

A man in a white shirt is standing next to a large, white rocket engine. The engine has black bands and the word "COLBERT" written on it. The man is looking towards the camera with a serious expression. The background is a blurred industrial setting.

The American

ROCKETEER

1  
00:00:00,630 --> 00:00:08,950

[Music]

2  
00:00:12,870 --> 00:00:10,709

on the outskirts of paris

3  
00:00:15,669 --> 00:00:12,880

there is an unusual home that has been

4  
00:00:17,990 --> 00:00:15,679

turned into a museum of sorts

5  
00:00:19,269 --> 00:00:18,000  
it is a place filled with memories

6  
00:00:21,830 --> 00:00:19,279

letters

7  
00:00:25,189 --> 00:00:21,840

and electronic paintings all of them

8  
00:00:27,269 --> 00:00:25,199

awaiting discovery by a larger world

9  
00:00:30,550 --> 00:00:27,279

they are the expressions of a man who

10  
00:00:33,030 --> 00:00:30,560

dreamt of exploring the heavens

11  
00:00:34,940 --> 00:00:33,040

his was a complicated life filled with

12  
00:00:36,870 --> 00:00:34,950

ironies and contradictions

13  
00:00:39,510 --> 00:00:36,880

[Music]

14

00:00:41,990 --> 00:00:39,520

an american by birth he became a citizen

15

00:00:44,389 --> 00:00:42,000

of the world

16

00:00:47,270 --> 00:00:44,399

though trained as an engineer he was

17

00:00:49,590 --> 00:00:47,280

drawn to the creative arts

18

00:00:51,510 --> 00:00:49,600

highly articulate he found it difficult

19

00:00:54,630 --> 00:00:51,520

to express his feelings

20

00:00:57,270 --> 00:00:54,640

even with those closest to him he was a

21

00:01:01,510 --> 00:00:57,280

pacifist who built weapons

22

00:01:03,750 --> 00:01:01,520

and a socialist who became a millionaire

23

00:01:05,509 --> 00:01:03,760

he set aside personal convictions to

24

00:01:07,510 --> 00:01:05,519

help win a world war

25

00:01:08,550 --> 00:01:07,520

only to later see his country turn

26

00:01:10,830 --> 00:01:08,560

against him

27

00:01:13,429 --> 00:01:10,840

and declare him an international

28

00:01:15,270 --> 00:01:13,439

fugitive

29

00:01:18,149 --> 00:01:15,280

through it all he kept meticulous

30

00:01:20,550 --> 00:01:18,159

records hoping to ensure his pioneering

31

00:01:23,749 --> 00:01:20,560

role in american rocketry

32

00:01:27,109 --> 00:01:23,759

but today he has been largely forgotten

33

00:01:31,109 --> 00:01:27,119

few know of his contributions or even

34

00:01:32,789 --> 00:01:31,119

his name but from his passion for

35

00:01:33,590 --> 00:01:32,799

reaching beyond the boundaries of the

36

00:01:35,990 --> 00:01:33,600

earth

37

00:01:39,190 --> 00:01:36,000

would emerge the world's premier center

38

00:01:41,749 --> 00:01:39,200

for exploring the solar system

39

00:01:43,190 --> 00:01:41,759

this is the story of one man's reach for

40

00:01:46,310 --> 00:01:43,200

the stars

41

00:01:49,429 --> 00:01:46,320

and how his ideas and idealism put him

42

00:01:52,830 --> 00:01:49,439

on a collision course with the world

43

00:02:02,950 --> 00:01:52,840

it is the story of the american

44

00:02:17,190 --> 00:02:13,750

[Music]

45

00:02:19,510 --> 00:02:17,200

in the fall of 1934 a young college

46

00:02:22,229 --> 00:02:19,520

graduate climbed aboard a train in texas

47

00:02:24,229 --> 00:02:22,239

and headed west

48

00:02:26,390 --> 00:02:24,239

his college professors had chipped in to

49

00:02:30,490 --> 00:02:26,400

help buy his train ticket

50

00:02:34,830 --> 00:02:30,500

he was now headed for pasadena

51  
00:02:47,830 --> 00:02:34,840  
[Music]

52  
00:02:47,840 --> 00:02:51,390  
and orange trees

53  
00:02:54,560 --> 00:02:54,550  
[Music]

54  
00:02:59,030 --> 00:02:56,390  
the young texan who stepped off the

55  
00:02:59,750 --> 00:02:59,040  
train found himself in a land of orange

56  
00:03:02,630 --> 00:02:59,760  
groves

57  
00:03:03,670 --> 00:03:02,640  
mansions parades and one of the world's

58  
00:03:06,550 --> 00:03:03,680  
leading engineering

59  
00:03:09,030 --> 00:03:06,560  
universities the california institute of

60  
00:03:10,949 --> 00:03:09,040  
technology

61  
00:03:13,920 --> 00:03:10,959  
caltech had accepted him into its

62  
00:03:15,270 --> 00:03:13,930  
graduate aviation program

63  
00:03:18,710 --> 00:03:15,280

[Music]

64

00:03:22,550 --> 00:03:18,720

his name was frank molina

65

00:03:24,710 --> 00:03:22,560

september 14 1934. dear folks

66

00:03:26,710 --> 00:03:24,720

i stayed all day looking over the school

67

00:03:29,190 --> 00:03:26,720

and finding a place to stay

68

00:03:31,589 --> 00:03:29,200

it is a fine school you can see that it

69

00:03:34,309 --> 00:03:31,599

has quality

70

00:03:37,830 --> 00:03:34,319

caltech and pasadena were a world away

71

00:03:42,229 --> 00:03:40,630

he was a first generation texan born of

72

00:03:46,550 --> 00:03:42,239

czech immigrant parents

73

00:03:48,789 --> 00:03:46,560

both of whom were musicians

74

00:03:51,110 --> 00:03:48,799

frank molina was expected to follow his

75

00:03:53,589 --> 00:03:51,120

father's musical footsteps

76  
00:03:54,869 --> 00:03:53,599  
but instead of music the young boy was

77  
00:03:58,830 --> 00:03:54,879  
drawn to science

78  
00:04:00,309 --> 00:03:58,840  
mathematics and art much to his father's

79  
00:04:02,630 --> 00:04:00,319  
dismay

80  
00:04:04,789 --> 00:04:02,640  
he made many cynical remarks about it

81  
00:04:06,710 --> 00:04:04,799  
that i bore very painfully

82  
00:04:08,149 --> 00:04:06,720  
he also i recall belittled my

83  
00:04:10,710 --> 00:04:08,159  
intelligence many times

84  
00:04:11,670 --> 00:04:10,720  
in other matters he was never really

85  
00:04:14,390 --> 00:04:11,680  
brutal about it

86  
00:04:16,789 --> 00:04:14,400  
explicitly but i knew that he carried

87  
00:04:21,110 --> 00:04:16,799  
many disappointments about his boy

88  
00:04:25,030 --> 00:04:23,430

molina's forceful father expressed not

89

00:04:26,710 --> 00:04:25,040

only disappointments

90

00:04:29,110 --> 00:04:26,720

but the desire that his son should

91

00:04:31,510 --> 00:04:29,120

pursue a military career

92

00:04:32,270 --> 00:04:31,520

an expectation at odds with molina's own

93

00:04:33,749 --> 00:04:32,280

ambitions

94

00:04:35,990 --> 00:04:33,759

[Music]

95

00:04:38,230 --> 00:04:36,000

early on he showed signs of a strong

96

00:04:40,390 --> 00:04:38,240

independent streak

97

00:04:42,469 --> 00:04:40,400

in his senior high school yearbook he

98

00:04:43,350 --> 00:04:42,479

declared to the world that he would

99

00:04:48,550 --> 00:04:43,360

follow

100

00:04:52,469 --> 00:04:50,710

after high school the cash-strapped

101

00:04:55,590 --> 00:04:52,479

molina enrolled at texas a

102

00:04:57,510 --> 00:04:55,600

m he majored in mechanical engineering

103

00:05:00,710 --> 00:04:57,520

and played trumpet in the aggie band to

104

00:05:02,870 --> 00:05:00,720

help pay for his tuition

105

00:05:04,870 --> 00:05:02,880

though he did well in his studies he did

106

00:05:06,310 --> 00:05:04,880

not fit in with the military culture of

107

00:05:09,189 --> 00:05:06,320

the school

108

00:05:13,029 --> 00:05:09,199

refusing to curse like the other boys he

109

00:05:16,790 --> 00:05:15,350

turning inward molina became a voracious

110

00:05:19,189 --> 00:05:16,800

writer and reader

111

00:05:22,390 --> 00:05:19,199

he kept a detailed journal noting every

112

00:05:26,070 --> 00:05:24,150

believing himself destined for a place

113

00:05:29,029 --> 00:05:26,080

in history he encouraged others to

114

00:05:31,510 --> 00:05:29,039

safeguard his letters

115

00:05:32,150 --> 00:05:31,520

having before only dabbled with drawing

116

00:05:34,790 --> 00:05:32,160

he became

117

00:05:37,029 --> 00:05:34,800

serious about art and drew

118

00:05:39,270 --> 00:05:37,039

self-portraits

119

00:05:41,430 --> 00:05:39,280

on his dorm wall he put up depictions of

120

00:05:44,629 --> 00:05:41,440

famous figures

121

00:05:48,150 --> 00:05:44,639

some were from the past

122

00:05:50,870 --> 00:05:48,160

there were world war one generals

123

00:05:52,629 --> 00:05:50,880

and the famed aviator charles lindbergh

124

00:05:53,350 --> 00:05:52,639

whose solitary flight across the

125

00:05:57,110 --> 00:05:53,360

atlantic

126  
00:05:59,029 --> 00:05:57,120  
had only recently electrified the world

127  
00:06:00,950 --> 00:05:59,039  
aviation was pushing the outermost

128  
00:06:03,110 --> 00:06:00,960  
boundaries of technology

129  
00:06:05,749 --> 00:06:03,120  
and it was the place molina intended to

130  
00:06:08,309 --> 00:06:05,759  
make his own mark

131  
00:06:10,550 --> 00:06:08,319  
and to study aviation there was no

132  
00:06:12,710 --> 00:06:10,560  
better place in the world to be than cal

133  
00:06:16,629 --> 00:06:12,720  
tech

134  
00:06:18,870 --> 00:06:16,639  
here was a state-of-the-art wind tunnel

135  
00:06:20,629 --> 00:06:18,880  
and a professor world renowned for his

136  
00:06:24,070 --> 00:06:20,639  
work in aerodynamics

137  
00:06:27,430 --> 00:06:24,080  
who would take molina under his wing

138  
00:06:29,110 --> 00:06:27,440

dear mr molina i'm very happy to inform

139

00:06:31,110 --> 00:06:29,120

you that you have been awarded a wind

140

00:06:33,749 --> 00:06:31,120

tunnel assistantship at the institute

141

00:06:35,990 --> 00:06:33,759

for the next year covering your tuition

142

00:06:38,469 --> 00:06:36,000

of three hundred dollars

143

00:06:39,029 --> 00:06:38,479

such work would be at the rate of 80

144

00:06:42,390 --> 00:06:39,039

cents

145

00:06:46,629 --> 00:06:42,400

an hour very sincerely yours

146

00:06:47,590 --> 00:06:46,639

theodore from carmen theodore von carmen

147

00:06:50,870 --> 00:06:47,600

was considered an

148

00:06:52,550 --> 00:06:50,880

undisputed genius a fact not lost to him

149

00:06:54,150 --> 00:06:52,560

when he ranked the greatest scientists

150

00:06:55,909 --> 00:06:54,160

of all time

151

00:06:58,790 --> 00:06:55,919

sir isaac newton was at the top for

152

00:07:01,029 --> 00:06:58,800

having had six original ideas

153

00:07:02,230 --> 00:07:01,039

next came einstein whom von carmen

154

00:07:05,350 --> 00:07:02,240

credited with having had

155

00:07:09,430 --> 00:07:05,360

four great ideas in my case

156

00:07:16,629 --> 00:07:09,440

i have had three great ideas maybe more

157

00:07:18,870 --> 00:07:16,639

yes perhaps three and a half great ideas

158

00:07:20,309 --> 00:07:18,880

von carmen was as sociable as he was

159

00:07:22,550 --> 00:07:20,319

intelligent

160

00:07:24,550 --> 00:07:22,560

he loved to smoke cigars drink bourbon

161

00:07:27,670 --> 00:07:24,560

out of tall glasses

162

00:07:31,029 --> 00:07:27,680

and flirt with beautiful women

163

00:07:33,670 --> 00:07:31,039

his home in pasadena was the site of

164

00:07:36,469 --> 00:07:33,680

apparently remarkable dinner parties

165

00:07:39,029 --> 00:07:36,479

where he drew intellectuals and other

166

00:07:39,670 --> 00:07:39,039

cultured figures from the los angeles

167

00:07:41,029 --> 00:07:39,680

area

168

00:07:43,430 --> 00:07:41,039

and seems to have been a rather

169

00:07:45,029 --> 00:07:43,440

remarkable kind of salon that went on

170

00:07:47,189 --> 00:07:45,039

for a number of years

171

00:07:49,189 --> 00:07:47,199

under his aegis and that of his sister

172

00:07:51,830 --> 00:07:49,199

and his mother

173

00:07:53,830 --> 00:07:51,840

besides the famous von carmen often

174

00:07:56,629 --> 00:07:53,840

invited his brightest students to his

175

00:07:59,110 --> 00:07:56,639

home for dinner and conversation

176

00:08:00,550 --> 00:07:59,120

he was like a mother hen with his chicks

177

00:08:03,029 --> 00:08:00,560

around him these were all

178

00:08:04,390 --> 00:08:03,039

young men whom he loved and felt very

179

00:08:07,670 --> 00:08:04,400

close to

180

00:08:09,060 --> 00:08:07,680

he was a mentor to all of them he was

181

00:08:11,110 --> 00:08:09,070

simply wonderful

182

00:08:13,749 --> 00:08:11,120

[Music]

183

00:08:15,189 --> 00:08:13,759

over time von carmen and molina became

184

00:08:17,189 --> 00:08:15,199

especially close

185

00:08:19,430 --> 00:08:17,199

the hungarian professor helped introduce

186

00:08:22,070 --> 00:08:19,440

his graduate student to a larger world

187

00:08:24,230 --> 00:08:22,080

and a dizzying swirl of subjects

188

00:08:26,150 --> 00:08:24,240

all of which molina shared in his weekly

189

00:08:28,390 --> 00:08:26,160

letter to his parents

190

00:08:29,270 --> 00:08:28,400

my brain is going round and round with

191

00:08:32,709 --> 00:08:29,280

airplanes

192

00:08:35,589 --> 00:08:32,719

socialism capitalism logic napoleon

193

00:08:37,350 --> 00:08:35,599

opera and thermodynamics our slide rules

194

00:08:39,110 --> 00:08:37,360

are being worn out

195

00:08:49,350 --> 00:08:39,120

i am certainly forced to learn a lot

196

00:08:53,910 --> 00:08:51,990

as molina's letter home hinted he was

197

00:08:54,790 --> 00:08:53,920

becoming intensely interested in

198

00:08:57,910 --> 00:08:54,800

politics

199

00:09:00,310 --> 00:08:57,920

and how to solve the great depression it

200

00:09:03,430 --> 00:09:00,320

was the era of roosevelt's new deal

201  
00:09:05,110 --> 00:09:03,440  
and socialism if not communism seemed to

202  
00:09:06,090 --> 00:09:05,120  
offer solutions for the stricken

203  
00:09:07,430 --> 00:09:06,100  
american economy

204  
00:09:11,030 --> 00:09:07,440  
[Music]

205  
00:09:12,550 --> 00:09:11,040  
in the 1930s he is not unlike a lot of

206  
00:09:15,910 --> 00:09:12,560  
intellectuals

207  
00:09:18,310 --> 00:09:15,920  
attracted to to marxism

208  
00:09:20,710 --> 00:09:18,320  
and learning a little bit about a sense

209  
00:09:21,990 --> 00:09:20,720  
of social and economic justice and how

210  
00:09:23,750 --> 00:09:22,000  
they might be able to achieve

211  
00:09:25,030 --> 00:09:23,760  
those and it's important to understand

212  
00:09:27,190 --> 00:09:25,040  
that in that era

213  
00:09:29,110 --> 00:09:27,200

marxism did not necessarily have the

214

00:09:31,829 --> 00:09:29,120

broad negative connotations that it

215

00:09:34,630 --> 00:09:31,839

would gain during the cold war

216

00:09:36,470 --> 00:09:34,640

dear folks if the depression continues

217

00:09:38,150 --> 00:09:36,480

and war doesn't break out

218

00:09:41,030 --> 00:09:38,160

perhaps we will have some form of

219

00:09:42,790 --> 00:09:41,040

socialism even before some people think

220

00:09:44,470 --> 00:09:42,800

there is plenty of reason for the rich

221

00:09:45,910 --> 00:09:44,480

class to be afraid

222

00:09:50,389 --> 00:09:45,920

don't worry about me getting into

223

00:09:52,230 --> 00:09:50,399

politics that is unavoidable

224

00:09:53,990 --> 00:09:52,240

there were so many terrible things

225

00:09:55,430 --> 00:09:54,000

happening in this country with the

226

00:09:57,509 --> 00:09:55,440

depression

227

00:09:59,590 --> 00:09:57,519

so this was not a rare thing it's a

228

00:10:02,790 --> 00:09:59,600

great deal that was being talked about

229

00:10:06,389 --> 00:10:02,800

and particularly among people like

230

00:10:08,870 --> 00:10:06,399

that you had at caltech whose minds were

231

00:10:10,470 --> 00:10:08,880

very active and very bright

232

00:10:13,750 --> 00:10:10,480

of course they would be looking into

233

00:10:15,910 --> 00:10:13,760

this there's no question about it

234

00:10:17,590 --> 00:10:15,920

many political discussions that molina

235

00:10:19,509 --> 00:10:17,600

attended took place at the home of

236

00:10:20,790 --> 00:10:19,519

caltech research assistant sydney

237

00:10:22,550 --> 00:10:20,800

weinbaum

238

00:10:24,470 --> 00:10:22,560

the russian-born wine bomb was a

239

00:10:26,389 --> 00:10:24,480

formidable intellectual

240

00:10:27,750 --> 00:10:26,399

he was a theoretical physicist a

241

00:10:30,870 --> 00:10:27,760

talented pianist

242

00:10:32,550 --> 00:10:30,880

and a master of chess he was also the

243

00:10:34,710 --> 00:10:32,560

head of the pasadena branch of the

244

00:10:37,030 --> 00:10:34,720

communist party

245

00:10:38,150 --> 00:10:37,040

in the years to come molina's friendship

246

00:10:46,800 --> 00:10:38,160

with wine bomb

247

00:10:51,110 --> 00:10:46,810

would have far-reaching consequences

248

00:10:54,389 --> 00:10:51,120

[Music]

