1
00:00:34,880 --> 00:00:32,330
the space shuttle is in orbit and

2
00:00:36,439 --> 00:00:34,890
members of a highly specialized team at

3
00:00:39,020 --> 00:00:36,449
NASA's Ames Dryden Flight Research

4
00:00:41,390 --> 00:00:39,030
Facility are tracking its progress in

5
00:00:43,990 --> 00:00:41,400
two days the orbiter will re-enter

6
00:00:46,610 --> 00:00:44,000
Earth's atmosphere over the Indian Ocean

7
00:00:48,560 --> 00:00:46,620
it'll perform an intricate series of

8
00:00:50,270 --> 00:00:48,570
slowing maneuvers and glide to a

9
00:00:56,450 --> 00:00:50,280
successful landing at Edwards Air Force

10
00:00:56,460 --> 00:01:00,540
here we come

11
00:01:00,550 --> 00:01:05,630
21

12
00:01:05,640 --> 00:01:13,020
I'm here

13
00:01:31,100 --> 00:01:19,289

but appears down altitude 300 feet just

14
00:01:31,110 --> 00:01:44,370
and the main gear down

15
00:01:56,330 --> 00:01:52,080
does your secure a touchdown and

16
00:02:00,749 --> 00:01:56,340
emission lap time of six days 56 minutes

17
00:02:04,200 --> 00:02:00,759
4 seconds nose gear down in six days 56

18
00:02:05,969 --> 00:02:04,210
minutes 16 seconds Edwards is the home

19
00:02:08,940 --> 00:02:05,979
of NASA's Ames Dryden Flight Research

20
00:02:11,220 --> 00:02:08,950
Facility the nerve center of three sites

21
00:02:13,500 --> 00:02:11,230
supporting a highly evolved technology

22
00:02:16,410 --> 00:02:13,510
network called the Western aeronautical

23
00:02:17,789 --> 00:02:16,420
test range the range is a key facility

24
00:02:20,550 --> 00:02:17,799
in NASA's aeronautical and space

25
00:02:22,650 --> 00:02:20,560
research and a major national resource

26
00:02:24,360 --> 00:02:22,660
its development is a critical

27
00:02:28,500 --> 00:02:24,370
achievement in flight testing today's

28
00:02:30,449 --> 00:02:28,510
experimental aircraft the range

29
00:02:32,280 --> 00:02:30,459
furnished precision monitoring for the

30
00:02:34,289 --> 00:02:32,290
orbiter during its crucial end of

31
00:02:38,039 --> 00:02:34,299
mission maneuvers and helped it guide

32
00:02:39,960 --> 00:02:38,049
the ship to a safe landing the first

33
00:02:43,259 --> 00:02:39,970
sonic boom was heard at Dryden on

34
00:02:45,360 --> 00:02:43,269
october fourteenth 1947 when Chuck

35
00:02:46,979 --> 00:02:45,370
Yeager flew the x1 experimental rocket

36
00:02:49,949 --> 00:02:46,989
powered airplane through the sound

37
00:02:51,720 --> 00:02:49,959
barrier facilities and equipment for

38
00:02:54,390 --> 00:02:51,730

air-to-ground monitoring of test flights

39
00:02:56,400 --> 00:02:54,400
were primitive flight research results

40
00:02:59,460 --> 00:02:56,410
depended mainly on air-to-air chase

41
00:03:03,930 --> 00:02:59,470
observations and recording data on board

42
00:03:07,170 --> 00:03:03,940
for later examination in 1959 NASA began

43
00:03:09,059 --> 00:03:07,180
testing the x-15 rocket plane this air

44
00:03:11,490 --> 00:03:09,069
launched highly experimental test

45
00:03:14,129 --> 00:03:11,500
vehicle reached altitudes far outside

46
00:03:17,069 --> 00:03:14,139
the atmosphere and flew at unprecedented

47
00:03:20,099 --> 00:03:17,079
speeds no chase plane could keep up with

48
00:03:22,129 --> 00:03:20,109
it testing the x-15 absolutely depended

49
00:03:24,210 --> 00:03:22,139
on immediate sophisticated air-to-ground

50
00:03:28,050 --> 00:03:24,220
communications tracking and data

51
00:03:30,930 --> 00:03:28,060
acquisition unlike previous research

52
00:03:32,340 --> 00:03:30,940
aircraft the x-15 with its high energy

53
00:03:34,530 --> 00:03:32,350
management requirements demanded

54
00:03:36,390 --> 00:03:34,540
real-time tracking and voice

55
00:03:40,559 --> 00:03:36,400
communication to accomplish its mission

56
00:03:42,629 --> 00:03:40,569
to test the x-15 Dryden engineers

57
00:03:46,530 --> 00:03:42,639
developed a complex system for flight

58
00:03:48,990 --> 00:03:46,540
monitoring a system that went far beyond

59
00:03:52,020 --> 00:03:49,000
anything yet known they called it the

60
00:03:53,770 --> 00:03:52,030
x-15 high range the range allowed

61
00:03:56,220 --> 00:03:53,780
researchers on the ground to try

62
00:03:58,949 --> 00:03:56,230
the x-15 throughout its entire mission

63
00:04:04,240 --> 00:03:58,959

monitor its data during quite and

64
00:04:06,400 --> 00:04:04,250
maintain radio contact with the pilot it

65
00:04:08,949 --> 00:04:06,410
enabled investigators to deal with data

66
00:04:12,699 --> 00:04:08,959
in real time during experimental flights

67
00:04:14,530 --> 00:04:12,709
and change plans during flight this

68
00:04:17,229 --> 00:04:14,540
greatly increased each missions

69
00:04:21,930 --> 00:04:17,239
effectiveness and save time and program

70
00:04:24,700 --> 00:04:21,940
costs it also made flight testing safer

71
00:04:27,310 --> 00:04:24,710
Dryden engineering teams set up remote

72
00:04:29,620 --> 00:04:27,320
sites at Ely and beatty nevada to

73
00:04:32,140 --> 00:04:29,630
accommodate the great speeds of the x-15

74
00:04:35,560 --> 00:04:32,150
for testing high speed long-range

75
00:04:38,950 --> 00:04:35,570
aircraft EV and Beatty became outer

76
00:04:41,260 --> 00:04:38,960
perimeters of the high range the Western

77
00:04:43,360 --> 00:04:41,270
aeronautical test range of today is the

78
00:04:44,730 --> 00:04:43,370
high range grown up a working

79
00:04:46,840 --> 00:04:44,740
integration of state-of-the-art

80
00:04:49,960 --> 00:04:46,850
communications tracking equipment

81
00:04:52,150 --> 00:04:49,970
computers and electronic display systems

82
00:04:55,030 --> 00:04:52,160
the result of creative engineering

83
00:04:57,610 --> 00:04:55,040
proven by continuous application these

84
00:04:59,620 --> 00:04:57,620
systems provide the laboratory needed to

85
00:05:02,380 --> 00:04:59,630
test today's high performance air and

86
00:05:04,870 --> 00:05:02,390
spacecraft the Mission Control Center is

87
00:05:11,800 --> 00:05:04,880
the focal point of the range this is

88
00:05:14,170 --> 00:05:11,810

where everything comes together here

89
00:05:16,810 --> 00:05:14,180
supremely advanced systems such as the

