



1
00:00:01,456 --> 00:00:08,366
>> Up, down, right rudder,
left rudder, release.

2
00:00:09,186 --> 00:00:10,126
Okay, brakes are on.

3
00:00:10,126 --> 00:00:11,486
That's max brakes, right?

4
00:00:12,156 --> 00:00:15,516
>> My name is David Stuart
and I am the external pilot

5
00:00:15,586 --> 00:00:17,456
for the AREA-I PTERA aircraft.

6
00:00:18,516 --> 00:00:27,236
[Engine Sounds]

7
00:00:27,736 --> 00:00:29,706
Testing this kind of an
airplane and doing research

8
00:00:29,706 --> 00:00:31,976
with it is primarily
what I've always done.

9
00:00:36,536 --> 00:00:39,216
The unique thing about
being a pilot of an airplane

10
00:00:39,216 --> 00:00:42,956
like PTERA is that its
multi-engine has the capability,

11
00:00:42,956 --> 00:00:44,976
although we're not flying
it with retractable gear,

12

00:00:45,486 --> 00:00:48,636
of being a retractable-gear
airplane.

13

00:00:48,636 --> 00:00:52,086
It is a heavy, complex,
high-speed airplane

14

00:00:52,716 --> 00:00:53,926
and it flies like that.

15

00:00:57,216 --> 00:00:59,906
>> So, once they get
above the 70, 80,000 RPM,

16

00:00:59,936 --> 00:01:01,116
they're about 50 percent

17

00:01:01,416 --> 00:01:03,936
and they'll go together
pretty closely,

18

00:01:04,606 --> 00:01:06,286
but down here they'll
probably --

19

00:01:06,886 --> 00:01:07,436
>> Right, yeah.

20

00:01:08,026 --> 00:01:09,946
>> Get it down.

21

00:01:11,046 --> 00:01:13,616
Watch the heads;
watch the engines!

22

00:01:13,616 --> 00:01:17,556
>> We're here to train

NASA on the PTERA airplane

23

00:01:17,556 --> 00:01:18,786
and get them up to speed on it.

24

00:01:18,786 --> 00:01:20,846
We've been flying it now
for three or four years.

25

00:01:21,076 --> 00:01:21,926
>> I'm coming with a checklist.

26

00:01:22,846 --> 00:01:24,166
>> Yeah, so we've been
here for the past week

27

00:01:24,166 --> 00:01:26,436
and a half training
NASA personnel

28

00:01:26,916 --> 00:01:28,176
to use the PTERA system.

29

00:01:28,576 --> 00:01:30,766
We've delivered a
set of checklists

30

00:01:30,766 --> 00:01:32,466
that they can reference
to make sure

31

00:01:32,656 --> 00:01:33,906
that everything's operational.

32

00:01:37,106 --> 00:01:38,206
Just we reviewed the system.

33

00:01:38,206 --> 00:01:39,616
The best way to do

it is hands-on,

34

00:01:40,076 --> 00:01:41,646

so I've had people
looking over my shoulder

35

00:01:41,646 --> 00:01:44,256

and explained what the
system is doing at all times

36

00:01:44,256 --> 00:01:47,326

and what I'm looking at and
what I expect and don't expect

37

00:01:47,326 --> 00:01:48,486

to see at any given time.

38

00:01:48,916 --> 00:01:52,266

My role here at the flight test,
I'm the ground station operator.

39

00:01:52,766 --> 00:01:53,926

That means I operate --

40

00:01:54,116 --> 00:01:56,276

I control the aircraft
from the ground.

41

00:01:56,806 --> 00:02:00,646

I give it waypoints, air
speed, and altitude commands.

42

00:02:00,826 --> 00:02:02,856

It also means that I'm checking
the health of the system

43

00:02:03,046 --> 00:02:05,956

at all times, making sure
that systems are operational,

44

00:02:05,956 --> 00:02:09,526

that we have good link, that
the computer is doing what's

45

00:02:09,526 --> 00:02:11,656

expected, and that all the
sensors are working properly.