249

00:10:54,949 --> 00:10:54,399

i'm happy my cows have flown away a new

250

00:10:58,829 --> 00:10:54,959

day

251  
00:11:01,509 --> 00:10:58,839  
with nothing enjoying let's dance

252  
00:11:03,990 --> 00:11:01,519  
together

253  
00:11:04,550 --> 00:11:04,000  
though politically brash frank molina

254  
00:11:07,750 --> 00:11:04,560  
was no

255  
00:11:10,069 --> 00:11:07,760  
firebrand revolutionary his letters home

256  
00:11:11,829 --> 00:11:10,079  
quickly jumped from politics to opera to

257  
00:11:15,030 --> 00:11:11,839  
the aggie football team

258  
00:11:18,150 --> 00:11:15,040  
to a budding social life

259  
00:11:19,590 --> 00:11:18,160  
dear folks last night i went to a dance

260  
00:11:21,509 --> 00:11:19,600  
at the athenian

261  
00:11:23,750 --> 00:11:21,519  
i had a good dancing partner so i

262  
00:11:25,430 --> 00:11:23,760  
enjoyed the evening very much

263  
00:11:27,590 --> 00:11:25,440

hope you get to see the athenaeum

264

00:11:28,630 --> 00:11:27,600

someday as it is really a beautiful

265

00:11:30,790 --> 00:11:28,640

place

266

00:11:34,630 --> 00:11:30,800

everything is kept as nearly as perfect

267

00:11:38,790 --> 00:11:36,630

there was yet another topic swirling in

268

00:11:41,190 --> 00:11:38,800

molina's mind

269

00:11:43,230 --> 00:11:41,200

might rocketry be worth pursuing as a

270

00:11:50,150 --> 00:11:43,240

career

271

00:11:52,310 --> 00:11:50,160

[Music]

272

00:11:53,430 --> 00:11:52,320

so far as respectable scientists were

273

00:11:58,140 --> 00:11:53,440

concerned

274

00:12:04,230 --> 00:11:58,150

rocketry was really buck rogers stuff

275

00:12:07,590 --> 00:12:06,150

no one wanting to advance their career

276

00:12:10,550 --> 00:12:07,600

in academia was thinking

277

00:12:11,190 --> 00:12:10,560

seriously of becoming a rocket scientist

278

00:12:13,910 --> 00:12:11,200

in fact

279

00:12:15,590 --> 00:12:13,920

the words rocket and scientist had yet

280

00:12:20,310 --> 00:12:15,600

to have been joined together as a

281

00:12:23,350 --> 00:12:22,870

it was very much an amateur sort of

282

00:12:29,509 --> 00:12:23,360

thing

283

00:12:30,550 --> 00:12:29,519

there was a widely used astronomy

284

00:12:33,350 --> 00:12:30,560

textbook

285

00:12:34,790 --> 00:12:33,360

published in the early 1930s which said

286

00:12:37,269 --> 00:12:34,800

that rocket flight was

287

00:12:39,110 --> 00:12:37,279

impossible it was something that was

288

00:12:40,310 --> 00:12:39,120

really not even on the fringes even

289

00:12:44,000 --> 00:12:40,320

beyond the fringes

290

00:12:44,010 --> 00:12:48,150

[Music]

291

00:12:52,389 --> 00:12:50,069

molina's interest in rockets might have

292

00:12:52,710 --> 00:12:52,399

been a passing whimsy had not two young

293

00:12:54,069 --> 00:12:52,720

men

294

00:12:56,790 --> 00:12:54,079

approached him with an intriguing

295

00:12:59,190 --> 00:12:56,800

proposal might the three of them

296

00:13:01,269 --> 00:12:59,200

these two strangers asked team up and

297

00:13:03,590 --> 00:13:01,279

build rockets

298

00:13:05,509 --> 00:13:03,600

their names were ed forman and john

299

00:13:07,110 --> 00:13:05,519

whiteside's parsons

300

00:13:09,670 --> 00:13:07,120

they had been friends since meeting on a

301  
00:13:10,710 --> 00:13:09,680  
schoolyard neither possessed a college

302  
00:13:13,030 --> 00:13:10,720  
degree

303  
00:13:17,350 --> 00:13:13,040  
but what they lacked in their education

304  
00:13:19,269 --> 00:13:17,360  
they more than made up for in enthusiasm

305  
00:13:20,790 --> 00:13:19,279  
apparently it was just electricity they

306  
00:13:21,990 --> 00:13:20,800  
shared this dream of building high

307  
00:13:25,350 --> 00:13:22,000  
altitude rockets

308  
00:13:26,389 --> 00:13:25,360  
and my dad must have been already

309  
00:13:29,430 --> 00:13:26,399  
thinking about it

310  
00:13:30,630 --> 00:13:29,440  
seriously and so

311  
00:13:33,030 --> 00:13:30,640  
it was just electric

312  
00:13:35,030 --> 00:13:33,040  
[Music]

313  
00:13:37,509 --> 00:13:35,040

foreman was a mechanic who knew how to

314

00:13:39,350 --> 00:13:37,519

bend metal into rocket casings

315

00:13:42,310 --> 00:13:39,360

parsons was a chemist who could fill

316

00:13:44,230 --> 00:13:42,320

those casings with rocket fuel

317

00:13:46,470 --> 00:13:44,240

what they needed was the scientific

318

00:13:48,310 --> 00:13:46,480

discipline molina could provide

319

00:13:50,310 --> 00:13:48,320

and the sponsorship of a caltech

320

00:13:52,150 --> 00:13:50,320

professor

321

00:13:55,350 --> 00:13:52,160

von carmen with an affinity for the

322

00:13:57,990 --> 00:13:55,360

unorthodox gave the project his blessing

323

00:14:00,389 --> 00:13:58,000

but there were conditions they could

324

00:14:03,269 --> 00:14:00,399

make use of his laboratory but only in

325

00:14:03,990 --> 00:14:03,279

off hours and they would have to raise

326

00:14:07,829 --> 00:14:04,000

their own

327

00:14:08,870 --> 00:14:07,839

funds i was immediately captivated by

328

00:14:11,590 --> 00:14:08,880

the earnestness

329

00:14:13,110 --> 00:14:11,600

and the enthusiasm of these young men

330

00:14:15,430 --> 00:14:13,120

most young people are quite

331

00:14:17,990 --> 00:14:15,440

serious about their dreams so this in

332

00:14:20,870 --> 00:14:18,000

itself was not what interested me

333

00:14:23,910 --> 00:14:20,880

it was the unusually strong background

334

00:14:26,150 --> 00:14:23,920

and drive of these young rocketeers

335

00:14:27,829 --> 00:14:26,160

parsons and foreman told me that their

336

00:14:29,910 --> 00:14:27,839

backyards in pasadena

337

00:14:33,910 --> 00:14:29,920

were pockmarked from the effects of

338

00:14:39,350 --> 00:14:37,269

foreman and molina would never be close

339

00:14:40,710 --> 00:14:39,360

but molina and parsons found their

340

00:14:43,189 --> 00:14:40,720

interests meshed beyond

341

00:14:45,030 --> 00:14:43,199

rockets there were common interests in

342

00:14:47,509 --> 00:14:45,040

music and literature

343

00:14:48,629 --> 00:14:47,519

years later molina summed up parsons as

344

00:14:50,949 --> 00:14:48,639

rather exotic

345

00:14:54,150 --> 00:14:50,959

of the cultist type which of course was

346

00:14:55,829 --> 00:14:54,160

not unusual in california

347

00:14:57,430 --> 00:14:55,839

it was a clever but obscuring

348

00:15:00,069 --> 00:14:57,440

description of parsons

349

00:15:00,870 --> 00:15:00,079

who was in fact a practitioner of black

350

00:15:04,150 --> 00:15:00,880

magic

351

00:15:08,069 --> 00:15:07,030

parsons love to recite pagan poetry to

352

00:15:11,590 --> 00:15:08,079

the sky

353

00:15:16,550 --> 00:15:14,790

he stood six foot one with dark wavy

354

00:15:18,790 --> 00:15:16,560

hair a small mustache

355

00:15:23,189 --> 00:15:18,800

and penetrating black eyes which

356

00:15:27,750 --> 00:15:24,870

when parsons wasn't working with

357

00:15:29,430 --> 00:15:27,760

explosives he headed a local chapter of

358

00:15:33,030 --> 00:15:29,440

a religious sect

359

00:15:37,030 --> 00:15:33,040

the membership was sworn to obey the law

360

00:15:40,230 --> 00:15:37,040

there is no law beyond do what thou wilt

361

00:15:43,749 --> 00:15:40,240

do what thou wilt shall be the whole of

362

00:15:47,269 --> 00:15:45,350

i think my father went to some of those

363

00:15:49,269 --> 00:15:47,279

parties which were pretty wild but then

364

00:15:50,870 --> 00:15:49,279

you know i grew up in the 60s

365

00:15:52,870 --> 00:15:50,880

when parties were pretty wild as

366

00:15:54,790 --> 00:15:52,880

students

367

00:15:57,350 --> 00:15:54,800

certainly my dad had no interest in

368

00:15:59,749 --> 00:15:57,360

astrology or no interest in mysticism

369

00:16:01,509 --> 00:15:59,759

and so this was really very far from his

370

00:16:03,350 --> 00:16:01,519

view of the world and what made it tick

371

00:16:04,710 --> 00:16:03,360

and yet it was something that came with

372

00:16:06,470 --> 00:16:04,720

the package

373

00:16:08,230 --> 00:16:06,480

that must have been an innate part of my

374

00:16:10,069 --> 00:16:08,240

dad's personality was

375

00:16:15,829 --> 00:16:10,079

a tolerance for bright people with

376  
00:16:20,230 --> 00:16:18,150  
they made for an odd trio but they were

377  
00:16:25,110 --> 00:16:20,240  
bound together by their desire to build

378  
00:16:28,550 --> 00:16:27,030  
for months they sketched out blueprint

379  
00:16:31,749 --> 00:16:28,560  
drawings and then hammered them into

380  
00:16:36,550 --> 00:16:34,829  
finally they were ready for their first

381  
00:16:38,470 --> 00:16:36,560  
test

382  
00:16:40,230 --> 00:16:38,480  
parsons and foreman accustomed to the

383  
00:16:41,350 --> 00:16:40,240  
thrill of launching their rockets up

384  
00:16:43,110 --> 00:16:41,360  
into the sky

385  
00:16:44,790 --> 00:16:43,120  
found that molina demanded that the

386  
00:16:46,550 --> 00:16:44,800  
first test should simply measure the

387  
00:16:48,790 --> 00:16:46,560  
rocket's thrust

388  
00:16:51,509 --> 00:16:48,800

to do so the motor was inverted with the

389

00:16:54,470 --> 00:16:51,519

exhaust nozzle pointing straight up

390

00:16:58,230 --> 00:16:54,480

this rocket engine was going nowhere or

391

00:17:02,710 --> 00:17:00,790

as the sun rose on saturday halloween

392

00:17:05,270 --> 00:17:02,720

day 1936

393

00:17:07,270 --> 00:17:05,280

molina parsons foreman and a handful of

394

00:17:09,909 --> 00:17:07,280

caltech students and supporters

395

00:17:11,829 --> 00:17:09,919

set out for the arroyo seiko a deserted

396

00:17:14,710 --> 00:17:11,839

mountain wash near the pasadena rose

397

00:17:17,990 --> 00:17:17,029

they assembled their rocket engine

398

00:17:20,949 --> 00:17:18,000

connected the pressure

399

00:17:26,069 --> 00:17:20,959

tanks then stacked sandbags to protect

400

00:17:29,630 --> 00:17:27,829

as the day wore on they took a break

401  
00:17:30,950 --> 00:17:29,640  
from their physical exertions

402  
00:17:33,590 --> 00:17:30,960  
[Music]

403  
00:17:35,830 --> 00:17:33,600  
the moment captured on camera is known

404  
00:17:37,830 --> 00:17:35,840  
today as the nativity scene

405  
00:17:39,830 --> 00:17:37,840  
the first rocket experiment by the

406  
00:17:42,870 --> 00:17:39,840  
founders of what would become

407  
00:17:44,710 --> 00:17:42,880  
the jet propulsion laboratory

408  
00:17:46,390 --> 00:17:44,720  
what was kind of surprising also is that

409  
00:17:48,549 --> 00:17:46,400  
they brought cameras along

410  
00:17:49,830 --> 00:17:48,559  
so you know they had no doubt that they

411  
00:17:54,070 --> 00:17:49,840  
were doing something important

412  
00:17:58,830 --> 00:17:56,070  
by the early afternoon molina and

413  
00:18:01,430 --> 00:17:58,840

parsons had the rocket motor ready for

414

00:18:03,669 --> 00:18:01,440

testing

415

00:18:05,909 --> 00:18:03,679

crouching behind sandbags they expected

416

00:18:07,510 --> 00:18:05,919

to hear a roar

417

00:18:11,669 --> 00:18:07,520

instead there was the disappointing

418

00:18:13,590 --> 00:18:11,679

sound of hissing air from a loose hose

419

00:18:15,510 --> 00:18:13,600

the second and third attempts netted the

420

00:18:17,590 --> 00:18:15,520

same result

421

00:18:18,630 --> 00:18:17,600

by now fuel had leaked all around the

422

00:18:21,590 --> 00:18:18,640

test area

423

00:18:23,669 --> 00:18:21,600

but a fourth try was made this time the

424

00:18:27,270 --> 00:18:23,679

rocket motor caught fire

425

00:18:31,029 --> 00:18:29,270

very many things happen that will teach

426

00:18:32,789 --> 00:18:31,039

us what to do next time

427

00:18:35,029 --> 00:18:32,799

the most excitement took place in the

428

00:18:37,669 --> 00:18:35,039

last shot when the oxygen hose

429

00:18:38,630 --> 00:18:37,679

for some reason ignited and swung around

430

00:18:41,350 --> 00:18:38,640

on the ground

431

00:18:43,110 --> 00:18:41,360

40 feet from us we all tore out across

432

00:18:44,950 --> 00:18:43,120

the country

433

00:18:46,950 --> 00:18:44,960

the rocket motor tests in the months

434

00:18:48,549 --> 00:18:46,960

that followed ebbed and flowed

435

00:18:52,390 --> 00:18:48,559

leaving the three men more often than

436

00:18:55,430 --> 00:18:54,470

and fissures between molina and his two

437

00:18:57,830 --> 00:18:55,440

partners began

438

00:18:59,750 --> 00:18:57,840

forming parsons and foreman were

439

00:19:02,870 --> 00:18:59,760

impatient to launch a rocket

440

00:19:04,390 --> 00:19:02,880

while molina demanded more tests

441

00:19:06,710 --> 00:19:04,400

knowing much could be gleaned through

442

00:19:08,230 --> 00:19:06,720

scientific calculations requiring no

443

00:19:10,150 --> 00:19:08,240

hardware at all

444

00:19:12,230 --> 00:19:10,160

molina added to the group a brilliant

445

00:19:16,070 --> 00:19:12,240

chinese graduate student

446

00:19:18,710 --> 00:19:16,080

named shui shen qian qian had come to

447

00:19:21,270 --> 00:19:18,720

the united states on a scholarship

448

00:19:22,789 --> 00:19:21,280

he was viewed as a human calculator who

449

00:19:25,430 --> 00:19:22,799

preferred to communicate through the

450

00:19:27,750 --> 00:19:25,440

language of equations

451

00:19:28,710 --> 00:19:27,760

his ambition he once declared was

452

00:19:35,270 --> 00:19:28,720

nothing short

453

00:19:39,669 --> 00:19:37,909

despite the addition of qien to the team

454

00:19:42,870 --> 00:19:39,679

the lack of funding threatened to put a

455

00:19:44,950 --> 00:19:42,880

halt to the whole effort

456

00:19:47,190 --> 00:19:44,960

attempts to join forces with the most

457

00:19:50,390 --> 00:19:47,200

well-known u.s rocket pioneer

458

00:19:52,390 --> 00:19:50,400

robert goddard were rebuffed much to von

459

00:19:55,029 --> 00:19:52,400

carmen's displeasure

460

00:19:57,029 --> 00:19:55,039

goddard it was said was the first man to

461

00:19:59,909 --> 00:19:57,039

fire a liquid rocket

462

00:20:01,190 --> 00:19:59,919

goddard's rocket reached an altitude of

463

00:20:03,990 --> 00:20:01,200

42

464

00:20:06,310 --> 00:20:04,000

feet however interesting this is

465

00:20:08,230 --> 00:20:06,320

historically i have never equated the

466

00:20:11,270 --> 00:20:08,240

characteristic of being first

467

00:20:13,669 --> 00:20:11,280

with being the greatest naturally

468

00:20:15,270 --> 00:20:13,679

we at caltech wanted as much information

469

00:20:16,710 --> 00:20:15,280

as we could get from goddard for our

470

00:20:19,990 --> 00:20:16,720

mutual benefit

471

00:20:23,270 --> 00:20:20,000

but goddard believed in secrecy

472

00:20:25,270 --> 00:20:23,280

there is no direct line from goddard to

473

00:20:27,820 --> 00:20:25,280

present-day rocketry

474

00:20:33,590 --> 00:20:27,830

he is on a branch that died

475

00:20:38,310 --> 00:20:36,149

now desperate for money parsons and

476

00:20:40,230 --> 00:20:38,320

molina began writing a science fiction

477

00:20:42,230 --> 00:20:40,240

treatment they hoped to sell as a movie

478

00:20:43,830 --> 00:20:42,240

script or novel

479

00:20:46,950 --> 00:20:43,840

and of course that film script turns out

480

00:20:48,789 --> 00:20:46,960

to be eerily anticipatory

481

00:20:50,710 --> 00:20:48,799

the storyline involves a group of

482

00:20:53,669 --> 00:20:50,720

liberal rocket researchers and their

483

00:20:55,750 --> 00:20:53,679

struggles with fascist capitalists

484

00:21:00,549 --> 00:20:55,760

one of the characters who resembles jack

485

00:21:05,430 --> 00:21:03,270

another character clearly qian returns

486

00:21:06,500 --> 00:21:05,440

to china when the us government fails to

487

00:21:08,789 --> 00:21:06,510

come to his aid

488

00:21:11,190 --> 00:21:08,799

[Music]

489

00:21:12,390 --> 00:21:11,200

and the character based on frank molina

490

00:21:14,070 --> 00:21:12,400

plays out his part

491

00:21:18,630 --> 00:21:14,080

trying to keep their rocket research

492

00:21:22,310 --> 00:21:20,549

the draft of the script was shopped

493

00:21:24,630 --> 00:21:22,320

around the studios

494

00:21:31,460 --> 00:21:24,640

but there were no takers for such an

495

00:21:40,870 --> 00:21:31,470

unrealistic plot

496

00:21:45,590 --> 00:21:43,350

rockets politics and classwork weren't

497

00:21:46,870 --> 00:21:45,600

all that were occupying molina's time

498

00:21:49,909 --> 00:21:46,880

[Music]

499

00:21:52,470 --> 00:21:49,919

in july of 1938 he met a young woman who

500

00:21:55,450 --> 00:21:52,480

aspired to be an artist

501  
00:21:57,110 --> 00:21:55,460  
her name was lillian darkore

502  
00:22:00,710 --> 00:21:57,120  
[Music]

