03:20,296 --> 01:03:22,565

Okay, didn't know that either.

1133

01:03:24,333 --> 01:03:28,137

Refusing to toast

obviously was a faux pas.

1134

01:03:28,137 --> 01:03:31,707

We were visiting a

monastery one weekend

1135

01:03:31,707 --> 01:03:34,377

out of -- it was [Inaudible].

1136

01:03:34,377 --> 01:03:35,511

And we got a tour

1137

01:03:35,511 --> 01:03:37,180

by an English-speaking

Russian Orthodox nun.

1138

01:03:37,180 --> 01:03:42,785

And at one point, we're

standing inside the cathedral

1139

01:03:42,785 --> 01:03:46,289

and she starts admonishing

us because several

1140

01:03:46,289 --> 01:03:48,057

of our members were

standing there

1141

01:03:48,057 --> 01:03:49,926

with their hands in our pockets.

1142

01:03:49,926 --> 01:03:54,063

And by way of example, she says,

"You know, if you were talking

1143

01:03:54,063 --> 01:03:55,431

to your boss, would

you stand there

1144

01:03:55,431 --> 01:03:57,633

with your hands in

your pockets?"

1145

01:03:58,801 --> 01:03:59,468

Sure.

1146

01:03:59,468 --> 01:04:03,139

[Laughter]

1147

01:04:03,139 --> 01:04:04,340

And she was aghast.

1148

01:04:04,340 --> 01:04:07,777

I thought Americans had

more manners than that.

1149

01:04:07,777 --> 01:04:12,915

So -- just for the record, I

wasn't standing with my hands

1150

01:04:12,915 --> 01:04:17,420

in my pockets but

you just never know.

1151

01:04:17,420 --> 01:04:25,261

And the Wilson in the earlier

days, I stayed back in Zhukovsky

1152

01:04:25,261 --> 01:04:29,799

or at Tupolev one day and

he went back to the hotel.

1153

01:04:29,799 --> 01:04:32,501

He was on the subway talking to

our interpreter and a woman gets

1154

01:04:32,501 --> 01:04:36,572

up and starts berating Wilson

for something in Russian.

1155

01:04:36,572 --> 01:04:37,640

He had no idea what it was.

1156

01:04:37,640 --> 01:04:39,508

And she got off and

a young man comes up

1157

01:04:39,508 --> 01:04:41,944

and does the same thing.

1158

01:04:41,944 --> 01:04:43,579

Wilson had a heck of a time

getting the interpreter

1159

01:04:43,579 --> 01:04:46,449

to tell him what the problem

was and she said, "Well,

1160

01:04:46,449 --> 01:04:48,417

she was unhappy with

you crossing your legs

1161

01:04:48,417 --> 01:04:50,786

on the subway."

1162

01:04:50,786 --> 01:04:53,489

But he never would tell us why.

1163

01:04:53,489 --> 01:04:54,757

We had a few guesses.

1164

01:04:54,757 --> 01:04:57,493

Maybe he was showing

the sole of his foot

1165

01:04:57,493 --> 01:04:59,061

or maybe he was taking

up too much space.

1166

01:04:59,061 --> 01:05:01,030

I don't know but it was

apparently a no-no that --

1167

01:05:01,030 --> 01:05:02,598

one of those unwritten rules

1168

01:05:02,598 --> 01:05:04,967

that foreigners were just

not going to know about.

1169

01:05:10,039 --> 01:05:15,611

One day, I was in a telecom in

Russia talking to the U.S. team

1170

01:05:15,611 --> 01:05:18,848

and Norm Prince -- and some

1171

01:05:18,848 --> 01:05:23,686

of you might know who's

worked projects in conjunction

1172

01:05:23,686 --> 01:05:25,321

with us later, he was doing

1173

01:05:25,321 --> 01:05:28,758

and handling quality

assessment for Douglas.

1174

01:05:28,758 --> 01:05:31,694

And I knew that he had to

coordinate with the Russians

1175

01:05:31,694 --> 01:05:33,863

for flight cards and I said,

"Norm, if you want to come

1176

01:05:33,863 --> 01:05:36,432

to Moscow to coordinate

your flight cards,

1177

01:05:36,432 --> 01:05:38,968

now's a good time to come."

1178

01:05:38,968 --> 01:05:40,369

And the Deputy Program Manager

1179

01:05:40,369 --> 01:05:43,239

at Boeing jumped

all over my case.

1180

01:05:43,239 --> 01:05:45,041

"I don't know how they do

things at NASA but at Boeing,

1181

01:05:45,041 --> 01:05:47,376

we let our managers make

those kind of decisions."

1182

01:05:47,376 --> 01:05:51,314

Okay, so I said, "Well, I don't

know how you do things at Boeing

1183

01:05:51,314 --> 01:05:53,716

but at NASA, we like to give our

managers information on which

1184

01:05:53,716 --> 01:05:55,718

to base their decisions."

1185

01:05:55,718 --> 01:05:58,587

And that's all I was doing and

I wasn't a manager at the time.

1186

01:05:58,587 --> 01:06:00,623

I certainly wasn't Norm's

manager but I was the guy

1187

01:06:00,623 --> 01:06:03,726

at the ground that had the

intelligence, the information

1188

01:06:03,726 --> 01:06:07,430

and I was passing it on.

1189

01:06:07,430 --> 01:06:10,199

I often found it easier to work
with the Russians than to work

1190

01:06:10,199 --> 01:06:15,805

with Boeing at this
project [laughter].

1191

01:06:15,805 --> 01:06:18,240

To be fair, they were
the prime contractor

1192

01:06:18,240 --> 01:06:20,242

and so it was their
responsibility

1193

01:06:20,242 --> 01:06:24,580

to run this program but
they weren't sending people

1194

01:06:24,580 --> 01:06:26,182

over to actually do that.

1195

01:06:26,182 --> 01:06:27,817

And one thing I discovered
with the Russians --

1196

01:06:27,817 --> 01:06:32,221

unless you're there, your
job has a lower priority.

1197

01:06:32,221 --> 01:06:35,391

And I was the guy that was there

1198

01:06:35,391 --> 01:06:38,027

so I was passing
on the information.

1199

01:06:43,966 --> 01:06:46,302

It was often because of
the import-export issues,

1200

01:06:46,302 --> 01:06:50,573

it was hard to send
things back for servicing.

1201

01:06:50,573 --> 01:06:53,976

So in at least one occasion,
I was trained by the factory

1202

01:06:53,976 --> 01:06:57,947

to do the servicing on our
flight recorder unit myself

1203

01:06:57,947 --> 01:07:01,951

because it's easier to send
me there to do it on site.

1204

01:07:01,951 --> 01:07:03,753

And as many times
as I was there,

1205

01:07:03,753 --> 01:07:06,555

my participation was
still kind of an event.

1206

01:07:06,555 --> 01:07:07,723

It wasn't just seamless.

