1
00:00:21,760 --> 00:00:37,230
glare

2
00:00:37,240 --> 00:00:47,680
again

3
00:00:47,690 --> 00:00:54,150
and body babe

4
00:00:54,160 --> 00:01:01,370
ma'am

5
00:01:06,990 --> 00:01:04,229
welcome to this edition of NASA images

6
00:01:09,570 --> 00:01:07,000
I'm Lynn Bondurant during this show were

7
00:01:11,640 --> 00:01:09,580
focusing on historic NASA documentary

8
00:01:14,310 --> 00:01:11,650
footage showing NASA technology

9
00:01:16,950 --> 00:01:14,320
spin-offs to medical and energy fields

10
00:01:20,880 --> 00:01:16,960
as well as others let's start off by

11
00:01:28,320 --> 00:01:20,890
going to a NASA report from 1979 about

12
00:01:30,050 --> 00:01:28,330
electric car tests this car running on a

13
00:01:32,910 --> 00:01:30,060

dynamometer at NASA's Jet Propulsion

14
00:01:36,450 --> 00:01:32,920
Laboratory in Pasadena is powered by a

15
00:01:39,150 --> 00:01:36,460
small electric motor and 20 batteries it

16
00:01:41,820 --> 00:01:39,160
was designed and is owned by Wally repel

17
00:01:44,760 --> 00:01:41,830
a senior engineer working on JPL's

18
00:01:46,499 --> 00:01:44,770
electric vehicle project if large

19
00:01:47,969 --> 00:01:46,509
numbers of electric automobiles are

20
00:01:51,030 --> 00:01:47,979
needed in the future because of

21
00:01:53,639 --> 00:01:51,040
continuing oil shortages engineers here

22
00:01:55,440 --> 00:01:53,649
and at other NASA facilities hope to be

23
00:02:01,440 --> 00:01:55,450
ready with the research answers that

24
00:02:07,200 --> 00:02:04,529
I think the electric car probably will

25
00:02:10,520 --> 00:02:07,210
run in terms of energy just pure energy

26
00:02:12,690 --> 00:02:10,530
about the same as a gasoline engine car

27
00:02:16,350 --> 00:02:12,700
however we're talking about energy

28
00:02:18,690 --> 00:02:16,360
displacement the prime factor in favor

29
00:02:20,250 --> 00:02:18,700
of electric car is that it can use any

30
00:02:23,490 --> 00:02:20,260
kind of energy to produce the

31
00:02:25,770 --> 00:02:23,500
electricity oil coal nuclear even solar

32
00:02:27,570 --> 00:02:25,780
power for example can be used to produce

33
00:02:32,100 --> 00:02:27,580
the electricity which can then be stored

34
00:02:34,259 --> 00:02:32,110
in the car and use for power the

35
00:02:36,720 --> 00:02:34,269
assessment of current electric vehicles

36
00:02:39,210 --> 00:02:36,730
is being conducted by NASA for the US

37
00:02:41,069 --> 00:02:39,220
Department of Energy the research is

38
00:02:44,699 --> 00:02:41,079

expected to provide the focus and

39
00:02:47,370 --> 00:02:44,709
direction needed for future efforts at a

40
00:02:49,069 --> 00:02:47,380
mile long and infrequently used runway

41
00:02:51,479 --> 00:02:49,079
on the edge of the Mojave Desert

42
00:03:10,260 --> 00:02:51,489
engineers prepare one of the electric

43
00:03:18,240 --> 00:03:14,770
if he can tell baby 13 people ah you

44
00:03:35,410 --> 00:03:18,250
make a life all right stand by o clock

45
00:03:39,220 --> 00:03:37,750
object of the coast down test is to

46
00:03:42,070 --> 00:03:39,230
determine the electric vehicles

47
00:03:44,170 --> 00:03:42,080
aerodynamic resistance the test is

48
00:03:47,290 --> 00:03:44,180
performed by towing the electric powered

49
00:03:49,930 --> 00:03:47,300
car up to about 60 miles an hour at that

50
00:03:51,940 --> 00:03:49,940
speed it's released the tow vehicle is

51
00:03:55,360 --> 00:03:51,950
driven out of the way and the electric

52
00:03:57,610 --> 00:03:55,370
car coasts to a stop both the velocity

53
00:04:00,309 --> 00:03:57,620
and distance are measured using a fifth

54
00:04:02,590 --> 00:04:00,319
wheel and recording device this tells

55
00:04:05,110 --> 00:04:02,600
researchers the aerodynamic resistance

56
00:04:07,690 --> 00:04:05,120
and the rolling resistance of the car

57
00:04:11,199 --> 00:04:07,700
both important factors in energy

58
00:04:13,600 --> 00:04:11,209
consumption another part of the program

59
00:04:16,960 --> 00:04:13,610
in the mojave is the driving cycle test

60
00:04:19,210 --> 00:04:16,970
the car is driven fast and slow as if it

61
00:04:21,550 --> 00:04:19,220
were being driven in traffic the cars

62
00:04:23,469 --> 00:04:21,560
energy flow is measured under this set

63
00:04:25,570 --> 00:04:23,479

of driving conditions as well as the

64
00:04:28,600 --> 00:04:25,580
range that the car can achieve with

65
00:04:31,330 --> 00:04:28,610
fully charged batteries again project

66
00:04:34,950 --> 00:04:31,340
manager Tom barber the frequency of

67
00:04:37,960 --> 00:04:34,960