503  
00:22:01,430 --> 00:22:00,720  
we started talking and frank began to

504  
00:22:04,630 --> 00:22:01,440  
ask me

505  
00:22:05,029 --> 00:22:04,640  
questions as people do when they first

506  
00:22:08,470 --> 00:22:05,039  
meet

507  
00:22:11,110 --> 00:22:08,480  
you know and it was just

508  
00:22:12,390 --> 00:22:11,120  
a very lovely evening very very simple

509  
00:22:19,590 --> 00:22:12,400  
and

510  
00:22:23,430 --> 00:22:19,600  
way

511  
00:22:26,070 --> 00:22:23,440  
playing a little tennis frank also

512  
00:22:26,870 --> 00:22:26,080  
took us to do archery which i had never

513  
00:22:29,990 --> 00:22:26,880

done

514

00:22:31,909 --> 00:22:30,000

and we went to the beach

515

00:22:32,620 --> 00:22:31,919

we did all the things that young people

516

00:22:36,149 --> 00:22:32,630

do

517

00:22:38,549 --> 00:22:36,159

[Music]

518

00:22:40,549 --> 00:22:38,559

just 10 weeks after meeting lillian

519

00:22:43,990 --> 00:22:40,559

molina made a major announcement to his

520

00:22:49,669 --> 00:22:47,110

dear folks lillian and i are happy to

521

00:22:51,669 --> 00:22:49,679

announce that we have become engaged

522

00:22:53,029 --> 00:22:51,679

we will probably not marry before next

523

00:22:55,110 --> 00:22:53,039

june

524

00:22:56,149 --> 00:22:55,120

i am sure that you will love her as much

525

00:22:59,029 --> 00:22:56,159

as i do

526

00:23:00,549 --> 00:22:59,039

as she is pretty serious and a hard

527

00:23:02,630 --> 00:23:00,559

worker

528

00:23:04,710 --> 00:23:02,640

it was a whirlwind romance to which

529

00:23:05,990 --> 00:23:04,720

molina brought an unusual sense of

530

00:23:07,990 --> 00:23:06,000

urgency

531

00:23:09,270 --> 00:23:08,000

getting married molina confided to his

532

00:23:13,590 --> 00:23:09,280

fiancee

533

00:23:19,990 --> 00:23:17,029

i think he had everything under control

534

00:23:20,549 --> 00:23:20,000

he had it compartmentalized and he tried

535

00:23:23,830 --> 00:23:20,559

to

536

00:23:25,750 --> 00:23:23,840

live by that

537

00:23:28,470 --> 00:23:25,760

he had a good sense of humor you know

538

00:23:30,549 --> 00:23:28,480

when he let it go

539

00:23:32,630 --> 00:23:30,559

i always felt that it was like being

540

00:23:34,149 --> 00:23:32,640

held back a little bit

541

00:23:35,669 --> 00:23:34,159

it would have been so nice if he could

542

00:23:39,430 --> 00:23:35,679

have just you know let it

543

00:23:43,990 --> 00:23:41,750

many tell me that i am secretive

544

00:23:45,990 --> 00:23:44,000

something i can't understand

545

00:23:47,750 --> 00:23:46,000

i have always thought my actions were as

546

00:23:51,510 --> 00:23:47,760

transparent as could be

547

00:23:53,830 --> 00:23:51,520

perhaps too much so at times

548

00:23:56,230 --> 00:23:53,840

as their wedding date neared lillian

549

00:24:00,390 --> 00:23:56,240

began to have doubts

550

00:24:03,830 --> 00:24:00,400

i felt the distance between us

551  
00:24:05,430 --> 00:24:03,840  
always i didn't like that and i kept

552  
00:24:08,870 --> 00:24:05,440  
telling myself it was me

553  
00:24:11,990 --> 00:24:08,880  
that i was just being foolishly romantic

554  
00:24:15,510 --> 00:24:12,000  
and too young but

555  
00:24:18,310 --> 00:24:15,520  
i was a little bit aware of it then

556  
00:24:19,990 --> 00:24:18,320  
lillian's parents smitten with molina

557  
00:24:20,789 --> 00:24:20,000  
encouraged their daughter to go ahead

558  
00:24:24,149 --> 00:24:20,799  
with the marriage

559  
00:24:31,350 --> 00:24:24,159  
despite her doubts she was all of

560  
00:24:35,669 --> 00:24:33,110  
marriage did little to slow down

561  
00:24:37,590 --> 00:24:35,679  
molina's interest in rockets

562  
00:24:38,789 --> 00:24:37,600  
he shared very little of his work with

563  
00:24:40,950 --> 00:24:38,799

his young bride who

564

00:24:42,149 --> 00:24:40,960

soon found herself alone as her husband

565

00:24:45,350 --> 00:24:42,159

and his colleagues

566

00:24:47,430 --> 00:24:45,360

worked late into the evenings

567

00:24:49,510 --> 00:24:47,440

i would come home from art school i

568

00:24:51,350 --> 00:24:49,520

would go do the marketing

569

00:24:53,590 --> 00:24:51,360

cook something awful because i didn't

570

00:24:55,750 --> 00:24:53,600

know how to cook in those days

571

00:24:58,549 --> 00:24:55,760

i think i was responsible for frank's

572

00:25:02,470 --> 00:25:01,590

and then they would come over and i

573

00:25:05,350 --> 00:25:02,480

could hear

574

00:25:06,710 --> 00:25:05,360

all the voices and the arguing and no

575

00:25:09,510 --> 00:25:06,720

yes and let's do this

576

00:25:12,149 --> 00:25:09,520

and let's do that this went on almost

577

00:25:15,110 --> 00:25:12,159

every night

578

00:25:16,870 --> 00:25:15,120

the group continued to expand as did the

579

00:25:20,149 --> 00:25:16,880

project's reputation

580

00:25:21,909 --> 00:25:20,159

but not for the better having been

581

00:25:23,350 --> 00:25:21,919

provided space in the basement of a

582

00:25:25,269 --> 00:25:23,360

caltech building

583

00:25:26,950 --> 00:25:25,279

the rocketeers chemical brews were

584

00:25:29,990 --> 00:25:26,960

raising eyebrows

585

00:25:32,710 --> 00:25:30,000

and an awful stench one of the liquids

586

00:25:35,269 --> 00:25:32,720

we are using gives off a very toxic gas

587

00:25:36,950 --> 00:25:35,279

that is heavier than air if there were

588

00:25:40,630 --> 00:25:36,960

any rats in the building

589

00:25:42,070 --> 00:25:40,640

they've probably left when toxic gases

590

00:25:44,149 --> 00:25:42,080

weren't being released

591

00:25:45,909 --> 00:25:44,159

unintended explosions were sometimes

592

00:25:48,950 --> 00:25:45,919

heard echoing through an otherwise

593

00:25:51,510 --> 00:25:48,960

tranquil campus

594

00:25:53,590 --> 00:25:51,520

one unexpected blast sent a piece of

595

00:25:55,669 --> 00:25:53,600

steel hurtling through the air

596

00:25:57,750 --> 00:25:55,679

just minutes earlier molina had been

597

00:25:58,180 --> 00:25:57,760

standing directly in the projectile's

598

00:25:59,350 --> 00:25:58,190

path

599

00:26:02,230 --> 00:25:59,360

[Music]

600

00:26:03,909 --> 00:26:02,240

dear folks i left about half an hour

601  
00:26:06,710 --> 00:26:03,919  
before the occurrence

602  
00:26:07,909 --> 00:26:06,720  
so that parsons and foreman were alone

603  
00:26:10,470 --> 00:26:07,919  
neither of them was hurt

604  
00:26:11,909 --> 00:26:10,480  
fortunately there will probably be very

605  
00:26:13,990 --> 00:26:11,919  
little financial loss

606  
00:26:15,900 --> 00:26:14,000  
as the institute carries insurance on

607  
00:26:18,870 --> 00:26:15,910  
all laboratory equipment

608  
00:26:21,350 --> 00:26:18,880  
[Music]

609  
00:26:22,870 --> 00:26:21,360  
the rocketeers began being referred to

610  
00:26:26,070 --> 00:26:22,880  
throughout the campus as

611  
00:26:27,909 --> 00:26:26,080  
the suicide squad it ruined our

612  
00:26:29,029 --> 00:26:27,919  
reputations one member of the group

613  
00:26:42,630 --> 00:26:29,039

recalled

614

00:26:49,110 --> 00:26:46,950

in 1938 europe was verging on war

615

00:26:51,029 --> 00:26:49,120

military planners in the united states

616

00:26:53,909 --> 00:26:51,039

fanned out to universities across the

617

00:26:55,590 --> 00:26:53,919

country searching for new technologies

618

00:26:57,269 --> 00:26:55,600

should the country be drawn into the

619

00:27:01,190 --> 00:26:57,279

conflict

620

00:27:03,909 --> 00:27:01,200

one stop was at caltech

621

00:27:06,149 --> 00:27:03,919

dear folks a big shot from the army

622

00:27:08,230 --> 00:27:06,159

ordnance division was here today

623

00:27:09,830 --> 00:27:08,240

he told of the army's experience with

624

00:27:11,750 --> 00:27:09,840

rockets and thought there was

625

00:27:13,750 --> 00:27:11,760

little possibility of using them for

626  
00:27:17,909 --> 00:27:13,760  
military purposes

627  
00:27:19,190 --> 00:27:17,919  
i silently rejoiced i have no doubt that

628  
00:27:21,430 --> 00:27:19,200  
a war will break out

629  
00:27:23,669 --> 00:27:21,440  
sooner or later but i can't get very

630  
00:27:25,890 --> 00:27:23,679  
enthusiastic over making rockets for

631  
00:27:27,830 --> 00:27:25,900  
murdering purposes

632  
00:27:29,750 --> 00:27:27,840  
[Music]

633  
00:27:31,350 --> 00:27:29,760  
though the army's ordnance department

634  
00:27:33,750 --> 00:27:31,360  
passed on rockets

635  
00:27:36,789 --> 00:27:33,760  
hap arnold the general in charge of the

636  
00:27:38,870 --> 00:27:36,799  
army's air force saw possibilities

637  
00:27:40,630 --> 00:27:38,880  
arnold was acquainted with von carmen

638  
00:27:42,549 --> 00:27:40,640

and was intrigued by what the professor

639

00:27:43,909 --> 00:27:42,559

had to say about his students rocket

640

00:27:46,630 --> 00:27:43,919

project

641

00:27:49,029 --> 00:27:46,640

hap arnold very perceptively understood

642

00:27:49,669 --> 00:27:49,039

the possibilities that rocketry would

643

00:27:53,269 --> 00:27:49,679

have

644

00:27:56,710 --> 00:27:53,279

for the military perhaps he saw that

645

00:27:59,350 --> 00:27:56,720

simply at extension of ordinance

646

00:27:59,750 --> 00:27:59,360

or whatever it was he sensed that there

647

00:28:03,510 --> 00:27:59,760

was

648

00:28:06,470 --> 00:28:03,520

also close to

649

00:28:07,269 --> 00:28:06,480

von carmen and von carmen probably was

650

00:28:08,710 --> 00:28:07,279

able to

651  
00:28:10,630 --> 00:28:08,720  
whisper something to him that was

652  
00:28:12,389 --> 00:28:10,640  
persuasive in some way

653  
00:28:14,310 --> 00:28:12,399  
but it's that early army air force

654  
00:28:17,990 --> 00:28:14,320  
funding that really takes

655  
00:28:20,549 --> 00:28:18,000  
the early jpl group from being

656  
00:28:21,669 --> 00:28:20,559  
basically a student research project

657  
00:28:24,470 --> 00:28:21,679  
assisted by

658  
00:28:25,590 --> 00:28:24,480  
these rather kooky amateurs and turns it

659  
00:28:31,029 --> 00:28:25,600  
into

660  
00:28:33,190 --> 00:28:31,039  
a serious undertaking

661  
00:28:35,510 --> 00:28:33,200  
general arnold was interested in getting

662  
00:28:37,909 --> 00:28:35,520  
planes especially bombers quickly into

663  
00:28:41,190 --> 00:28:37,919

the skies on shorter runways

664

00:28:43,430 --> 00:28:41,200

and he thought rockets might help

665

00:28:45,190 --> 00:28:43,440

under von carmen's signature molina

666

00:28:46,110 --> 00:28:45,200

prepared a proposal for the army's

667

00:28:47,990 --> 00:28:46,120

consideration

668

00:28:51,190 --> 00:28:48,000

[Music]

669

00:28:54,230 --> 00:28:51,200

given the stigma associated with rockets

670

00:28:56,710 --> 00:28:54,240

that word was avoided in favor of jet

671

00:28:59,110 --> 00:28:56,720

propulsion

672

00:29:00,870 --> 00:28:59,120

what pleased me most was that uncle sam

673

00:29:02,950 --> 00:29:00,880

was going to supply money to help our

674

00:29:04,710 --> 00:29:02,960

boys with their rocket experiments

675

00:29:06,789 --> 00:29:04,720

so they would no longer have to dip into

676

00:29:10,830 --> 00:29:06,799

their own pockets

677

00:29:13,190 --> 00:29:10,840

the first contract was for one thousand

678

00:29:15,750 --> 00:29:13,200

dollars

679

00:29:18,310 --> 00:29:15,760

it was only the beginning a second grant

680

00:29:21,350 --> 00:29:18,320

in july of 1939 was for 10

681

00:29:24,950 --> 00:29:24,230

when hitler invaded poland money began

682

00:29:28,230 --> 00:29:24,960

to gush

683

00:29:31,990 --> 00:29:30,149

needing more space and no longer

684

00:29:34,789 --> 00:29:32,000

welcomed at cal tech

685

00:29:37,029 --> 00:29:34,799

a strip of land was leased in the arroyo

686

00:29:38,549 --> 00:29:37,039

the site of the very first rocket motor

687

00:29:41,909 --> 00:29:38,559

tests

688

00:29:43,909 --> 00:29:41,919

a dozen engineers were hired soon tin

689

00:29:46,070 --> 00:29:43,919

shacks began to appear though some

690

00:29:49,750 --> 00:29:46,080

workers had to use their automobiles as

691

00:29:52,950 --> 00:29:51,669

with the army's money came a need not

692

00:29:56,789 --> 00:29:52,960

only for expansion

693

00:29:59,750 --> 00:29:56,799

but official titles von karman was named

694

00:30:01,750 --> 00:29:59,760

director of the jet propulsion project

695

00:30:03,029 --> 00:30:01,760

parsons was put in charge of propellant

696

00:30:05,029 --> 00:30:03,039

development

697

00:30:06,310 --> 00:30:05,039

and foreman was made head of the machine

698

00:30:09,110 --> 00:30:06,320

shop

699

00:30:09,990 --> 00:30:09,120

day-to-day operations were run by molina

700

00:30:13,110 --> 00:30:10,000

who was named

701  
00:30:15,190 --> 00:30:13,120  
chief engineer construction has started

702  
00:30:16,789 --> 00:30:15,200  
on the shacks for the rocket station

703  
00:30:18,549 --> 00:30:16,799  
we have plenty of pressure on us to

704  
00:30:20,549 --> 00:30:18,559  
produce something quick

705  
00:30:22,310 --> 00:30:20,559  
perhaps we will be lucky and get some

706  
00:30:23,909 --> 00:30:22,320  
gadget to work but

707  
00:30:25,750 --> 00:30:23,919  
this isn't the type of problem that can

708  
00:30:27,909 --> 00:30:25,760  
be solved on order

709  
00:30:29,830 --> 00:30:27,919  
i need a good physicist foreman and

710  
00:30:30,710 --> 00:30:29,840  
parsons are all right for some type of

711  
00:30:33,110 --> 00:30:30,720  
work

712  
00:30:36,230 --> 00:30:33,120  
sometimes they're like inventors in the

713  
00:30:38,789 --> 00:30:36,240

worst sense of the word

714

00:30:42,710 --> 00:30:38,799

in the summer the corrugated shacks were

715

00:30:46,549 --> 00:30:44,630

with rockets being fired off there was a

716

00:30:47,110 --> 00:30:46,559

constant dread of setting off a brush

717

00:30:48,630 --> 00:30:47,120

fire

718

00:30:49,860 --> 00:30:48,640

that would spread deep into the san

719

00:30:52,549 --> 00:30:49,870

gabriel mountains

720

00:30:54,789 --> 00:30:52,559

[Music]

721

00:30:56,389 --> 00:30:54,799

in winter there was no heat and rain

722

00:30:57,750 --> 00:30:56,399

rushing down from the mountains would

723

00:31:02,830 --> 00:30:57,760

flood the arroyo

724

00:31:09,190 --> 00:31:04,549

encampment

725

00:31:12,310 --> 00:31:11,110

one day when molina showed up for work

726

00:31:14,310 --> 00:31:12,320

wearing a suit

727

00:31:16,830 --> 00:31:14,320

a worker made a fashion statement by

728

00:31:19,990 --> 00:31:16,840

taking scissors and cutting his tie in

729

00:31:23,430 --> 00:31:22,710

on a more serious occasion a distraught

730

00:31:25,590 --> 00:31:23,440

employee

731

00:31:28,789 --> 00:31:25,600

fed up with growing bureaucracy

732

00:31:31,269 --> 00:31:28,799

threatened molina with an axe

733

00:31:32,070 --> 00:31:31,279

they're starting under very primitive

734

00:31:35,669 --> 00:31:32,080

conditions

735

00:31:38,870 --> 00:31:35,679

here so tension is bound to flare

736

00:31:40,470 --> 00:31:38,880

attracting people to the early jpo was

737

00:31:43,669 --> 00:31:40,480

not so easy

738

00:31:45,909 --> 00:31:43,679

because rocketry still had that taint of

739

00:31:47,190 --> 00:31:45,919

not being quite respectable it wasn't

740

00:31:49,430 --> 00:31:47,200

clear where it was going

741

00:31:50,710 --> 00:31:49,440

was there a future and so it took a lot

742

00:31:53,669 --> 00:31:50,720

of persuasion

743

00:31:54,549 --> 00:31:53,679

to get people to be involved at that

744

00:31:56,230 --> 00:31:54,559

point

745

00:31:59,669 --> 00:31:56,240

you're really making a bet on your

746

00:32:04,470 --> 00:32:02,230

one phd recruit arrived at the site

747

00:32:05,430 --> 00:32:04,480

after a bumpy ride in on the dirt road

748

00:32:09,430 --> 00:32:05,440

and uttered

749

00:32:12,389 --> 00:32:09,440

my god what have i gotten into

750

00:32:13,590 --> 00:32:12,399

but the work went on the team first

751

00:32:17,269 --> 00:32:13,600

intended to build

752

00:32:19,269 --> 00:32:17,279

a solid rocket so many explosives

753

00:32:21,509 --> 00:32:19,279

experts believe we were embarking on a

754

00:32:24,389 --> 00:32:21,519

wild goose chase

755

00:32:26,789 --> 00:32:24,399

i remember well the repeated and

756

00:32:30,070 --> 00:32:26,799

occasionally unnerving explosion

757

00:32:31,750 --> 00:32:30,080

of parsons rockets i began to wonder

758

00:32:34,630 --> 00:32:31,760

whether our original idea

759

00:32:43,190 --> 00:32:34,640

was practical and i continue to listen

760

00:32:45,190 --> 00:32:43,200

to more explosions

761

00:32:47,350 --> 00:32:45,200

by now the government had decided that

762

00:32:49,190 --> 00:32:47,360

the work was to be classified

763

00:32:51,110 --> 00:32:49,200

there would be security checks made on

764

00:32:53,190 --> 00:32:51,120

everyone and chen

765

00:32:54,310 --> 00:32:53,200

a foreign national was refused a

766

00:32:57,590 --> 00:32:54,320

clearance

767

00:33:00,230 --> 00:32:57,600

a decision that left molina fuming

768

00:33:02,470 --> 00:33:00,240

this secret business is very childish

769

00:33:04,789 --> 00:33:02,480

everything now is very confidential and

770

00:33:09,430 --> 00:33:04,799

we have to suspect spies under every

771

00:33:14,630 --> 00:33:12,950

but the war was nearing in early 1941

772

00:33:16,310 --> 00:33:14,640

an intelligence report warned that

773

00:33:18,149 --> 00:33:16,320

germany was also trying to lift

774

00:33:19,509 --> 00:33:18,159

airplanes off the ground by using

775

00:33:21,350 --> 00:33:19,519

rockets

776

00:33:25,970 --> 00:33:21,360

the news further underscored the

777

00:33:29,350 --> 00:33:27,669

[Music]