1207

01:07:07,723 --> 01:07:08,624

Oh, you're here again.

1208

01:07:08,624 --> 01:07:10,292

Let's go do stuff.

1209

01:07:10,292 --> 01:07:12,495

There's a bit of
ceremony often involved.

1210

01:07:12,495 --> 01:07:15,598

You had -- you didn't have

direct access to people.

1211

01:07:16,899 --> 01:07:20,870

And I already talked about

the issues of keeping warm.

1212

01:07:20,870 --> 01:07:23,239

But you can see how

they kept warm.

1213

01:07:23,239 --> 01:07:26,909

This is a very common

winter garb for the women

1214

01:07:26,909 --> 01:07:29,011

and there's a reason for it.

1215

01:07:36,052 --> 01:07:37,920

Here's a typical

lunch at Zhukovsky

1216

01:07:37,920 --> 01:07:39,822

and you probably can't tell

1217

01:07:39,822 --> 01:07:42,958

but that's Donna Gallagher

beneath the burka there.

1218

01:07:46,295 --> 01:07:50,800

Completely wrapped including

gloves just to keep warm

1219

01:07:50,800 --> 01:07:53,969

at our literally cold lunch.

1220

01:07:56,572 --> 01:07:59,508

There were some positive

things about this and back

1221

01:07:59,508 --> 01:08:02,411

in those days, the airline

baggage limit was larger

1222

01:08:02,411 --> 01:08:03,245

than it is now.

1223

01:08:03,245 --> 01:08:04,980

And I usually used it to the max

1224

01:08:04,980 --> 01:08:08,617

because I was transporting all

kinds of stuff back and forth.

1225

01:08:08,617 --> 01:08:10,719

Airlines still serve foods.

1226

01:08:10,719 --> 01:08:13,355

Security was such that I

could carry bottles of water

1227

01:08:13,355 --> 01:08:19,361

from California to Moscow

and not have it confiscated.

1228

01:08:19,361 --> 01:08:23,933

I even often got upgraded to

business class automatically.

1229

01:08:23,933 --> 01:08:26,102

That was a bit dicey

in the early days

1230

01:08:26,102 --> 01:08:28,838

because the government

had rules against that,

1231

01:08:28,838 --> 01:08:31,140
that were changing at the time.

1232
01:08:31,140 --> 01:08:35,311
In fact, the frequent flyer
miles rules changed during this

1233
01:08:35,311 --> 01:08:36,011
as well.

1234
01:08:36,011 --> 01:08:37,113
I accumulated the miles

1235
01:08:37,113 --> 01:08:39,048
and never expecting I'd
be able to use them.

1236
01:08:39,048 --> 01:08:41,350
I ended up using them
for the Concorde flight

1237
01:08:41,350 --> 01:08:42,918
but that was officially
a business trip

1238
01:08:42,918 --> 01:08:44,954
because I was going
to Moscow for a --

1239
01:08:44,954 --> 01:08:48,057
I mean to Paris for a meeting.

1240
01:08:48,057 --> 01:08:50,059
The 11-hour time
difference allowed me

1241
01:08:50,059 --> 01:08:51,527
to take advantage
of a double shift.

1242

01:08:51,527 --> 01:08:56,132

I'd get information at

Zhukovsky and Tupolev in Moscow,

1243

01:08:56,132 --> 01:08:58,167

go back to my hotel,

write emails.

1244

01:08:58,167 --> 01:09:00,469

Go to bed, wake up

in the morning.

1245

01:09:00,469 --> 01:09:02,271

Meanwhile the people in the

States have had a chance

1246

01:09:02,271 --> 01:09:05,875

to work their normal work day.

1247

01:09:05,875 --> 01:09:08,577

I'd take the answers

and go back to Tupolev.

1248

01:09:08,577 --> 01:09:10,779

So that -- if you

handled that right,

1249

01:09:10,779 --> 01:09:12,448

that worked out rather well.

1250

01:09:12,448 --> 01:09:15,651

It also gave me the

ability out of necessity

1251

01:09:15,651 --> 01:09:17,987

to operate pretty autonomously.

1252

01:09:20,856 --> 01:09:22,291

There was nobody to talk to

1253

01:09:22,291 --> 01:09:24,527

and limited ways in

which to do that.

1254

01:09:24,527 --> 01:09:26,729

I couldn't call them

on the phone initially.

1255

01:09:26,729 --> 01:09:28,864

They wouldn't be

there first of all.

1256

01:09:28,864 --> 01:09:30,833

Second, it was prohibitively

expensive initially.

1257

01:09:30,833 --> 01:09:34,970

Emails -- I was going

through a local ISP so I had

1258

01:09:34,970 --> 01:09:36,505

to be somewhat careful

1259

01:09:36,505 --> 01:09:39,041

about what information we were

transferring back and forth.

1260

01:09:39,041 --> 01:09:44,513

I was the only guy

there so I got

1261

01:09:44,513 --> 01:09:51,720

to make decisions somewhat

to Boeing's chagrin.

1262

01:09:51,720 --> 01:09:53,222

So what I'd do on the weekends?

1263

01:09:53,222 --> 01:09:54,823
One of my favorite pictures.

1264
01:09:54,823 --> 01:09:56,025
I took this picture.

1265
01:09:56,025 --> 01:09:59,528
This is a park just a
few blocks from my hotel.

1266
01:09:59,528 --> 01:10:04,133
The Russians were very fond of
walking the park with the family

1267
01:10:04,133 --> 01:10:07,069
and with sleds, as you see --

1268
01:10:07,069 --> 01:10:10,206
very pleasant if
cold environment.

1269
01:10:11,540 --> 01:10:13,642
And I was a frequent
visitor to this place,

1270
01:10:13,642 --> 01:10:15,744
the [Inaudible] Flea Market.

1271
01:10:15,744 --> 01:10:19,582
I would take the Moscow
subways across town

1272
01:10:19,582 --> 01:10:23,586
and you could buy everything
there from matryoshka dolls

1273
01:10:23,586 --> 01:10:26,622
to surplus military hardware.

1274

01:10:28,157 --> 01:10:30,459

Not wanting to deal

with customs issues

1275

01:10:30,459 --> 01:10:32,294

with the surplus

military hardware,

1276

01:10:32,294 --> 01:10:35,731

I opted for the matryoshka

dolls.

1277

01:10:35,731 --> 01:10:37,900

And I became quite

adept at picking

1278

01:10:37,900 --> 01:10:39,802

out good quality matryoshka.

1279

01:10:39,802 --> 01:10:42,671

Those are stacking dolls.

1280

01:10:42,671 --> 01:10:44,807

Sold by the artists

of those things,

1281

01:10:44,807 --> 01:10:48,677

people that actually

painted them,

1282

01:10:48,677 --> 01:10:50,212

good quality for a low cost.