recharge depends very heavily on how the

68
00:04:40,390 --> 00:04:37,970
car is used just as for example the

69
00:04:43,090 --> 00:04:40,400
gasoline my logic of your car varies

70
00:04:45,790 --> 00:04:43,100
depending on how you use it if you use

71
00:04:49,960 --> 00:04:45,800
the car around town you'll get probably

72
00:04:53,080 --> 00:04:49,970
45 miles or so on a full charge it takes

73
00:04:55,900 --> 00:04:53,090
approximately 8 to 12 hours to replace

74
00:04:57,820 --> 00:04:55,910
that full charge on the open highway for

75
00:05:00,550 --> 00:04:57,830
example at 55 miles an hour you might

76
00:05:02,140 --> 00:05:00,560
get as much as 75 miles and the recharge

77
00:05:06,630 --> 00:05:02,150
time is still the same because you have

78
00:05:11,740 --> 00:05:10,090
electric car research an effort to find

79
00:05:14,020 --> 00:05:11,750
reasonable alternatives to

80
00:05:18,910 --> 00:05:14,030
gasoline-powered automobiles that may

81
00:05:21,130 --> 00:05:18,920
also be quieter and less polluting not

82
00:05:23,950 --> 00:05:21,140
only was NASA involved with electric

83
00:05:26,830 --> 00:05:23,960
cars during the energy crisis but also

84
00:05:29,200 --> 00:05:26,840
wind power later during the next report

85
00:05:31,510 --> 00:05:29,210
please notice that the blades of the

86
00:05:37,030 --> 00:05:31,520
large wind turbine machines are like

87
00:05:39,160 --> 00:05:37,040
wings in some ways residents of this

88
00:05:41,410 --> 00:05:39,170

rhode island community can use steady

89
00:05:43,510 --> 00:05:41,420
ocean breezes to help air-conditioned

90
00:05:45,480 --> 00:05:43,520
their homes in the summer or to heat

91
00:05:47,590 --> 00:05:45,490
them during the cold New England winters

92
00:05:51,880 --> 00:05:47,600
they'll do it with a two hundred

93
00:05:54,430 --> 00:05:51,890
thousand watt wind turbine generator the

94
00:05:56,970 --> 00:05:54,440
place is block island about 35 miles

95
00:05:59,350 --> 00:05:56,980
south of Providence this is the third

96
00:06:02,140 --> 00:05:59,360
experimental two hundred thousand watt

97
00:06:04,150 --> 00:06:02,150
wind machine in a five-year wind energy

98
00:06:07,420 --> 00:06:04,160
program a joint project of the

99
00:06:09,580 --> 00:06:07,430
Department of Energy and NASA this New

100
00:06:11,920 --> 00:06:09,590
England island like all windmill sites

101
00:06:15,700 --> 00:06:11,930
was chosen because of its consistently

102
00:06:18,940 --> 00:06:15,710
high winds the generator will electrify

103
00:06:21,010 --> 00:06:18,950
up to 250 homes during the winter that's

104
00:06:23,860 --> 00:06:21,020
half the permanent residences on the

105
00:06:26,020 --> 00:06:23,870
island until the windmill block I'll

106
00:06:28,840 --> 00:06:26,030
amused all diesel generators for

107
00:06:31,180 --> 00:06:28,850
electricity but now wind energy and

108
00:06:34,960 --> 00:06:31,190
diesel fuel will work together to power

109
00:06:36,730 --> 00:06:34,970
the island block Islands winds should

110
00:06:38,800 --> 00:06:36,740
make it possible for the generator to

111
00:06:42,060 --> 00:06:38,810
operate at an average year round output

112
00:06:45,340 --> 00:06:42,070
of one hundred thousand watts an hour

113
00:06:48,070 --> 00:06:45,350

now when we come to savings it's

114
00:06:49,420 --> 00:06:48,080
directly proportional to the fuel if

115
00:06:51,920 --> 00:06:49,430
this

116
00:06:54,260 --> 00:06:51,930
machine generates approximately a

117
00:06:57,050 --> 00:06:54,270
hundred average which it will with 17

118
00:06:59,180 --> 00:06:57,060
mile an hour wind that would come to a

119
00:07:02,510 --> 00:06:59,190
considerable amount of fuel forty fifty

120
00:07:04,580 --> 00:07:02,520
thousand gallons during the course of a

121
00:07:06,350 --> 00:07:04,590
year and simply multiply that by the

122
00:07:10,250 --> 00:07:06,360
president price and you can see that

123
00:07:12,260 --> 00:07:10,260
it's it's substantial block island is

124
00:07:17,480 --> 00:07:12,270
not the only community boasting a new

125
00:07:20,180 --> 00:07:17,490
wind generator another windmill now

126
00:07:21,980 --> 00:07:20,190
towers majestically 1,000 feet above the

127
00:07:24,920 --> 00:07:21,990
mountain town of boone north carolina

128
00:07:26,990 --> 00:07:24,930
and the folks from boone have lots to

129
00:07:29,720 --> 00:07:27,000
brag about because their windmill is the

130
00:07:33,290 --> 00:07:29,730
largest in the world the blades alone

131
00:07:36,050 --> 00:07:33,300
way 18 tons they spread 200 feet from

132
