1
00:00:18,400 --> 00:00:52,850
you

2
00:00:57,990 --> 00:00:56,130
hi I'm astronaut Mario ronco and I've

3
00:01:01,219 --> 00:00:58,000
had the rare privilege few have had of

4
00:01:03,869 --> 00:01:01,229
seeing our home planet from space the

5
00:01:05,730 --> 00:01:03,879
earth is certainly a beautiful place and

6
00:01:07,740 --> 00:01:05,740
astronauts over the years have returned

7
00:01:10,859 --> 00:01:07,750
to Earth with breathtaking images of our

8
00:01:12,719 --> 00:01:10,869
home planet now for the first time the

9
00:01:14,340 --> 00:01:12,729
international space station provides the

10
00:01:17,010 --> 00:01:14,350
ability to take more than simple

11
00:01:18,870 --> 00:01:17,020
photographs of the earth with the window

12
00:01:20,760 --> 00:01:18,880
installed in the u.s. laboratory module

13
00:01:22,410 --> 00:01:20,770

destiny there is the capability of

14
00:01:24,210 --> 00:01:22,420
acquiring multispectral and

15
00:01:26,999 --> 00:01:24,220
hyperspectral data and high-resolution

16
00:01:29,370 --> 00:01:27,009
imagery this optical quality science

17
00:01:31,109 --> 00:01:29,380
window was meticulously calibrated prior

18
00:01:33,300 --> 00:01:31,119
to its installation in the Destiny

19
00:01:35,100 --> 00:01:33,310
module it has greater than ninety-five

20
00:01:37,169 --> 00:01:35,110
percent transmission across most of the

21
00:01:39,600 --> 00:01:37,179
visible spectrum and better than ninety

22
00:01:41,070 --> 00:01:39,610
percent in the near infrared bands the

23
00:01:43,710 --> 00:01:41,080
window will support sensors and

24
00:01:46,020 --> 00:01:43,720
instruments with apertures of up to 350

25
00:01:47,819 --> 00:01:46,030
millimeters in diameter making it the

26
00:01:51,090 --> 00:01:47,829
highest quality window that has ever

27
00:01:53,310 --> 00:01:51,100
flown on any manned spacecraft the

28
00:01:54,929 --> 00:01:53,320
window port is 20 inches in diameter and

29
00:01:57,450 --> 00:01:54,939
is actually composed of four panes of

30
00:01:58,889 --> 00:01:57,460
glass an exterior debris pain that

31
00:02:00,569 --> 00:01:58,899
protects the entire assembly from

32
00:02:03,029 --> 00:02:00,579
impacts with space debris while the

33
00:02:04,980 --> 00:02:03,039
external shutter is open to pressure

34
00:02:07,920 --> 00:02:04,990
paints that maintain cabin pressure and

35
00:02:10,440 --> 00:02:07,930
on its interior side a removable scratch

36
00:02:12,060 --> 00:02:10,450
paint the scratch pain protects the

37
00:02:14,310 --> 00:02:12,070
interior pressure pain from internal

38
00:02:15,720 --> 00:02:14,320

contamination and debris and has a

39
00:02:18,090 --> 00:02:15,730
built-in heater to prevent condensation

40
00:02:19,830 --> 00:02:18,100
from forming on the window while the

41
00:02:21,599 --> 00:02:19,840
scratch paint allows occasional access

42
00:02:23,759 --> 00:02:21,609
to the window for crew earth observation

43
00:02:25,620 --> 00:02:23,769
photography it is not of the same high

44
00:02:27,900 --> 00:02:25,630
optical quality as the other three panes

45
00:02:30,690 --> 00:02:27,910
and therefore must be removed and stowed

46
00:02:32,430 --> 00:02:30,700
for science operations the whole

47
00:02:38,120 --> 00:02:32,440
assembly is protected from the space

48
00:02:42,000 --> 00:02:40,229
supporting the science instruments that

49
00:02:43,620 --> 00:02:42,010
would be placed in Destiny's window is

50
00:02:46,650 --> 00:02:43,630
the window observational research