1283

01:10:50,212 --> 01:10:51,547

Like you go to the same --

1284

01:10:51,547 --> 01:10:53,716

I could find the same dolls

in the GUM Department Store

1285

01:10:53,716 --> 01:10:57,987

in downtown Moscow for

probably five times the cost.

1286

01:11:01,757 --> 01:11:04,793

And to get there,

I'd use the Metro.

1287

01:11:04,793 --> 01:11:08,364

The Metro stations themselves

were rather opulently appointed.

1288

01:11:08,364 --> 01:11:11,166

There's a lot of marble

columns and statues

1289

01:11:11,166 --> 01:11:14,336

and sometimes chandeliers.

1290

01:11:14,336 --> 01:11:17,506

The subway cars themselves

were very boxy

1291

01:11:17,506 --> 01:11:20,509

and functional and blue.

1292

01:11:20,509 --> 01:11:26,382

And the markings -- unless

you could read Cyrillic,

1293

01:11:26,382 --> 01:11:28,484

you had no clue where

to go on the subways

1294

01:11:28,484 --> 01:11:32,288

because all you had was just a

stack of names about this long

1295

01:11:32,288 --> 01:11:37,626

in the Cyrillic alphabet
that listed the stops.

1296

01:11:37,626 --> 01:11:40,896

If you had some kind of a map,
they were listed as color coded

1297

01:11:40,896 --> 01:11:42,364

but none of the color
coding ever made it

1298

01:11:42,364 --> 01:11:44,033

into the subway itself.

1299

01:11:44,033 --> 01:11:47,603

And I think this is
initially a security feature

1300

01:11:47,603 --> 01:11:48,837

to the Russians.

1301

01:11:48,837 --> 01:11:50,372

They didn't want foreigners
wandering around knowing

1302

01:11:50,372 --> 01:11:52,408

where to go, you know.

1303

01:11:52,408 --> 01:11:53,876

Putting things like
military bases

1304

01:11:53,876 --> 01:11:57,313

on the maps is a foreign
concept to them as well.

1305

01:11:57,313 --> 01:12:00,883

And you might have seen
St. Basil's Cathedral

1306

01:12:00,883 --> 01:12:02,918

at the end of Red Square.

1307

01:12:02,918 --> 01:12:05,287

It's a very famous icon.

1308

01:12:06,522 --> 01:12:12,328

Okay, we had -- we had good

technical interpreters.

1309

01:12:12,328 --> 01:12:17,800

I'll mention one story where

that didn't work out so well.

1310

01:12:17,800 --> 01:12:22,671

We were doing a summary

discussion at the end of one

1311

01:12:22,671 --> 01:12:26,175

of my visits and looking at a

shipping document that listed

1312

01:12:26,175 --> 01:12:27,509

where I had left some things.

1313

01:12:27,509 --> 01:12:31,146

And I read off some items,

the interpreter said something

1314

01:12:31,146 --> 01:12:33,816

in Russian and the Russians

got this confused look

1315

01:12:33,816 --> 01:12:35,250

on their face.

1316

01:12:35,250 --> 01:12:37,186

So I said it again

and I listened

1317

01:12:37,186 --> 01:12:39,688

to what the interpreter was
saying and I knew just enough

1318

01:12:39,688 --> 01:12:42,725

to recognize he wasn't
saying it right.

1319

01:12:42,725 --> 01:12:45,060

So in desperation, I
broke into Russian myself.

1320

01:12:45,060 --> 01:12:47,463

Anybody here speak Russian?

1321

01:12:47,463 --> 01:12:48,764

Good [laughter].

1322

01:12:50,132 --> 01:12:51,467

But I said.

1323

01:12:51,467 --> 01:12:55,003

[Speaking in Foreign Language]

1324

01:12:55,003 --> 01:12:57,706

Which means items one, two and
three are Zhukovsky and four,

1325

01:12:57,706 --> 01:12:59,074

five and six are in Moscow.

1326

01:12:59,074 --> 01:13:01,677

And they got another startled
expression on their face

1327

01:13:01,677 --> 01:13:03,679

and from then on, they never
were quite sure how much Russian

1328

01:13:03,679 --> 01:13:04,480

I understood.

1329

01:13:04,480 --> 01:13:08,384

[Laughter]

1330

01:13:08,384 --> 01:13:10,519

And they all handled

it in different ways.

1331

01:13:10,519 --> 01:13:12,654

Some guys would go off

and whisper in the corner.

1332

01:13:12,654 --> 01:13:15,524

Other guys would

come right to my face

1333

01:13:15,524 --> 01:13:16,859

and start chattering

away at Russian

1334

01:13:16,859 --> 01:13:18,227

and assume I knew

everything they were talking

1335

01:13:18,227 --> 01:13:20,996

about which was not

often the case.

1336

01:13:26,201 --> 01:13:29,738

Briefly, the Germans sent a film

team out and for three days,

1337

01:13:29,738 --> 01:13:32,875

they followed me around

and did a documentary,

1338

01:13:32,875 --> 01:13:36,812
kind of like a reality show
before there was such a thing

1339
01:13:36,812 --> 01:13:38,614
in which I figured prominently.

1340
01:13:38,614 --> 01:13:43,218
I have a copy of it only
because it aired in Germany

1341
01:13:43,218 --> 01:13:47,489
and a colleague of mine
-- his daughter saw it,

1342
01:13:47,489 --> 01:13:49,992
recognized my name and
hit the record button

1343
01:13:49,992 --> 01:13:52,995
and so I got a copy
of that in German.

1344
01:13:58,467 --> 01:14:04,039
The calibration lab --
they were giving me a tour

1345
01:14:04,039 --> 01:14:07,976
of how they calibrated pressure
transducers and at the end

1346
01:14:07,976 --> 01:14:11,914
of it, the interpreter
or the head of the lab,

1347
01:14:11,914 --> 01:14:14,817
the aforementioned communist
turned to me and asked,

1348
01:14:14,817 --> 01:14:16,618

"So tell me, are we behind?"

1349

01:14:16,618 --> 01:14:21,390

And I was thinking,

"Heck, yeah."

1350

01:14:21,390 --> 01:14:25,494

But what I said was -- I

started my career at NASA

1351

01:14:25,494 --> 01:14:26,962

in the pressure calibration lab.

1352

01:14:26,962 --> 01:14:30,632

My first job was to

design an automatic program

1353

01:14:30,632 --> 01:14:32,134

for automating the process

1354

01:14:32,134 --> 01:14:33,936

of calibrating pressure

transducers.

1355

01:14:33,936 --> 01:14:36,038

And some of the stuff I just

seen there was antiquated

1356

01:14:36,038 --> 01:14:40,175

when I arrived at NASA

over 20 years before that.

1357

01:14:40,175 --> 01:14:44,413

But what I told him was, "Well,

we do an automated process

1358

01:14:44,413 --> 01:14:47,983

but what I've discovered is

the technicians have often lost

1359

01:14:47,983 --> 01:14:50,752

touch with the physics
of the situation."