00:07:40,100 --> 00:07:36,060
tip to tip about the wingspan of a

133
00:07:42,380 --> 00:07:40,110
Boeing 747 the machine produces two

134
00:07:45,040 --> 00:07:42,390
million watts of electricity or ten

135
00:07:47,960 --> 00:07:45,050
times as much as the other generators

136
00:07:49,790 --> 00:07:47,970
before the dedication engineers tested

137
00:07:53,420 --> 00:07:49,800
the windmill from the control van yes

138
00:07:55,430 --> 00:07:53,430

here we go monitor enabled the

139
00:07:57,500 --> 00:07:55,440
electricity that's produced is cabled

140
00:08:00,110 --> 00:07:57,510
Underground through the legs of the

141
00:08:01,610 --> 00:08:00,120
generator and then ties in here before

142
00:08:07,040 --> 00:08:01,620
it's sent down the mountain for

143
00:08:12,499 --> 00:08:09,419
dedication day was a big eventing book

144
00:08:14,570 --> 00:08:12,509
it was declared a town holiday and

145
00:08:20,150 --> 00:08:14,580
everyone turned out to celebrate

146
00:08:20,160 --> 00:09:08,750
Oh

147
00:09:13,710 --> 00:09:11,280
interest in wind energy is growing and

148
00:09:15,810 --> 00:09:13,720
now that the cost of fossil fuel has

149
00:09:18,150 --> 00:09:15,820
increased and supplies at dwindles

150
00:09:20,550 --> 00:09:18,160
engineers are once again turning to the

151
00:09:26,800 --> 00:09:20,560
wind as a potential source of renewable

152
00:09:33,019 --> 00:09:31,160
by sep tember 1982 two more experimental

153
00:09:37,460 --> 00:09:33,029
wind powered generators were being

154
00:09:39,590 --> 00:09:37,470
tested as this 1982 report shows this is

155
00:09:41,869 --> 00:09:39,600
Medicine Bow Wyoming site of the

156
00:09:44,299 --> 00:09:41,879
dedication of to wind powered generators

157
00:09:46,249 --> 00:09:44,309
on sep tember forth the project is a

158
00:09:48,019 --> 00:09:46,259
joint endeavor of NASA's Lewis research

159
00:09:50,929 --> 00:09:48,029
center the Department of Energy and the

160
00:09:52,699 --> 00:09:50,939
Bureau of Reclamation one unit was built

161
00:09:55,309 --> 00:09:52,709
by the hamilton standard company and is

162
00:09:57,939 --> 00:09:55,319
nearly 400 feet high it's capable of

163
00:10:00,439 --> 00:09:57,949

producing for megawatts of electricity

164
00:10:01,939 --> 00:10:00,449
the second unit constructed by the

165
00:10:04,730 --> 00:10:01,949
Boeing engineering and construction

166
00:10:06,889 --> 00:10:04,740
company is powered by a rotor 300 feet

167
00:10:09,710 --> 00:10:06,899
in diameter and can produce two point

168
00:10:11,509 --> 00:10:09,720
five megawatts of electricity when

169
00:10:13,129 --> 00:10:11,519
operating together the pair of wind

170
00:10:14,929 --> 00:10:13,139
turbines will provide enough energy to

171
00:10:17,650 --> 00:10:14,939
meet the needs of three thousand homes

172
00:10:20,780 --> 00:10:17,660
in the rocky mountain area three other

173
00:10:22,460 --> 00:10:20,790
300-foot wind turbines were erected and

174
00:10:25,309 --> 00:10:22,470
successfully tested in the state of

175
00:10:27,499 --> 00:10:25,319
Washington a third-generation wind

176
00:10:31,189 --> 00:10:27,509
turbine was installed and tested in

177
00:10:33,319 --> 00:10:31,199
Hawaii in 1987 following successful

178
00:10:35,990 --> 00:10:33,329
completion of the NASA wind turbine

179
00:10:38,240 --> 00:10:36,000
development program the machine was sold

180
00:10:42,139 --> 00:10:38,250
to Hawaiian Electric renewable systems

181
00:10:45,259 --> 00:10:42,149
corporation in early 1988 according to

182
00:10:48,110 --> 00:10:45,269
dr. David spira of NASA Hawaiian

183
00:10:51,199 --> 00:10:48,120
Electric is to operate the 3.2 mega watt

184
00:10:52,670 --> 00:10:51,209
machine to make commercial power and the

185
00:10:55,280 --> 00:10:52,680
company is to give NASA and the

186
00:10:58,460 --> 00:10:55,290
Department of Energy five years of

187
00:11:02,179 --> 00:10:58,470
operation reports now let's move from

188
00:11:06,759 --> 00:11:02,189

wind power to a 1979 report call

189
00:11:11,210 --> 00:11:09,079
most of us take it for granted that

190
00:11:14,210 --> 00:11:11,220
they'll be fresh fruit in the stores all

191
00:11:15,889 --> 00:11:14,220
winter long but citrus growers often

192
00:11:17,870 --> 00:11:15,899
have trouble getting oranges and

193
00:11:29,540 --> 00:11:17,880
grapefruits to our supermarkets during

194
00:11:34,860 --> 00:11:32,700
in the past few years fruit growers have

195
00:11:40,190 --> 00:11:34,870
spent millions of dollars trying to save

196
00:11:49,510 --> 00:11:42,830
these oil heaters are used for freeze

