1
00:00:39,410 --> 00:00:36,830
discovery Houston winter Hawaiian with

2
00:00:41,720 --> 00:00:39,420
America shuttle fleet is playing a vital

3
00:00:44,350 --> 00:00:41,730
role in preparing people and machinery

4
00:00:50,080 --> 00:00:44,360
for a more permanent presence in space

5
00:00:55,870 --> 00:00:53,710
shuttle is on orbit testing of new

6
00:00:58,030 --> 00:00:55,880
hardware like this restorable solar

7
00:01:00,460 --> 00:00:58,040
array has helped engineers designed

8
00:01:03,190 --> 00:01:00,470
lightweight contact structures for the

9
00:01:06,310 --> 00:01:03,200
station astronauts also gain knowledge

10
00:01:09,190 --> 00:01:06,320
in handling large objects and connecting

11
00:01:11,200 --> 00:01:09,200
space station like components even

12
00:01:13,960 --> 00:01:11,210
devices for transporting crew members

13
00:01:17,860 --> 00:01:13,970

along freedoms 350 foot trusts of been

14
00:01:22,570 --> 00:01:20,140
on several occasions the shuttles

15
00:01:25,090 --> 00:01:22,580
payload Bay has been converted to accept

16
00:01:27,730 --> 00:01:25,100
spacelab similar in design to the

17
00:01:30,970 --> 00:01:27,740
scientific laboratories plan for station

18
00:01:33,130 --> 00:01:30,980
freedom here life science experiments

19
00:01:36,790 --> 00:01:33,140
focus on the bodies and apt ation to

20
00:01:39,850 --> 00:01:36,800
weightlessness without gravity bones and

21
00:01:42,190 --> 00:01:39,860
muscles deteriorate rapidly astronauts

22
00:01:44,740 --> 00:01:42,200
conduct research to find out why and

23
00:01:47,370 --> 00:01:44,750
test possible countermeasures to prepare

24
00:01:50,380 --> 00:01:47,380
for extended stays aboard freedom

25
00:01:52,660 --> 00:01:50,390
microgravity research gives America a

26
00:01:55,570 --> 00:01:52,670
competitive edge in today's high-tech

27
00:01:58,110 --> 00:01:55,580
marketplace providing valuable new

28
00:02:01,930 --> 00:01:58,120
developments in such fields as materials

29
00:02:04,750 --> 00:02:01,940
electronics and Biosciences for example

30
00:02:08,350 --> 00:02:04,760
protein crystals can be grown larger and

31
00:02:10,480 --> 00:02:08,360
more uniform in space researchers want

32
00:02:13,450 --> 00:02:10,490
to unlock the molecular structure of

33
00:02:15,970 --> 00:02:13,460
proteins large molecules that perform

34
00:02:18,700 --> 00:02:15,980
any key functions in our bodies so they

35
00:02:22,030 --> 00:02:18,710
can design drugs targeting specific

36
00:02:24,729 --> 00:02:22,040
diseases and viruses shuttles spend only

37
00:02:27,420 --> 00:02:24,739
a few weeks in Earth orbit while space

38
00:02:30,280 --> 00:02:27,430

station is designed for a long-term stay

39
00:02:33,310 --> 00:02:30,290
its state-of-the-art laboratory will

40
00:02:36,340 --> 00:02:33,320
house more than a hundred scientific

41
00:02:38,590 --> 00:02:36,350
including those to develop better

42
00:02:41,710 --> 00:02:38,600
more efficient semiconductors and solar

43
00:02:43,780 --> 00:02:41,720
energy systems this research will

44
00:02:45,790 --> 00:02:43,790
revolutionize our way of life in the

45
00:02:48,760 --> 00:02:45,800
same way the Apollo era gave us

46
00:02:51,730 --> 00:02:48,770
technology for computers laser surgery

47
00:02:55,450 --> 00:02:51,740
long distance calling and even ATM

48
00:02:58,390 --> 00:02:55,460
machines already prototype components

49
00:03:00,850 --> 00:02:58,400
are being built and tested engineers are

50
00:03:02,860 --> 00:03:00,860
also fine-tuning power systems and

51
00:03:07,570 --> 00:03:02,870
simulating the station's demands on

52
00:03:09,790 --> 00:03:07,580
electricity 18 Shuttle missions will

53
00:03:12,850 --> 00:03:09,800
carry prefabricated sections of the

54
00:03:15,820 --> 00:03:12,860
station into orbit using robotic arms to

55
00:03:18,760 --> 00:03:15,830
assist astronauts during assembly once

56
00:03:20,860 --> 00:03:18,770
completed a single habitation and three

57
00:03:24,100 --> 00:03:20,870
laboratory modules will be clustered

58
00:03:26,890 --> 00:03:24,110
together shared by the United States of

59
00:03:30,490 --> 00:03:26,900
its international partners Canada Japan

60
00:03:33,530 --> 00:03:30,500
and 13 European countries

61
00:03:35,570 --> 00:03:33,540
freedoms for person cruz are scheduled

62
00:03:38,300 --> 00:03:35,580
to spend three to six months at a time