1360

01:14:50,752 --> 01:14:53,822

And the technician drew
herself up proudly and said,

1361

01:14:53,822 --> 01:14:56,592

"I understand the
physics of the situation.

1362

01:14:56,592 --> 01:14:58,460

Let's move on."

1363

01:14:58,460 --> 01:15:03,165

[Laughter]

1364

01:15:03,165 --> 01:15:05,601

And just quickly, Mark Twain,

1365

01:15:05,601 --> 01:15:09,037

I discovered was a popular
favorite author in Russia.

1366

01:15:09,037 --> 01:15:10,439

And I let it slip one day

1367

01:15:10,439 --> 01:15:12,407

that he was actually a
distant relative of mine.

1368

01:15:12,407 --> 01:15:14,676

And that got them all excited.

1369

01:15:14,676 --> 01:15:17,946

To the extent of next day,
they brought in copies

1370

01:15:17,946 --> 01:15:22,484

of Russian works of Mark Twain
and had me autograph them

1371

01:15:22,484 --> 01:15:27,389

[Laughter]

1372

01:15:27,389 --> 01:15:30,292

And I said, "But I'm
only a distant relative."

1373

01:15:30,292 --> 01:15:32,761

They said, "Well,
don't put that part."

1374

01:15:32,761 --> 01:15:36,164

So I used my toasting experience
to say, "From the banks

1375

01:15:36,164 --> 01:15:39,134

of the Mississippi River
to the banks of the Moscow,

1376

01:15:39,134 --> 01:15:39,968

we send you greetings."

1377

01:15:39,968 --> 01:15:41,003

And signed my name to it.

1378

01:15:41,003 --> 01:15:42,838

So they were very happy.

1379

01:15:47,976 --> 01:15:51,647

Now some of these -- if
you tell me what they mean

1380

01:15:52,714 --> 01:15:55,450

but there were things
that were uttered.

1381

01:15:55,450 --> 01:16:03,992

[Laughter]

1382

01:16:03,992 --> 01:16:07,663

I was asked to help them with

a Windows problem one day.

1383

01:16:07,663 --> 01:16:09,464

And remember the little --

1384

01:16:09,464 --> 01:16:13,001

[Laughter]

1385

01:16:13,001 --> 01:16:14,102

Remember the little

flying folder

1386

01:16:14,102 --> 01:16:15,737

of copying and the countdown?

1387

01:16:15,737 --> 01:16:18,507

Well, it kind of

would get down to zero

1388

01:16:18,507 --> 01:16:21,810

and sit there while the

folder was still flying.

1389

01:16:21,810 --> 01:16:24,313

And I said, "Wait for it."

1390

01:16:24,313 --> 01:16:27,049

Sure enough, about 30 seconds

later, it finished and that's

1391

01:16:27,049 --> 01:16:28,750

when one of the Russians

said that line [laughter].

1392

01:16:28,750 --> 01:16:33,889

On a more serious note, one
of the conversations I had

1393

01:16:33,889 --> 01:16:38,560

with my interpreter, you know,
they were still trying to figure

1394

01:16:38,560 --> 01:16:40,762

out how things worked.

1395

01:16:40,762 --> 01:16:41,897

They knew how things worked

1396

01:16:41,897 --> 01:16:43,699

under communism whether
they liked it or not.

1397

01:16:43,699 --> 01:16:45,400

They knew how it worked.

1398

01:16:45,400 --> 01:16:48,437

Under capitalism, they didn't
know what was going on.

1399

01:16:48,437 --> 01:16:50,572

But one interpretation
was there --

1400

01:16:50,572 --> 01:16:52,874

it's every man for himself are
expected to do their worse,

1401

01:16:52,874 --> 01:16:55,410

could not work for
the common good.

1402

01:16:55,410 --> 01:16:59,481

So that was a very interesting
observation on the part

1403
01:16:59,481 --> 01:17:01,550
of someone who grew
up in that system.

1404
01:17:01,550 --> 01:17:05,220
That's Mr. [Inaudible],

1405
01:17:05,220 --> 01:17:08,924
the communist there
and Mr. [Inaudible].

1406
01:17:12,194 --> 01:17:15,297
So I'm trying to
wrap it up here.

1407
01:17:15,297 --> 01:17:16,798
What happened afterwards?

1408
01:17:16,798 --> 01:17:19,735
Boeing decided that engine
technology, it just wasn't there

1409
01:17:19,735 --> 01:17:21,370
to support the next generation

1410
01:17:21,370 --> 01:17:25,173
of supersonic transport
in the late '90s.

1411
01:17:25,173 --> 01:17:28,310
They couldn't make the economic
case and at the same time,

1412
01:17:28,310 --> 01:17:32,914
the high speed research program
ended for various reasons,

1413

01:17:32,914 --> 01:17:36,118

one of which I gather

is that it looked

1414

01:17:36,118 --> 01:17:39,021

like Boeing was thinking NASA

was going to do all the research

1415

01:17:39,021 --> 01:17:42,991

for them so they cut back the

research program and NASA looked

1416

01:17:42,991 --> 01:17:44,793

at Boeing cutting back the

research program and said,

1417

01:17:44,793 --> 01:17:45,827

"Well, this is no

longer of interest

1418

01:17:45,827 --> 01:17:48,897

to them so we cut back ours."

1419

01:17:48,897 --> 01:17:54,670

The Space Station

was way over budget

1420

01:17:54,670 --> 01:17:57,172

and if they got the

appropriation line stuff sorted

1421

01:17:57,172 --> 01:18:01,877

out, I gather than all the money

kind of went that direction.

1422

01:18:01,877 --> 01:18:05,480

But I will say that these

things go in cycles.

1423

01:18:05,480 --> 01:18:10,018

And as you know, the supersonic

[inaudible] lab is over land

1424

01:18:10,018 --> 01:18:11,987

and that has a renewed emphasis.

1425

01:18:11,987 --> 01:18:17,259

And I think a lot

of data gathered

1426

01:18:17,259 --> 01:18:19,327

on this program could still

be quite useful in that.

1427

01:18:19,327 --> 01:18:24,266

And we still have it and as

the instrumentation is here,

1428

01:18:24,266 --> 01:18:27,335

I know how to interpret it.

1429

01:18:27,335 --> 01:18:31,573

But we did learn a great deal.

1430

01:18:31,573 --> 01:18:33,909

I gathered a great deal

of quantitative data.

1431

01:18:33,909 --> 01:18:38,113

And I personally learned how

to work with Russians and hone

1432

01:18:38,113 --> 01:18:40,282

down some of my diplomatic

skills

1433

01:18:40,282 --> 01:18:41,550

like in the calibration lab.

1434

01:18:41,550 --> 01:18:45,587

It was an opportunity to
build trust with the Russians

1435

01:18:45,587 --> 01:18:48,957

which I think we did
pretty effectively.

