



1
00:00:15,910 --> 00:00:14,390
when you look in the shuttle bay for the

2
00:00:16,710 --> 00:00:15,920
hubble service mission you'll see these

3
00:00:19,269 --> 00:00:16,720
four

4
00:00:20,390 --> 00:00:19,279
large structures we call

5
00:00:21,910 --> 00:00:20,400
carriers

6
00:00:23,509 --> 00:00:21,920
and they carry

7
00:00:25,509 --> 00:00:23,519
all the space flight hardware including

8
00:00:27,750 --> 00:00:25,519
the scientific instruments the brand new

9
00:00:30,230 --> 00:00:27,760
ones into space to service hubble space

10
00:00:32,150 --> 00:00:30,240
telescope the carriers provide the

11
00:00:34,709 --> 00:00:32,160
structural support and the electrical

12
00:00:37,510 --> 00:00:34,719
support to ensure that the instruments

13
00:00:39,990 --> 00:00:37,520

and electronics that we are launching on

14

00:00:43,430 --> 00:00:40,000

the shuttle arrive there safely and

15

00:00:46,069 --> 00:00:43,440

secure one booster ignition and liftoff

16

00:00:49,029 --> 00:00:46,079

loads that are exerted during liftoff

17

00:00:51,270 --> 00:00:49,039

you know the static acceleration the

18

00:00:52,229 --> 00:00:51,280

random from the acoustic noise all that

19

00:00:55,510 --> 00:00:52,239

stuff

20

00:00:57,029 --> 00:00:55,520

is is bad for electronics and one of the

21

00:00:59,510 --> 00:00:57,039

things we have to do is provide load

22

00:01:02,069 --> 00:00:59,520

isolation so that nothing breaks before

23

00:01:04,710 --> 00:01:02,079

it gets up to hubble we provide heaters

24

00:01:06,950 --> 00:01:04,720

to make sure nothing gets too cold

25

00:01:08,950 --> 00:01:06,960

we don't want to get too hot either

26
00:01:11,109 --> 00:01:08,960
we want to be just right when it's ready

27
00:01:12,310 --> 00:01:11,119
to go into hubble

28
00:01:14,070 --> 00:01:12,320
everything is assembled to goddard

29
00:01:15,510 --> 00:01:14,080
tested here at goddard and then shipped

30
00:01:16,630 --> 00:01:15,520
down in large shipping containers and

31
00:01:19,030 --> 00:01:16,640
various

32
00:01:32,789 --> 00:01:19,040
containers to kennedy for integration

33
00:01:32,799 --> 00:01:44,710
so

34
00:01:49,429 --> 00:01:46,469
for servicing mission four we'll be

35
00:01:52,630 --> 00:01:49,439
flying with four carriers

36
00:01:55,510 --> 00:01:52,640
the one closest to the tail is the mule

37
00:01:57,190 --> 00:01:55,520
it's carrying contingency hardware

38
00:01:59,109 --> 00:01:57,200

the next one going forward is the flight

39

00:02:03,590 --> 00:01:59,119

support system which is our primary

40

00:02:06,789 --> 00:02:05,590

it's also carrying a new soft capture

41

00:02:08,790 --> 00:02:06,799

mechanism

42

00:02:11,350 --> 00:02:08,800

it's basically a ring that will attach

43

00:02:13,589 --> 00:02:11,360

to the bottom of the telescope

44

00:02:15,430 --> 00:02:13,599

for a future rendezvous capture of the

45

00:02:17,110 --> 00:02:15,440

space telescope

46

00:02:19,670 --> 00:02:17,120

in front of that we have the orbital

47

00:02:21,110 --> 00:02:19,680

replacement unit carrier which has two

48

00:02:24,150 --> 00:02:21,120

instruments in it

49

00:02:26,550 --> 00:02:24,160

the oruc is really the workhorse carrier

50

00:02:28,630 --> 00:02:26,560

it is carrying both the cosmic origin

51
00:02:29,830 --> 00:02:28,640