197
00:11:54,560 --> 00:11:51,890
crews can set them up early in the

198
00:11:57,680 --> 00:11:54,570
evening and flames will warn the orange

199
00:11:59,660 --> 00:11:57,690
or grapefruit roads until morning many

200
00:12:01,670 --> 00:11:59,670
nights during the winter Florida growers

201
00:12:04,310 --> 00:12:01,680
are faced with the decision whether to

202
00:12:07,190 --> 00:12:04,320
call out standby freeze protection crews

203
00:12:10,130 --> 00:12:07,200
at a cost of about thirty six thousand

204
00:12:13,940 --> 00:12:10,140
dollars per hour or to risk having crops

205
00:12:17,120 --> 00:12:13,950
ruined by an unexpected freeze but now

206
00:12:19,450 --> 00:12:17,130
NASA the University of Florida and NOAA

207
00:12:21,770 --> 00:12:19,460
the National Oceanic and Atmospheric

208
00:12:23,750 --> 00:12:21,780
Administration are developing a system

209
00:12:26,630 --> 00:12:23,760
to warn growers about freezing

210
00:12:29,330 --> 00:12:26,640
temperatures using a computerized and

211
00:12:33,050 --> 00:12:29,340
more accurate means of forecasting the

212
00:12:35,690 --> 00:12:33,060
freeze line information from the goes

213
00:12:38,060 --> 00:12:35,700

one weather satellite is received at the

214
00:12:40,760 --> 00:12:38,070
ruskin national weather service station

215
00:12:43,280 --> 00:12:40,770
just east of Tampa Bay and relayed

216
00:12:52,150 --> 00:12:43,290
around the state alerting growers when

217
00:12:58,070 --> 00:12:55,220
we collect up to three hours of data

218
00:13:01,130 --> 00:12:58,080
from the key stations and at 8pm we

219
00:13:03,410 --> 00:13:01,140
enter that data into the computer at

220
00:13:05,990 --> 00:13:03,420
that time we will have our 8pm satellite

221
00:13:08,150 --> 00:13:06,000
seen in the computer it takes a few

222
00:13:09,980 --> 00:13:08,160
minutes types of data end and from that

223
00:13:12,140 --> 00:13:09,990
point on it's very fast the computer

224
00:13:14,420 --> 00:13:12,150
takes over and produces the mountaineers

225
00:13:16,250 --> 00:13:14,430
so by about eight thirty in the evening

226
00:13:18,260 --> 00:13:16,260
we can have our predicted maps for the

227
00:13:20,930 --> 00:13:18,270
rest of these okay Jim here's the key

228
00:13:28,170 --> 00:13:20,940
station data for this hour okay soil

229
00:13:32,510 --> 00:13:28,180
temperatures 55.3 52.7

230
00:13:34,930 --> 00:13:32,520
51.3 air temperatures

231
00:13:37,069 --> 00:13:34,940
55.2

232
00:13:39,950 --> 00:13:37,079
56.3

233
00:13:43,340 --> 00:13:39,960
57.8

234
00:13:46,250 --> 00:13:43,350
dew point is 35 this is the 0 to Z

235
00:13:48,920 --> 00:13:46,260
picture yes looks like we've got mid 40s

236
00:13:50,480 --> 00:13:48,930
in Central Florida perhaps some

237
00:13:53,150 --> 00:13:50,490
near-freezing temperatures at North

238
00:13:59,319 --> 00:13:53,160

Central let's blow this area about north

239
00:13:59,329 --> 00:14:05,170
yes that's the area

240
00:14:08,620 --> 00:14:06,730
yeah it looks like there are there are

241
00:14:10,600 --> 00:14:08,630
some temperatures right at 32 up in

242
00:14:12,430 --> 00:14:10,610
north central florida that correlates so

243
00:14:15,670 --> 00:14:12,440
closely with the reports have received

244
00:14:17,410 --> 00:14:15,680
from growers florida has certain cloud

245
00:14:21,580 --> 00:14:17,420
patterns that make it conducive to

246
00:14:23,920 --> 00:14:21,590
satellite weather predictions a normal

247
00:14:27,400 --> 00:14:23,930
severe freeze for florida produces a

248
00:14:30,550 --> 00:14:27,410
very dry air mass over the state which

249
00:14:31,810 --> 00:14:30,560
eliminates any cloud cover and this is

250
00:14:33,670 --> 00:14:31,820
one thing that makes the system work

251
00:14:36,190 --> 00:14:33,680
well in florida when we have very very

252
00:14:38,710 --> 00:14:36,200
cold temperatures we do not have clouds

253
00:14:40,480 --> 00:14:38,720
of spearing the satellite data it gives

254
00:14:43,480 --> 00:14:40,490
us a very clear picture of the state

255
00:14:46,750 --> 00:14:43,490
using the satellite seen oil heaters

256
00:14:48,880 --> 00:14:46,760
computers and satellites working

257
00:14:50,860 --> 00:14:48,890
together to help citrus growers bring an

258
00:14:54,850 --> 00:14:50,870
abundance of winter fruit to our

259
00:14:57,880 --> 00:14:54,860
supermarkets next let's see to 1981

260
00:15:00,780 --> 00:14:57,890
reports which show how nasa's study of

261
00:15:05,680 --> 00:15:00,790
aerodynamics has spun off two trucks

262
00:15:08,110 --> 00:15:05,690