63
00:03:41,990 --> 00:03:38,310

living working and observing from its

64
00:03:47,750 --> 00:03:44,630
the station will regularly be visited by

65
00:03:51,080 --> 00:03:47,760
shuttle ferrying food supplies and new

66
00:03:53,990 --> 00:03:51,090
scientific experiments from Earth one

67
00:03:57,560 --> 00:03:54,000
thing is certain the key to this country

68
00:04:00,550 --> 00:03:57,570
space future is tied to the ability to

69
00:04:04,580 --> 00:04:00,560
live and work there on a permanent basis

70
00:04:06,890 --> 00:04:04,590
Station freedom a unique outpost built

71
00:04:22,490 --> 00:04:06,900
on the strength of America's space

72
00:04:26,960 --> 00:04:24,780
every year nearly half a million

73
00:04:29,430 --> 00:04:26,970
Americans suffer sudden cardiac arrest

74
00:04:32,340 --> 00:04:29,440
the heart begins to beat a rapidly

75
00:04:34,230 --> 00:04:32,350
losing its ability to pump blood often

76
00:04:36,570 --> 00:04:34,240
the only hope for survival is a

77
00:04:38,520 --> 00:04:36,580
defibrillator sending electrical shocks

78
00:04:41,220 --> 00:04:38,530
to the heart that can restore normal

79
00:04:42,900 --> 00:04:41,230
rhythms in the past those fortunate

80
00:04:45,990 --> 00:04:42,910
enough to live through an episode like

81
00:04:48,620 --> 00:04:46,000
this faced more bad news a 50-50 chance

82
00:04:51,630 --> 00:04:48,630
of it happening again within two years

83
00:04:54,690 --> 00:04:51,640
today these odds can be reduced to about

84
00:04:57,590 --> 00:04:54,700
two percent thanks to this automatic and

85
00:05:01,380 --> 00:04:57,600
plentiful cardioverter defibrillators or

86
00:05:03,690 --> 00:05:01,390
aicd incorporating a variety of NASA

87
00:05:05,670 --> 00:05:03,700
developed technologies the device

88
00:05:08,250 --> 00:05:05,680

consists of a pulse generator in a

89
00:05:11,190 --> 00:05:08,260
series of wire leads all implanted in

90
00:05:13,260 --> 00:05:11,200
the body the generator about the size of

91
00:05:16,050 --> 00:05:13,270
a deck of cards is inserted under the

92
00:05:18,150 --> 00:05:16,060
skin in the abdomen leads connected to

93
00:05:21,630 --> 00:05:18,160
the generator sewn onto are placed

94
00:05:23,960 --> 00:05:21,640
inside the heart once implanted the AICD

95
00:05:26,370 --> 00:05:23,970
continually monitors cardiac activity

96
00:05:29,730 --> 00:05:26,380
delivering corrective electrical shocks

97
00:05:32,400 --> 00:05:29,740
any time erratic rhythms occur according

98
00:05:34,950 --> 00:05:32,410
to dr. ray Beltran a chief of cardiology

99
00:05:37,350 --> 00:05:34,960
at sinai hospital in baltimore city more

100
00:05:39,270 --> 00:05:37,360
than half of the 250 patients he is

101
00:05:41,940 --> 00:05:39,280
treated with the device experienced a

102
00:05:43,920 --> 00:05:41,950
shock within the first two years if we

103
00:05:47,219 --> 00:05:43,930
equate that first shock as being

104
00:05:49,350 --> 00:05:47,229
potentially a life-saving intervention

105
00:05:51,300 --> 00:05:49,360
then obviously sixty percent of those

106
00:05:54,060 --> 00:05:51,310
patients would not have lived to tell

107
00:05:56,550 --> 00:05:54,070
about it Michael lederer is one of these

108
00:05:57,719 --> 00:05:56,560
patients he runs his own eating and air

109
00:06:00,029 --> 00:05:57,729
conditioning come

110
00:06:02,399 --> 00:06:00,039
Mike describes the shock is implanted

111
00:06:04,649 --> 00:06:02,409
device delivers as akin to a kick in the

112
00:06:07,529 --> 00:06:04,659
chest not pleasant but something you

113
00:06:09,689 --> 00:06:07,539

recover from quickly his job requires

114
00:06:12,510 --> 00:06:09,699
spending time at different construction

115
00:06:15,179 --> 00:06:12,520
sites his active lifestyle both in and

116
00:06:17,939 --> 00:06:15,189
out of the workplace maybe aicd a

117
00:06:20,070 --> 00:06:17,949
logical choice physically I'm doing the

118
00:06:22,110 --> 00:06:20,080
same thing always did I've been thrown

119
00:06:24,029 --> 00:06:22,120
off my lawn mower and I played golf and

120
00:06:27,959 --> 00:06:24,039
a volleyball and I've been knocked down

121
00:06:32,100 --> 00:06:27,969
and what have you it's no effect I'm

122
00:06:34,679 --> 00:06:32,110
glad I got it the AICD is manufactured

123
00:06:37,489 --> 00:06:34,689
by cardiac pacemakers incorporated st.