spectrograph and the fine guidance

52
00:02:31,910 --> 00:02:29,840
sensor

53
00:02:34,550 --> 00:02:31,920
it is also carrying the

54
00:02:36,150 --> 00:02:34,560
acs repair hardware this disc repair

55
00:02:38,630 --> 00:02:36,160
hardware

56
00:02:40,390 --> 00:02:38,640
the new one is up front and it's called

57
00:02:43,830 --> 00:02:40,400
slick the super lightweight

58
00:02:47,750 --> 00:02:45,589
the only way we could carry up

59
00:02:49,509 --> 00:02:47,760
everything we wanted to take up on the

60
00:02:52,470 --> 00:02:49,519
very last servicing mission to hubble

61
00:02:54,550 --> 00:02:52,480
was to design a new carrier system that

62
00:02:58,470 --> 00:02:54,560
was lightweight

63
00:03:01,110 --> 00:02:58,480

slick is the unsung hero of the sm4

64

00:03:03,110 --> 00:03:01,120

carrier systems it is what is enabling

65

00:03:05,190 --> 00:03:03,120

us to take the brand new wide field

66

00:03:07,750 --> 00:03:05,200

camera 3 to orbit if we didn't have

67

00:03:09,830 --> 00:03:07,760

slick wide field camera 3 would not be

68

00:03:13,110 --> 00:03:09,840

flying the hubble

69

00:03:14,070 --> 00:03:13,120

slick is actually a new technology for

70

00:03:15,750 --> 00:03:14,080

our

71

00:03:17,910 --> 00:03:15,760

space support equipment

72

00:03:19,910 --> 00:03:17,920

the slick carrier is a composite carrier

73

00:03:21,750 --> 00:03:19,920

it's made essentially of carbon fibers

74

00:03:23,110 --> 00:03:21,760

instead of metal

75

00:03:24,869 --> 00:03:23,120

and the nice thing about the graphite

76

00:03:26,390 --> 00:03:24,879

composite is you get a lot of strength

77

00:03:28,390 --> 00:03:26,400

for less weight

78

00:03:30,390 --> 00:03:28,400

so you have greater payload carrying

79

00:03:32,550 --> 00:03:30,400

capability

80

00:03:33,750 --> 00:03:32,560

because slick is the first carbon

81

00:03:35,350 --> 00:03:33,760

composite

82

00:03:37,670 --> 00:03:35,360

airframe to fly on the space shuttle we

83

00:03:39,750 --> 00:03:37,680

had to do some really special things the

84

00:03:42,229 --> 00:03:39,760

slick structure had to go through a

85

00:03:44,070 --> 00:03:42,239

significant testing program to prove out

86

00:03:46,470 --> 00:03:44,080

that it'll survive the launch and

87

00:03:49,190 --> 00:03:46,480

landing stresses that it's going to see

88

00:03:50,550 --> 00:03:49,200

the test involved putting the the

89

00:03:52,470 --> 00:03:50,560

carrier into several different

90

00:03:54,550 --> 00:03:52,480

configurations and then pushing and

91

00:03:55,350 --> 00:03:54,560

pulling on it with these actuators which

92

00:03:58,070 --> 00:03:55,360

are just

93

00:04:01,030 --> 00:03:58,080

rods and push and pull on it to

94

00:04:02,390 --> 00:04:01,040

simulate the the stresses or the loads

95

00:04:05,110 --> 00:04:02,400

it's going to see when it's launching

96

00:04:06,710 --> 00:04:05,120

and when it's landing

97

00:04:09,030 --> 00:04:06,720

all of that made us

98

00:04:11,990 --> 00:04:09,040

a whole lot smarter and a whole lot more

99

00:04:13,910 --> 00:04:12,000

experienced in the world of composites

100

00:04:16,310 --> 00:04:13,920

and we're now working with the people in

101

00:04:17,749 --> 00:04:16,320

the exploration program to help transfer