46

00:02:11,786 --> 00:02:12,736

Come around the far corner,

47

00:02:13,266 --> 00:02:15,006

just do your normal
figure-eight pattern

48

00:02:15,006 --> 00:02:19,856

and we'll intercept our course
here because we're going

49

00:02:19,856 --> 00:02:22,906

to be doing a right-hand
racetrack.

50

00:02:23,086 --> 00:02:24,226

And then I communicate as well

51

00:02:24,226 --> 00:02:27,216

with the pilot throughout
the course of the flight,

52

00:02:27,216 --> 00:02:30,346

making sure that everybody
has situational awareness,

53

00:02:30,926 --> 00:02:34,506

and if anything is out of spec,
I'll have the external pilot

54

00:02:34,506 --> 00:02:37,146

or safety pilot take it back
and bring it back safely.

55

00:02:37,876 --> 00:02:38,736

>> Well, you don't know me.

56

00:02:38,736 --> 00:02:39,456

I'm Nick Alley.

57

00:02:40,046 --> 00:02:43,156

I'll be the flight test
director for this first flight.

58

00:02:43,356 --> 00:02:46,166

So the maneuvers that we're
going to be carrying out today,

59

00:02:46,166 --> 00:02:47,976

we're going to take off.

60

00:02:47,976 --> 00:02:50,266

We're going to be manually
performing a figure-eight

61

00:02:50,266 --> 00:02:52,246

procedure out over
the lake thread.

62

00:02:52,246 --> 00:02:52,976

>> Break soft, Dave.

63

00:02:53,486 --> 00:02:55,506

>> All right, so the primary
project that PTERA is slated

64

00:02:55,536 --> 00:02:59,326

for right now is a partnership
with -- between NASA, Boeing,

65

00:02:59,706 --> 00:03:01,356
and AREA-I, and that's
in working

66
00:03:01,356 --> 00:03:02,606
on a shape-adaptive wing.

67
00:03:03,196 --> 00:03:04,716
We're designing a
wing that will go

68
00:03:04,716 --> 00:03:06,666
on the aircraft that's
sitting behind us right now

69
00:03:07,156 --> 00:03:12,666
that can significantly change
its shape in flight using NASA

70
00:03:12,886 --> 00:03:13,986
and Boeing technology.

71
00:03:14,556 --> 00:03:14,936
>> All hold.

72
00:03:14,936 --> 00:03:15,976
We're going to do piccolo
[phonetic] directions.

73
00:03:16,996 --> 00:03:19,036
>> Hopefully that
program will transition

74
00:03:19,036 --> 00:03:20,926
through a successful
test flight on PTERA

75
00:03:21,606 --> 00:03:24,466
where initially they'll
be looking at controlling

76

00:03:24,846 --> 00:03:29,926
that shape adaptation and how
well the controller does it,

77

00:03:29,926 --> 00:03:31,906
how it affects the
aerodynamics of the air frame

78

00:03:31,906 --> 00:03:37,256
and how well the onboard flight
controller is able to, you know,

79

00:03:37,256 --> 00:03:39,526
maintain flight control
throughout the transition

80

00:03:39,526 --> 00:03:40,786
between the different
wing states.

81

00:03:42,036 --> 00:03:43,186
>> Antennas are in place.

82

00:03:43,556 --> 00:03:44,296
Go for takeoff.

83

00:03:45,216 --> 00:03:45,716
Affirmative.

84

00:03:45,926 --> 00:03:57,256
All right, 15, 17, 20, 24,
28, 30, 35, 37, 40, 43, 45,

85

00:03:57,396 --> 00:04:02,356
50, 55, 60, 65, 68, 70.