freeways and motorhomes nasa's role in

263
00:15:09,970 --> 00:15:08,120

studying things aerodynamic has ranged

264
00:15:13,060 --> 00:15:09,980
from several decades before the second

265
00:15:19,010 --> 00:15:13,070
world war two the reusable space shuttle

266
00:15:23,990 --> 00:15:21,680
using similar aerodynamic scaling

267
00:15:25,940 --> 00:15:24,000
techniques nASA has been assisting in a

268
00:15:28,250 --> 00:15:25,950
federal highway administration sponsored

269
00:15:30,230 --> 00:15:28,260
project that may one day help engineers

270
00:15:32,810 --> 00:15:30,240
improve the design of tunnels and

271
00:15:35,510 --> 00:15:32,820
highways this facility is a hundred and

272
00:15:37,070 --> 00:15:35,520
ten feet long the reason for that length

273
00:15:38,720 --> 00:15:37,080
is for the level section to be

274
00:15:42,200 --> 00:15:38,730
equivalent to about a half a mile long

275
00:15:44,420 --> 00:15:42,210
so one could have about five sections of

276
00:15:48,560 --> 00:15:44,430
three tunnels and two no tunnels about

277
00:15:50,690 --> 00:15:48,570
500 feet long and that gave us enough

278
00:15:52,790 --> 00:15:50,700
tunnels in a row such that we can

279
00:15:55,340 --> 00:15:52,800
observe the recirculation of the air

280
00:15:56,960 --> 00:15:55,350
from tunnel to tunnel as it gets dragged

281
00:15:59,840 --> 00:15:56,970
from one tunnel the next by the movement

282
00:16:02,720 --> 00:15:59,850
of the cars or actually backs up to go

283
00:16:05,030 --> 00:16:02,730
to an adjacent tunnel we have two lanes

284
00:16:06,380 --> 00:16:05,040
of traffic such that we can have the

285
00:16:09,920 --> 00:16:06,390
traffic either going in the same

286
00:16:12,460 --> 00:16:09,930
direction or in opposing directions just

287
00:16:14,960 --> 00:16:12,470
like what happened in a real highway

288
00:16:17,030 --> 00:16:14,970

frequently freeways and tunnels use up

289
00:16:19,640 --> 00:16:17,040
large areas of land that might better be

290
00:16:21,800 --> 00:16:19,650
used in other ways the researchers are

291
00:16:23,990 --> 00:16:21,810
experimentally depressing and partially

292
00:16:26,510 --> 00:16:24,000
covering simulated freeways in an urban

293
00:16:29,120 --> 00:16:26,520
area to find out how much and how little

294
00:16:31,580 --> 00:16:29,130
tunnel is needed one of the tests

295
00:16:34,190 --> 00:16:31,590
involves injecting trace gases that act

296
00:16:35,900 --> 00:16:34,200
like pot automobile exhausts coupled

297
00:16:37,730 --> 00:16:35,910
with carefully controlled wind and

298
00:16:39,560 --> 00:16:37,740
temperature measurements air flow

299
00:16:41,510 --> 00:16:39,570
patterns can be determined that may help

300
00:16:48,050 --> 00:16:41,520
designers build more efficient highways

301
00:16:53,010 --> 00:16:50,670
they come in a variety of sizes and

302
00:16:55,350 --> 00:16:53,020
shapes from huge tractor trailers

303
00:16:57,210 --> 00:16:55,360
capable of hauling tons to weekend

304
00:17:00,000 --> 00:16:57,220
motorhomes used for pleasure by

305
00:17:02,160 --> 00:17:00,010
thousands all share one common trait

306
00:17:05,370 --> 00:17:02,170
they burn gasoline or diesel fuel to

307
00:17:06,930 --> 00:17:05,380
make them go engineers at NASA's Dryden

308
00:17:09,480 --> 00:17:06,940
Flight Research Center in California

309
00:17:10,920 --> 00:17:09,490
have been studying for several years how

310
00:17:13,380 --> 00:17:10,930
to help make these vehicles more

311
00:17:17,660 --> 00:17:13,390
fuel-efficient aerospace engineer ed

312
00:17:19,650 --> 00:17:17,670
Saltzman tells how we began with a

313
00:17:22,620 --> 00:17:19,660

vehicle that looked a little different

314
00:17:24,780 --> 00:17:22,630
like than what this does here we had

315
00:17:27,600 --> 00:17:24,790
square corners on the front and square

316
00:17:30,330 --> 00:17:27,610
corners on the back to represent the the

317
00:17:33,720 --> 00:17:30,340
worst in vehicle design for high-volume

318
00:17:35,900 --> 00:17:33,730
pars and we documented the drag of that

319
00:17:37,980 --> 00:17:35,910
configuration and then we begin

320
00:17:40,560 --> 00:17:37,990
aerodynamic refinements rounding the

321
00:17:42,480 --> 00:17:40,570
front corners as you can see and we

322
00:17:44,340 --> 00:17:42,490
smoothed the underbody so that the

323
00:17:46,350 --> 00:17:44,350
muffler and the axles are covered up in

324
00:17:47,970 --> 00:17:46,360
the transmission and this reduced the

325
00:17:50,610 --> 00:17:47,980
drag too we compared that configuration

326
00:17:51,900 --> 00:17:50,620