778

00:33:33,350 --> 00:33:29,360

in august they believed they were ready

779

00:33:36,870 --> 00:33:35,430

their modest plan called for mounting

780

00:33:40,070 --> 00:33:36,880

six canisters called

781

00:33:43,230 --> 00:33:40,080

jet assisted takeoff rockets or jatos

782

00:33:45,830 --> 00:33:43,240

to the smallest plane they could find a

783

00:33:50,549 --> 00:33:45,840

753 pound aircraft called

784

00:33:54,870 --> 00:33:52,789

one of von carmen's graduate students

785

00:33:58,149 --> 00:33:54,880

army lieutenant homer boucher

786

00:34:00,710 --> 00:33:58,159

volunteered to be the pilot

787

00:34:02,630 --> 00:34:00,720

a week or so before the flight boucher

788

00:34:05,990 --> 00:34:02,640

came down to the arroyo seco

789

00:34:08,230 --> 00:34:06,000

to see how the rockets were working

790

00:34:09,750 --> 00:34:08,240

parsons had set up a packet of rockets

791

00:34:13,589 --> 00:34:09,760

which simulated the rack

792

00:34:16,869 --> 00:34:15,510

as the group gathered to watch from a

793

00:34:19,190 --> 00:34:16,879

safe vantage point

794

00:34:21,790 --> 00:34:19,200

he ran through a brief countdown and

795

00:34:24,389 --> 00:34:21,800

pushed the firing button

796

00:34:25,349 --> 00:34:24,399

explosions occurred like on the 4th of

797

00:34:28,629 --> 00:34:25,359

july

798

00:34:31,990 --> 00:34:28,639

and nozzles flew off in all directions

799

00:34:36,310 --> 00:34:34,310

parsons came to realize the longer the

800

00:34:37,750 --> 00:34:36,320

rockets were stored the greater the odds

801  
00:34:39,490 --> 00:34:37,760  
of an explosion

802  
00:34:42,869 --> 00:34:39,500  
but no one knew why

803  
00:34:44,710 --> 00:34:42,879  
[Music]

804  
00:34:46,829 --> 00:34:44,720  
the first static rocket test was

805  
00:34:50,149 --> 00:34:46,839  
conducted with the plane secured to the

806  
00:34:55,829 --> 00:34:52,389  
a nozzle on one of the jatos blew off

807  
00:34:58,710 --> 00:34:55,839  
tearing a hole in the tail of the plane

808  
00:35:01,030 --> 00:34:58,720  
at least one of the rocketeers joked it

809  
00:35:03,910 --> 00:35:01,040  
isn't a big hole

810  
00:35:05,190 --> 00:35:03,920  
i must express my admiration for

811  
00:35:08,150 --> 00:35:05,200  
boucher's courage

812  
00:35:08,870 --> 00:35:08,160  
and faith for he did not give up his

813  
00:35:11,990 --> 00:35:08,880

agreement

814

00:35:13,670 --> 00:35:12,000

to go ahead with the tests there's a

815

00:35:16,790 --> 00:35:13,680

certain amount of gallows humor

816

00:35:18,550 --> 00:35:16,800

about all this looking at the small hole

817

00:35:20,630 --> 00:35:18,560

and fuselage

818

00:35:21,750 --> 00:35:20,640

for one of the tests they take off the

819

00:35:23,510 --> 00:35:21,760

propeller

820

00:35:24,870 --> 00:35:23,520

paste one of the safety posters that was

821

00:35:27,510 --> 00:35:24,880

around during the war

822

00:35:29,190 --> 00:35:27,520

over where the propeller had been i

823

00:35:30,710 --> 00:35:29,200

think there is always a sense that

824

00:35:33,150 --> 00:35:30,720

you're living on the edge

825

00:35:37,750 --> 00:35:33,160

a bit in these situations

826

00:35:42,829 --> 00:35:40,870

a few days later on august 12 1941

827

00:35:43,990 --> 00:35:42,839

with carmen and molina overseeing

828

00:35:46,150 --> 00:35:44,000

preparations

829

00:35:49,750 --> 00:35:46,160

six freshly made jatos were mounted

830

00:35:51,910 --> 00:35:49,760

underneath the wings of the light plane

831

00:35:53,190 --> 00:35:51,920

as bouchet climbed into the air coop

832

00:35:55,910 --> 00:35:53,200

that day

833

00:35:56,470 --> 00:35:55,920

i am sure we all shared a certain tingle

834

00:35:59,750 --> 00:35:56,480

of

835

00:36:01,990 --> 00:35:59,760

mounting excitement we knew that this

836

00:36:04,950 --> 00:36:02,000

test was vital to convince the air corps

837

00:36:07,349 --> 00:36:04,960

that our rockets worked

838

00:36:10,150 --> 00:36:07,359

but were there any other unknowns that

839

00:36:11,910 --> 00:36:10,160

we hadn't considered

840

00:36:15,080 --> 00:36:11,920

would there be troubles with the

841

00:36:15,090 --> 00:36:21,030

[Music]

842

00:36:24,470 --> 00:36:23,109

as the plane rolled down the field and

843

00:36:27,829 --> 00:36:24,480

gathered momentum

844

00:36:31,589 --> 00:36:27,839

he kicked the ignition switch

845

00:36:33,990 --> 00:36:31,599

smoke billowed out as the rocket ignited

846

00:36:38,790 --> 00:36:34,000

the plane shot off as if released from a

847

00:36:44,470 --> 00:36:41,109

none of us had ever seen a plane climb

848

00:36:46,950 --> 00:36:44,480

at such a steep angle

849

00:36:48,710 --> 00:36:46,960

to emphasize the achievement they rolled

850

00:36:51,430 --> 00:36:48,720

the film camera again

851  
00:36:53,349 --> 00:36:51,440  
and had two planes take to the skies one

852  
00:36:56,790 --> 00:36:53,359  
powered by jato rockets

853  
00:36:58,550 --> 00:36:56,800  
the other only propeller driven

854  
00:37:00,390 --> 00:36:58,560  
the strapped on jatos had cut the

855  
00:37:04,550 --> 00:37:00,400  
distance needed to take to the air

856  
00:37:06,870 --> 00:37:04,560  
almost in half the team was ecstatic

857  
00:37:09,510 --> 00:37:06,880  
but because the work was now classified

858  
00:37:11,109 --> 00:37:09,520  
there were no public celebrations

859  
00:37:13,990 --> 00:37:11,119  
molina could only hint of the

860  
00:37:15,990 --> 00:37:14,000  
accomplishment in a letter home

861  
00:37:18,390 --> 00:37:16,000  
we have had success this week with our

862  
00:37:20,069 --> 00:37:18,400  
rocket project that exceeded our highest

863  
00:37:25,670 --> 00:37:20,079

expectation

864

00:37:30,550 --> 00:37:28,550

the flight test was a major step forward

865

00:37:34,069 --> 00:37:30,560

but the problem of the short shelf life

866

00:37:35,829 --> 00:37:34,079

of the fuel continued to hamper them

867

00:37:37,910 --> 00:37:35,839

after a few days of storage the

868

00:37:40,230 --> 00:37:37,920

canisters were more likely to explode

869

00:37:42,870 --> 00:37:40,240

than fire off

870

00:37:44,550 --> 00:37:42,880

but in a moment of insight parsons

871

00:37:46,470 --> 00:37:44,560

tossed out some of the traditional

872

00:37:48,790 --> 00:37:46,480

ingredients of black powder

873

00:37:50,150 --> 00:37:48,800

in favor of an unusual combination of

874

00:37:53,109 --> 00:37:50,160

asphalt and potassium

875

00:37:54,470 --> 00:37:53,119

perchlorate the storage problem was

876

00:37:57,270 --> 00:37:54,480

solved

877

00:37:58,630 --> 00:37:57,280

jack parsons solid fuel concoction would

878

00:38:01,270 --> 00:37:58,640

prove to be one of the most

879

00:38:07,260 --> 00:38:01,280

important rocket science advances of the

880

00:38:07,270 --> 00:38:16,950

[Music]

881

00:38:24,390 --> 00:38:21,190

witnessed this morning's a distant view

882

00:38:27,589 --> 00:38:24,400

a brief people battle off pearl harbor

883

00:38:33,430 --> 00:38:27,599

and a severe bombing of pearl harbor by

884

00:38:35,750 --> 00:38:33,440

enemy planes undoubtedly japanese

885

00:38:36,950 --> 00:38:35,760

dear folks we got up this morning and

886

00:38:39,270 --> 00:38:36,960

turned on the radio

887

00:38:41,430 --> 00:38:39,280

to listen to the symphony concert

888

00:38:43,510 --> 00:38:41,440

instead we heard the first news of the

889

00:38:47,270 --> 00:38:43,520

attack on hawaii and manila by the

890

00:38:50,150 --> 00:38:47,280

japanese fascists

891

00:38:53,990 --> 00:38:50,160

that morning is etched in your mind you

892

00:38:57,349 --> 00:38:56,390

frank was sitting in the one arm chair

893

00:38:59,750 --> 00:38:57,359

in the living room

894

00:39:00,950 --> 00:38:59,760

that we had he was looking at some

895

00:39:04,470 --> 00:39:00,960

papers

896

00:39:06,310 --> 00:39:04,480

and i was on the floor kind of leaning

897

00:39:09,829 --> 00:39:06,320

against the chair

898

00:39:11,910 --> 00:39:09,839

with the newspaper when this came on

899

00:39:14,630 --> 00:39:11,920

the announcement that pearl harbor had

900

00:39:17,910 --> 00:39:14,640

been attacked

901  
00:39:21,750 --> 00:39:17,920  
that's where we were and of course

902  
00:39:25,990 --> 00:39:23,829  
here in southern california all

903  
00:39:28,470 --> 00:39:26,000  
servicemen are called from leads

904  
00:39:29,430 --> 00:39:28,480  
the police and firemen air raid

905  
00:39:32,550 --> 00:39:29,440  
personnel

906  
00:39:34,150 --> 00:39:32,560  
are all called to their posts the whole

907  
00:39:40,230 --> 00:39:34,160  
state of affairs seems

908  
00:39:44,790 --> 00:39:42,230  
with the united states entry into world

909  
00:39:45,750 --> 00:39:44,800  
war ii the work of the rocketeers took

910  
00:39:47,670 --> 00:39:45,760  
on a wartime

911  
00:39:52,150 --> 00:39:47,680  
urgency and they were given new

912  
00:40:05,430 --> 00:39:54,069  
the team was now experimenting with

913  
00:40:09,750 --> 00:40:07,349

in charge of that effort was martin

914

00:40:11,030 --> 00:40:09,760

summerfield molina's former caltech

915

00:40:12,870 --> 00:40:11,040

roommate

916

00:40:15,430 --> 00:40:12,880

summerfield was given what seemed an

917

00:40:17,109 --> 00:40:15,440

impossible assignment

918

00:40:19,190 --> 00:40:17,119

building a rocket engine that could

919

00:40:20,550 --> 00:40:19,200

deliver a thousand pounds of thrust for

920

00:40:22,630 --> 00:40:20,560

at least a minute

921

00:40:25,270 --> 00:40:22,640

enough to help lift a twenty thousand

922

00:40:27,349 --> 00:40:25,280

pound bomber into the sky

923

00:40:29,430 --> 00:40:27,359

some speculated it would require an

924

00:40:31,349 --> 00:40:29,440

engine the size of a house

925

00:40:32,950 --> 00:40:31,359

but summerfield went to work designing

926

00:40:36,390 --> 00:40:32,960

an engine employing a small

927

00:40:41,349 --> 00:40:39,349

by april of 1942 the problem seemed to

928

00:40:43,270 --> 00:40:41,359

have been solved as a bomber called the

929

00:40:58,069 --> 00:40:43,280

havoc was pulled out of the hangar

930

00:41:01,750 --> 00:40:59,990

given the possibility of an explosion

931

00:41:03,270 --> 00:41:01,760

that would ignite the liquid propellants

932

00:41:05,910 --> 00:41:03,280

and doom the plane

933

00:41:06,950 --> 00:41:05,920

only two men were allowed on board the

934

00:41:08,790 --> 00:41:06,960

pilot

935

00:41:25,860 --> 00:41:08,800

and an operator stationed in the rear

936

00:41:25,870 --> 00:41:34,630

[Music]

937

00:41:38,790 --> 00:41:37,349

the entire team including von carmen

938

00:41:41,109 --> 00:41:38,800

molina and parsons

939

00:41:48,760 --> 00:41:41,119

stood and watched as the bomber taxied

940

00:41:50,790 --> 00:41:48,770

into position for takeoff

941

00:41:53,349 --> 00:41:50,800

[Music]