86

00:04:02,636 --> 00:04:03,996
>> The way PTERA was designed,

87

00:04:03,996 --> 00:04:06,206

the way the airframe
was designed, was to,

88

00:04:06,886 --> 00:04:10,996

with relative ease, allow
it to be reconfigured,

89

00:04:12,496 --> 00:04:15,596

to be able to add -- put on
a new tail, to be able to put

90

00:04:15,596 --> 00:04:19,246

on new wings, to be able
to extend the fuselage

91

00:04:19,246 --> 00:04:21,596

or even shrink the
fuselage, if necessary.

92

00:04:21,816 --> 00:04:22,706

>> Piccolo has it.

93

00:04:23,446 --> 00:04:23,956

Piccolo --

94

00:04:23,956 --> 00:04:26,286

>> The air frame that you're
seeing fly right now is the PTERA

95

00:04:26,286 --> 00:04:28,516

baseline, and we call
it the "baseline"

96

00:04:28,516 --> 00:04:30,016

because it is the configuration

97

00:04:30,456 --> 00:04:32,706

to which all future PTERA configurations could

98

00:04:32,706 --> 00:04:33,306
be compared.

99

00:04:34,046 --> 00:04:37,336
So you can find, you know,
the performance deltas

100

00:04:37,336 --> 00:04:40,056
and compare them back
to the PTERA airframe.

101

00:04:40,366 --> 00:04:42,236
In addition to that,
the avionics,

102

00:04:42,586 --> 00:04:45,796
the software that's been
written, is highly flexible,

103

00:04:45,796 --> 00:04:47,166
so it's a lot like the airplane.

104

00:04:47,166 --> 00:04:49,036
It's kind of the
erector set of avionics.

105

00:04:49,516 --> 00:04:54,436
It could be used to add
additional flight computers.

106

00:04:55,526 --> 00:04:57,536
With all of the redundancies
and the safeties

107

00:04:57,536 --> 00:05:00,946
of a flight-proven system, you
can add the new system on board,

108

00:05:01,466 --> 00:05:04,736

and the PTERA avionics can turn control over to that new system,

109

00:05:05,426 --> 00:05:07,276

you know, on a temporary basis

110

00:05:07,326 --> 00:05:09,716

until the new system proves to be flight worthy.

111

00:05:10,126 --> 00:05:14,706

>> All right, prepping for a high-speed pass, full throttle,

112

00:05:14,706 --> 00:05:22,796

115, 120, 125, 130, 134, 134.

113

00:05:23,346 --> 00:05:26,616

Ground speed's 145, 146.

114

00:05:26,616 --> 00:05:28,926

I'm really excited about the ways I think

115

00:05:28,926 --> 00:05:30,226

that NASA could use PTERA.

116

00:05:30,226 --> 00:05:31,356

Just being around this week,

117

00:05:31,356 --> 00:05:33,176

I've already seen people's eyes light

118

00:05:33,176 --> 00:05:37,346

up when they understand what we're going for here

119

00:05:37,346 --> 00:05:41,016
with the system design
and seeing experiments

120

00:05:41,436 --> 00:05:44,806
that evaluate new
wing treatments

121

00:05:44,806 --> 00:05:50,496
or new wing mechanical
designs and allow people

122

00:05:50,496 --> 00:05:53,236
to actually fly experiments

123

00:05:53,356 --> 00:05:54,976
that otherwise might
not have made it off the

124

00:05:54,976 --> 00:05:55,916
ground literally.

125

00:05:56,296 --> 00:06:00,966
60, 58, 55, 54, 53.

126

00:06:02,556 --> 00:06:05,446
>> We've dreamed up of a lot
of configuration, but whether

127

00:06:05,446 --> 00:06:08,026
or not it's appropriate or not
to do those experiments on PTERA,

128

00:06:08,026 --> 00:06:09,026
it's really up to the engineer.

129

00:06:09,026 --> 00:06:12,676
It's up to the researcher

to decide, and the system