with the the original one the most

327
00:17:53,310 --> 00:17:51,910
recent tests were run with the

328
00:17:56,460 --> 00:17:53,320
configuration you see now where we have

329
00:17:58,950 --> 00:17:56,470
a partial boat tail and we just compare

330
00:18:00,990 --> 00:17:58,960
the deceleration characteristics of each

331
00:18:02,730 --> 00:18:01,000
of these configurations and relate them

332
00:18:05,580 --> 00:18:02,740
back to the original lewin we started

333
00:18:07,770 --> 00:18:05,590
with for six decades nasa has been

334
00:18:10,080 --> 00:18:07,780
studying aerodynamic problems associated

335
00:18:12,600 --> 00:18:10,090
with making airplanes faster and more

336
00:18:14,760 --> 00:18:12,610
fuel-efficient it was logical than that

337
00:18:17,070 --> 00:18:14,770
it could apply this same expertise to

338
00:18:19,200 --> 00:18:17,080

ground transportation vehicles the

339
00:18:21,060 --> 00:18:19,210
results have been very encouraging by

340
00:18:23,520 --> 00:18:21,070
rounding the corners and enclosing its

341
00:18:25,440 --> 00:18:23,530
underbody this van has about seventy

342
00:18:27,540 --> 00:18:25,450
percent lower drag than before the

343
00:18:29,940 --> 00:18:27,550
modifications the technique of reducing

344
00:18:32,220 --> 00:18:29,950
air resistance as the van travels along

345
00:18:34,320 --> 00:18:32,230
can be directly translated into fuel

346
00:18:36,780 --> 00:18:34,330
savings about thirty percent fuel

347
00:18:39,180 --> 00:18:36,790
savings in this particular instance the

348
00:18:41,820 --> 00:18:39,190
reshaped van is actually aerodynamically

349
00:18:44,910 --> 00:18:41,830
superior for its size to most sports

350
00:18:47,190 --> 00:18:44,920
cars on the road today these successful

351
00:18:50,350 --> 00:18:47,200
aerodynamic tests are helping change the

352
00:18:54,310 --> 00:18:50,360
shape of vans motorhomes and trucks make

353
00:18:56,230 --> 00:18:54,320
the more fuel-efficient another field

354
00:18:59,170 --> 00:18:56,240
which has benefited from NASA spin-off

355
00:19:03,340 --> 00:18:59,180
is medicine our next report which is

356
00:19:09,760 --> 00:19:03,350
from 1982 is about a space-age aid for

357
00:19:12,220 --> 00:19:09,770
coronary diagnosis in August 1981 as

358
00:19:14,680 --> 00:19:12,230
voyager 2 made its way through the solar

359
00:19:16,680 --> 00:19:14,690
system from jupiter to saturn beaming

360
00:19:18,630 --> 00:19:16,690
dramatic photographs back to earth

361
00:19:21,220 --> 00:19:18,640
researchers at NASA's Jet Propulsion

362
00:19:22,930 --> 00:19:21,230
Laboratory in California using

363
00:19:25,270 --> 00:19:22,940

sophisticated image processing

364
00:19:27,490 --> 00:19:25,280
techniques were busy enhancing

365
00:19:31,330 --> 00:19:27,500
significant areas of these images for

366
00:19:33,550 --> 00:19:31,340
scientific study today the people at JPL

367
00:19:34,720 --> 00:19:33,560
working in conjunction with scientists

368
00:19:37,030 --> 00:19:34,730
from the University of Southern

369
00:19:39,100 --> 00:19:37,040
California are applying these same

370
00:19:41,410 --> 00:19:39,110
space-related computerized image

371
00:19:43,540 --> 00:19:41,420
analysis techniques to the earthly

372
00:19:46,240 --> 00:19:43,550
treatment of arteriosclerosis and

373
00:19:49,330 --> 00:19:46,250
stenosis of the arteries diseases that

374
00:19:51,670 --> 00:19:49,340
affect thousands of Americans dr. Edwin

375
00:19:54,550 --> 00:19:51,680
s beckenbaugh deputy manager of the

376
00:19:56,950 --> 00:19:54,560
Lyell medical program at JPL explains

377
00:19:59,500 --> 00:19:56,960
the basic problem that we're looking at

378
00:20:02,740 --> 00:19:59,510
is an insufficient supply of blood to

379
00:20:04,810 --> 00:20:02,750
the heart the blood that the heart pumps

380
00:20:06,540 --> 00:20:04,820
does not supply the heart it's supplied

381
00:20:09,280 --> 00:20:06,550
by blood through the coronary arteries

382
00:20:12,490 --> 00:20:09,290
knowing how much of that blood flow is

383
00:20:14,740 --> 00:20:12,500
being cut off by the stenotic disease

384
00:20:17,830 --> 00:20:14,750
process it is narrowing of the coronary

385
00:20:20,020 --> 00:20:17,840
arteries it's very important because if

386
00:20:22,060 --> 00:20:20,030
there's an insufficient amount of blood

387
00:20:24,040 --> 00:20:22,070
going to a part of a heart the doctor

388
00:20:26,170 --> 00:20:24,050

has to do a bypass operation or some

389
00:20:28,000 --> 00:20:26,180
other kind of open-heart surgery that's

390
00:20:29,290 --> 00:20:28,010