51
00:02:48,300 --> 00:02:46,660
facility or wharf for short the wharf is

52
00:02:49,830 --> 00:02:48,310
the rack that is installed over the

53
00:02:51,720 --> 00:02:49,840
window and not only provides the

54
00:02:53,880 --> 00:02:51,730
necessary access to the window itself

55
00:02:55,470 --> 00:02:53,890
but also the power data and cooling

56
00:02:57,479 --> 00:02:55,480
connections required for science

57
00:02:59,250 --> 00:02:57,489
struments to operate I'm here in the

58
00:03:00,660 --> 00:02:59,260
space station processing facility where

59
00:03:03,839 --> 00:03:00,670
the wharf rack is being prepared for

60
00:03:06,509 --> 00:03:03,849
launch the wharfs payload volume has

61
00:03:08,670 --> 00:03:06,519
approximately 27 cubic feet of available

62
00:03:11,130 --> 00:03:08,680
space about three feet on a side to

63
00:03:13,080 --> 00:03:11,140

accommodate instruments the entire

64
00:03:15,059 --> 00:03:13,090
surface is coated with a flat black

65
00:03:17,820 --> 00:03:15,069
non-reflective finish to reduce stray

66
00:03:19,619 --> 00:03:17,830
light within the payload volume the

67
00:03:21,869 --> 00:03:19,629
payload shelf located within the lower

68
00:03:23,520 --> 00:03:21,879
portion of the payload volume provides a

69
00:03:25,530 --> 00:03:23,530
stable platform on which to mount

70
00:03:27,509 --> 00:03:25,540
instruments the mounting surface is

71
00:03:30,240 --> 00:03:27,519
three feet by two feet and is configured

72
00:03:33,300 --> 00:03:30,250
with 165 threaded inserts on a 2-inch

73
00:03:34,589 --> 00:03:33,310
grid that require 1032 screws the

74
00:03:36,780 --> 00:03:34,599
platform provides a line-of-sight

75
00:03:38,430 --> 00:03:36,790
stability of approximately 19 micro

76
00:03:40,110 --> 00:03:38,440
radians depending upon the mass of the

77
00:03:41,970 --> 00:03:40,120
instrument for more demanding

78
00:03:43,530 --> 00:03:41,980
instruments a detailed analysis should

79
00:03:45,030 --> 00:03:43,540
be performed to determine whether an

80
00:03:47,849 --> 00:03:45,040
individual instrument will require

81
00:03:49,470 --> 00:03:47,859
additional stabilization on the sides of

82
00:03:52,170 --> 00:03:49,480
the payload volume is an array of

83
00:03:54,270 --> 00:03:52,180
standard ISSC tracks five rows on each

84
00:03:56,039 --> 00:03:54,280
side wall and all on which can be

85
00:03:58,470 --> 00:03:56,049
mounted any ancillary equipment needed

86
00:04:00,240 --> 00:03:58,480
to support payloads only items that do

87
00:04:02,430 --> 00:04:00,250
not require stability should be attached

88
00:04:04,080 --> 00:04:02,440

to the seat tracks there is also see

89
00:04:07,530 --> 00:04:04,090
track on each side of the front face of

90
00:04:09,000 --> 00:04:07,540
the wharf for the same purpose opposite

91
00:04:10,620 --> 00:04:09,010
the payload shelf is one of the

92
00:04:13,140 --> 00:04:10,630
connector panels that provide the power

93
00:04:15,120 --> 00:04:13,150
data video and cooling lines for

94
00:04:16,949 --> 00:04:15,130
installed instruments there are three

95
00:04:19,500 --> 00:04:16,959
available sets of payload connectors on

96
00:04:21,719 --> 00:04:19,510
this panel each set has a power outlet

97
00:04:23,940 --> 00:04:21,729
providing 28 volt DC power with

98
00:04:27,540 --> 00:04:23,950
selectable current that can be set at 5

99
00:04:32,159 --> 00:04:27,550
10 15 or 20 amps and an instrument data

100
00:04:35,520 --> 00:04:32,169