1436

01:18:48,957 --> 01:18:53,495

And it was a unique experience
to work in an environment --

1437

01:18:53,495 --> 01:18:57,065

I did a lot of traveling before
this but I had never really been

1438

01:18:57,065 --> 01:18:59,668

in a place where it was
hard to find someone

1439

01:18:59,668 --> 01:19:02,137

who spoke my language.

1440

01:19:02,137 --> 01:19:05,874

And I knew more of the local
language than they knew of mine.

1441

01:19:05,874 --> 01:19:10,112

So it was kind of forced the
issue to use it a bit more.

1442

01:19:10,112 --> 01:19:12,514

And it was an experience
of a lifetime.

1443

01:19:12,514 --> 01:19:15,784

When I left the program,
when the program ended,

1444

01:19:15,784 --> 01:19:18,186
some of my Russian colleagues
put together this collage

1445
01:19:18,186 --> 01:19:23,391
and signed it to give to
me which I appreciated.

1446
01:19:23,391 --> 01:19:26,795
They also gave me a medal.

1447
01:19:26,795 --> 01:19:28,597
This is actually the
first medal I ever got.

1448
01:19:28,597 --> 01:19:31,700
I got a few from
NASA subsequently

1449
01:19:31,700 --> 01:19:33,535
but this is the first
medal I was ever awarded.

1450
01:19:33,535 --> 01:19:37,038
And it was for excellence in the
field of aviation technology.

1451
01:19:37,038 --> 01:19:40,408
Now the kicker there -- the
reason I show you this is

1452
01:19:40,408 --> 01:19:43,145
because they told
me I was the --

1453
01:19:43,145 --> 01:19:47,415
only the second foreigner they
had ever given this medal to.

1454
01:19:47,415 --> 01:19:49,251

Want to know who
the first one was?

1455

01:19:49,251 --> 01:19:50,485
The head of North Korea.

1456

01:19:50,485 --> 01:19:58,026
[Laughter]

1457

01:19:58,026 --> 01:19:59,427
My old buddy, yeah [laughter].

1458

01:19:59,427 --> 01:20:02,798
One thing and please don't
tell my security services

1459

01:20:02,798 --> 01:20:04,966
about this, okay?

1460

01:20:06,434 --> 01:20:09,571
And a year after
the program ended,

1461

01:20:09,571 --> 01:20:12,774
the Russians sent
this certificate.

1462

01:20:12,774 --> 01:20:18,380
And I want to read
you what it says

1463

01:20:18,380 --> 01:20:22,717
on there as closely as I can.

1464

01:20:22,717 --> 01:20:25,954
"This given certificate is in
confirmation of your ability

1465

01:20:25,954 --> 01:20:28,890

to cope with all difficulties
in extreme situations similar

1466

01:20:28,890 --> 01:20:32,194
on the character of flood, fire,
earthquake, volcano eruption,

1467

01:20:32,194 --> 01:20:34,529
marriage or family life."

1468

01:20:34,529 --> 01:20:39,100
[Laughter]

1469

01:20:39,100 --> 01:20:41,403
"Let us congratulate
you on your marriage.

1470

01:20:41,403 --> 01:20:44,005
At last it happened.

1471

01:20:44,005 --> 01:20:47,275
We congratulate your
bride on very good taste.

1472

01:20:47,275 --> 01:20:49,211
We swear before her
and before the God

1473

01:20:49,211 --> 01:20:51,346
that she has chosen
a very reliable man

1474

01:20:51,346 --> 01:20:53,081
to herself as a husband.

1475

01:20:53,081 --> 01:20:55,784
Wishing you happiness and good
luck through all family life."

1476

01:20:55,784 --> 01:20:58,854
And it's signed by the Chief
Designer, Alexander Pukhov.

1477
01:20:58,854 --> 01:21:04,526
I think I broke the
cultural barrier.

1478
01:21:06,194 --> 01:21:07,495
Thank you.

1479
01:21:07,495 --> 01:21:16,238
[Applause]

1480
01:21:16,238 --> 01:21:18,874
Sorry, I took longer than
I expected to, right.

1481
01:21:18,874 --> 01:21:21,843
As long as I feared but
longer than I expected to.

1482
01:21:21,843 --> 01:21:23,712
But anyway, we have time
for a few questions,

1483
01:21:23,712 --> 01:21:25,413
if anybody is still awake.

1484
01:21:25,413 --> 01:21:27,916
>> I have a question
[inaudible].

1485
01:21:27,916 --> 01:21:32,187
Did you make any
significant measure --

1486
01:21:32,187 --> 01:21:36,958
did you make any significant
measurements in the inlets

1487

01:21:36,958 --> 01:21:40,595

since that is such an important

factor in high speed flight?

1488

01:21:40,595 --> 01:21:45,133

It's as much important, maybe

more so, than the engine itself.

1489

01:21:45,133 --> 01:21:47,369

>> Well, we took a

number of measurements.

1490

01:21:47,369 --> 01:21:51,239

There were pressures and

temperatures in the inlet.

1491

01:21:51,239 --> 01:21:53,575

We also tried to

measure the fuel flow.

1492

01:21:53,575 --> 01:21:56,211

We were using an

acoustical sensor

1493

01:21:56,211 --> 01:22:00,015

which I arranged to bring there.

1494

01:22:00,015 --> 01:22:03,818

It wasn't very successful

because the noise environment --

1495

01:22:03,818 --> 01:22:06,655

the acoustical environment of

the engine was just too much.

1496

01:22:06,655 --> 01:22:08,590

The acoustical sensor

would have worked okay

1497

01:22:08,590 --> 01:22:10,158

in an engine test stand.

1498

01:22:10,158 --> 01:22:13,128

But it wasn't working in flight.

1499

01:22:13,128 --> 01:22:17,666

I am not an expert in

any of the actual results

1500

01:22:17,666 --> 01:22:19,634

of the data that were gathered.

1501

01:22:19,634 --> 01:22:23,471

There were some reports that

were published at that time.

1502

01:22:23,471 --> 01:22:26,341

But I don't know

what the quality

1503

01:22:26,341 --> 01:22:27,676

of those were considered to be.

1504

01:22:27,676 --> 01:22:31,246

>> I wonder also about dynamic

measurements as contrasted

1505

01:22:31,246 --> 01:22:33,715

with static measurements

of pressure.

1506

01:22:33,715 --> 01:22:37,118

Did you get high frequency

pressure measurements

1507

01:22:37,118 --> 01:22:38,453

on anything?

1508

01:22:38,453 --> 01:22:40,088

>> We did.

1509

01:22:40,088 --> 01:22:41,189

l'd have to go back and look

1510

01:22:41,189 --> 01:22:44,993

to see what the frequencies

were of those.

1511

01:22:49,397 --> 01:22:52,968

But I don't know that right

off the top of my head.

1512

01:22:56,004 --> 01:22:56,805

Terry.

1513

01:22:56,805 --> 01:22:57,772

>> You neglected to mention.

1514

01:22:57,772 --> 01:23:00,141

Talk about the mugging

[laughter].