a very risky procedure it's not

391
00:20:32,140 --> 00:20:29,300
something you want to do unless you're

392
00:20:35,320 --> 00:20:32,150
sure you need to a special type of x ray

393
00:20:37,930 --> 00:20:35,330
called an angiogram is made by injecting

394
00:20:40,390 --> 00:20:37,940
contrast dye into the diseased artery

395
00:20:42,760 --> 00:20:40,400
this allows the computer operator or

396
00:20:45,520 --> 00:20:42,770
physician to locate the area of concern

397
00:20:47,200 --> 00:20:45,530
and indicate it to the computer by

398
00:20:49,640 --> 00:20:47,210
positioning the electronic cross

399
00:20:52,220 --> 00:20:49,650
accordingly once the computer has

400
00:20:54,140 --> 00:20:52,230
received this information it can in turn

401
00:20:57,020 --> 00:20:54,150
supply the position with what he needs

402
00:20:59,570 --> 00:20:57,030
to make an accurate diagnosis the degree

403
00:21:02,570 --> 00:20:59,580
of stenosis or narrowing in this

404
00:21:05,060 --> 00:21:02,580
particular vessel is such that in

405
00:21:07,370 --> 00:21:05,070
general a doctor provided with this

406
00:21:09,650 --> 00:21:07,380
image would have a hard time deciding

407
00:21:11,930 --> 00:21:09,660
whether the narrowing was sufficiently

408
00:21:15,110 --> 00:21:11,940
important the warrant bypass surgery or

409
00:21:17,990 --> 00:21:15,120
not to different doctors given this

410
00:21:20,390 --> 00:21:18,000
particular image might well differ in

411
00:21:24,290 --> 00:21:20,400
their opinion of the degree of narrowing

412
00:21:26,000 --> 00:21:24,300
by Oh ten or fifteen percent and that

413
00:21:27,260 --> 00:21:26,010

difference is exactly the difference

414
00:21:29,060 --> 00:21:27,270
that becomes important when you're

415
00:21:32,600 --> 00:21:29,070
considering a serious operation like

416
00:21:35,990 --> 00:21:32,610
bypass surgery the benefit of the

417
00:21:38,870 --> 00:21:36,000
computer is not so much that it is

418
00:21:41,900 --> 00:21:38,880
better than a doctor but it is more

419
00:21:44,630 --> 00:21:41,910
consistent to calculate the degree of

420
00:21:47,120 --> 00:21:44,640
disease present the computer first

421
00:21:50,060 --> 00:21:47,130
indicates the edges of the artery with

422
00:21:52,520 --> 00:21:50,070
black lines the white lines which just

423
00:21:54,530 --> 00:21:52,530
appeared are the computers best estimate

424
00:21:57,190 --> 00:21:54,540
of where the walls of the artery would

425
00:22:00,350 --> 00:21:57,200
be if there were no disease present

426
00:22:02,840 --> 00:22:00,360
using these as guidelines statistics

427
00:22:04,820 --> 00:22:02,850
such as the degree of narrowing can be

428
00:22:07,970 --> 00:22:04,830
computed and printed out for the

429
00:22:10,370 --> 00:22:07,980
patient's file the importance of the

430
00:22:12,590 --> 00:22:10,380
individual seated at the control panel

431
00:22:15,230 --> 00:22:12,600
of the medical image processing station

432
00:22:17,750 --> 00:22:15,240
be it a JPL researcher now or a

433
00:22:20,930 --> 00:22:17,760
physician in the near future should not

434
00:22:23,510 --> 00:22:20,940
be overlooked one thing we've really

435
00:22:25,610 --> 00:22:23,520
found out in this whole program is that

436
00:22:27,830 --> 00:22:25,620
if you take the individual the human out

437
00:22:30,500 --> 00:22:27,840
of the loop totally and try to automate

438
00:22:32,990 --> 00:22:30,510

the whole procedure using the computer

439
00:22:35,780 --> 00:22:33,000
you are almost certainly doomed to

440
00:22:38,360 --> 00:22:35,790
failure so to have the operator in the

441
00:22:40,880 --> 00:22:38,370
in the picture to provide the computer

442
00:22:42,770 --> 00:22:40,890
with a beginning point to make take care

443
00:22:45,170 --> 00:22:42,780
of mistakes that the computer makes and

444
00:22:47,060 --> 00:22:45,180
to finally decide whether the job that

445
00:22:50,090 --> 00:22:47,070
the computer is done is adequate is

446
00:22:53,000 --> 00:22:50,100
vitally important the medical image

447
00:22:54,740 --> 00:22:53,010
processing station using space gained

448
00:22:59,590 --> 00:22:54,750
expertise to

449
00:23:05,270 --> 00:23:02,660
our last video taped segment was really

450
00:23:07,400 --> 00:23:05,280
produced for a convention display but we

451
00:23:09,170 --> 00:23:07,410
thought you would find it interesting it

452
00:23:12,080 --> 00:23:09,180
deals with feral fluids which are

453
00:23:14,900 --> 00:23:12,090
magnetic liquids early use of the feral

454
00:23:17,090 --> 00:23:14,910
fluids was intended for rocket fuels but