942

00:41:54,309 --> 00:41:53,359

the engines revved up the rockets

943

00:41:56,870 --> 00:41:54,319

ignited

944

00:41:57,750 --> 00:41:56,880

and suddenly the bomber took off with a

945

00:42:00,630 --> 00:41:57,760

roar

946

00:42:01,270 --> 00:42:00,640

almost straight up as smoke billowed

947

00:42:03,670 --> 00:42:01,280

forth

948

00:42:04,550 --> 00:42:03,680

the plane continued to rise as though

949

00:42:07,910 --> 00:42:04,560

scooped up

950

00:42:09,030 --> 00:42:07,920

by a sudden draft it was a wonderful

951  
00:42:12,150 --> 00:42:09,040  
sight

952  
00:42:16,150 --> 00:42:12,160  
and the beginning of practical rocketry

953  
00:42:18,150 --> 00:42:16,160  
in the united states

954  
00:42:20,309 --> 00:42:18,160  
was as excited as von carmen with the

955  
00:42:25,109 --> 00:42:20,319  
test and rushed out to congratulate the

956  
00:42:30,390 --> 00:42:27,270  
soon afterwards he shared with his wife

957  
00:42:32,790 --> 00:42:30,400  
his pride in the accomplishment

958  
00:42:34,710 --> 00:42:32,800  
i have not written to you for some time

959  
00:42:35,510 --> 00:42:34,720  
mainly because of the pressure of work

960  
00:42:39,030 --> 00:42:35,520  
during the past

961  
00:42:40,870 --> 00:42:39,040  
hectic two weeks the most important fact

962  
00:42:43,589 --> 00:42:40,880  
is that this weekend the outlook for the

963  
00:42:45,829 --> 00:42:43,599

future is the brightest it has ever been

964

00:42:47,349 --> 00:42:45,839

we have something that really works and

965

00:42:53,510 --> 00:42:47,359

we should be able to help give the

966

00:42:59,030 --> 00:42:56,710

perhaps anticipating success just a few

967

00:43:01,430 --> 00:42:59,040

days before the first bomber test flight

968

00:43:04,309 --> 00:43:01,440

molina came forth with a decidedly

969

00:43:07,109 --> 00:43:04,319

capitalist proposal

970

00:43:09,270 --> 00:43:07,119

with the rocket work expanding why not

971

00:43:11,670 --> 00:43:09,280

molina proposed to the core team

972

00:43:13,030 --> 00:43:11,680

incorporate and sell mass-produced

973

00:43:16,630 --> 00:43:13,040

versions of their rocket

974

00:43:21,430 --> 00:43:19,030

von carmen agreed and he was immediately

975

00:43:25,829 --> 00:43:21,440

named president of a company they named

976  
00:43:28,069 --> 00:43:25,839  
aerojet parsons foreman and summerfield

977  
00:43:30,150 --> 00:43:28,079  
were made vice presidents

978  
00:43:31,829 --> 00:43:30,160  
molina was put in charge of managing the

979  
00:43:34,470 --> 00:43:31,839  
money for what looked to be

980  
00:43:35,910 --> 00:43:34,480  
a fly-by-night seat of your pants

981  
00:43:37,589 --> 00:43:35,920  
operation

982  
00:43:39,270 --> 00:43:37,599  
i have been running around like a

983  
00:43:41,589 --> 00:43:39,280  
chicken with its head cut off

984  
00:43:43,670 --> 00:43:41,599  
everything is going so fast around me

985  
00:43:45,750 --> 00:43:43,680  
that it's bewildering

986  
00:43:48,470 --> 00:43:45,760  
the company will either be a wonderful

987  
00:43:51,750 --> 00:43:48,480  
success or a glorious flop

988  
00:43:52,950 --> 00:43:51,760

there won't be any in between the lines

989

00:43:55,990 --> 00:43:52,960

of authority between

990

00:43:58,069 --> 00:43:56,000

aerojet and caltech were vague but no

991

00:43:59,829 --> 00:43:58,079

one had the time to worry about overlaps

992

00:44:01,670 --> 00:43:59,839

in wartime

993

00:44:02,870 --> 00:44:01,680

parsons and foreman moved over to the

994

00:44:05,109 --> 00:44:02,880

new company

995

00:44:06,829 --> 00:44:05,119

von carmen who was officially in charge

996

00:44:09,589 --> 00:44:06,839

was spending more of his time in

997

00:44:12,470 --> 00:44:09,599

washington which left molina to run both

998

00:44:14,550 --> 00:44:12,480

operations he found running a growing

999

00:44:15,270 --> 00:44:14,560

business and dealing with government red

1000

00:44:18,550 --> 00:44:15,280

tape

1001  
00:44:19,109 --> 00:44:18,560  
not to his liking we have come across

1002  
00:44:22,309 --> 00:44:19,119  
the most

1003  
00:44:24,390 --> 00:44:22,319  
foolishness incompetence helplessness

1004  
00:44:26,069 --> 00:44:24,400  
ignorance and stubbornness that you can

1005  
00:44:28,950 --> 00:44:26,079  
possibly imagine

1006  
00:44:30,630 --> 00:44:28,960  
what a mess we ran into i have lost my

1007  
00:44:34,150 --> 00:44:30,640  
temper so many times that

1008  
00:44:35,270 --> 00:44:34,160  
i have no temper left there were other

1009  
00:44:37,109 --> 00:44:35,280  
problems

1010  
00:44:39,270 --> 00:44:37,119  
parsons interest in the occult was

1011  
00:44:41,670 --> 00:44:39,280  
deepening and rumors of his activities

1012  
00:44:44,069 --> 00:44:41,680  
were spreading to the press

1013  
00:44:45,510 --> 00:44:44,079

molina's wife lillian became so alarmed

1014

00:44:47,589 --> 00:44:45,520

that she wrote to her husband

1015

00:44:50,870 --> 00:44:47,599

warning of the dangers of continuing to

1016

00:44:52,790 --> 00:44:50,880

associate with parsons dear frank

1017

00:44:54,550 --> 00:44:52,800

the most disconcerting thing i've heard

1018

00:44:57,430 --> 00:44:54,560

this week is a story concerning

1019

00:44:59,270 --> 00:44:57,440

friend parsons it seems that certain

1020

00:45:00,790 --> 00:44:59,280

people are not taking his cult as

1021

00:45:03,109 --> 00:45:00,800

lightly as you are

1022

00:45:04,630 --> 00:45:03,119

the story goes further in as much as the

1023

00:45:06,069 --> 00:45:04,640

fbi is on their trail

1024

00:45:07,829 --> 00:45:06,079

because they are sure there is some

1025

00:45:11,589 --> 00:45:07,839

honest-to-god leak in the whole

1026  
00:45:13,910 --> 00:45:11,599  
organization i think you and anyone else

1027  
00:45:19,430 --> 00:45:13,920  
in erijet who is not of their ilk

1028  
00:45:21,430 --> 00:45:19,440  
is in serious danger lillian

1029  
00:45:23,910 --> 00:45:21,440  
i think that the suicide squad was a

1030  
00:45:26,390 --> 00:45:23,920  
pretty strange group of characters

1031  
00:45:27,109 --> 00:45:26,400  
i assumed that as the war effort started

1032  
00:45:29,270 --> 00:45:27,119  
wrapping up

1033  
00:45:30,390 --> 00:45:29,280  
files on all these people right and

1034  
00:45:32,630 --> 00:45:30,400  
anybody that

1035  
00:45:34,069 --> 00:45:32,640  
that started having a profile that was a

1036  
00:45:36,470 --> 00:45:34,079  
little bit strange

1037  
00:45:38,150 --> 00:45:36,480  
they would have started investigating

1038  
00:45:38,950 --> 00:45:38,160

persons file must have been really

1039

00:45:40,390 --> 00:45:38,960

interesting

1040

00:45:42,309 --> 00:45:40,400

i mean they were busy looking at the

1041

00:45:43,829 --> 00:45:42,319

parties he was holding trying to figure

1042

00:45:45,829 --> 00:45:43,839

out what was going on there

1043

00:45:47,430 --> 00:45:45,839

and certainly you know given my father's

1044

00:45:48,950 --> 00:45:47,440

situation

1045

00:45:51,349 --> 00:45:48,960

very quickly he must have gotten a lot

1046

00:45:53,990 --> 00:45:51,359

of attention

1047

00:45:56,630 --> 00:45:54,000

molina had no way of knowing it but his

1048

00:45:58,550 --> 00:45:56,640

political activities in the late 1930s

1049

00:46:00,230 --> 00:45:58,560

had come to the personal attention of

1050

00:46:03,270 --> 00:46:00,240

the fbi's director

1051  
00:46:05,589 --> 00:46:03,280  
j edgar hoover

1052  
00:46:06,870 --> 00:46:05,599  
hoover convinced molina was a member of

1053  
00:46:08,950 --> 00:46:06,880  
the communist party

1054  
00:46:12,230 --> 00:46:08,960  
based on the report of an informant

1055  
00:46:14,870 --> 00:46:12,240  
ordered his agents to find the proof

1056  
00:46:16,309 --> 00:46:14,880  
a review of the report fails to reflect

1057  
00:46:18,230 --> 00:46:16,319  
definite information

1058  
00:46:19,589 --> 00:46:18,240  
that the subject is a member of the

1059  
00:46:21,990 --> 00:46:19,599  
communist party

1060  
00:46:23,510 --> 00:46:22,000  
it is suggested that further efforts be

1061  
00:46:25,990 --> 00:46:23,520  
made by your office

1062  
00:46:27,750 --> 00:46:26,000  
to determine whether subject is actually

1063  
00:46:29,829 --> 00:46:27,760

a communist party member

1064

00:46:31,910 --> 00:46:29,839

in order that additional consideration

1065

00:46:35,120 --> 00:46:31,920

may be given to the preparation

1066

00:46:37,349 --> 00:46:35,130

of a security index card concerning him

1067

00:46:40,390 --> 00:46:37,359

[Music]

1068

00:46:41,990 --> 00:46:40,400

what's now known from released fbi files

1069

00:46:45,109 --> 00:46:42,000

is that molina had been of interest

1070

00:46:47,270 --> 00:46:45,119

to the bureau as early as 1942

1071

00:46:50,150 --> 00:46:47,280

with a dozen informants having provided

1072

00:46:51,829 --> 00:46:50,160

information about him

1073

00:46:53,589 --> 00:46:51,839

one of them told of molina having

1074

00:46:55,589 --> 00:46:53,599

attended and hosted

1075

00:46:57,430 --> 00:46:55,599

communist party meetings prior to

1076

00:47:02,390 --> 00:46:57,440

america's entry into world war

1077

00:47:04,630 --> 00:47:02,400

ii after two years of investigative work

1078

00:47:06,390 --> 00:47:04,640

the fbi's los angeles office reported

1079

00:47:08,550 --> 00:47:06,400

back to a disappointed hoover

1080

00:47:10,230 --> 00:47:08,560

that their investigation failed to

1081

00:47:13,190 --> 00:47:10,240

indicate that molina was

1082

00:47:15,270 --> 00:47:13,200

actually a member of the communist party

1083

00:47:17,510 --> 00:47:15,280

the memo went on to recommend molina

1084

00:47:18,790 --> 00:47:17,520

not be placed on a list of security

1085

00:47:20,950 --> 00:47:18,800

risks

1086

00:47:22,069 --> 00:47:20,960

there the matter rested but was not

1087

00:47:24,230 --> 00:47:22,079

forgotten

1088

00:47:25,990 --> 00:47:24,240

whatever suspicions the fbi may have had

1089

00:47:28,710 --> 00:47:26,000

about molina and others

1090

00:47:30,470 --> 00:47:28,720

they did not act upon them for when top

1091

00:47:32,390 --> 00:47:30,480

secret reports arrived with the news

1092

00:47:33,430 --> 00:47:32,400

that the nazis were building ballistic

1093

00:47:35,109 --> 00:47:33,440

missiles

1094

00:47:37,030 --> 00:47:35,119

the talents of the rocketeers were

1095

00:47:39,910 --> 00:47:37,040

needed more than ever

1096

00:47:53,430 --> 00:47:39,920

the world's first missile arms race was

1097

00:47:57,270 --> 00:47:53,440

about to get underway

1098

00:48:00,390 --> 00:47:57,280

in july of 1943 theodore von carmen was

1099

00:48:02,150 --> 00:48:00,400

shown a series of top-secret photographs

1100

00:48:04,309 --> 00:48:02,160

they were pictures of what looked like

1101  
00:48:06,549 --> 00:48:04,319  
ramps being constructed off the coast of

1102  
00:48:08,950 --> 00:48:06,559  
german-occupied france

1103  
00:48:11,270 --> 00:48:08,960  
what the army wanted to know could they

1104  
00:48:15,190 --> 00:48:14,069  
when carmen gets some super secret

1105  
00:48:17,910 --> 00:48:15,200  
photographs

1106  
00:48:18,710 --> 00:48:17,920  
probably through cap arnold what looked

1107  
00:48:21,990 --> 00:48:18,720  
like these

1108  
00:48:23,270 --> 00:48:22,000  
giant ski slopes and they want to know

1109  
00:48:25,910 --> 00:48:23,280  
what's going on here

1110  
00:48:27,510 --> 00:48:25,920  
what does this look like to you when

1111  
00:48:30,710 --> 00:48:27,520  
carmen analyzes it

1112  
00:48:32,790 --> 00:48:30,720  
and decides that

1113  
00:48:45,349 --> 00:48:32,800

probably the germans have a rocket

1114

00:48:51,270 --> 00:48:48,790

the v-1 the v stood for vengeance weapon

1115

00:48:54,470 --> 00:48:51,280

was an early cruise missile first used

1116

00:48:57,190 --> 00:48:54,480

in june 1944

1117

00:48:59,490 --> 00:48:57,200

over 8 000 of these subsonic buzz bombs

1118

00:49:00,829 --> 00:48:59,500

were launched against england and

1119

00:49:04,309 --> 00:49:00,839

[Music]

1120

00:49:07,510 --> 00:49:06,549

but even more alarming reports began to

1121

00:49:09,270 --> 00:49:07,520

arrive

1122

00:49:11,430 --> 00:49:09,280

all pointing to a rocket far

1123

00:49:13,349 --> 00:49:11,440

outstripping anything being undertaken

1124

00:49:16,309 --> 00:49:13,359

by the allies

1125

00:49:23,750 --> 00:49:16,319

it was the v2 the world's first

1126  
00:49:27,829 --> 00:49:26,790  
flying at supersonic speeds the v-2 gave

1127  
00:49:30,390 --> 00:49:27,839  
no warning

1128  
00:49:32,630 --> 00:49:30,400  
was invulnerable to counter-attack and

1129  
00:49:36,460 --> 00:49:32,640  
could take out an entire city block

1130  
00:49:41,430 --> 00:49:38,390  
[Music]

1131  
00:49:43,589 --> 00:49:41,440  
the u.s army wanted its own v-2

1132  
00:49:45,270 --> 00:49:43,599  
and looked to the pasadena rocketeers to

1133  
00:49:47,430 --> 00:49:45,280  
deliver it

1134  
00:49:51,990 --> 00:49:47,440  
frank molina was given the assignment of

1135  
00:49:55,910 --> 00:49:54,710  
we may have a big blank canvas facing us

1136  
00:49:57,750 --> 00:49:55,920  
in research

1137  
00:49:59,750 --> 00:49:57,760  
since there is a probability that the

1138  
00:50:00,790 --> 00:49:59,760

new program from washington will come

1139

00:50:02,710 --> 00:50:00,800

through

1140

00:50:04,230 --> 00:50:02,720

i feel a little frightened in tackling

1141

00:50:07,589 --> 00:50:04,240

such a big job

1142

00:50:10,069 --> 00:50:07,599

and dr von carmen is also hesitant

1143

00:50:11,109 --> 00:50:10,079

no final decisions have been made so

1144

00:50:12,710 --> 00:50:11,119

that i do not know

1145

00:50:14,470 --> 00:50:12,720

exactly where we stand

1146

00:50:16,630 --> 00:50:14,480

[Music]

1147

00:50:17,750 --> 00:50:16,640

molina quickly turned to his caltech

1148

00:50:20,549 --> 00:50:17,760

colleague shui

1149

00:50:22,230 --> 00:50:20,559

shin chen in the past chen had been

1150

00:50:24,150 --> 00:50:22,240

excluded from working on secret

1151  
00:50:25,349 --> 00:50:24,160  
government projects due to his foreign

1152  
00:50:27,349 --> 00:50:25,359  
status

1153  
00:50:29,430 --> 00:50:27,359  
but that concern was discarded given the

1154  
00:50:33,430 --> 00:50:29,440  
news of the v2 and the need for his

1155  
00:50:36,950 --> 00:50:35,670  
the proposal written by molina and tien

1156  
00:50:39,510 --> 00:50:36,960  
with von carmen's name

1157  
00:50:42,549 --> 00:50:39,520  
prominently attached called for a crash

1158  
00:50:45,910 --> 00:50:42,559  
american rocket program

1159  
00:50:47,030 --> 00:50:45,920  
issued on november 20th 1943 the report

1160  
00:50:50,870 --> 00:50:47,040  
carried the name of

1161  
00:50:53,430 --> 00:50:50,880  
jpl one the first time the words jet

1162  
00:50:55,650 --> 00:50:53,440  
propulsion laboratory were ever used in

1163  
00:50:56,950 --> 00:50:55,660

combination

1164

00:50:59,190 --> 00:50:56,960

[Music]

1165

00:51:01,109 --> 00:50:59,200

the plan was quickly accepted and

1166

00:51:02,470 --> 00:51:01,119

suddenly millions of dollars were made

1167

00:51:07,030 --> 00:51:02,480

available to the one-time

1168

00:51:10,950 --> 00:51:09,510

but rather than rejoicing frank molina

1169

00:51:14,230 --> 00:51:10,960

was having misgivings

1170

00:51:15,910 --> 00:51:14,240

that he shared with his wife dearest

1171

00:51:17,990 --> 00:51:15,920

sweetheart

1172

00:51:19,750 --> 00:51:18,000

the past few days i have been thinking

1173

00:51:21,990 --> 00:51:19,760

about the future

1174

00:51:23,190 --> 00:51:22,000

trying to formulate a post-war plan for

1175

00:51:25,990 --> 00:51:23,200

myself

1176  
00:51:27,349 --> 00:51:26,000  
and dreaming about the two of us i have

1177  
00:51:29,430 --> 00:51:27,359  
learned on this trip

1178  
00:51:31,190 --> 00:51:29,440  
that the culmination of my efforts with

1179  
00:51:33,109 --> 00:51:31,200  
many others in pasadena

1180  
00:51:34,829 --> 00:51:33,119  
will probably be a permanent jet

1181  
00:51:38,069 --> 00:51:34,839  
propulsion laboratory at cal

1182  
00:51:39,190 --> 00:51:38,079  
tech i still have a part to play mainly

1183  
00:51:42,630 --> 00:51:39,200  
at cal tech

1184  
00:51:44,710 --> 00:51:42,640  
in trying to start the jp lab on its way

1185  
00:51:47,349 --> 00:51:44,720  
then i'm going back to school for a year

1186  
00:51:50,549 --> 00:51:47,359  
or two to study human beings

1187  
00:51:52,549 --> 00:51:50,559  
their ways and how they live together i

1188  
00:51:53,750 --> 00:51:52,559

am convinced that i must do something

1189

00:51:55,829 --> 00:51:53,760

like this

1190

00:51:57,670 --> 00:51:55,839

for i would rather be a failure in that

1191

00:52:00,309 --> 00:51:57,680

sphere of human endeavor

1192

00:52:01,109 --> 00:52:00,319

than a recognized success at the end of

1193

00:52:04,950 --> 00:52:01,119

my life

1194

00:52:07,190 --> 00:52:04,960

in the field i am now working in

1195

00:52:10,549 --> 00:52:07,200

i think it was very much on his mind

1196

00:52:13,910 --> 00:52:10,559

that all the work he was doing

1197

00:52:16,790 --> 00:52:13,920

was really for killing people

1198

00:52:17,990 --> 00:52:16,800

in the end that's what it was for he was

1199

00:52:21,030 --> 00:52:18,000

very disturbed about

1200

00:52:21,510 --> 00:52:21,040

that because he was a humanitarian i

1201  
00:52:24,470 --> 00:52:21,520  
mean

1202  
00:52:25,349 --> 00:52:24,480  
he was a great idealist i think and i

1203  
00:52:28,870 --> 00:52:25,359  
think he had

1204  
00:52:31,430 --> 00:52:28,880  
difficulty oh

1205  
00:52:32,309 --> 00:52:31,440  
how would i say matching his life with

1206  
00:52:35,589 --> 00:52:32,319  
what he

1207  
00:52:38,309 --> 00:52:35,599  
really thought life should be

1208  
00:52:39,670 --> 00:52:38,319  
so i would ask him but what can you do

1209  
00:52:42,790 --> 00:52:39,680  
what can we do about it

1210  
00:52:44,630 --> 00:52:42,800  
what do you have any ideas you can't

1211  
00:52:45,990 --> 00:52:44,640  
stop what you're doing he said no i

1212  
00:52:48,630 --> 00:52:46,000  
can't i have to go on

1213  
00:52:50,390 --> 00:52:48,640

with this so i said so do it you know at

1214

00:52:51,589 --> 00:52:50,400

least that you're helping the war effort

1215

00:52:53,990 --> 00:52:51,599

this is

1216

00:52:54,870 --> 00:52:54,000

very worthwhile and we would leave it

1217

00:52:57,990 --> 00:52:54,880

like that

1218

00:53:00,069 --> 00:52:58,000

and he had made

1219

00:53:02,230 --> 00:53:00,079

his peace with i guess what he

1220

00:53:04,069 --> 00:53:02,240

considered a compromise that's all i can

1221

00:53:08,390 --> 00:53:04,079

say

1222

00:53:12,630 --> 00:53:10,230

molina who had been an officer in the

1223

00:53:15,030 --> 00:53:12,640

army reserve going back to his texas a

1224

00:53:17,270 --> 00:53:15,040

m days was sent to london and france to

1225

00:53:20,150 --> 00:53:17,280

witness firsthand the destructive power

1226  
00:53:27,270 --> 00:53:21,990  
and to see what might be gleaned from

1227  
00:53:31,990 --> 00:53:29,750  
sunday i got into uniform for the first

1228  
00:53:34,710 --> 00:53:32,000  
time in 10 years

1229  
00:53:35,670 --> 00:53:34,720  
i had to buy it here and considering

1230  
00:53:39,190 --> 00:53:35,680  
everything

1231  
00:53:40,630 --> 00:53:39,200  
it fits fairly well since i am here as a

1232  
00:53:43,270 --> 00:53:40,640  
technical representative

1233  
00:53:44,069 --> 00:53:43,280  
therefore wear no officer insignia but

1234  
00:53:47,349 --> 00:53:44,079  
do wear an

1235  
00:53:49,349 --> 00:53:47,359  
officer's uniform the gis have to salute

1236  
00:53:52,790 --> 00:53:49,359  
me when i pass them

1237  
00:53:55,190 --> 00:53:52,800  
some do some don't and some get their

1238  
00:53:56,150 --> 00:53:55,200

arm halfway up before deciding against

1239

00:53:59,349 --> 00:53:56,160

it

1240

00:54:01,670 --> 00:53:59,359

i have had some good laughs

1241

00:54:02,870 --> 00:54:01,680

that was what he wrote to his parents

1242

00:54:06,309 --> 00:54:02,880

but to lillian

1243

00:54:10,630 --> 00:54:08,549

i still haven't been able to rid myself

1244

00:54:14,230 --> 00:54:10,640

of that subconscious feeling of

1245

00:54:16,870 --> 00:54:14,240

anticipating flying bombs or v2 rockets

1246

00:54:18,549 --> 00:54:16,880

sailing through the air one of them with

1247

00:54:21,109 --> 00:54:18,559

my number on it

1248

00:54:22,950 --> 00:54:21,119

i went to bed very early this evening

1249

00:54:26,150 --> 00:54:22,960

and i had a very vivid dream

1250

00:54:26,390 --> 00:54:26,160

just before midnight as you know there

1251  
00:54:32,790 --> 00:54:26,400  
is

1252  
00:54:35,190 --> 00:54:32,800  
of physical pain

1253  
00:54:37,430 --> 00:54:35,200  
not so much for myself but when it

1254  
00:54:39,670 --> 00:54:37,440  
happens to others

1255  
00:54:43,190 --> 00:54:39,680  
i know there must be some suppressed

1256  
00:54:45,589 --> 00:54:43,200  
fear that gives rise to these reactions

1257  
00:54:47,270 --> 00:54:45,599  
as i think back i am conscious of a

1258  
00:54:49,190 --> 00:54:47,280  
great fear of my father

1259  
00:54:52,309 --> 00:54:49,200  
who was very impatient with me if i

1260  
00:54:54,630 --> 00:54:52,319  
could not carry out his desires as you

1261  
00:54:59,349 --> 00:54:54,640  
know he was at one time a butcher

1262  
00:55:02,630 --> 00:55:01,510  
those were molina's tortured thoughts at

1263  
00:55:04,390 --> 00:55:02,640

night

1264

00:55:06,549 --> 00:55:04,400

during the day he moved ahead with

1265

00:55:07,070 --> 00:55:06,559

creating a missile he was reluctant to

1266

00:55:08,309 --> 00:55:07,080

build

1267

00:55:10,870 --> 00:55:08,319

[Music]