90
00:05:19,120 --> 00:05:16,820
master graphics interactive console or

91
00:05:21,580 --> 00:05:19,130
magic display give researchers a unique

92
00:05:24,010 --> 00:05:21,590
edge in flight testing magic is an

93
00:05:26,560 --> 00:05:24,020
interactive high-resolution easy-to-use

94
00:05:29,830 --> 00:05:26,570
tool which allows investigators to see

95
00:05:32,650 --> 00:05:29,840
your ol time history and cross plots on

96
00:05:35,050 --> 00:05:32,660
command it opens new capabilities in

97
00:05:37,659 --> 00:05:35,060
changing parameters during flight thus

98
00:05:41,740 --> 00:05:37,669
saving valuable time and optimising

99
00:05:44,260 --> 00:05:41,750
information yield here the real-time

100
00:05:47,140 --> 00:05:44,270
interactive map or rim is helping

101
00:05:49,090 --> 00:05:47,150
advance Flight Research this is an

102
00:05:50,830 --> 00:05:49,100
intelligent graphic workstation that

103
00:05:52,750 --> 00:05:50,840
instantly shows an aircraft's flight

104
00:05:57,100 --> 00:05:52,760
position with respect to geographic

105
00:05:58,990 --> 00:05:57,110
location rim tracks displays and

106
00:06:01,240 --> 00:05:59,000
computes time distance measurements

107
00:06:04,450 --> 00:06:01,250
functions done previously with pen and

108
00:06:07,060 --> 00:06:04,460
paper it immediately projects flight

109
00:06:07,580 --> 00:06:07,070
paths on command allows the controller

110
00:06:09,740 --> 00:06:07,590
to chain

111
00:06:11,900 --> 00:06:09,750
perspective by zooming in on areas of

112
00:06:13,490 --> 00:06:11,910
interest and warns the flight controller

113
00:06:17,210 --> 00:06:13,500

when his aircraft is approaching a

114
00:06:19,130 --> 00:06:17,220
restricted area rim reduces workload on

115
00:06:20,750 --> 00:06:19,140
the host computer which is free to

116
00:06:25,730 --> 00:06:20,760
perform other critical mission related

117
00:06:27,920 --> 00:06:25,740
tasks more efficiently the f-18 high

118
00:06:29,780 --> 00:06:27,930
alpha spin display demonstrates how

119
00:06:31,280 --> 00:06:29,790
innovative graphics systems can be

120
00:06:34,490 --> 00:06:31,290
tailored to meet requirements of a

121
00:06:37,610 --> 00:06:34,500
specific program this presentation

122
00:06:39,640 --> 00:06:37,620
details precisely and in real-time such

123
00:06:43,190 --> 00:06:39,650
critical information as yaw rate

124
00:06:46,660 --> 00:06:43,200
airspeed altitude and spin conditions

125
00:06:49,880 --> 00:06:46,670
for high-risk flight research programs

126
00:06:51,770 --> 00:06:49,890
such advanced systems greatly simplify

127
00:06:54,110 --> 00:06:51,780
the work of the range control officer

128
00:06:57,560 --> 00:06:54,120
whose job it is to determine how well

129
00:06:59,750 --> 00:06:57,570
the range is operating they vastly

130
00:07:01,850 --> 00:06:59,760
increased findings of the principal

131
00:07:03,950 --> 00:07:01,860
investigator and his team during a

132
00:07:05,870 --> 00:07:03,960
mission and the quantity and quality of

133
00:07:08,750 --> 00:07:05,880
work achieved by the flight controller

134
00:07:12,500 --> 00:07:08,760
who coordinates the test aircraft chase

135
00:07:14,450 --> 00:07:12,510
plane and control tower they enhance

136
00:07:16,550 --> 00:07:14,460
flight safety monitoring and the

137
00:07:20,210 --> 00:07:16,560
capabilities of the aircraft operations

138
00:07:22,460 --> 00:07:20,220

director and flight safety officer the

139
00:07:24,710 --> 00:07:22,470
output of all mission control systems

140
00:07:27,200 --> 00:07:24,720
depends on data drawn in real time from

141
00:07:29,240 --> 00:07:27,210
all other elements of the range the

142
00:07:31,340 --> 00:07:29,250
aeronautical tracking facilities the

143
00:07:36,680 --> 00:07:31,350
communications building the real-time

144
00:07:38,750 --> 00:07:36,690
processing and display systems Dryden

145
00:07:40,820 --> 00:07:38,760
has two tracking facilities their

146
00:07:42,590 --> 00:07:40,830
antenna systems provide radar and

147
00:07:45,350 --> 00:07:42,600
telemetry for command uplink and

148
00:07:47,150 --> 00:07:45,360
downlink research data their equipment

149
00:07:49,040 --> 00:07:47,160
contract local test flights or

150
00:07:52,610 --> 00:07:49,050
satellites orbiting at altitudes

151
00:07:54,710 --> 00:07:52,620
exceeding 32,000 miles during Space

152
00:07:56,780 --> 00:07:54,720
Shuttle missions support technicians use

153
00:08:00,210 --> 00:07:56,790
the facilities to track the shuttle in

154
00:08:05,020 --> 00:08:02,830
these stations are the acquisition

155
00:08:07,059 --> 00:08:05,030
points for all research data from air

156
00:08:10,029 --> 00:08:07,069
and spacecraft and the points for

157
00:08:11,830 --> 00:08:10,039
primary command uplink the

158
00:08:13,689 --> 00:08:11,840
communications building provides the

159
00:08:15,760 --> 00:08:13,699
radiofrequency link which allows

160
00:08:18,490 --> 00:08:15,770
aircraft and spacecraft to talk to

161
00:08:20,439 --> 00:08:18,500
ground kontrol it provides air to ground

162
00:08:21,999 --> 00:08:20,449
communication between pilots and

163
00:08:24,580 --> 00:08:22,009

engineers in all of emissions

164
00:08:27,390 --> 00:08:24,590
participating aircraft and backup

165
00:08:30,279 --> 00:08:27,400
command app link to research vehicles

166
00:08:32,259 --> 00:08:30,289
the telemetry processing room houses

167
00:08:35,440 --> 00:08:32,269
many of the ranges real-time processing

168
00:08:37,690 --> 00:08:35,450
and display systems today's high

169
00:08:39,969 --> 00:08:37,700
performance test aircraft produce such

170
00:08:42,219 --> 00:08:39,979
huge quantities of data that human

171
00:08:44,380 --> 00:08:42,229
investigators working on their own can't

172
00:08:47,500 --> 00:08:44,390
begin to interpret and use them during a

173
00:08:49,870 --> 00:08:47,510
mission these systems rely on computers

174
00:08:52,300 --> 00:08:49,880
for quick real-time processing and

175
00:08:54,550 --> 00:08:52,310
conversion of raw data into real time

176
00:08:59,380 --> 00:08:54,560
information that researchers and pilots

177