1515

01:23:00,141 --> 01:23:04,846

>> Yeah but it wasn't

my mugging [laughter]

1516

01:23:04,846 --> 01:23:12,354

but what happened was

I found a dictionary

1517

01:23:12,354 --> 01:23:20,128

of Russian obscenities in a

bookstore here in the States

1518

01:23:20,128 --> 01:23:25,100

which I took with me to Moscow

and one of my colleagues

1519

01:23:25,100 --> 01:23:29,237

from Langley took great delight

in reading off different parts

1520

01:23:29,237 --> 01:23:32,674

of that to our driver on the

way to the air base [laughter].

1521

01:23:37,045 --> 01:23:38,813

I have to tell the

Steve story now

1522

01:23:38,813 --> 01:23:40,582

as you opened that

Pandora's Box.

1523

01:23:40,582 --> 01:23:45,653

Steve in one day talking

with the Chief Designer,

1524

01:23:45,653 --> 01:23:47,389

the Chief Designer

said something

1525

01:23:47,389 --> 01:23:53,428

and he uttered a phrase which

basically meant up yours.

1526

01:23:54,796 --> 01:24:00,101

And the Chief Designer thought

that was hysterically funny.

1527

01:24:00,101 --> 01:24:02,103

Steve became his best friend.

1528

01:24:02,103 --> 01:24:02,937

This is really cool.

1529

01:24:02,937 --> 01:24:06,374
He was able to swear in Russian.

1530
01:24:06,374 --> 01:24:11,312
So Steve is feeling really good
about this and the next day

1531
01:24:11,312 --> 01:24:13,314
or two, he had occasion
to use the same phrase

1532
01:24:13,314 --> 01:24:18,286
with another Russian and nearly
got called out to a duel, so.

1533
01:24:18,286 --> 01:24:21,389
But anyway, one of my
interpreters wanted

1534
01:24:21,389 --> 01:24:25,060
to borrow my dictionary when
I went back home one time.

1535
01:24:25,060 --> 01:24:27,395
And the next time I came
back, he met at the airport

1536
01:24:27,395 --> 01:24:33,535
and he had a black eye and
he had cuts over his eye

1537
01:24:33,535 --> 01:24:37,505
and he had -- he was -- his
face had obviously been messed

1538
01:24:37,505 --> 01:24:38,740
and I said, "What happened?"

1539
01:24:38,740 --> 01:24:41,876
He said, "I got mugged."

1540

01:24:41,876 --> 01:24:43,244

He said, "I'm sorry to
tell you that you know,

1541

01:24:43,244 --> 01:24:45,146

they took my briefcase
and your dictionary

1542

01:24:45,146 --> 01:24:47,182

of Russian obscenities
was in the briefcase."

1543

01:24:47,182 --> 01:24:50,085

I said, "Oh, that's too bad.

1544

01:24:50,085 --> 01:24:51,219

I'm sorry to hear
that you got mugged."

1545

01:24:51,219 --> 01:24:53,488

And he said, "But I
felt so bad about that."

1546

01:24:53,488 --> 01:24:56,925

He went out and he bought
another Russian obscenities

1547

01:24:56,925 --> 01:25:00,695

dictionary in Moscow that
was published in Russia.

1548

01:25:00,695 --> 01:25:04,132

So now I had a dictionary that
had the Russian expressions

1549

01:25:04,132 --> 01:25:07,869

and the literal English
translations

1550

01:25:07,869 --> 01:25:13,007

which often made no sense

whatsoever [laughter].

1551

01:25:14,375 --> 01:25:18,246

So I actually traded

up at his expense.

1552

01:25:18,246 --> 01:25:21,049

Any other questions?

1553

01:25:21,049 --> 01:25:23,251

>> I have a question.

1554

01:25:23,251 --> 01:25:23,952

>> It's [inaudible].

1555

01:25:23,952 --> 01:25:27,622

>> All right, oh thanks.

1556

01:25:29,724 --> 01:25:37,765

So related to the Tupolev,

the Blackjack versus the B-1,

1557

01:25:37,765 --> 01:25:41,202

I was just wondering if you

could add an opinion, you know,

1558

01:25:41,202 --> 01:25:42,971

just being in that

environment and working

1559

01:25:42,971 --> 01:25:45,673

with people associated

with that company?

1560

01:25:45,673 --> 01:25:49,477

I've had some just sort

of security training

1561

01:25:49,477 --> 01:25:53,581

where they kind of drive

home the point of, you know,

1562

01:25:53,581 --> 01:25:56,751

keeping a secret by

showing the image of the B-1

1563

01:25:56,751 --> 01:26:00,488

and the Tupolev Blackjack.

1564

01:26:00,488 --> 01:26:02,290

And it's just sort of see it,

1565

01:26:02,290 --> 01:26:07,462

be quiet otherwise you

know, this is what happens.

1566

01:26:07,462 --> 01:26:13,835

And I'm wondering if over there,

is the opinion quite reversed?

1567

01:26:13,835 --> 01:26:17,372

Does the aerospace

community over there thing

1568

01:26:17,372 --> 01:26:20,508

that we copied the Tupolev

designs with our B-1?

1569

01:26:20,508 --> 01:26:21,976

So which is it?

1570

01:26:25,046 --> 01:26:32,720

>> I've never heard anybody

express that opinion over there.

1571

01:26:32,720 --> 01:26:35,690

That wasn't weighing on
their minds, if it was.

1572

01:26:35,690 --> 01:26:38,593

I saw the Buran which is
the Russian Space Shuttle

1573

01:26:38,593 --> 01:26:47,602

which was quite clearly very
similar to the one we put on.

1574

01:26:48,937 --> 01:26:51,506

And they are sensitive to
thinking that they copied some

1575

01:26:51,506 --> 01:26:54,475

of our designs like
with the Concorde.

1576

01:26:54,475 --> 01:27:00,748

But remember that the
industry, there was hurting

1577

01:27:00,748 --> 01:27:02,717

and they were looking
for a customer base.

1578

01:27:02,717 --> 01:27:06,187

And we represented their
best hope at a customer base.

1579

01:27:06,187 --> 01:27:10,925

They were hoping to continue
this project after phase two

1580

01:27:10,925 --> 01:27:13,061

and as I said, that
didn't happen.

1581

01:27:13,061 --> 01:27:16,164

But the Russians had actually
invested some of their own money

1582
01:27:16,164 --> 01:27:17,265
in this refurbishment.

1583
01:27:17,265 --> 01:27:18,900
We didn't pay for
the entire thing.

1584
01:27:18,900 --> 01:27:20,902
They put a fair amount of money

1585
01:27:20,902 --> 01:27:23,738
into their own refurbishment
efforts.

1586
01:27:24,939 --> 01:27:29,978
But security was not --
was not a real key factor.