1268

00:55:11,670 --> 00:55:10,880

he's constantly ringing his hands about

1269

00:55:14,069 --> 00:55:11,680

how

1270

00:55:15,270 --> 00:55:14,079

this is oh he just hates doing this and

1271

00:55:17,349 --> 00:55:15,280

and building things that are going to

1272

00:55:19,109 --> 00:55:17,359

kill people and break things

1273

00:55:20,549 --> 00:55:19,119

is not what he really wants to do and

1274

00:55:22,390 --> 00:55:20,559

it's not what he's about

1275

00:55:24,950 --> 00:55:22,400

and he always comes back at the end of

1276

00:55:27,910 --> 00:55:24,960

this after he has this soul-searching

1277

00:55:29,270 --> 00:55:27,920

exercise to say but you know we have to

1278

00:55:31,910 --> 00:55:29,280

defeat the nazis

1279

00:55:33,190 --> 00:55:31,920

we must win this war and if we don't

1280

00:55:38,549 --> 00:55:33,200

it's going to be in new

1281

00:55:43,670 --> 00:55:41,910

dear folks i got back to pasadena on a

1282

00:55:45,670 --> 00:55:43,680

b-17 bomber

1283

00:55:48,710 --> 00:55:45,680

i am gradually getting used to the

1284

00:55:49,589 --> 00:55:48,720

absence of explosions i will have a new

1285

00:55:51,750 --> 00:55:49,599

title

1286

00:55:56,470 --> 00:55:51,760

something like acting director of the

1287

00:56:01,510 --> 00:55:59,030

molina was by now managing an evolving

1288

00:56:04,310 --> 00:56:01,520

operation that had moved beyond jatos to

1289

00:56:04,320 --> 00:56:08,950

[Music]

1290

00:56:13,030 --> 00:56:11,510

the jplers named their first missile the

1291

00:56:15,190 --> 00:56:13,040

private a

1292

00:56:16,150 --> 00:56:15,200

the rocket's modest rank was fitting

1293

00:56:20,230 --> 00:56:16,160

given its small

1294

00:56:22,390 --> 00:56:20,240

size the engine was a jato

1295

00:56:24,300 --> 00:56:22,400

fitted with a cone head and four fins

1296

00:56:28,789 --> 00:56:24,310

serving as flight stabilizers

1297

00:56:31,190 --> 00:56:28,799

[Music]

1298

00:56:33,430 --> 00:56:31,200

to achieve liftoff the private required

1299

00:56:35,430 --> 00:56:33,440

a small launch tower with guide rails

1300

00:56:44,520 --> 00:56:35,440

and a booster stage containing four

1301  
00:56:53,430 --> 00:56:44,530  
smaller solid rockets

1302  
00:56:56,309 --> 00:56:53,440  
[Music]

1303  
00:56:57,030 --> 00:56:56,319  
the brainchild of molina and chen the

1304  
00:56:59,270 --> 00:56:57,040  
private a

1305  
00:57:00,630 --> 00:56:59,280  
exceeded their expectations by reaching

1306  
00:57:03,150 --> 00:57:00,640  
a flight distance of over

1307  
00:57:04,470 --> 00:57:03,160  
10 miles when first launched in december

1308  
00:57:08,890 --> 00:57:04,480  
1944

1309  
00:57:12,950 --> 00:57:10,549  
[Music]

1310  
00:57:14,870 --> 00:57:12,960  
emboldened by the private a's success

1311  
00:57:17,670 --> 00:57:14,880  
wings were added in hopes of increasing

1312  
00:57:22,710 --> 00:57:17,680  
the rockets range

1313  
00:57:27,270 --> 00:57:25,190

the first of 17 rounds were shot off at

1314

00:57:28,190 --> 00:57:27,280

fort bliss texas beginning on april

1315

00:57:29,380 --> 00:57:28,200

fool's day

1316

00:57:32,630 --> 00:57:29,390

1945.

1317

00:57:34,549 --> 00:57:32,640

[Music]

1318

00:57:37,190 --> 00:57:34,559

the rockets blasted out of the launcher

1319

00:57:39,510 --> 00:57:37,200

as planned but then promptly corkscrewed

1320

00:57:42,150 --> 00:57:39,520

into the ground

1321

00:57:43,510 --> 00:57:42,160

the letter f the joke went stood for

1322

00:57:45,640 --> 00:57:43,520

either failure

1323

00:57:51,349 --> 00:57:45,650

or fiasco

1324

00:57:56,309 --> 00:57:53,030

locating the errant rockets in the

1325

00:57:58,470 --> 00:57:56,319

desert was an adventure of its own

1326

00:58:02,470 --> 00:57:58,480

given the truncated flight paths the

1327

00:58:07,670 --> 00:58:02,480

fuel was not always entirely consumed

1328

00:58:11,589 --> 00:58:09,589

the hunting expeditions included not

1329

00:58:13,589 --> 00:58:11,599

only tracking down the privates

1330

00:58:27,700 --> 00:58:13,599

but in a moment of levity captured on

1331

00:58:31,990 --> 00:58:29,270

[Music]

1332

00:58:32,950 --> 00:58:32,000

as the war was ending in europe theodore

1333

00:58:35,910 --> 00:58:32,960

von carmen

1334

00:58:37,589 --> 00:58:35,920

and shui shin chin also donned u.s

1335

00:58:39,670 --> 00:58:37,599

officer uniforms

1336

00:58:40,789 --> 00:58:39,680

von carmen was given the simulated rank

1337

00:58:43,829 --> 00:58:40,799

of a general

1338

00:58:45,829 --> 00:58:43,839

then a colonel they traveled to germany

1339

00:58:49,510 --> 00:58:45,839

to see firsthand the technologies of the

1340

00:58:53,750 --> 00:58:51,910

von carmen who had once lived studied

1341

00:58:59,990 --> 00:58:53,760

and worked in germany

1342

00:59:03,990 --> 00:59:02,789

i was deep in a country which i had once

1343

00:59:05,520 --> 00:59:04,000

believed was the fulcrum

1344

00:59:08,309 --> 00:59:05,530

of world science

1345

00:59:10,950 --> 00:59:08,319

[Music]

1346

00:59:11,670 --> 00:59:10,960

now it was rubble abandoned machinery

1347

00:59:13,670 --> 00:59:11,680

and dull

1348

00:59:16,950 --> 00:59:13,680

spiritless faces along the road

1349

00:59:25,990 --> 00:59:19,109

reminders of the deep tragedy that had

1350

00:59:30,870 --> 00:59:28,950

i thought to myself how much misery had

1351

00:59:33,190 --> 00:59:30,880

been brought to a highly civilized

1352

00:59:39,510 --> 00:59:33,200

people by stupidity

1353

00:59:44,150 --> 00:59:42,549

as the german army collapsed von karman

1354

00:59:45,829 --> 00:59:44,160

and chen fanned out in different

1355

00:59:47,589 --> 00:59:45,839

directions searching for german

1356

00:59:51,349 --> 00:59:47,599

engineers and scientists

1357

00:59:55,589 --> 00:59:53,109

von carmen found more than he had

1358

00:59:58,309 --> 00:59:55,599

bargained for

1359

00:59:59,990 --> 00:59:58,319

we went on to nordhausen which lies in

1360

01:00:02,470 --> 01:00:00,000

the hearts mountains

1361

01:00:04,150 --> 01:00:02,480

here work on v2 rockets had been carried

1362

01:00:05,990 --> 01:00:04,160

out

1363

01:00:07,829 --> 01:00:06,000

the visit proved to be one of the most

1364

01:00:11,030 --> 01:00:07,839

ghastly experiences i

1365

01:00:15,270 --> 01:00:12,870

the nazis had developed a fiendish

1366

01:00:22,230 --> 01:00:15,280

scheme of executing their prisoners

1367

01:00:24,760 --> 01:00:23,990

this was the most horrible thing i had

1368

01:00:27,270 --> 01:00:24,770

yet heard of

1369

01:00:29,829 --> 01:00:27,280

[Music]

1370

01:00:33,990 --> 01:00:29,839

a perversion of science beyond anyone's

1371

01:00:37,190 --> 01:00:36,069

twenty thousand inmates died at

1372

01:00:40,829 --> 01:00:37,200

nordhausen

1373

01:00:43,910 --> 01:00:40,839

from starvation and being worked to

1374

01:00:49,030 --> 01:00:46,390

the v2 was the creation of nazi party

1375

01:00:51,109 --> 01:00:49,040

member werner von braun

1376

01:00:53,430 --> 01:00:51,119

von braun was not responsible for the

1377

01:00:56,549 --> 01:00:53,440

nordhausen facility where his v2 was

1378

01:00:58,789 --> 01:00:56,559

mass produced by slave labor but he knew

1379

01:01:01,430 --> 01:00:58,799

what took place there

1380

01:01:02,549 --> 01:01:01,440

at the war's end in europe von braun and

1381

01:01:05,190 --> 01:01:02,559

members of his team

1382

01:01:07,910 --> 01:01:05,200

surrendered to the american army jen was

1383

01:01:10,230 --> 01:01:07,920

among the first to interrogate him

1384

01:01:12,710 --> 01:01:10,240

eventually the army secretly moved these

1385

01:01:14,390 --> 01:01:12,720

spoils of war to the united states

1386

01:01:16,870 --> 01:01:14,400

to learn more about their knowledge of

1387

01:01:19,510 --> 01:01:16,880

rockets

1388

01:01:20,630 --> 01:01:19,520

at the same time entirely intact v2s

1389

01:01:22,630 --> 01:01:20,640

captured by the us

1390

01:01:24,150 --> 01:01:22,640

army were also making their way back to

1391

01:01:27,430 --> 01:01:24,160

the united states

1392

01:01:29,510 --> 01:01:27,440

some of them came to jpl

1393

01:01:31,829 --> 01:01:29,520

during the weekend we received two

1394

01:01:34,630 --> 01:01:31,839

complete v2 rockets

1395

01:01:36,950 --> 01:01:34,640

they came on open flat cars lots of

1396

01:01:38,870 --> 01:01:36,960

people in pasadena came to the railroad

1397

01:01:41,430 --> 01:01:38,880

station to see them

1398

01:01:44,150 --> 01:01:41,440

i found them very interesting after

1399

01:01:46,950 --> 01:01:44,160

hearing them land in london

1400

01:01:49,190 --> 01:01:46,960

molina had been unscathed by v2s raining

1401

01:01:51,190 --> 01:01:49,200

down on london during his time there

1402

01:01:54,470 --> 01:01:51,200

but in the years to come he would become

1403

01:01:56,710 --> 01:01:54,480

a casualty of the v2 in a different way

1404

01:01:57,829 --> 01:01:56,720

for in a twist of fates it would be

1405

01:02:01,190 --> 01:01:57,839

verner von braun

1406

01:02:03,430 --> 01:02:01,200

and his german v2 team not frank molina

1407

01:02:05,910 --> 01:02:03,440

and his pasadena rocketeers

1408

01:02:23,990 --> 01:02:05,920

who would be chosen to lead the u.s

1409

01:02:30,230 --> 01:02:27,829

on july 16 1945 the first atomic bomb

1410

01:02:32,829 --> 01:02:30,240

was detonated at a new mexico test site

1411

01:02:36,870 --> 01:02:35,109

trinity

1412

01:02:38,630 --> 01:02:36,880

three weeks later the united states

1413

01:02:43,670 --> 01:02:38,640

dropped atomic bombs on the japanese

1414

01:02:47,510 --> 01:02:46,630

in a matter of days japan surrendered

1415

01:02:50,560 --> 01:02:47,520

world war

1416

01:02:52,710 --> 01:02:50,570

ii was over

1417

01:02:56,470 --> 01:02:52,720

[Music]

1418

01:02:59,270 --> 01:02:56,480

august 23 1945.

1419

01:03:00,950 --> 01:02:59,280

dear folks it is a long time since i

1420

01:03:03,029 --> 01:03:00,960

have written to you

1421

01:03:04,870 --> 01:03:03,039

so many things have happened in the last

1422

01:03:07,270 --> 01:03:04,880

10 days

1423

01:03:08,630 --> 01:03:07,280

the end of the war still does not appear

1424

01:03:11,990 --> 01:03:08,640

a reality

1425

01:03:14,069 --> 01:03:12,000

but i guess it is true the development

1426

01:03:17,029 --> 01:03:14,079

of atomic energy is here

1427

01:03:18,549 --> 01:03:17,039

and no one knows for sure what it means

1428

01:03:21,349 --> 01:03:18,559

except that another war

1429

01:03:23,029 --> 01:03:21,359

might be worse than the last one if that

1430

01:03:25,190 --> 01:03:23,039

is possible

1431

01:03:26,870 --> 01:03:25,200

you asked if i had anything to do with

1432

01:03:30,230 --> 01:03:26,880

the atomic bomb

1433

01:03:31,990 --> 01:03:30,240

no i did not although many of us knew

1434

01:03:33,910 --> 01:03:32,000

that that work was going on

1435

01:03:37,270 --> 01:03:33,920

and that whoever succeeded would

1436

01:03:42,069 --> 01:03:39,670

as you know i have never been convinced

1437

01:03:43,270 --> 01:03:42,079

that what i was doing the past 10 years

1438

01:03:46,470 --> 01:03:43,280

was right

1439

01:03:47,829 --> 01:03:46,480

at least in my own mind technical

1440

01:03:50,870 --> 01:03:47,839

developments are now

1441

01:03:53,670 --> 01:03:50,880

so far ahead of other human arrangements

1442

01:03:54,870 --> 01:03:53,680

it appears nonsensical for one who sees

1443

01:03:58,150 --> 01:03:54,880

the gap

1444

01:04:00,230 --> 01:03:58,160

to make it even wider

1445

01:04:02,230 --> 01:04:00,240

molina was wrestling with his conscience

1446

01:04:03,990 --> 01:04:02,240

because he knew that the next generation

1447

01:04:07,670 --> 01:04:04,000

of missiles he was helping to create

1448

01:04:09,589 --> 01:04:07,680

would carry atomic warheads

1449

01:04:11,990 --> 01:04:09,599

a follow-on to the private rocket was

1450

01:04:14,309 --> 01:04:12,000

already underway

1451

01:04:17,190 --> 01:04:14,319

molina also proposed another missile

1452

01:04:19,589 --> 01:04:17,200

known as the wac corporal

1453

01:04:21,109 --> 01:04:19,599

this liquid-fueled rocket molina thought

1454

01:04:27,670 --> 01:04:21,119

could be used for science

1455

01:04:30,069 --> 01:04:27,680

rather than military purposes

1456

01:04:30,950 --> 01:04:30,079

whack was shorthand for without attitude

1457

01:04:32,950 --> 01:04:30,960

control

1458

01:04:37,670 --> 01:04:32,960

a way of indicating the missile had no

1459

01:04:43,750 --> 01:04:39,670

the wac corporal's increased range

1460

01:04:52,710 --> 01:04:46,150

the spot chosen was white sands new

1461

01:04:56,870 --> 01:04:55,589

white sands was chosen for this kind of

1462

01:05:00,390 --> 01:04:56,880

experimentation because

1463

01:05:02,150 --> 01:05:00,400

it was remote it's very much a kind of

1464

01:05:05,190 --> 01:05:02,160

roughing it barracks type

1465

01:05:08,470 --> 01:05:05,200

environment we are near the spot that

1466

01:05:10,150 --> 01:05:08,480

the first atomic bomb was set off

1467

01:05:14,470 --> 01:05:10,160

and we will probably have a look at the

1468

01:05:19,990 --> 01:05:17,270

we are very comfortable the food is fine

1469

01:05:21,589 --> 01:05:20,000

and we should have a pleasant time

1470

01:05:38,230 --> 01:05:21,599

provided we do not have too many

1471

01:05:44,150 --> 01:05:41,230

white sands proving grounds october 11th

1472

01:05:47,589 --> 01:05:44,160

1945.