00:09:01,810 --> 00:08:59,390
can respond to during a flight the

178
00:09:04,060 --> 00:09:01,820
real-time processing and display systems

179
00:09:06,160 --> 00:09:04,070
generate organized results on control

180
00:09:09,460 --> 00:09:06,170
room monitors and strip chart recorders

181
00:09:11,410 --> 00:09:09,470
a vital part of today's Western

182
00:09:13,290 --> 00:09:11,420
aeronautical test range is the Moffett

183
00:09:16,000 --> 00:09:13,300
flight complex in Northern California

184
00:09:18,280 --> 00:09:16,010
based at Ames Research Center on Naval

185
00:09:20,170 --> 00:09:18,290
Air Station Moffett Field this is one of

186
00:09:23,220 --> 00:09:20,180
the country's prime test sites for

187
00:09:25,870 --> 00:09:23,230
powered lift and rotorcraft vehicles a

188
00:09:27,760 --> 00:09:25,880

new satellite link the nasscom

189
00:09:30,250 --> 00:09:27,770
integrated system digital network

190
00:09:32,319 --> 00:09:30,260
generally shortened tune is done and a

191
00:09:35,380 --> 00:09:32,329
process called time division multiple

192
00:09:37,180 --> 00:09:35,390
access allow Moffett and Dryden each to

193
00:09:41,650 --> 00:09:37,190
monitor flights at the others facility

194
00:09:43,780 --> 00:09:41,660
and at their remote locations because

195
00:09:46,449 --> 00:09:43,790
the area surrounding Moffett Field has

196
00:09:48,220 --> 00:09:46,459
grown increasingly congested researchers

197
00:09:50,470 --> 00:09:48,230
here conduct many of their sea-level

198
00:09:53,019 --> 00:09:50,480
altitude tests at crows landing in the

199
00:09:54,699 --> 00:09:53,029
San Joaquin Valley while crows landing

200
00:09:57,009 --> 00:09:54,709
is equipped to support these flight

201
00:09:59,259 --> 00:09:57,019
tests much of the real-time monitoring

202
00:10:02,439 --> 00:09:59,269
and post mission processing is done from

203
00:10:04,689 --> 00:10:02,449
Moffett Field range versatility is

204
00:10:07,150 --> 00:10:04,699
giving researchers vast new capabilities

205
00:10:09,280 --> 00:10:07,160
and opening great new vistas in research

206
00:10:11,560 --> 00:10:09,290
flight testing at the same time

207
00:10:12,410 --> 00:10:11,570
sophisticated new research projects are

208
00:10:15,170 --> 00:10:12,420
demanding new case

209
00:10:16,850 --> 00:10:15,180
abilities of the range there is a

210
00:10:20,750 --> 00:10:16,860
growing need to test experimental

211
00:10:22,579 --> 00:10:20,760
aircraft at remote locations engineers

212
00:10:24,470 --> 00:10:22,589
have answered this need by developing

213
00:10:26,569 --> 00:10:24,480

the mobile research flight test support

214
00:10:28,490 --> 00:10:26,579
capability generally known as the

215
00:10:32,269 --> 00:10:28,500
Western aeronautical test range mobile

216
00:10:34,519 --> 00:10:32,279
system created for total adaptability

217
00:10:36,829 --> 00:10:34,529
the mobile system can go virtually

218
00:10:40,730 --> 00:10:36,839
anywhere and get to work immediately on

219
00:10:42,560 --> 00:10:40,740
arrival its air ride suspension protects

220
00:10:46,610 --> 00:10:42,570
the delicate equipment inside during

221
00:10:48,500 --> 00:10:46,620
hauling either over ground or by air its

222
00:10:50,870 --> 00:10:48,510
first run supporting the advanced

223
00:10:53,120 --> 00:10:50,880
fighter technology integration f-16 in

224
00:10:55,730 --> 00:10:53,130
tests at Nellis Air Force Base proved

225
00:10:57,410 --> 00:10:55,740
completely successful and demonstrated

226
00:11:00,139 --> 00:10:57,420
that it can handle real-time processing

227
00:11:02,420 --> 00:11:00,149
and display and communications with the

228
00:11:06,379 --> 00:11:02,430
airplane and Mission Control at Dryden

229
00:11:08,569 --> 00:11:06,389
an outstanding example of resourceful

230
00:11:10,460 --> 00:11:08,579
design the fully equipped trailer can

231
00:11:12,710 --> 00:11:10,470
perform all of the functions normally

232
00:11:15,949 --> 00:11:12,720
done in the control room at Moffett or

233
00:11:17,689 --> 00:11:15,959
Dryden it's approximately twenty six

234
00:11:20,380 --> 00:11:17,699
hundred cubic feet can store the

235
00:11:23,210 --> 00:11:20,390
six-foot telemetry antenna during moves

236
00:11:25,730 --> 00:11:23,220
when the trailer arrives at a test site

237
00:11:27,949 --> 00:11:25,740
expandable 18-foot sections on either

238
00:11:30,319 --> 00:11:27,959

side of the computer banks open to

239
00:11:33,860 --> 00:11:30,329
provide 630 additional cubic feet of

240
00:11:36,530 --> 00:11:33,870
space highly compact computer banks

241
00:11:38,650 --> 00:11:36,540
receive store and process data for the

242
00:11:41,240 --> 00:11:38,660
trailers major components telemetry

243
00:11:43,610 --> 00:11:41,250
communications real-time and post

244
00:11:46,160 --> 00:11:43,620
mission processing display and strip

245
00:11:48,620 --> 00:11:46,170
charts and a full remotely piloted

246
00:11:52,210 --> 00:11:48,630
research vehicle cockpit which permits

247
00:11:55,189 --> 00:11:52,220
remote operation of an unmanned aircraft

248
00:11:57,199 --> 00:11:55,199
the trailer can operate independently or

249
00:11:59,569 --> 00:11:57,209
interface with a mission control center

250
00:12:01,250 --> 00:11:59,579
because it is highly automated two

251
00:12:04,880 --> 00:12:01,260
people can handle operations and

252
00:12:06,710 --> 00:12:04,890
maintenance the trailers reinforced roof

253
00:12:09,170 --> 00:12:06,720
supports the deployed directional

254
00:12:11,600 --> 00:12:09,180
antenna which accommodates both tracking

255
00:12:14,809 --> 00:12:11,610
and communications the antenna can

256
00:12:17,059 --> 00:12:14,819
receive and transmit in the L s and C

257
00:12:19,309 --> 00:12:17,069
bands when the trailer reaches its full

258
00:12:21,740 --> 00:12:19,319
capability the system will include a

259
00:12:23,720 --> 00:12:21,750
mobile earth station radar system and

260
00:12:26,310 --> 00:12:23,730
frequency van

261
00:12:28,230 --> 00:12:26,320
heavily dependent on the range and the

262
00:12:30,990 --> 00:12:28,240
mobile trailer is a joint army NASA

263
00:12:33,240 --> 00:12:31,000