1587
01:27:29,978 --> 01:27:35,383
The only problem I had with
security was trying to find ways

1588
01:27:35,383 --> 01:27:38,519
at passing my information
back to the States

1589
01:27:38,519 --> 01:27:42,490
that our growing IT security
infrastructure would put

1590
01:27:42,490 --> 01:27:44,125
up with.

1591
01:27:44,125 --> 01:27:46,227
Because every time I came up
with a method, they said, "Oh,

1592

01:27:46,227 --> 01:27:47,729

we don't really like that."

1593

01:27:47,729 --> 01:27:49,530

So I come up with something else

1594

01:27:49,530 --> 01:27:50,665

so I get some more

data transfer.

1595

01:27:50,665 --> 01:27:52,700

"Oh, we don't like

that one either."

1596

01:27:52,700 --> 01:27:55,703

So I was always trying to keep

a step ahead of the restrictions

1597

01:27:55,703 --> 01:27:59,207

that were put on me for

actually getting the information

1598

01:27:59,207 --> 01:28:02,977

out of Russia back

to the United States.

1599

01:28:07,982 --> 01:28:09,050

Christian.

1600

01:28:09,050 --> 01:28:10,585

>> They [inaudible]

shared or something?

1601

01:28:10,585 --> 01:28:13,788

Was the data mutually

shared with the Russians?

1602

01:28:13,788 --> 01:28:16,658

>> Yes. I mean, I got

the data from them.

1603

01:28:16,658 --> 01:28:19,827

I mean, when I -- the data

files off the aircraft,

1604

01:28:19,827 --> 01:28:21,896

I got from the Russians.

1605

01:28:21,896 --> 01:28:23,865

Originally with the

flight data recorder,

1606

01:28:23,865 --> 01:28:27,268

we eventually used a

Russian PC basically

1607

01:28:27,268 --> 01:28:31,406

that captured the data

in commutated form.

1608

01:28:31,406 --> 01:28:34,075

So that was raw information

I got.

1609

01:28:34,075 --> 01:28:36,511

All the calibration files

I got for the parameters,

1610

01:28:36,511 --> 01:28:39,547

I got from the Russians

and calibrated them.

1611

01:28:39,547 --> 01:28:41,716

They typically did

their own data analysis

1612

01:28:41,716 --> 01:28:46,754

in their own systems but I had

the data that was translated

1613

01:28:46,754 --> 01:28:48,790

and used by the American team.

1614

01:28:48,790 --> 01:28:50,491

So it was a complete

sharing of data.

1615

01:28:50,491 --> 01:28:52,193

It was their aircraft.

1616

01:28:52,193 --> 01:28:53,661

Sometimes sensors that --

1617

01:28:53,661 --> 01:28:56,164

often sensors that we

bought but they installed.

1618

01:28:56,164 --> 01:28:59,233

So it was a real

collaborative effort.

1619

01:28:59,233 --> 01:29:00,635

Like I said, it was unique.

1620

01:29:00,635 --> 01:29:04,205

At the time, we had some

Space Station activity going

1621

01:29:04,205 --> 01:29:06,040

on in Moscow and I'd

run across, you know,

1622

01:29:06,040 --> 01:29:07,875

Goddard people and JSC people.

1623

01:29:07,875 --> 01:29:10,978

In fact, I didn't tell a

story about the Abbey Express

1624

01:29:10,978 --> 01:29:15,249

which I often took that

originated in Houston that kind

1625

01:29:15,249 --> 01:29:20,355

of puddle jumped across the

Atlantic as a charter flight

1626

01:29:20,355 --> 01:29:25,526

but this was the only -- the

only game for aeronautics

1627

01:29:25,526 --> 01:29:28,196

and it was a complete

sharing of data.

1628

01:29:28,196 --> 01:29:32,500

By the way, I'm -- my plan is

1629

01:29:32,500 --> 01:29:35,069

to produce a memoir

about this program.

1630

01:29:35,069 --> 01:29:41,476

This is a kind of -- the

surface of what's going to be

1631

01:29:41,476 --> 01:29:42,744

in the book because

there's just a lot of --

1632

01:29:42,744 --> 01:29:44,812

I figured out, if you could

spend four or five years

1633

01:29:44,812 --> 01:29:47,882

in a place, there's a lot of

stories that come out of it.

1634

01:29:47,882 --> 01:29:50,118

I'm trying to capture those.

1635

01:29:52,286 --> 01:29:52,787

Anything else?

1636

01:29:52,787 --> 01:29:53,955

Yes?

1637

01:30:00,661 --> 01:30:04,632

>> Glenn, I'm curious if you

keep up with the people you met

1638

01:30:04,632 --> 01:30:08,302

over there, the colleagues

and do you have a desire

1639

01:30:08,302 --> 01:30:11,205

to go back and if you do, why?

1640

01:30:12,573 --> 01:30:15,843

>> Well, first of all, I have

not maintained communication

1641

01:30:15,843 --> 01:30:17,145

with the people there.

1642

01:30:17,145 --> 01:30:20,481

It was initially very, very,

very difficult to do that.

1643

01:30:20,481 --> 01:30:23,918

They often did not

have email addresses

1644

01:30:23,918 --> 01:30:25,787

or electronic communication.

1645

01:30:25,787 --> 01:30:29,490

I did keep up with one of my
interpreters for a little while

1646

01:30:29,490 --> 01:30:33,728

but it was difficult to do
that for various reasons,

1647

01:30:33,728 --> 01:30:37,965

some of which I don't
understand but suspect.

1648

01:30:44,038 --> 01:30:47,608

One of my relatives once said,
"Never get good at something

1649

01:30:47,608 --> 01:30:53,915

that you don't want
to be doing."

1650

01:30:53,915 --> 01:30:59,253

And it was a once-in-a-lifetime
experience.

1651

01:30:59,253 --> 01:31:00,488

And once is probably enough.

1652

01:31:00,488 --> 01:31:01,622

I mean, I would like to go back.

1653

01:31:01,622 --> 01:31:03,891

I never did get to St.
Petersburg, for example.

1654

01:31:03,891 --> 01:31:08,296

I always -- I got a visa
because in Russia, you got visas

1655

01:31:08,296 --> 01:31:09,530

for the city you were visiting.

1656

01:31:09,530 --> 01:31:11,899

If I wanted to visit two
cities I had to get a visa

1657

01:31:11,899 --> 01:31:14,235

that included both cities on it.

1658

01:31:14,235 --> 01:31:16,504

And I actually got a visa
that included St. Petersburg

1659

01:31:16,504 --> 01:31:18,239

but to get there, it was like
-- I don't know, about a six,

1660

01:31:18,239 --> 01:31:22,710

seven-hour ride on a train and
I kept hearing horror stories

1661

01:31:22,710 --> 01:31:24,745

about people getting
gassed and robbed

1662

01:31:24,745 --> 01:31:26,113

on the train and so forth.

1663

01:31:26,113 --> 01:31:29,250

And I was by myself and so I
was a little reluctant to travel

1664

01:31:29,250 --> 01:31:32,920

around too far from the
fort in that environment.