1473

01:05:50,130 --> 01:05:47,599

dearest sweetheart today was the day

1474

01:05:59,260 --> 01:05:50,140

and i don't think i will ever forget it

1475

01:06:04,069 --> 01:06:01,910

[Music]

1476  
01:06:05,560 --> 01:06:04,079  
our little lady performed beautifully on

1477  
01:06:15,349 --> 01:06:05,570  
her maiden flight

1478  
01:06:17,980 --> 01:06:17,349  
tomorrow night we plan to celebrate

1479  
01:06:20,470 --> 01:06:17,990  
juarez

1480  
01:06:22,870 --> 01:06:20,480  
[Music]

1481  
01:06:25,349 --> 01:06:22,880  
the lady has one bad habit which we have

1482  
01:06:27,910 --> 01:06:25,359  
not been able to cure

1483  
01:06:28,950 --> 01:06:27,920  
in the overall picture however she is

1484  
01:06:30,789 --> 01:06:28,960  
mighty good

1485  
01:06:32,789 --> 01:06:30,799  
and we think that we will be able to get

1486  
01:06:33,349 --> 01:06:32,799  
her to do one more stunt before our

1487  
01:06:37,589 --> 01:06:33,359  
program

1488  
01:06:39,109 --> 01:06:37,599

is completed i will enjoy telling you

1489

01:06:41,910 --> 01:06:39,119

about her someday

1490

01:06:43,190 --> 01:06:41,920

she is very pretty and up to now we love

1491

01:06:46,309 --> 01:06:43,200

her dearly

1492

01:06:50,069 --> 01:06:46,319

give everyone my regards all my love

1493

01:06:51,990 --> 01:06:50,079

frank molina was ecstatic

1494

01:06:53,270 --> 01:06:52,000

because his was corporal the world's

1495

01:06:57,510 --> 01:06:53,280

first sounding rocket

1496

01:06:59,750 --> 01:06:57,520

reached an altitude of 235 000 feet

1497

01:07:01,349 --> 01:06:59,760

the highest any human-made object had

1498

01:07:03,270 --> 01:07:01,359

ever reached

1499

01:07:04,950 --> 01:07:03,280

it was what rocketeers had always

1500

01:07:09,190 --> 01:07:04,960

dreamed of achieving

1501

01:07:14,150 --> 01:07:11,430

of the original group molina was the

1502

01:07:16,309 --> 01:07:14,160

only one to witness the achievement

1503

01:07:18,230 --> 01:07:16,319

his mentor theodore von carmen was in

1504

01:07:19,990 --> 01:07:18,240

such demand by the pentagon

1505

01:07:22,150 --> 01:07:20,000

that he had all but set up permanent

1506

01:07:24,710 --> 01:07:22,160

residence in washington

1507

01:07:26,150 --> 01:07:24,720

jack parsons and ed forman had cashed in

1508

01:07:29,270 --> 01:07:26,160

their aerojet stock

1509

01:07:33,430 --> 01:07:29,280

and moved on even chen was gone

1510

01:07:38,390 --> 01:07:36,470

molina was alone in another way even as

1511

01:07:39,829 --> 01:07:38,400

he celebrated the heights of success of

1512

01:07:42,710 --> 01:07:39,839

his little lady

1513

01:07:45,990 --> 01:07:42,720

his personal life was coming apart the

1514

01:07:48,069 --> 01:07:46,000

fbi was once again investigating him

1515

01:07:49,430 --> 01:07:48,079

while he was away on a trip his wife was

1516

01:07:51,750 --> 01:07:49,440

warned by a friend

1517

01:07:53,910 --> 01:07:51,760

that the fbi was searching the pasadena

1518

01:07:55,270 --> 01:07:53,920

homes of people suspected of communist

1519

01:07:57,960 --> 01:07:55,280

party activity

1520

01:07:59,670 --> 01:07:57,970

and that molina was next on the list

1521

01:08:02,150 --> 01:07:59,680

[Music]

1522

01:08:04,950 --> 01:08:02,160

when i got home that evening the house

1523

01:08:08,870 --> 01:08:04,960

had indeed been broken into

1524

01:08:13,109 --> 01:08:08,880

and things on frank's desk had been

1525

01:08:16,950 --> 01:08:13,119

rummaged around drawers had been opened

1526

01:08:21,030 --> 01:08:16,960

someone had been through the whole place

1527

01:08:23,590 --> 01:08:21,040

it was just chaos tired of being alone

1528

01:08:25,189 --> 01:08:23,600

fearful of the fbi and no longer sure of

1529

01:08:27,430 --> 01:08:25,199

whom she was

1530

01:08:29,269 --> 01:08:27,440

lillian told molina she wanted out of

1531

01:08:31,829 --> 01:08:29,279

the marriage

1532

01:08:35,990 --> 01:08:31,839

she left pasadena and moved to new york

1533

01:08:41,269 --> 01:08:39,110

this must have been absolutely awful for

1534

01:08:42,149 --> 01:08:41,279

frank i mean for me to do that at that

1535

01:08:45,510 --> 01:08:42,159

time

1536

01:08:47,669 --> 01:08:45,520

was terrible here i am

1537

01:08:50,390 --> 01:08:47,679

leaving him just at the worst time in

1538

01:08:52,390 --> 01:08:50,400

his life you know

1539

01:08:54,229 --> 01:08:52,400

but i knew i had to get out of there i

1540

01:08:56,390 --> 01:08:54,239

just had had it

1541

01:09:00,630 --> 01:08:56,400

had enough i couldn't i couldn't take it

1542

01:09:08,709 --> 01:09:04,229

woman of my heart i cannot sleep

1543

01:09:12,070 --> 01:09:08,719

i cannot think my heart is sorely bent

1544

01:09:14,789 --> 01:09:12,080

why must humans suffer as i am suffering

1545

01:09:16,789 --> 01:09:14,799

and i know that you have suffered more

1546

01:09:19,430 --> 01:09:16,799

it is only when one is alone

1547

01:09:20,950 --> 01:09:19,440

that one realizes the things that really

1548

01:09:23,590 --> 01:09:20,960

matter

1549

01:09:25,590 --> 01:09:23,600

and still i am afraid that tomorrow the

1550

01:09:27,990 --> 01:09:25,600

gears will enmesh me

1551  
01:09:29,269 --> 01:09:28,000  
and somehow i i don't care where they

1552  
01:09:32,309 --> 01:09:29,279  
carry me

1553  
01:09:33,910 --> 01:09:32,319  
and then again i do and you do

1554  
01:09:35,669 --> 01:09:33,920  
for we were born to fight for the

1555  
01:09:38,229 --> 01:09:35,679  
worthwhile

1556  
01:09:41,269 --> 01:09:38,239  
i have torn myself apart and tried to

1557  
01:09:43,910 --> 01:09:41,279  
look in my darkest corners

1558  
01:09:47,510 --> 01:09:43,920  
i have made mistakes and have eaten

1559  
01:09:52,390 --> 01:09:49,349  
as you read the news release on the

1560  
01:09:53,669 --> 01:09:52,400  
rocket i wondered if you experienced the

1561  
01:09:55,510 --> 01:09:53,679  
sensation of

1562  
01:09:59,270 --> 01:09:55,520  
at least being the midwife to the

1563  
01:10:02,149 --> 01:09:59,280

creature whose father i am called

1564

01:10:03,189 --> 01:10:02,159

i know you are as happy as i am that the

1565

01:10:07,270 --> 01:10:03,199

good success

1566

01:10:11,510 --> 01:10:07,280

was achieved new york city

1567

01:10:14,709 --> 01:10:11,520

april 1 1946 dear frank

1568

01:10:16,709 --> 01:10:14,719

you failed to see so many things

1569

01:10:18,550 --> 01:10:16,719

with any degree of common sense you

1570

01:10:19,430 --> 01:10:18,560

could not expect me to read of your

1571

01:10:24,229 --> 01:10:19,440

success

1572

01:10:26,149 --> 01:10:24,239

without me having pride and feeling part

1573

01:10:28,870 --> 01:10:26,159

in all of it

1574

01:10:30,149 --> 01:10:28,880

that has passed and i can only tell you

1575

01:10:33,350 --> 01:10:30,159

that i sweated it through

1576  
01:10:35,350 --> 01:10:33,360  
in more ways than you realize that is of

1577  
01:10:37,750 --> 01:10:35,360  
no importance in itself

1578  
01:10:38,950 --> 01:10:37,760  
for i say truthfully that the reports i

1579  
01:10:42,229 --> 01:10:38,960  
read of your success

1580  
01:10:45,990 --> 01:10:42,239  
made me very happy and made me know that

1581  
01:10:47,500 --> 01:10:46,000  
it was all to some very good purpose

1582  
01:10:49,110 --> 01:10:47,510  
lillian

1583  
01:10:52,709 --> 01:10:49,120  
[Music]

1584  
01:10:53,990 --> 01:10:52,719  
dear lillian i appreciate the kind words

1585  
01:10:55,830 --> 01:10:54,000  
about me

1586  
01:10:59,750 --> 01:10:55,840  
but i have finally caught hold of the

1587  
01:11:02,870 --> 01:10:59,760  
idea that i can't force you to love me

1588  
01:11:08,940 --> 01:11:02,880

i wish it had been possible

1589

01:11:23,750 --> 01:11:10,830

[Music]

1590

01:11:29,750 --> 01:11:26,950

molina's marriage was over he believed

1591

01:11:31,830 --> 01:11:29,760

he was being pursued by the fbi

1592

01:11:32,950 --> 01:11:31,840

and the more molina learned in pentagon

1593

01:11:35,030 --> 01:11:32,960

meetings about how

1594

01:11:36,470 --> 01:11:35,040

missiles would be put to use in a future

1595

01:11:38,550 --> 01:11:36,480

nuclear war

1596

01:11:40,470 --> 01:11:38,560

the more conflicted he became about the

1597

01:11:43,270 --> 01:11:40,480

purpose of his work

1598

01:11:44,470 --> 01:11:43,280

the war plans molina later wrote were a

1599

01:11:48,790 --> 01:11:44,480

form of national

1600

01:11:50,870 --> 01:11:48,800

insanity dear folks

1601

01:11:53,590 --> 01:11:50,880

i have notified the institute that i

1602

01:11:55,910 --> 01:11:53,600

want a year leave of absence

1603

01:11:57,270 --> 01:11:55,920

what i really want to do i am not at all

1604

01:11:59,590 --> 01:11:57,280

certain

1605

01:12:01,590 --> 01:11:59,600

the way the world looks now too many

1606

01:12:05,110 --> 01:12:01,600

people are getting ready for world war

1607

01:12:06,870 --> 01:12:05,120

iii but he certainly talks about how

1608

01:12:08,470 --> 01:12:06,880

upset he was that all the people around

1609

01:12:09,030 --> 01:12:08,480

him were preparing for the third world

1610

01:12:10,790 --> 01:12:09,040

war

1611

01:12:13,189 --> 01:12:10,800

right and so from the military

1612

01:12:15,189 --> 01:12:13,199

perspective as soon as the atom bombs

1613

01:12:16,550 --> 01:12:15,199

were successfully developed the next

1614

01:12:17,110 --> 01:12:16,560

problem was to how to put them on

1615

01:12:19,350 --> 01:12:17,120

missiles

1616

01:12:20,950 --> 01:12:19,360

and and that that just made him sick to

1617

01:12:23,669 --> 01:12:20,960

his stomach

1618

01:12:26,149 --> 01:12:23,679

seeking answers he traveled to princeton

1619

01:12:28,790 --> 01:12:26,159

to meet albert einstein

1620

01:12:31,189 --> 01:12:28,800

einstein was in very good humor and

1621

01:12:33,910 --> 01:12:31,199

talked and listened for an hour

1622

01:12:35,990 --> 01:12:33,920

he is like almost all scientists

1623

01:12:37,750 --> 01:12:36,000

disturbed over the hysteria that is

1624

01:12:39,750 --> 01:12:37,760

current in the u.s

1625

01:12:42,310 --> 01:12:39,760

he said all of us in international

1626  
01:12:47,110 --> 01:12:42,320  
organizations must have courage to fight

1627  
01:12:52,550 --> 01:12:50,310  
in the spring of 1947 molina boarded the

1628  
01:12:54,310 --> 01:12:52,560  
queen elizabeth bound for france and a

1629  
01:12:55,590 --> 01:12:54,320  
new career working for the united

1630  
01:12:58,229 --> 01:12:55,600  
nations education

1631  
01:12:59,910 --> 01:12:58,239  
scientific and cultural organization or

1632  
01:13:01,590 --> 01:12:59,920  
unesco

1633  
01:13:03,510 --> 01:13:01,600  
molina's role there was to help

1634  
01:13:06,790 --> 01:13:03,520  
scientists from around the globe

1635  
01:13:08,390 --> 01:13:06,800  
find ways of collaborating just as at

1636  
01:13:11,189 --> 01:13:08,400  
cal tech and rockets

1637  
01:13:12,550 --> 01:13:11,199  
i have to provide leadership and push

1638  
01:13:14,390 --> 01:13:12,560

there is much to be done

1639

01:13:16,470 --> 01:13:14,400

if we are going to be at all effective

1640

01:13:18,870 --> 01:13:16,480

in stopping another war

1641

01:13:20,229 --> 01:13:18,880

i am now in a much better position to

1642

01:13:22,870 --> 01:13:20,239

grasp things and

1643

01:13:28,550 --> 01:13:22,880

in a little longer i will be really able

1644

01:13:31,669 --> 01:13:30,790

a year into his job he met a young

1645

01:13:36,310 --> 01:13:31,679

british woman

1646

01:13:38,070 --> 01:13:36,320

marjorie duckworth in 1949 they married

1647

01:13:39,830 --> 01:13:38,080

shortly after their wedding molina

1648

01:13:40,709 --> 01:13:39,840

journeyed with his bride to the united

1649

01:13:43,110 --> 01:13:40,719

states

1650

01:13:44,390 --> 01:13:43,120

just as a political bombshell exploded

1651

01:13:47,910 --> 01:13:44,400

over pasadena

1652

01:13:49,189 --> 01:13:47,920

and the nation former cal tech student

1653

01:13:50,870 --> 01:13:49,199

frank oppenheimer

1654

01:13:52,630 --> 01:13:50,880

brought before the house committee on

1655

01:13:54,390 --> 01:13:52,640

un-american activities

1656

01:13:56,229 --> 01:13:54,400

testified that he had been an active

1657

01:13:57,750 --> 01:13:56,239

member of the pasadena chapter of the

1658

01:14:01,189 --> 01:13:57,760

communist party

1659

01:14:03,030 --> 01:14:01,199

professional unit 122

1660

01:14:05,510 --> 01:14:03,040

what made oppenheimer's testimony of

1661

01:14:08,310 --> 01:14:05,520

such tremendous interest was his brother

1662

01:14:09,669 --> 01:14:08,320

robert oppenheimer the physicist who led

1663

01:14:12,709 --> 01:14:09,679

the scientific effort

1664

01:14:14,950 --> 01:14:12,719

to build the first atomic bomb

1665

01:14:16,630 --> 01:14:14,960

during his testimony frank oppenheimer

1666

01:14:18,709 --> 01:14:16,640

was pressed to name other members of

1667

01:14:20,950 --> 01:14:18,719

unit 122.

1668

01:14:22,470 --> 01:14:20,960

among the names inquired about was frank

1669

01:14:25,270 --> 01:14:22,480

molina

1670

01:14:27,669 --> 01:14:25,280

oppenheimer refused to implicate others

1671

01:14:27,990 --> 01:14:27,679

but molina's name was mentioned so often

1672

01:14:29,910 --> 01:14:28,000

that

1673

01:14:31,350 --> 01:14:29,920

clearly he was of special interest to

1674

01:14:33,200 --> 01:14:31,360

the committee

1675

01:14:35,510 --> 01:14:33,210

but why

1676

01:14:37,910 --> 01:14:35,520

[Music]

1677

01:14:39,750 --> 01:14:37,920

a memo by j edgar hoover written just

1678

01:14:41,270 --> 01:14:39,760

days before oppenheimer's appearance

1679

01:14:42,149 --> 01:14:41,280

before the un-american activities

1680

01:14:45,510 --> 01:14:42,159

committee

1681

01:14:47,510 --> 01:14:45,520

provides one possible answer

1682

01:14:49,189 --> 01:14:47,520

a complete and thorough review of your

1683

01:14:51,350 --> 01:14:49,199

files should be made

1684

01:14:53,030 --> 01:14:51,360

particularly the information reflecting

1685

01:14:54,950 --> 01:14:53,040

molina's possible connection

1686

01:14:56,709 --> 01:14:54,960

with the loss of certain documents and

1687

01:15:01,110 --> 01:14:56,719

blueprints relating to the

1688

01:15:02,390 --> 01:15:01,120

wac corporal based on information from

1689

01:15:05,590 --> 01:15:02,400

an informant known as

1690

01:15:06,709 --> 01:15:05,600

t1 hoover suspected someone had passed

1691

01:15:08,790 --> 01:15:06,719

to the french government

1692

01:15:10,709 --> 01:15:08,800

a complete set of classified information

1693

01:15:13,750 --> 01:15:10,719

on the wac corporal rocket

1694

01:15:15,830 --> 01:15:13,760

the loss of these documents t1 suggested

1695

01:15:18,390 --> 01:15:15,840

had happened during the time of molina's

1696

01:15:20,709 --> 01:15:18,400

directorship of jpl

1697

01:15:22,790 --> 01:15:20,719

the informant went on to raise concerns

1698

01:15:24,870 --> 01:15:22,800

about others who had or were still

1699

01:15:27,830 --> 01:15:24,880

working at jpl

1700

01:15:29,030 --> 01:15:27,840

they included martin summerfield sydney

1701

01:15:34,950 --> 01:15:29,040

weinbaum

1702

01:15:37,990 --> 01:15:36,830

there was hysteria throughout the

1703

01:15:40,149 --> 01:15:38,000

country

1704

01:15:41,669 --> 01:15:40,159

it was inevitable that attention would

1705

01:15:44,149 --> 01:15:41,679

be turned to caltech

1706

01:15:46,470 --> 01:15:44,159

the little california institution with a

1707

01:15:50,390 --> 01:15:46,480

reputation of harboring many odd

1708

01:15:53,669 --> 01:15:52,550

martin summerfield security clearance

1709

01:15:55,750 --> 01:15:53,679

was revoked

1710

01:15:58,550 --> 01:15:55,760

along with his ability to be involved in

1711

01:16:01,110 --> 01:15:58,560

government projects

1712

01:16:03,830 --> 01:16:01,120

molina's close friend sydney weinbaum

1713

01:16:06,149 --> 01:16:03,840

lost his job at jpl

1714

01:16:07,990 --> 01:16:06,159

weinbaum was another prime suspect in

1715

01:16:10,149 --> 01:16:08,000

the alleged loss of whack corporal

1716

01:16:11,990 --> 01:16:10,159

documents to the french

1717

01:16:14,470 --> 01:16:12,000

for a while the fbi considered

1718

01:16:16,870 --> 01:16:14,480

developing weinbaum into a double agent

1719

01:16:18,870 --> 01:16:16,880

but ultimately he was brought to trial

1720

01:16:21,030 --> 01:16:18,880

charged with perjury for denying his

1721

01:16:23,110 --> 01:16:21,040

communist party membership

1722

01:16:27,750 --> 01:16:23,120

he was convicted and sentenced to four

1723

01:16:31,430 --> 01:16:30,149

chen who had returned to caltech after a

1724

01:16:34,550 --> 01:16:31,440

stint at mit

1725

01:16:36,630 --> 01:16:34,560

was also targeted in september as

1726

01:16:38,950 --> 01:16:36,640

weinbaum's trial was underway

1727

01:16:41,030 --> 01:16:38,960

chen was arrested in front of his family

1728

01:16:43,910 --> 01:16:41,040

and held for two weeks

1729

01:16:44,709 --> 01:16:43,920

the charge that he too had lied about

1730

01:16:48,550 --> 01:16:44,719

membership

1731

01:16:51,270 --> 01:16:48,560

in the communist party

1732

01:16:53,270 --> 01:16:51,280

jen's security clearance was revoked he

1733

01:16:55,270 --> 01:16:53,280

was allowed to teach at caltech

1734

01:16:57,669 --> 01:16:55,280

but was kept under constant surveillance

1735

01:17:00,229 --> 01:16:57,679

for the next five years

1736

01:17:01,590 --> 01:17:00,239

that was when enough time had passed u.s

1737

01:17:03,350 --> 01:17:01,600

authorities hoped

1738

01:17:05,189 --> 01:17:03,360

to make his knowledge of missiles less

1739

01:17:07,750 --> 01:17:05,199

than state of the art

1740

01:17:09,990 --> 01:17:07,760

only then was chen allowed to leave the

1741

01:17:12,229 --> 01:17:10,000

united states

1742

01:17:14,229 --> 01:17:12,239

the deportation of qin one u.s

1743

01:17:16,870 --> 01:17:14,239

government official later said

1744

01:17:18,950 --> 01:17:16,880

was the stupidest thing this country

1745

01:17:21,110 --> 01:17:18,960

ever did

1746

01:17:22,630 --> 01:17:21,120

how could this tragedy for america have

1747

01:17:25,350 --> 01:17:22,640

come about

1748

01:17:26,790 --> 01:17:25,360

his story is a strange one i think it

1749

01:17:29,110 --> 01:17:26,800

holds important lessons

1750

01:17:30,390 --> 01:17:29,120

for all of us on the problems of science

1751

01:17:33,669 --> 01:17:30,400

and politics

1752

01:17:36,630 --> 01:17:33,679

and simple human justice

1753

01:17:37,990 --> 01:17:36,640

i am not opposed to reasonable security

1754

01:17:40,630 --> 01:17:38,000

but i must say

1755

01:17:44,390 --> 01:17:40,640

that governments often pass foolish and

1756

01:17:46,950 --> 01:17:44,400

harmful laws in this area

1757

01:17:49,830 --> 01:17:46,960

even von carmen did not avoid the red

1758

01:17:52,470 --> 01:17:49,840

scare of the fifties

1759

01:17:53,270 --> 01:17:52,480

von carmen called the fbi investigation

1760

01:17:57,189 --> 01:17:53,280

of him

1761

01:18:02,550 --> 01:17:57,199

an inexcusable insult no charges were

1762

01:18:06,709 --> 01:18:04,709

all of these events frank molina watched

1763

01:18:08,870 --> 01:18:06,719

unfold from paris

1764

01:18:10,870 --> 01:18:08,880

out of hoover's reach he filed away

1765

01:18:12,149 --> 01:18:10,880

newspaper clippings of his friends as

1766

01:18:15,510 --> 01:18:12,159

they fell to the red

1767

01:18:18,070 --> 01:18:15,520

scare unable to build a viable case that

1768

01:18:20,070 --> 01:18:18,080

molina had been involved in espionage

1769

01:18:22,070 --> 01:18:20,080

the u.s state department refused to

1770

01:18:24,149 --> 01:18:22,080

renew molina's passport

1771

01:18:26,070 --> 01:18:24,159

[Music]