rotor air loads program this project is

264
00:12:35,130 --> 00:12:33,250
using a blackhawk and other helicopters

265
00:12:38,220 --> 00:12:35,140
to discover what stresses rotor blades

266
00:12:40,620 --> 00:12:38,230
encountered during flight researchers

267
00:12:42,660 --> 00:12:40,630
will measure a total of 250 pressure

268
00:12:44,550 --> 00:12:42,670
points on the blades all of these

269
00:12:47,220 --> 00:12:44,560
measurements require extreme precision

270
00:12:49,760 --> 00:12:47,230
and real-time transmission to both brown

271
00:12:52,590 --> 00:12:49,770
control and a tape recorder on board

272
00:12:54,870 --> 00:12:52,600
this place is enormous demands on range

273
00:12:56,880 --> 00:12:54,880
equipment requirements for acoustical

274
00:12:58,940 --> 00:12:56,890
testing and a variety of flight modes

275
00:13:01,880 --> 00:12:58,950
call for flying in different locations

276
00:13:04,500 --> 00:13:01,890
including Edwards and crows landing

277
00:13:07,200 --> 00:13:04,510
ground instrumentation for these flights

278
00:13:09,990 --> 00:13:07,210
is programmed dedicated very costly and

279
00:13:12,750 --> 00:13:10,000
not practical to install in all control

280
00:13:14,160 --> 00:13:12,760
rooms the mobile trailer allows

281
00:13:16,320 --> 00:13:14,170
researchers to make a single

282
00:13:19,740 --> 00:13:16,330
installation which they can move from

283
00:13:22,410 --> 00:13:19,750
one location to another Ames researchers

284
00:13:24,450 --> 00:13:22,420
are using Crows Landing to conduct tests

285
00:13:26,700 --> 00:13:24,460
with the Harrier this remarkable

286
00:13:28,920 --> 00:13:26,710
aircraft flies successfully both as a

287
00:13:32,010 --> 00:13:28,930
vertical takeoff vehicle and as a

288
00:13:33,890 --> 00:13:32,020

high-performance fighter investigators

289
00:13:36,900 --> 00:13:33,900
are using it to explore flight dynamics

290
00:13:38,670 --> 00:13:36,910
propulsion controls and display for

291
00:13:42,090 --> 00:13:38,680
short and vertical takeoff and landing

292
00:13:44,340 --> 00:13:42,100
vehicles they expect these tests to

293
00:13:46,740 --> 00:13:44,350
result in advanced design concepts for

294
00:13:48,360 --> 00:13:46,750
aircraft of the future Harrier flights

295
00:13:50,579 --> 00:13:48,370
generate a great amount of information

296
00:13:54,360 --> 00:13:50,589
and rely heavily on range data

297
00:13:56,010 --> 00:13:54,370
acquisition facility the range has been

298
00:13:57,840 --> 00:13:56,020
indispensable in supporting this

299
00:14:00,810 --> 00:13:57,850
uniquely versatile aircraft called the

300
00:14:02,460 --> 00:14:00,820
tiltrotor the cells mounted on its wings

301
00:14:04,560 --> 00:14:02,470
tilt upward to make it fly like a

302
00:14:08,160 --> 00:14:04,570
helicopter or 90 degrees forward

303
00:14:10,320 --> 00:14:08,170
allowing it to fly like an airplane with

304
00:14:12,780 --> 00:14:10,330
the tiltrotor ames research has produced

305
00:14:14,790 --> 00:14:12,790
an extremely successful working aircraft

306
00:14:18,720 --> 00:14:14,800
from which the marine corps production

307
00:14:20,579 --> 00:14:18,730
tiltrotor v-22 was derived Dryden is

308
00:14:23,820 --> 00:14:20,589
where aims tests high-performance

309
00:14:25,860 --> 00:14:23,830
airplanes clean dry desert air and

310
00:14:28,019 --> 00:14:25,870
sparsely populated terrain make this

311
00:14:29,790 --> 00:14:28,029
location ideal for researching

312
00:14:31,199 --> 00:14:29,800
high-speed jet and rocket-powered

313
00:14:34,290 --> 00:14:31,209

aircraft

314
00:14:35,639 --> 00:14:34,300
the f18 high alpha research vehicle is

315
00:14:38,340 --> 00:14:35,649
pushing high-performance to

316
00:14:41,369 --> 00:14:38,350
unprecedented extremes using a modified

317
00:14:43,319 --> 00:14:41,379
pre-production f-18 is testbed this

318
00:14:45,230 --> 00:14:43,329
program is working to improve fighter

319
00:14:48,329 --> 00:14:45,240
performance at high angles of attack

320
00:14:50,939 --> 00:14:48,339
this is possible only if engineers learn

321
00:14:54,150 --> 00:14:50,949
precisely how air vortices flow during

322
00:14:57,150 --> 00:14:54,160
high angle maneuvers both on and off the

323
00:14:59,400 --> 00:14:57,160
airplane surface to study on surface

324
00:15:02,069 --> 00:14:59,410
flows investigators released colored dye

325
00:15:04,739 --> 00:15:02,079
during specific maneuvers over areas of

326
00:15:07,379 --> 00:15:04,749
interest such as the nose and wing and

327
00:15:09,569 --> 00:15:07,389
photograph the resulting patterns this

328
00:15:13,049 --> 00:15:09,579
information also is down linked in real

329
00:15:15,449 --> 00:15:13,059
time for immediate assessment off

330
00:15:17,609 --> 00:15:15,459
surface flows show up clearly when an

331
00:15:20,549 --> 00:15:17,619
onboard generator in its smoke over the

332
00:15:22,530 --> 00:15:20,559
f-18s leading-edge extension a video

333
00:15:25,410 --> 00:15:22,540
camera in a nearby chase plane and

334
00:15:28,230 --> 00:15:25,420
another inside the f-18 showing precise

335
00:15:30,269 --> 00:15:28,240
vortex closed the airplane carries a

336
00:15:33,569 --> 00:15:30,279
total of four strategically placed on

337
00:15:36,239 --> 00:15:33,579
board video cameras this program is

338
00:15:38,759 --> 00:15:36,249

completely dependent on the range during

339
00:15:40,590 --> 00:15:38,769
test flights the f-18 down links to

340
00:15:43,499 --> 00:15:40,600
video signals and two streams of

341
00:15:45,960 --> 00:15:43,509
telemetry data it depends on the ranges

342
00:15:48,660 --> 00:15:45,970
command uplink capability for trajectory

343
00:15:50,999 --> 00:15:48,670
guidance the program specific high alpha

344
00:15:54,150 --> 00:15:51,009
spin display is critical to carrying out

345
00:15:56,009 --> 00:15:54,160
F 18 missions since it defines emergency

346
00:15:59,970 --> 00:15:56,019
recovery procedures for any loss of

347
00:16:02,129 --> 00:15:59,980
control situation that might occur the

348
00:16:04,350 --> 00:16:02,139
f-15 places enormous real-time

349
00:16:06,329 --> 00:16:04,360