1665

01:31:32,920 --> 01:31:34,388

But I always regretted
that I never --

1666

01:31:34,388 --> 01:31:37,325

never made it up

to St. Petersburg.

1667

01:31:37,325 --> 01:31:40,394

And I would like to see how

some things have changed now

1668

01:31:40,394 --> 01:31:47,969

but all this was pre-Putin

Russia, just barely.

1669

01:31:47,969 --> 01:31:49,270

And one thing that

I discovered is

1670

01:31:49,270 --> 01:31:55,209

that Russians really respect

a strong leader regardless

1671

01:31:55,209 --> 01:31:58,346

of where they come from.

1672

01:31:58,346 --> 01:32:01,015

The Secretary of State at

the time, Madeleine Albright,

1673

01:32:01,015 --> 01:32:05,953

who also spoke Russian because

she was from Czechoslovakia --

1674

01:32:05,953 --> 01:32:10,558

they respected her because she

was regarded as a strong leader.

1675

01:32:10,558 --> 01:32:12,727

So that transcended

gender as well

1676

01:32:12,727 --> 01:32:16,430

as nationality although
there are some interesting

1677
01:32:16,430 --> 01:32:20,434
gender-related stories
that you can ask Lori Losey

1678
01:32:20,434 --> 01:32:23,004
about some time.

1679
01:32:23,004 --> 01:32:24,939
The Russian views about access

1680
01:32:24,939 --> 01:32:28,309
to aircraft immediately before
a flight did not include the

1681
01:32:28,309 --> 01:32:31,312
concept of allowing
women on board.

1682
01:32:31,312 --> 01:32:33,281
And that was a tough
nut to crack.

1683
01:32:33,281 --> 01:32:37,652
One of the technicians, Donna
Gallagher, had the same issue.

1684
01:32:37,652 --> 01:32:41,722
And I had to argue vociferously
in some meetings to get them

1685
01:32:41,722 --> 01:32:43,791
to allow that to happen
because they were just critical

1686
01:32:43,791 --> 01:32:45,993
for what we needed them to do.

1687

01:32:52,333 --> 01:32:53,668

Bob.

1688

01:32:53,668 --> 01:32:58,205

>> I think I just -- you know,

one perspective that I saw

1689

01:32:58,205 --> 01:33:00,408

and that was a little

different from Glenn's

1690

01:33:00,408 --> 01:33:02,443

because I was an

experimenter and, you know,

1691

01:33:02,443 --> 01:33:06,280

so lots of us experimenters

-- but Glenn, you know,

1692

01:33:06,280 --> 01:33:08,649

is responsible for the

instrumentation system

1693

01:33:08,649 --> 01:33:12,019

which is critical to

all the experiments,

1694

01:33:12,019 --> 01:33:15,890

much more critical -- lots

of the experiments cancelled

1695

01:33:15,890 --> 01:33:18,559

or dropped out along the way.

1696

01:33:18,559 --> 01:33:22,630

You know, Dryden had undertaken

the most visible and high --

1697

01:33:22,630 --> 01:33:24,265

you know, if they had failed,

1698

01:33:24,265 --> 01:33:26,400

the whole effort would

have been a bust.

1699

01:33:26,400 --> 01:33:31,472

And you know, I did get

with [inaudible] early

1700

01:33:31,472 --> 01:33:34,809

on in the development of it, you

know, designing the experiments

1701

01:33:34,809 --> 01:33:36,510

and went back several times.

1702

01:33:36,510 --> 01:33:39,780

And I will say that you can't --

1703

01:33:39,780 --> 01:33:43,150

you know, it's hard to ever

state how politically valuable

1704

01:33:43,150 --> 01:33:44,485

this project was.

1705

01:33:44,485 --> 01:33:47,421

When it started out, it was

at the height of, you know,

1706

01:33:47,421 --> 01:33:50,057

trying to build technical

relationships with Russia

1707

01:33:50,057 --> 01:33:53,761

after the Cold War and Space

Station cooperation was big.

1708

01:33:53,761 --> 01:33:58,399

But this one was near term and

it had a lot of quick payback.

1709

01:33:58,399 --> 01:34:02,003

And the high point

politically for all

1710

01:34:02,003 --> 01:34:04,005

of this was the roll-out

ceremony

1711

01:34:04,005 --> 01:34:06,140

which was a joke technically.

1712

01:34:06,140 --> 01:34:07,975

You know, the plane

was badly painted.

1713

01:34:07,975 --> 01:34:10,745

It didn't have an engine in it.

1714

01:34:10,745 --> 01:34:14,615

But there were people from every

one of those organizations.

1715

01:34:14,615 --> 01:34:19,220

They sent vice-presidents,

big name managers out for this

1716

01:34:19,220 --> 01:34:22,556

and you know, watching it as an

engineer, you're all jockeying

1717

01:34:22,556 --> 01:34:25,993

for position and you know,

who's going to sit where.

1718

01:34:25,993 --> 01:34:28,562

And after that roll-out

ceremony, they disappeared.

1719

01:34:28,562 --> 01:34:30,431

You never saw them again.

1720

01:34:30,431 --> 01:34:33,634

And truly at that point on,

1721

01:34:33,634 --> 01:34:36,170

the people who made the

project work were Glenn

1722

01:34:36,170 --> 01:34:38,039

and one other name?

1723

01:34:38,039 --> 01:34:40,675

It was Ross Barber who was the

other -- well, the person who,

1724

01:34:40,675 --> 01:34:42,943

you know, rolled up his sleeves.

1725

01:34:42,943 --> 01:34:46,981

You know, kind of an

unsung hero and you know,

1726

01:34:46,981 --> 01:34:49,050

that's how the project

really got to work.

1727

01:34:49,050 --> 01:34:53,587

And I thought -- you know, for

all the organizations you show

1728

01:34:53,587 --> 01:34:56,791

up there, Dryden's the

tiniest one but that's what --

1729

01:34:56,791 --> 01:34:59,093

you know, that's what Dryden
or Armstrong really does well.

1730

01:34:59,093 --> 01:35:00,494

They actually made it work.

1731

01:35:00,494 --> 01:35:03,197

And I think, you know, I think

they really -- Glenn, you know,

1732

01:35:03,197 --> 01:35:05,433

really made the Center look

good and really more than that,

1733

01:35:05,433 --> 01:35:07,935

probably made the whole

national team look good.

1734

01:35:07,935 --> 01:35:10,337

People have thought of it --

a lot of high idealism going

1735

01:35:10,337 --> 01:35:14,375

into it and you know, a lot

of it could have fallen apart

1736

01:35:14,375 --> 01:35:16,944

if we hadn't come through on it.

1737

01:35:16,944 --> 01:35:18,512

>> Well, thanks Bob.

1738

01:35:18,512 --> 01:35:20,815

I'll pay you later [laughter].