1772

01:18:27,270 --> 01:18:26,080

my father applied for political refugee

1773

01:18:30,630 --> 01:18:27,280

status in england

1774

01:18:31,350 --> 01:18:30,640

repeatedly was turned down they were

1775

01:18:33,110 --> 01:18:31,360

interviewed

1776

01:18:34,630 --> 01:18:33,120

a number of times with by the french

1777

01:18:36,709 --> 01:18:34,640

secret service

1778

01:18:37,750 --> 01:18:36,719

um and my mother always used to tell the

1779

01:18:39,669 --> 01:18:37,760

story later

1780

01:18:41,270 --> 01:18:39,679

about how she got to know the secret

1781

01:18:42,790 --> 01:18:41,280

service agents so well that she'd take

1782

01:18:43,750 --> 01:18:42,800

them coffee they were sitting in a car

1783

01:18:45,189 --> 01:18:43,760

at the end of the road

1784

01:18:47,750 --> 01:18:45,199

watching who was coming in and out of

1785

01:18:50,550 --> 01:18:47,760

our house she'd give them coffee on the

1786

01:18:52,149 --> 01:18:50,560

way to pick up her bread in the morning

1787

01:18:53,910 --> 01:18:52,159

that must have been a pretty frightening

1788

01:18:55,510 --> 01:18:53,920

time i mean they didn't know what was

1789

01:18:56,470 --> 01:18:55,520

going to come down next they didn't know

1790

01:18:58,070 --> 01:18:56,480

whether

1791

01:19:02,550 --> 01:18:58,080

the french were going to decide to turn

1792

01:19:06,950 --> 01:19:05,270

other pressures were brought to bear

1793

01:19:08,470 --> 01:19:06,960

president harry truman issued an

1794

01:19:10,790 --> 01:19:08,480

executive order

1795

01:19:12,550 --> 01:19:10,800

its purpose to root out american

1796

01:19:13,750 --> 01:19:12,560

subversives working for the united

1797

01:19:15,830 --> 01:19:13,760

nations

1798

01:19:17,510 --> 01:19:15,840

the order required u.s citizens to

1799

01:19:19,510 --> 01:19:17,520

disclose whether they had ever been

1800

01:19:21,030 --> 01:19:19,520

party of any activity considered

1801  
01:19:23,430 --> 01:19:21,040  
subversive

1802  
01:19:25,930 --> 01:19:23,440  
rather than submit to the inquiry molina

1803  
01:19:27,430 --> 01:19:25,940  
resigned from unesco

1804  
01:19:29,189 --> 01:19:27,440  
[Music]

1805  
01:19:32,070 --> 01:19:29,199  
news of molina's resignation was

1806  
01:19:34,709 --> 01:19:32,080  
immediately transmitted to the fbi

1807  
01:19:37,830 --> 01:19:34,719  
a warrant for molina's arrest was issued

1808  
01:19:39,910 --> 01:19:37,840  
and he was secretly declared a fugitive

1809  
01:19:41,030 --> 01:19:39,920  
but knowing the case against molina was

1810  
01:19:44,229 --> 01:19:41,040  
still weak

1811  
01:19:46,550 --> 01:19:44,239  
hoover again pressured his agents

1812  
01:19:48,390 --> 01:19:46,560  
the u.s attorney in los angeles has

1813  
01:19:49,590 --> 01:19:48,400

indicated that the government's case

1814

01:19:52,229 --> 01:19:49,600  
against the subject

1815

01:19:53,270 --> 01:19:52,239  
is not a strong one if it has not

1816

01:19:54,950 --> 01:19:53,280  
already been done

1817

01:19:56,310 --> 01:19:54,960  
this case should be assigned to an

1818

01:19:58,790 --> 01:19:56,320  
experienced agent

1819

01:19:59,990 --> 01:19:58,800  
who has the desire the willingness the

1820

01:20:02,390 --> 01:20:00,000  
aggressiveness

1821

01:20:04,229 --> 01:20:02,400  
and the ability to get out and dig for

1822

01:20:08,790 --> 01:20:04,239  
additional evidence of the subject's

1823

01:20:12,629 --> 01:20:11,750  
but at the end of march the u.s justice

1824

01:20:15,430 --> 01:20:12,639  
system

1825

01:20:17,350 --> 01:20:15,440  
had had enough inasmuch as the bureau

1826  
01:20:17,990 --> 01:20:17,360  
has corresponded with the department on

1827  
01:20:20,310 --> 01:20:18,000  
a number of

1828  
01:20:21,189 --> 01:20:20,320  
cases regarding the prosecution of the

1829  
01:20:23,270 --> 01:20:21,199  
subject

1830  
01:20:25,030 --> 01:20:23,280  
it is recommended that the matter not be

1831  
01:20:26,790 --> 01:20:25,040  
again called to the department's

1832  
01:20:36,810 --> 01:20:26,800  
attention

1833  
01:20:43,430 --> 01:20:41,270  
[Music]

1834  
01:20:45,990 --> 01:20:43,440  
america's rocketeers were scattered by

1835  
01:20:48,229 --> 01:20:46,000  
the winds of the red scare

1836  
01:20:50,470 --> 01:20:48,239  
chen arrived in china and quickly went

1837  
01:20:53,510 --> 01:20:50,480  
to work building china's missile program

1838  
01:20:55,350 --> 01:20:53,520

virtually from scratch while he may not

1839

01:20:56,070 --> 01:20:55,360

have been a communist when he arrived in

1840

01:20:58,390 --> 01:20:56,080

china

1841

01:21:00,070 --> 01:20:58,400

three years after his return he joined

1842

01:21:02,310 --> 01:21:00,080

the party

1843

01:21:03,189 --> 01:21:02,320

revered as the father of modern chinese

1844

01:21:05,189 --> 01:21:03,199

rocketry

1845

01:21:07,110 --> 01:21:05,199

he lived to see chinese astronauts

1846

01:21:10,390 --> 01:21:07,120

orbiting the earth

1847

01:21:13,990 --> 01:21:10,400

he died at the age of 97 on october 31st

1848

01:21:20,149 --> 01:21:14,000

2009 he outlived all of his

1849

01:21:25,189 --> 01:21:22,950

after leaving jpl and aerojet jack

1850

01:21:26,470 --> 01:21:25,199

parsons became more deeply involved in

1851

01:21:28,470 --> 01:21:26,480

cult activities

1852

01:21:30,310 --> 01:21:28,480

even as he continued to experiment with

1853

01:21:33,669 --> 01:21:30,320

explosives

1854

01:21:36,070 --> 01:21:33,679

he died in june 1952 following an

1855

01:21:39,510 --> 01:21:36,080

explosion at his home laboratory

1856

01:21:40,310 --> 01:21:39,520

he was 37 years old in honor of his

1857

01:21:42,629 --> 01:21:40,320

achievements

1858

01:21:45,350 --> 01:21:42,639

the international astronomical union

1859

01:21:51,510 --> 01:21:45,360

named a crater on the moon after him

1860

01:21:55,030 --> 01:21:53,430

ed forman one of the three original

1861

01:21:57,750 --> 01:21:55,040

rocketeers lived a far

1862

01:21:59,590 --> 01:21:57,760

more conventional life after leaving

1863

01:22:02,390 --> 01:21:59,600

aerojet he went to work for another

1864

01:22:05,060 --> 01:22:02,400

aerospace company in northern california

1865

01:22:07,270 --> 01:22:05,070

he died in 1973

1866

01:22:09,430 --> 01:22:07,280

[Music]

1867

01:22:11,669 --> 01:22:09,440

martin summerfield's association with

1868

01:22:14,310 --> 01:22:11,679

professional unit 122

1869

01:22:15,830 --> 01:22:14,320

cost him his security clearance he

1870

01:22:17,030 --> 01:22:15,840

became a professor at princeton

1871

01:22:21,910 --> 01:22:17,040

university

1872

01:22:26,310 --> 01:22:24,470

sydney weinbaum imprisoned for perjury

1873

01:22:28,070 --> 01:22:26,320

served three years of a four-year

1874

01:22:30,550 --> 01:22:28,080

sentence

1875

01:22:33,590 --> 01:22:30,560

with his science career destroyed he

1876

01:22:36,390 --> 01:22:33,600

found a job in the garment business

1877

01:22:37,750 --> 01:22:36,400

about his life he once said i can't

1878

01:22:42,229 --> 01:22:37,760

complain

1879

01:22:46,550 --> 01:22:44,310

frank molina's first wife lillian

1880

01:22:47,990 --> 01:22:46,560

wonderman lived out her dream of being

1881

01:22:52,070 --> 01:22:48,000

an artist in new york

1882

01:22:54,790 --> 01:22:52,080

where she still lives

1883

01:22:55,669 --> 01:22:54,800

frank molina without a passport without

1884

01:22:57,430 --> 01:22:55,679

a job

1885

01:23:00,310 --> 01:22:57,440

and with a warrant sworn out for his

1886

01:23:02,550 --> 01:23:00,320

arrest might have seemed in a precarious

1887

01:23:05,590 --> 01:23:02,560

place in 1953

1888

01:23:07,910 --> 01:23:05,600

but he had held on to his aérojet stock

1889

01:23:09,430 --> 01:23:07,920

and the stock made him independently

1890

01:23:12,070 --> 01:23:09,440

wealthy

1891

01:23:13,590 --> 01:23:12,080

the man accused of being a communist

1892

01:23:17,030 --> 01:23:13,600

became a millionaire

1893

01:23:19,350 --> 01:23:17,040

as a result of his capitalist endeavors

1894

01:23:22,310 --> 01:23:19,360

it's a tremendous irony that he's the

1895

01:23:24,229 --> 01:23:22,320

one who didn't sell his stock

1896

01:23:25,510 --> 01:23:24,239

it enables him to lead a very

1897

01:23:27,830 --> 01:23:25,520

comfortable life

1898

01:23:29,830 --> 01:23:27,840

and gives him the freedom to become an

1899

01:23:32,390 --> 01:23:29,840

artist

1900

01:23:34,070 --> 01:23:32,400

frank molina goes on to have a

1901

01:23:36,790 --> 01:23:34,080

successful career

1902

01:23:37,590 --> 01:23:36,800

as a kinetic artist really bringing

1903

01:23:39,669 --> 01:23:37,600

together

1904

01:23:42,149 --> 01:23:39,679

i suppose you could say the right and

1905

01:23:51,830 --> 01:23:42,159

left sides of the brain

1906

01:24:04,390 --> 01:23:54,950

it's almost as if you put calder mobiles

1907

01:24:08,870 --> 01:24:07,189

once again free to travel molina also

1908

01:24:09,830 --> 01:24:08,880

rekindled his interest in space

1909

01:24:11,910 --> 01:24:09,840

exploration

1910

01:24:13,830 --> 01:24:11,920

he joined theodore von carmen in

1911

01:24:15,189 --> 01:24:13,840

creating the international academy of

1912

01:24:17,990 --> 01:24:15,199

astronautics

1913

01:24:19,990 --> 01:24:18,000

its purpose to help thaw the cold war by

1914

01:24:23,669 --> 01:24:20,000

fostering space collaboration

1915

01:24:25,669 --> 01:24:23,679

among nations for years to come

1916

01:24:27,510 --> 01:24:25,679

melina would rub elbows and exchange

1917

01:24:30,229 --> 01:24:27,520

ideas with cosmonauts

1918

01:24:34,629 --> 01:24:30,239

astronauts and major space agency

1919

01:24:37,990 --> 01:24:36,790

theodore von carmen who had been center

1920

01:24:39,990 --> 01:24:38,000

stage for so long

1921

01:24:41,750 --> 01:24:40,000

found himself less in demand in his

1922

01:24:45,110 --> 01:24:41,760

later years

1923

01:24:47,350 --> 01:24:45,120

in 1963 there was one last moment in the

1924

01:24:49,750 --> 01:24:47,360

sun for the professor

1925

01:24:50,950 --> 01:24:49,760

it is hard to visualize what the world

1926

01:24:53,830 --> 01:24:50,960

would be like

1927

01:24:55,830 --> 01:24:53,840

without aircraft and jet propulsion

1928

01:24:58,070 --> 01:24:55,840

without the vision we have

1929

01:24:59,910 --> 01:24:58,080

just entering the realm of reality of

1930

01:25:01,750 --> 01:24:59,920

exploring space

1931

01:25:04,229 --> 01:25:01,760

i'm especially glad to present this

1932

01:25:06,709 --> 01:25:04,239

first national medal of science

1933

01:25:08,950 --> 01:25:06,719

to one of the pioneers who has helped

1934

01:25:12,229 --> 01:25:08,960

make all of this new and exciting age

1935

01:25:16,390 --> 01:25:12,239

possible science

1936

01:25:19,030 --> 01:25:16,400

is eternal its progress is continuous

1937

01:25:21,270 --> 01:25:19,040

being a philosopher's son i have always

1938

01:25:23,110 --> 01:25:21,280

felt it was necessary for me to believe

1939

01:25:25,669 --> 01:25:23,120

in something

1940

01:25:26,709 --> 01:25:25,679

i still believe that god will do right

1941

01:25:29,430 --> 01:25:26,719

by us

1942

01:25:31,270 --> 01:25:29,440

and that we will survive the spirit of

1943

01:25:34,310 --> 01:25:31,280

destruction

1944

01:25:36,790 --> 01:25:34,320

in short i am an optimist i believe in

1945

01:25:38,790 --> 01:25:36,800

the goodness of the future

1946

01:25:40,149 --> 01:25:38,800

and if i have done a small bit to help

1947

01:25:42,160 --> 01:25:40,159

bring it about

1948

01:25:44,870 --> 01:25:42,170

i am content

1949

01:25:46,629 --> 01:25:44,880

[Music]

1950

01:25:48,470 --> 01:25:46,639

shortly after his visit to the white

1951

01:25:51,750 --> 01:25:48,480

house in frail health

1952

01:25:52,550 --> 01:25:51,760

von carmen traveled to germany there he

1953

01:25:55,350 --> 01:25:52,560

died

1954

01:25:57,750 --> 01:25:55,360

five days short of his 82nd birthday in

1955

01:26:03,600 --> 01:25:57,760

the presence of his old student

1956

01:26:11,270 --> 01:26:07,750

[Music]

1957

01:26:13,189 --> 01:26:11,280

in 1968 molina returned to jpl to take

1958

01:26:16,709 --> 01:26:13,199

part in a celebration commemorating the

1959

01:26:19,430 --> 01:26:16,719

first rocket experiment 30 years before

1960

01:26:21,270 --> 01:26:19,440

it was a bittersweet moment for molina

1961

01:26:21,990 --> 01:26:21,280

the laboratory that he had played such a

1962

01:26:24,310 --> 01:26:22,000

large role

1963

01:26:26,229 --> 01:26:24,320

in bringing into being had gone on to

1964

01:26:28,070 --> 01:26:26,239

build the first u.s satellite

1965

01:26:29,830 --> 01:26:28,080

and other spacecraft that had traveled

1966

01:26:33,030 --> 01:26:29,840

to the moon to venus

1967

01:26:36,870 --> 01:26:33,040

and to mars most of the solar system

1968

01:26:39,350 --> 01:26:36,880

molina knew would soon be within reach

1969

01:26:41,510 --> 01:26:39,360

how different his life and the history

1970

01:26:43,990 --> 01:26:41,520

of american rocketry would have been

1971

01:26:46,229 --> 01:26:44,000

had he stayed in the united states no

1972

01:26:48,229 --> 01:26:46,239

one can say

1973

01:26:50,149 --> 01:26:48,239

what can be said is that america's

1974

01:26:51,750 --> 01:26:50,159

rocket program took a different route

1975

01:26:54,070 --> 01:26:51,760

with different players

1976

01:26:56,149 --> 01:26:54,080

and in doing so the pioneering

1977

01:26:57,910 --> 01:26:56,159

contributions of molina and his fellow

1978

01:27:04,870 --> 01:26:57,920

rocketeers today

1979

01:27:07,669 --> 01:27:04,880

have been largely forgotten molina died

1980

01:27:09,270 --> 01:27:07,679

in paris in 1981

1981

01:27:11,270 --> 01:27:09,280

he had never stopped working for

1982

01:27:13,270 --> 01:27:11,280

peaceful and international efforts in

1983

01:27:15,430 --> 01:27:13,280

the exploration of space

1984

01:27:16,950 --> 01:27:15,440

and he continued with his own work as a

1985

01:27:20,070 --> 01:27:16,960

kinetic artist

1986

01:27:22,709 --> 01:27:20,080

creating more than 250 works

1987

01:27:23,110 --> 01:27:22,719

nearly all of them speak of journeys to

1988

01:27:38,550 --> 01:27:23,120

far

1989

01:27:42,550 --> 01:27:40,390

most people like to have you in a

1990

01:27:44,629 --> 01:27:42,560

clear-cut cubbyhole

1991

01:27:46,310 --> 01:27:44,639

sometimes i find that my former

1992

01:27:48,870 --> 01:27:46,320

colleagues in scientific

1993

01:27:50,310 --> 01:27:48,880

and technical research regard me no

1994

01:27:53,669 --> 01:27:50,320

longer as such

1995

01:27:54,550 --> 01:27:53,679

and that now i'm an artist among the

1996

01:27:56,790 --> 01:27:54,560

artists

1997

01:27:57,830 --> 01:27:56,800

they find it very difficult to accept me

1998

01:28:01,750 --> 01:27:57,840

as an artist

1999

01:28:04,629 --> 01:28:01,760

and they say i'm an engineer well

2000

01:28:23,100 --> 01:28:04,639

it doesn't really much matter i'm a