computation and display demands on the

350
00:16:08,999 --> 00:16:06,339
range because its engine is heavily

351
00:16:11,129 --> 00:16:09,009
loaded with instrumentation researchers

352
00:16:14,309 --> 00:16:11,139
are using the f-15 to develop methods

353
00:16:16,199 --> 00:16:14,319
for reducing pilot workload if they can

354
00:16:18,720 --> 00:16:16,209
create systems that take over basic

355
00:16:20,579 --> 00:16:18,730
operating tasks pilots will be freed for

356
00:16:23,069 --> 00:16:20,589
other critical activities such as

357
00:16:25,619 --> 00:16:23,079
responding to threats or setting up

358
00:16:26,910 --> 00:16:25,629
weapons systems the program team is

359
00:16:30,030 --> 00:16:26,920
working on developing a trajectory

360
00:16:31,980 --> 00:16:30,040
guidance system a computer which they

361
00:16:34,199 --> 00:16:31,990
have mounted in the airplanes ammunition

362
00:16:37,009 --> 00:16:34,209
bay calculates airspeed and altitude

363
00:16:40,110 --> 00:16:37,019

with no assistance from the pilot

364
00:16:41,850 --> 00:16:40,120
aircraft and engine command then can be

365
00:16:44,100 --> 00:16:41,860
supplied either to the pilot through the

366
00:16:44,910 --> 00:16:44,110
heads-up display or directly to the

367
00:16:47,160 --> 00:16:44,920
aircraft in

368
00:16:51,420 --> 00:16:47,170
automatic mode this technology

369
00:16:54,329 --> 00:16:51,430
significantly reduces pilot workload the

370
00:16:56,250 --> 00:16:54,339
range with its magic and rim displays is

371
00:16:58,440 --> 00:16:56,260
uniquely equipped to support this

372
00:17:01,860 --> 00:16:58,450
program these advanced interactive

373
00:17:04,409 --> 00:17:01,870
displays allow f15 team members to view

374
00:17:07,289 --> 00:17:04,419
in real time the airplanes trajectory

375
00:17:10,530 --> 00:17:07,299
three miles behind and seven ahead of

376
00:17:12,809 --> 00:17:10,540
its present position at the same time

377
00:17:14,939 --> 00:17:12,819
they also can watch the aircraft's round

378
00:17:17,159 --> 00:17:14,949
track with reference to restricted areas

379
00:17:19,439 --> 00:17:17,169
and monitor processed parameters

380
00:17:22,260 --> 00:17:19,449
critical to the flight should any fault

381
00:17:25,439 --> 00:17:22,270
or failure occur on board these displays

382
00:17:27,299 --> 00:17:25,449
will flag it immediately the advanced

383
00:17:30,630 --> 00:17:27,309
fighter technology integration called

384
00:17:32,630 --> 00:17:30,640
fdf 16 is another demanding program that

385
00:17:37,080 --> 00:17:32,640
puts extremely heavy loads on the range

386
00:17:39,210 --> 00:17:37,090
FD is a joint NASA Air Force program the

387
00:17:41,669 --> 00:17:39,220
aircraft a highly modified version of

388
00:17:43,470 --> 00:17:41,679

the f-16 Fighting Falcon has been

389
00:17:46,740 --> 00:17:43,480
expanding the limits of flight since

390
00:17:49,140 --> 00:17:46,750
1981 equipped with a unique set of

391
00:17:51,600 --> 00:17:49,150
computer driven control surfaces the

392
00:17:54,240 --> 00:17:51,610
afty can execute maneuvers impossible

393
00:17:55,860 --> 00:17:54,250
with any other aircraft after his total

394
00:17:58,049 --> 00:17:55,870
dependence on computers and

395
00:18:00,090 --> 00:17:58,059
experimentation with flight modes never

396
00:18:02,690 --> 00:18:00,100
before attempted make the range a

397
00:18:05,250 --> 00:18:02,700
crucial part of testing this airplane a

398
00:18:07,230 --> 00:18:05,260
heads-up display which superimposes

399
00:18:09,510 --> 00:18:07,240
critical flight data over the cockpit

400
00:18:11,400 --> 00:18:09,520
window allows the pilot to monitor

401
00:18:14,039 --> 00:18:11,410
instrumentation readings without looking

402
00:18:16,560 --> 00:18:14,049
away from the flight path range tracking

403
00:18:18,299 --> 00:18:16,570
facilities simultaneously feed this

404
00:18:20,669 --> 00:18:18,309
picture to researchers in the control

405
00:18:23,450 --> 00:18:20,679
room allowing them to monitor in

406
00:18:26,370 --> 00:18:23,460
real-time what the pilot is seeing

407
00:18:28,710 --> 00:18:26,380
currently the f-16 working to improve

408
00:18:30,930 --> 00:18:28,720
close air support in Europe is checking

409
00:18:33,539 --> 00:18:30,940
technologies such as automated attack

410
00:18:35,850 --> 00:18:33,549
digital map systems for poor weather and

411
00:18:38,909 --> 00:18:35,860
night flying and target acquisition from

412
00:18:40,830 --> 00:18:38,919
ground control this testing utilizing

413
00:18:43,530 --> 00:18:40,840

computer-based artificial intelligence

414
00:18:45,630 --> 00:18:43,540
uses great amounts of data and requires

415
00:18:48,080 --> 00:18:45,640
the capacity to profit from in-flight

416
00:18:51,060 --> 00:18:48,090
Corrections and change the test agenda

417
00:18:52,590 --> 00:18:51,070
the range gives afty critical support

418
00:18:55,680 --> 00:18:52,600
which is not available anywhere else

419
00:18:58,670 --> 00:18:55,690
it's systems during flight offer more

420
00:19:01,410 --> 00:18:58,680
processed data in easily used form

421
00:19:03,210 --> 00:19:01,420
rim figures importantly by letting

422
00:19:05,970 --> 00:19:03,220
flight controllers reprogram for

423
00:19:08,460 --> 00:19:05,980
restricted altitudes fd's multiple

424
00:19:10,920 --> 00:19:08,470
program requirements and exacting test

425
00:19:12,810 --> 00:19:10,930
schedule demand optimal return from test

426
00:19:17,160 --> 00:19:12,820
flights and the range makes this

427
00:19:18,990 --> 00:19:17,170
possible effectively and safely some of

428
00:19:21,090 --> 00:19:19,000
the flight experimentation performed at

429
00:19:23,370 --> 00:19:21,100
Dryden has been so hazardous that

430
00:19:26,610 --> 00:19:23,380
researchers ruled out the use of onboard

431
00:19:28,680 --> 00:19:26,620
pilots for these high-risk programs they

432
00:19:32,430 --> 00:19:28,690
developed remotely piloted research

433
00:19:35,580 --> 00:19:32,440
vehicles called RP RVs the spin research

434
00:19:37,470 --> 00:19:35,590
vehicle was a characteristic RP RV it

435
00:19:40,650 --> 00:19:37,480