124
00:06:39,629 --> 00:06:37,499
Paul Minnesota microelectronic

125
00:06:41,820 --> 00:06:39,639
microcomputer battery and telemetry

126
00:06:44,480 --> 00:06:41,830
technologies originally developed for

127
00:06:47,909 --> 00:06:44,490
the space program are all incorporated

128
00:06:50,879 --> 00:06:47,919
dr. Morton Mauer a vice president at CPI

129
00:06:54,269 --> 00:06:50,889
is co-inventor of the device our work

130
00:06:57,659 --> 00:06:54,279
with the device actually was in the same

131
00:06:59,429 --> 00:06:57,669
time period as the putting a man on the

132
00:07:02,519 --> 00:06:59,439
moon and bringing him back safely within

133
00:07:05,369 --> 00:07:02,529
10 years and it was the push that this

134
00:07:09,150 --> 00:07:05,379
gave to science engineering which

135
00:07:14,650 --> 00:07:12,430
there are currently over 25,000 people

136
00:07:18,400 --> 00:07:14,660
like Don Gallagher who have received a I

137
00:07:20,350 --> 00:07:18,410
CDs and the new lease on life I can't

138
00:07:22,780 --> 00:07:20,360

imagine the circumstances where a person

139
00:07:24,550 --> 00:07:22,790
wouldn't want to live and certainly it's

140
00:07:26,740 --> 00:07:24,560
it's a device that gives you the

141
00:07:29,020 --> 00:07:26,750
opportunity to continue living every

142
00:07:31,900 --> 00:07:29,030
time it goes off literally it saves your

143
00:07:35,800 --> 00:07:31,910
life and mine's gone off almost 50 times

144
00:07:51,910 --> 00:07:35,810
in the four years so it definitely saved

145
00:07:54,280 --> 00:07:51,920
my life many occasions in 1990 shuttle

146
00:07:57,040 --> 00:07:54,290
discovery launched NASA's Hubble Space

147
00:08:01,180 --> 00:07:57,050
Telescope the most powerful Observatory

148
00:08:04,150 --> 00:08:01,190
ever built able to image detail up to 15

149
00:08:06,820 --> 00:08:04,160
billion miles away Hubble has provided

150
00:08:15,490 --> 00:08:06,830
astronomers with a clear window to our

151
00:08:20,510 --> 00:08:17,899
soon after Hubble was deployed

152
00:08:25,219 --> 00:08:20,520
scientists discovered an aberration in

153
00:08:27,350 --> 00:08:25,229
the 94 inch primary mirror even so the

154
00:08:29,360 --> 00:08:27,360
huge spaceborne telescope has been

155
00:08:32,120 --> 00:08:29,370
returning a steady stream of new

156
00:08:36,230 --> 00:08:32,130
information particularly with the aid of

157
00:08:37,790 --> 00:08:36,240
computer enhancement similar processing

158
00:08:41,149 --> 00:08:37,800
has been used on data from other

159
00:08:44,630 --> 00:08:41,159
spacecraft like Voyager which traveled

160
00:08:48,670 --> 00:08:44,640
past the planets enhancement now brings

161
00:08:51,889 --> 00:08:48,680
out more detail for Hubble scientists

162
00:08:55,069 --> 00:08:51,899
this is the telescope's original image

163
00:08:57,740 --> 00:08:55,079

of a galaxy 52 million light-years from

164
00:09:02,990 --> 00:08:57,750
Earth as it is cleaned up to its final

165
00:09:05,030 --> 00:09:03,000
version here light pulses in a straight

166
00:09:09,139 --> 00:09:05,040
line between Earth and the distant

167
00:09:11,690 --> 00:09:09,149
quasar years ago Albert Einstein

168
00:09:14,240 --> 00:09:11,700
suggested that if a uniform object