port providing Ethernet rs422 rs-232 and

101
00:04:37,409 --> 00:04:35,530
RS 170 or video connectivity to the

102
00:04:40,050 --> 00:04:37,419
payload land and the wharf laptop

103
00:04:42,089 --> 00:04:40,060
computer the wharf laptop computer will

104
00:04:44,010 --> 00:04:42,099
reside outside the payload volume on the

105
00:04:46,050 --> 00:04:44,020
front of the rack and is connected via

106
00:04:48,360 --> 00:04:46,060
the laptop connectors on the front

107
00:04:50,219 --> 00:04:48,370
connector panel the front connector

108
00:04:52,409 --> 00:04:50,229
panel contains two more sets of payload

109
00:04:54,480 --> 00:04:52,419
connectors with the same power and data

110
00:04:57,629 --> 00:04:54,490
availability is on the internal payload

111
00:04:59,400 --> 00:04:57,639
connector panel this panel also provides

112
00:05:02,460 --> 00:04:59,410
the connections for the wharf laptop

113
00:05:04,490 --> 00:05:02,470

computer including a 28 volt DC power

114
00:05:06,190 --> 00:05:04,500
outlet with selectable current an

115
00:05:09,280 --> 00:05:06,200
Ethernet connection

116
00:05:12,400 --> 00:05:09,290
an rs-232 data port for rack commanding

117
00:05:16,600 --> 00:05:12,410
and health and status and a two-way RS

118
00:05:18,880 --> 00:05:16,610
170 NTSC video port an instrument

119
00:05:20,740 --> 00:05:18,890
package may also be controlled operated

120
00:05:22,360 --> 00:05:20,750
and monitored locally by the crew via

121
00:05:24,400 --> 00:05:22,370
the use of the pass-through connectors a

122
00:05:26,500 --> 00:05:24,410
set of which is provided on both the

123
00:05:28,870 --> 00:05:26,510
front and payload volume connector

124
00:05:31,420 --> 00:05:28,880
panels these permit direct connectivity

125
00:05:33,250 --> 00:05:31,430
from an interior instrument to support

126
00:05:37,060 --> 00:05:33,260
equipment outside the payload volume

127
00:05:39,340 --> 00:05:37,070
when the hatch is installed there is an

128
00:05:41,890 --> 00:05:39,350
additional connection that can carry 120

129
00:05:43,930 --> 00:05:41,900
volt DC power from one of the many

130
00:05:46,030 --> 00:05:43,940
utility outlet panels in the Destiny

131
00:05:48,280 --> 00:05:46,040
module to the internal payload connector

132
00:05:50,020 --> 00:05:48,290
panel these are intended mainly for the

133
00:05:52,090 --> 00:05:50,030
crew to use for portable lighting and

134
00:05:54,610 --> 00:05:52,100
ventilation when they are installing and

135
00:05:56,380 --> 00:05:54,620
removing equipment the environment

136
00:05:58,300 --> 00:05:56,390
within the wharf payload volume is

137
00:06:00,250 --> 00:05:58,310
regulated by an internal environmental

138
00:06:02,080 --> 00:06:00,260

control system the heart of which is an

139
00:06:03,730 --> 00:06:02,090
air-water heat exchanger located beneath

140
00:06:06,400 --> 00:06:03,740
the payload shelf in the bottom section

141
00:06:08,260 --> 00:06:06,410
of the rack the avionics air assembly or

142
00:06:10,630 --> 00:06:08,270
triple a is the fan that provides the

143
00:06:12,580 --> 00:06:10,640
air circulation for the system the

144
00:06:15,010 --> 00:06:12,590
Triple A also provides air flow across

145
00:06:16,720 --> 00:06:15,020
the window through a long narrow vent

146
00:06:18,580 --> 00:06:16,730
known as the air knife to prevent

147
00:06:20,740 --> 00:06:18,590
condensation from forming on the window

148
00:06:22,480 --> 00:06:20,750
when the scratch pain is removed the air