was carried aloft under the wing of a

436
00:19:43,560 --> 00:19:40,660
b-52 then air-launched typical of all

437
00:19:45,960 --> 00:19:43,570
air-launched vehicles RP RVs require

438
00:19:48,840 --> 00:19:45,970

precise coordination of carrier test

439
00:19:51,890 --> 00:19:48,850
aircraft and chase plane they consume

440
00:19:54,630 --> 00:19:51,900
enormous quantities of range support

441
00:19:56,630 --> 00:19:54,640
pilots fly remotely piloted research

442
00:19:58,650 --> 00:19:56,640
vehicles from cockpits on the ground

443
00:20:00,930 --> 00:19:58,660
depending completely on telemetry

444
00:20:03,420 --> 00:20:00,940
provided by the range to receive sensory

445
00:20:07,050 --> 00:20:03,430
information from and send commands to

446
00:20:09,150 --> 00:20:07,060
the airplane the ranges advanced antenna

447
00:20:12,060 --> 00:20:09,160
systems supply the primary command

448
00:20:13,560 --> 00:20:12,070
uplink to all of the RP RVs the

449
00:20:15,450 --> 00:20:13,570
complexity of flight maneuvers

450
00:20:17,520 --> 00:20:15,460
accommodated by this impressive system

451
00:20:20,430 --> 00:20:17,530
was demonstrated dramatically in the

452
00:20:23,040 --> 00:20:20,440
testing of hi Matt short for highly

453
00:20:25,350 --> 00:20:23,050
maneuverable aircraft technology hi Matt

454
00:20:29,160 --> 00:20:25,360
was one of Dryden's most spectacular RP

455
00:20:31,170 --> 00:20:29,170
RVs at about 3,400 pounds and less than

456
00:20:33,210 --> 00:20:31,180
half the size of an average fighter it

457
00:20:35,970 --> 00:20:33,220
allowed testing of a highly experimental

458
00:20:37,830 --> 00:20:35,980
configuration at considerably less cost

459
00:20:40,710 --> 00:20:37,840
than would have been the case with a man

460
00:20:42,780 --> 00:20:40,720
rated vehicle hi Matt was designed to be

461
00:20:45,090 --> 00:20:42,790
more maneuverable than any existing

462
00:20:46,920 --> 00:20:45,100
fighter and made turns pulling up to

463
00:20:49,050 --> 00:20:46,930

eight and a half times the force of

464
00:20:51,390 --> 00:20:49,060
Earth's gravity such maneuvers would

465
00:20:54,830 --> 00:20:51,400
cause extreme discomfort to even an

466
00:21:00,330 --> 00:20:57,600
the range antenna systems with their

467
00:21:01,920 --> 00:21:00,340
enormous capacity enabled the pilot to

468
00:21:04,800 --> 00:21:01,930
perform even the most complicated

469
00:21:07,080 --> 00:21:04,810
maneuvers from his ground cockpit its

470
00:21:09,270 --> 00:21:07,090
small size and quick movements made hi

471
00:21:11,910 --> 00:21:09,280
Mac very hard to track with conventional

472
00:21:14,550 --> 00:21:11,920
chase aircraft range tracking telemetry

473
00:21:17,340 --> 00:21:14,560
and command uplink made these flights

474
00:21:19,050 --> 00:21:17,350
possible the most dramatic use of

475
00:21:20,700 --> 00:21:19,060
command uplink was the full-scale

476
00:21:23,400 --> 00:21:20,710
transport controlled impact

477
00:21:25,860 --> 00:21:23,410
demonstration our prv called Sid for

478
00:21:28,050 --> 00:21:25,870
short Dryden conducted the SID

479
00:21:30,420 --> 00:21:28,060
experiment in cooperation with the FAA

480
00:21:32,790 --> 00:21:30,430
and NASA Langley to test the

481
00:21:35,100 --> 00:21:32,800
effectiveness of crashworthy advances

482
00:21:37,170 --> 00:21:35,110
including an eddy misting fuel designed

483
00:21:40,230 --> 00:21:37,180
to reduce damage from fire following a

484
00:21:43,230 --> 00:21:40,240
crash researchers instrumented this old

485
00:21:46,860 --> 00:21:43,240
be 720 passenger jet liner to be flown

486
00:21:48,660 --> 00:21:46,870
as a remotely piloted vehicle pilot Fitz

487
00:21:50,910 --> 00:21:48,670
Fulton worked for months in the ground

488
00:21:53,280 --> 00:21:50,920

cockpit and in the plane itself with

489
00:21:55,080 --> 00:21:53,290
range support to prepare the jet liners

490
00:21:58,110 --> 00:21:55,090
remotely controlled systems for its

491
00:22:09,090 --> 00:21:58,120
flight final impact during the crash

492
00:22:12,770 --> 00:22:11,039
while best known for carrying out

493
00:22:15,120 --> 00:22:12,780
research on high-performance aircraft

494
00:22:17,610 --> 00:22:15,130
bryden's range has supported a wide

495
00:22:19,919 --> 00:22:17,620
variety of test aircraft such as the

496
00:22:23,520 --> 00:22:19,929
gossamer albatross which was peddled

497
00:22:25,289 --> 00:22:23,530
somewhat like a bicycle the light eagle

498
00:22:27,299 --> 00:22:25,299
another human powered experimental

499
00:22:29,669 --> 00:22:27,309
airplane one for records during its

500
00:22:31,470 --> 00:22:29,679
range supported flight tests this

501
00:22:35,010 --> 00:22:31,480
aircraft was a Massachusetts Institute

502
00:22:36,900 --> 00:22:35,020
of Technology student project the idea

503
00:22:38,850 --> 00:22:36,910
came from Greek mythology accounts of

504
00:22:41,070 --> 00:22:38,860
Daedalus effort to build wings for human

505
00:22:43,529 --> 00:22:41,080
flight the eagle served as a prototype

506
00:22:45,870 --> 00:22:43,539
for the aircraft Daedalus which flew the

507
00:22:48,299 --> 00:22:45,880
74 mile distance from Crete to Santorini

508
00:22:50,940 --> 00:22:48,309
in a record-setting three hours 55

509
00:22:52,380 --> 00:22:50,950
minutes Dryden engineers supported the

510
00:22:55,950 --> 00:22:52,390
eagle flight tests with long-range

511
00:22:57,960 --> 00:22:55,960
optics and a video van to support

512
00:23:00,029 --> 00:22:57,970
development of the space shuttle Dryden

513
00:23:02,250 --> 00:23:00,039

researchers built and tested a series of

514
00:23:05,220 --> 00:23:02,260
wingless aircraft called lifting bodies

515
00:23:07,950 --> 00:23:05,230
the X 24 b was one of these aircraft

516
00:23:10,110 --> 00:23:07,960
they drew their lift entirely from their

517
00:23:14,279 --> 00:23:10,120
body shapes which acted like the wings

518
00:23:16,529 --> 00:23:14,289
of conventional airplanes the X 24 b was

519
00:23:18,810 --> 00:23:16,539
rocket-powered so we could reach speeds

520
00:23:20,460 --> 00:23:18,820
and altitudes similar to those

521
00:23:23,010 --> 00:23:20,470