169
00:09:17,210 --> 00:09:14,250
crossed the path light would bend into a

170
00:09:19,370 --> 00:09:17,220
ring but if the object were not uniform

171
00:09:22,880 --> 00:09:19,380
the ring would break up into four

172
00:09:25,910 --> 00:09:22,890
patches known as the Einstein cross

173
00:09:30,740 --> 00:09:25,920
Hubble's imagery confirmed this part of

174
00:09:37,320 --> 00:09:33,840
hubbell also showed scientists a

175
00:09:39,900 --> 00:09:37,330
celestial X marking the exact spot of a

176
00:09:45,060 --> 00:09:39,910
black hole with the possible mass of 1

177
00:09:46,950 --> 00:09:45,070
million of our sons astronauts are

178
00:09:48,690 --> 00:09:46,960
already training to fix the Hubble

179
00:09:51,240 --> 00:09:48,700
mirror problem during a shuttle service

180
00:09:54,090 --> 00:09:51,250
call scheduled for late nineteen ninety

181
00:09:56,030 --> 00:09:54,100
three by substituting a special

182
00:09:58,920 --> 00:09:56,040
component in the telescope the

183
00:10:02,220 --> 00:09:58,930
aberration will be repaired called

184
00:10:04,440 --> 00:10:02,230
co-star this corrective optics package

185
00:10:06,990 --> 00:10:04,450
contains a series of mirrors that work

186
00:10:12,180 --> 00:10:07,000
like contact lenses to restore huddle

187
00:10:14,160 --> 00:10:12,190
close to its full imaging potential in a

188
00:10:17,010 --> 00:10:14,170

clean room at NASA's Goddard Space

189
00:10:19,290 --> 00:10:17,020
Flight Center technicians also practice

190
00:10:26,489 --> 00:10:19,300
removing the spacecraft star tracker

191
00:10:34,089 --> 00:10:30,099
in the meantime Hubble continues to send

192
00:10:40,559 --> 00:10:34,099
back fine detail of the planets faraway

193
00:10:43,599 --> 00:10:40,569
galaxies black holes and distant stars

194
00:11:00,889 --> 00:10:43,609
rewriting the textbooks on how we do our

195
00:11:07,079 --> 00:11:03,840
it will take off from an airport runway

196
00:11:09,840 --> 00:11:07,089
achieve speeds over 17,000 miles per

197
00:11:12,509 --> 00:11:09,850
hour and fly directly into low Earth

198
00:11:16,499 --> 00:11:12,519
orbit called the National aerospace

199
00:11:18,360 --> 00:11:16,509
plane or x 30 this sleek research craft

200
00:11:20,879 --> 00:11:18,370
will lead to a new generation of

201
00:11:24,809 --> 00:11:20,889
vehicles providing affordable flexible

202
00:11:27,090 --> 00:11:24,819
access to space in the 21st century to

203
00:11:29,819 --> 00:11:27,100
help ensure that this high-tech concept

204
00:11:32,370 --> 00:11:29,829
becomes a reality a group of about 50

205
00:11:34,199 --> 00:11:32,380
engineering students faculty matters and

206
00:11:36,780 --> 00:11:34,209
technicians of Mississippi State

207
00:11:38,759 --> 00:11:36,790
University set out to build the one in

208
00:11:41,819 --> 00:11:38,769
third scale mock-up of the all space

209
00:11:44,759 --> 00:11:41,829
play they were selected for the job in a

210
00:11:47,999 --> 00:11:44,769
competition open to all 350 engineering

211
00:11:49,530 --> 00:11:48,009
schools around the country the goal was

212
00:11:52,439 --> 00:11:49,540
to create something that would help

213
00:11:55,470 --> 00:11:52,449

communicate what the x30 is all about a