455
00:23:27,620 --> 00:23:17,100
the feral fluids have found other uses

456
00:23:30,290 --> 00:23:27,630
in other fields we needed a magnetic

457
00:23:31,820 --> 00:23:30,300
liquid for control of spacecraft liquid

458
00:23:35,920 --> 00:23:31,830
propellants under zero gravity

459
00:23:40,840 --> 00:23:35,930
conditions in space now we have

460
00:23:46,370 --> 00:23:43,790
ferrofluid is a liquid in which sub

461
00:23:49,520 --> 00:23:46,380
microscopic particles of iron oxide are

462
00:23:52,700 --> 00:23:49,530
permanently suspended in other words a

463
00:23:54,620 --> 00:23:52,710

fuel with magnetic properties the

464
00:23:57,170 --> 00:23:54,630
technology we developed to solve our

465
00:23:59,570 --> 00:23:57,180
fuel problems in space is now being used

466
00:24:03,200 --> 00:23:59,580
to entertain you with higher quality

467
00:24:05,180 --> 00:24:03,210
audio reproduction everyday ferrofluid

468
00:24:06,740 --> 00:24:05,190
research led to development of fuels

469
00:24:09,170 --> 00:24:06,750
that are controllable in the

470
00:24:11,360 --> 00:24:09,180
weightlessness of space this eliminates

471
00:24:14,480 --> 00:24:11,370
the problem in space vehicles cause

472
00:24:16,760 --> 00:24:14,490
chugging this chugging effect is from

473
00:24:19,790 --> 00:24:16,770
lack of fuel or even flow of fuel

474
00:24:21,920 --> 00:24:19,800
through the engines as a result the

475
00:24:24,110 --> 00:24:21,930
commercial applications of ferrofluid

476
00:24:26,630 --> 00:24:24,120
are providing a wide variety of new

477
00:24:29,350 --> 00:24:26,640
products for consumer use and some major

478
00:24:32,300 --> 00:24:29,360
improvements in old-time favorites

479
00:24:34,430 --> 00:24:32,310
ferrofluid serves as an excellent heat

480
00:24:36,680 --> 00:24:34,440
transfer medium for cooling the voice

481
00:24:38,630 --> 00:24:36,690
coil in a speaker so the system's

482
00:24:41,150 --> 00:24:38,640
ability to handle higher power is

483
00:24:44,150 --> 00:24:41,160
increased and speaker failure is

484
00:24:46,490 --> 00:24:44,160
decreased for the manufacturers the

485
00:24:48,710 --> 00:24:46,500
bottom line is better quality fewer

486
00:24:53,270 --> 00:24:48,720
returns or defects and lower

487
00:24:55,640 --> 00:24:53,280
manufacturing costs dr. Ronald Moskowitz

488
00:24:57,350 --> 00:24:55,650

and dr. Ronald rosin wife have been

489
00:24:59,960 --> 00:24:57,360
working on the development of magnetic

490
00:25:01,970 --> 00:24:59,970
fluid and with the cooperation of NASA's

491
00:25:03,940 --> 00:25:01,980
technology utilization services

492
00:25:06,279 --> 00:25:03,950
department they obtained a vice

493
00:25:08,560 --> 00:25:06,289
to use the technology that NASA Lewis

494
00:25:10,210 --> 00:25:08,570
Research Center had developed putting

495
00:25:12,850 --> 00:25:10,220
all this together they founded

496
00:25:14,769 --> 00:25:12,860
ferrofluid excoriation and have

497
00:25:16,659 --> 00:25:14,779
successfully advanced and applied the

498
00:25:19,690 --> 00:25:16,669
technology for a wide range of

499
00:25:21,549 --> 00:25:19,700
commercial uses applications have ranged

500
00:25:24,159 --> 00:25:21,559
from integrated circuit production

501
00:25:26,799 --> 00:25:24,169
visual displays analytical

502
00:25:31,139 --> 00:25:26,809
instrumentation automated machine tools

503
00:25:34,600 --> 00:25:31,149
and industrial processes from us to you

504
00:25:37,269 --> 00:25:34,610
working for you and with you the

505
00:25:40,299 --> 00:25:37,279
technology is here which your ideas can

506
00:25:42,340 --> 00:25:40,309
grow let's work together call the

507
00:25:47,830 --> 00:25:42,350
technology utilization office nearest

508
00:25:49,960 --> 00:25:47,840
you for more information if you would

509
00:25:52,210 --> 00:25:49,970
like to contact NASA about spin-offs

510
00:25:54,269 --> 00:25:52,220
please watch the credits at the end of

511
00:25:56,889 --> 00:25:54,279
the show on where to write or call

512
00:25:59,919 --> 00:25:56,899
that's all we have for this edition of

513
00:26:01,690 --> 00:25:59,929

NASA images but before we go let me

514
00:26:04,539 --> 00:26:01,700
remind you that you're cordially invited

515
00:26:06,340 --> 00:26:04,549
to see the displays at the Visitor

516
00:26:08,830 --> 00:26:06,350
Center here at the NASA Lewis Research

517
00:26:10,500 --> 00:26:08,840
Center we're located near the Hopkins

518
00:26:14,139 --> 00:26:10,510
international airport in Cleveland

519
00:27:41,730 --> 00:26:14,149
admission is free until next time this