encountered by the shuttle when it

522
00:23:25,350 --> 00:23:23,020
approaches to land the lifting bodies

523
00:23:27,270 --> 00:23:25,360
depended on range support for energy

524
00:23:30,779 --> 00:23:27,280
management and guidance to the landing

525
00:23:33,120 --> 00:23:30,789
site the uniquely configured x 29 a

526
00:23:35,460 --> 00:23:33,130
forward swept wing is entirely dependent

527
00:23:37,529 --> 00:23:35,470
on the range to conduct its flight tests

528
00:23:40,350 --> 00:23:37,539
this high-performance research aircraft

529
00:23:43,200 --> 00:23:40,360
maneuvers at very high speeds at the

530
00:23:45,539 --> 00:23:43,210
same time it requires constant computer

531
00:23:48,190 --> 00:23:45,549
adjustment and correction to position

532
00:23:51,129 --> 00:23:48,200
its exotic flight control surfaces

533
00:23:53,440 --> 00:23:51,139
the x29 set a whole new baseline for the

534
00:23:57,070 --> 00:23:53,450
range in real-time data processing and

535
00:23:59,440 --> 00:23:57,080
display range engineers answered the x29

536
00:24:01,480 --> 00:23:59,450
program demands by developing the

537
00:24:04,180 --> 00:24:01,490
necessary capabilities in just four

538
00:24:06,490 --> 00:24:04,190

months in the process they created

539
00:24:09,190 --> 00:24:06,500
facsimile zuv cockpit status panels on

540
00:24:11,049 --> 00:24:09,200
control room monitors they established a

541
00:24:13,149 --> 00:24:11,059
real-time satellite link between the

542
00:24:15,310 --> 00:24:13,159
Dryden range control room and the

543
00:24:17,620 --> 00:24:15,320
contractors home base in New York and

544
00:24:20,139 --> 00:24:17,630
they developed the capacity to deliver

545
00:24:22,539 --> 00:24:20,149
more than 4 million processed words per

546
00:24:25,120 --> 00:24:22,549
minute the control room display monitors

547
00:24:29,560 --> 00:24:25,130
and strip chart recorders on both sides

548
00:24:32,500 --> 00:24:29,570
of the continent in real-time the

549
00:24:34,960 --> 00:24:32,510
historic why f12 also was a completely

550
00:24:37,029 --> 00:24:34,970
range dependent test plane this

551
00:24:39,940 --> 00:24:37,039
high-performance vehicle flew so fast

552
00:24:42,190 --> 00:24:39,950
and so high that no other airplane could

553
00:24:44,860 --> 00:24:42,200
stay with it in a matter of moments it

554
00:24:47,049 --> 00:24:44,870
covered so much territory the Dryden had

555
00:24:50,169 --> 00:24:47,059
to maintain an extended range in order

556
00:24:52,539 --> 00:24:50,179
to test it as with the x-15 the EV and

557
00:24:54,960 --> 00:24:52,549
Beatty test sites in Nevada became range

558
00:24:57,399 --> 00:24:54,970
boundaries for YF 12 experiments

559
00:25:00,279 --> 00:24:57,409
officially clocked at two thousand two

560
00:25:02,590 --> 00:25:00,289
miles per hour the YF 12 with its air

561
00:25:05,470 --> 00:25:02,600
breathing engines was the prototype for

562
00:25:08,440 --> 00:25:05,480
hypersonic planes of the future the

563
00:25:10,779 --> 00:25:08,450

National aerospace plane or NASP will be

564
00:25:13,870 --> 00:25:10,789
such a hypersonic plane and much more

565
00:25:16,330 --> 00:25:13,880
this is the next generation air and

566
00:25:18,899 --> 00:25:16,340
spacecraft NASP will take off

567
00:25:22,090 --> 00:25:18,909
horizontally like an ordinary airplane

568
00:25:24,629 --> 00:25:22,100
accelerate to escape velocity leave the

569
00:25:27,220 --> 00:25:24,639
atmosphere and fly in low Earth orbit

570
00:25:30,460 --> 00:25:27,230
it'll re-enter the atmosphere and make a

571
00:25:32,950 --> 00:25:30,470
powered horizontal landing again like an

572
00:25:35,470 --> 00:25:32,960
ordinary airplane currently in the

573
00:25:37,840 --> 00:25:35,480
design phase this joint NASA air force

574
00:25:42,279 --> 00:25:37,850
research craft is targeted to make its

575
00:25:44,830 --> 00:25:42,289
first flight in 1994 NASP will take off

576
00:25:47,200 --> 00:25:44,840
and land at Edwards Air Force Base as

577
00:25:49,029 --> 00:25:47,210
the program progresses the plane will

578
00:25:52,570 --> 00:25:49,039
cover the continental United States in

579
00:25:54,549 --> 00:25:52,580
minutes during flights in the atmosphere

580
00:25:58,029 --> 00:25:54,559
range Mission Control will encompass

581
00:26:00,580 --> 00:25:58,039
every contiguous state when NASP begins

582
00:26:01,250 --> 00:26:00,590
orbital flights range scope will become

583
00:26:04,280 --> 00:26:01,260
world

584
00:26:06,970 --> 00:26:04,290
I'd telemetry will interface with NASA's

585
00:26:09,830 --> 00:26:06,980
tracking and data relay satellite system

586
00:26:11,540 --> 00:26:09,840
NASP test flights may require multiple

587
00:26:14,420 --> 00:26:11,550
fully equipped mobile trailers

588
00:26:16,670 --> 00:26:14,430

positioned at strategic locations range

589
00:26:18,650 --> 00:26:16,680
controllers and researchers will need to

590
00:26:22,420 --> 00:26:18,660
know where the plane is every moment in

591
00:26:25,790 --> 00:26:22,430
terms of latitude longitude and altitude

592
00:26:28,580 --> 00:26:25,800
at NASP speeds this will be a major

593
00:26:30,140 --> 00:26:28,590
accomplishment researchers will need

594
00:26:33,230 --> 00:26:30,150
ground computer processed

595
00:26:35,090 --> 00:26:33,240
instrumentation data during flights this

596
00:26:37,880 --> 00:26:35,100
will place extraordinary demands on

597
00:26:39,920 --> 00:26:37,890
range acquisition and processing getting

598
00:26:41,810 --> 00:26:39,930
ready for next generation test planes is

599
00:26:44,000 --> 00:26:41,820
a major challenge for Range engineers

600
00:26:46,010 --> 00:26:44,010
they're meeting it by developing

601
00:26:49,220 --> 00:26:46,020
next-generation equipment and support

602
00:26:51,980 --> 00:26:49,230
systems a prime example is the automated

603
00:26:54,470 --> 00:26:51,990
flight test management system or a TMS

604
00:26:56,810 --> 00:26:54,480
this is a highly advanced knowledge

605
00:26:59,570 --> 00:26:56,820
based system being developed to assist

606
00:27:02,090 --> 00:26:59,580
researchers plan and conduct flight test

607