214
00:11:58,620 --> 00:11:55,480
marvel folks could see and touch at air

215
00:12:00,600 --> 00:11:58,630
shows and museums around the country it

216
00:12:02,490 --> 00:12:00,610
had to be rugged enough to withstand the

217
00:12:05,400 --> 00:12:02,500
rigors of both the road and mother

218
00:12:08,189 --> 00:12:05,410
nature this wasn't a problem for the

219
00:12:11,490 --> 00:12:08,199
project team they built it just like an

220
00:12:14,340 --> 00:12:11,500
actual flying prototype professor of

221
00:12:17,699 --> 00:12:14,350
aerospace engineering masood ratio honey

222
00:12:20,670 --> 00:12:17,709
it is quite realistic where did not make

223
00:12:22,050 --> 00:12:20,680
any shortcuts or we did not take into

224
00:12:23,759 --> 00:12:22,060
consideration that this thing is not

225
00:12:25,410 --> 00:12:23,769
going to fly so if you don't have to

226
00:12:28,340 --> 00:12:25,420
make this part strong or that part

227
00:12:30,840 --> 00:12:28,350
strong we did not think that way at all

228
00:12:32,639 --> 00:12:30,850
building it like a real plane gave

229
00:12:34,949 --> 00:12:32,649
aerospace engineering students who

230
00:12:36,870 --> 00:12:34,959
worked on the mock-up an opportunity to

231
00:12:39,420 --> 00:12:36,880
apply what they've learned in four years

232
00:12:41,900 --> 00:12:39,430
of classwork and get a better idea of

233
00:12:45,360 --> 00:12:41,910
what to expect once they graduate it

234
00:12:47,939 --> 00:12:45,370
senior lagunya pack you can sit in class

235
00:12:49,710 --> 00:12:47,949
and listen to lectures I mean make sure

236
00:12:51,569 --> 00:12:49,720
you have to lecture after lecture but

237
00:12:53,069 --> 00:12:51,579
you can't really get a good feeling for

238
00:12:54,900 --> 00:12:53,079

what's going on until you've actually

239
00:12:57,060 --> 00:12:54,910
had hands-on experience

240
00:12:59,120 --> 00:12:57,070
one of the keys to designing and

241
00:13:02,010 --> 00:12:59,130
building the model in just one semester

242
00:13:04,890 --> 00:13:02,020
was the use of a robotic router to cut

243
00:13:06,930 --> 00:13:04,900
molds for key component an approach that

244
00:13:10,560 --> 00:13:06,940
spurred real interest in the aerospace

245
00:13:12,480 --> 00:13:10,570
industry professor Kenneth hall we

246
00:13:14,250 --> 00:13:12,490
actually have people waiting in line now

247
00:13:16,170 --> 00:13:14,260
that they see our construction

248
00:13:25,680 --> 00:13:16,180
techniques to apply these techniques to

249
00:13:27,960 --> 00:13:25,690
their aircraft prototype development at

250
00:13:30,840 --> 00:13:27,970
a ceremony in the school hanger with

251
00:13:33,060 --> 00:13:30,850
some five hundred supporters on hand the

252
00:13:35,070 --> 00:13:33,070
50-foot five thousand pound Markov was

253
00:13:42,369 --> 00:13:35,080
presented to the public for the first

254
00:13:47,840 --> 00:13:45,019
congratulations accepted it was time to

255
00:13:57,020 --> 00:13:47,850
ready the model for the road its wings

256
00:14:02,240 --> 00:13:59,810
once loaded on to a large flat bed truck

257
00:14:05,570 --> 00:14:02,250
the two-and-a-half tonne markup was

258
00:14:07,850 --> 00:14:05,580
bound for its first air show beginning a