00:27:05,390 --> 00:27:02,100
missions and make necessary changes in

608
00:27:07,640 --> 00:27:05,400
real time a flight engineer enters test

609
00:27:10,400 --> 00:27:07,650
parameters and aircraft performance

610
00:27:13,430 --> 00:27:10,410
characteristics and a TMS provides an

611
00:27:14,960 --> 00:27:13,440
ordered set of flight test points a TMS

612
00:27:17,300 --> 00:27:14,970
designers are experimenting with

613
00:27:20,420 --> 00:27:17,310

artificial intelligence to direct flight

614
00:27:22,460 --> 00:27:20,430
control programs they anticipate big

615
00:27:24,350 --> 00:27:22,470
benefits for programs requiring the

616
00:27:26,540 --> 00:27:24,360
ability to record small changes in

617
00:27:30,290 --> 00:27:26,550
aircraft parameters during repeated

618
00:27:32,420 --> 00:27:30,300
maneuvers from its earliest days the

619
00:27:34,220 --> 00:27:32,430
Western aeronautical test range has

620
00:27:36,160 --> 00:27:34,230
played a key role in advancing the

621
00:27:38,720 --> 00:27:36,170
latest concepts in air and spacecraft

622
00:27:41,000 --> 00:27:38,730
the best aeronautical engineers have

623
00:27:43,430 --> 00:27:41,010
used its facilities to maximize their

624
00:27:45,830 --> 00:27:43,440
research Milt Thompson is the chief

625
00:27:47,530 --> 00:27:45,840
engineer at Ames Dryden Thomson was a

626
00:27:51,440 --> 00:27:47,540
test pilot on both the history-making

627
00:27:53,630 --> 00:27:51,450
x-15 and lifting body aircraft he had a

628
00:27:55,670 --> 00:27:53,640
major part in creating the tradition of

629
00:27:57,350 --> 00:27:55,680
excellence here he's among the few

630
00:27:59,270 --> 00:27:57,360
people qualified to give firsthand

631
00:28:01,460 --> 00:27:59,280
perspective on the development of

632
00:28:04,400 --> 00:28:01,470
today's aeronautics and the direction of

633
00:28:09,990 --> 00:28:04,410
tomorrow's research key programs that

634
00:28:14,160 --> 00:28:10,000
kind of defined the range were the x-15

635
00:28:20,540 --> 00:28:14,170
and subsequent to that the YF 12 that

636
00:28:23,720 --> 00:28:20,550
had an extremely long range requiring

637
00:28:26,670 --> 00:28:23,730
tracking communications and data relay

638
00:28:29,960 --> 00:28:26,680

the NASA program will provide the next

639
00:28:32,960 --> 00:28:29,970
challenge for the range and of course

640
00:28:36,270 --> 00:28:32,970
will be an extremely high speed vehicle

641
00:28:38,850 --> 00:28:36,280
potentially going on into orbit and it

642
00:28:43,140 --> 00:28:38,860
will cover an awful lot of distance in

643
00:28:46,440 --> 00:28:43,150
its test program and during say an

644
00:28:48,150 --> 00:28:46,450
acceleration up to orbital speeds and it

645
00:28:51,180 --> 00:28:48,160
will require almost a worldwide

646
00:28:56,010 --> 00:28:51,190
capability worldwide tracking capability

647
00:28:58,620 --> 00:28:56,020
to follow the vehicle in its development

648
00:29:01,320 --> 00:28:58,630
program any other program other than

649
00:29:08,190 --> 00:29:01,330
NASA that involves extremely high speeds

650
00:29:11,250 --> 00:29:08,200
will be candidates also for good

651
00:29:16,040 --> 00:29:11,260
utilization of the high range for

652
00:29:20,190 --> 00:29:16,050
example any scramjet or ram jet

653
00:29:22,170 --> 00:29:20,200
propulsion test programs there again the

654
00:29:25,230 --> 00:29:22,180
speeds will be high and it will require

655
00:29:28,680 --> 00:29:25,240
the support of a range such as what we

656
00:29:33,810 --> 00:29:28,690
currently have these become essential as

657
00:29:37,440 --> 00:29:33,820
I indicated for safety to ensure that we

658
00:29:40,100 --> 00:29:37,450
know where the vehicle is and are able

659
00:29:44,280 --> 00:29:40,110
to guide the vehicle back to a

660
00:29:49,590 --> 00:29:44,290
successful landing the range has been an

661
00:29:52,820 --> 00:29:49,600
essential part of the development of the

662
00:29:57,520 --> 00:29:52,830
high-speed aircraft without the range I

663
00:30:06,160 --> 00:30:01,450

you have to have this tracking

664
00:30:09,700 --> 00:30:06,170
capability and the data transmission

665
00:30:12,280 --> 00:30:09,710
capability to really do a development

666
00:30:15,190 --> 00:30:12,290
program on these higher speed vehicles

667
00:30:19,420 --> 00:30:15,200
in my opinion there is just no question

668
00:30:23,070 --> 00:30:19,430
that we have an unsurpassed capability

669
00:30:26,020 --> 00:30:23,080
as far as being able to handle

670
00:30:28,900 --> 00:30:26,030
aeronautical research programs within

671
00:30:32,280 --> 00:30:28,910
this country and very likely within the

672
00:30:34,720 --> 00:30:32,290
world building on its basic capabilities

673
00:30:38,430 --> 00:30:34,730
television downlink including heads-up

674
00:30:41,610 --> 00:30:38,440
display guidance and control uplink

675
00:30:44,470 --> 00:30:41,620
worldwide tracking network ties and

676
00:30:46,090 --> 00:30:44,480
transmission of data to any location the

677
00:30:48,150 --> 00:30:46,100
Western aeronautical test range

678
00:30:50,800 --> 00:30:48,160
undergoes continuous expansion

679
00:30:52,600 --> 00:30:50,810
refinement and improvement at the hands

680
00:30:57,760 --> 00:30:52,610
of its top professional engineers and

681
00:31:00,040 --> 00:30:57,770
support team since the time of the x-15

682
00:31:02,200 --> 00:31:00,050
the range is experienced astounding

683
00:31:04,330 --> 00:31:02,210
transformations and expanded its

684
00:31:07,150 --> 00:31:04,340
capabilities to become the complex and

685
00:31:09,220 --> 00:31:07,160
indispensable network it is today it

686
00:31:11,910 --> 00:31:09,230
will continue to be a vital resource for

687
00:31:15,100 --> 00:31:11,920
testing air and spacecraft of the future

688
00:31:17,710 --> 00:31:15,110

such future research craft from exotic

689
00:31:19,750 --> 00:31:17,720
forms only now being familiar to those

690
00:31:22,150 --> 00:31:19,760
we have not yet imagined will share a

691
00:31:23,700 --> 00:31:22,160
common link they will depend on the

692
00:31:25,990 --> 00:31:23,710
Western aeronautical test range