



1
00:00:14,970 --> 00:00:12,240
happened to be fortunate to be at the in

2
00:00:18,480 --> 00:00:14,980
the in the launch facility at that time

3
00:00:22,019 --> 00:00:18,490
as I had been for all the the the Apollo

4
00:00:24,660 --> 00:00:22,029
of launches up at that time the the

5
00:00:27,090 --> 00:00:24,670
interest of course in the from the press

6
00:00:30,090 --> 00:00:27,100
and a lot of outside people who look at

7
00:00:33,210 --> 00:00:30,100
that is a little different than the

8
00:00:35,040 --> 00:00:33,220
there may be the other launches increase

9
00:00:36,840 --> 00:00:35,050
the intensity and the emphasis and

10
00:00:38,580 --> 00:00:36,850
interests I think in that in that

11
00:00:41,850 --> 00:00:38,590
particular launch you have to recognize

12
00:00:43,469 --> 00:00:41,860
that them at that time we launched that

13
00:00:46,860 --> 00:00:43,479

particular one we knew was going to the

14

00:00:49,530 --> 00:00:46,870

moon that was a big big flight but the

15

00:00:51,600 --> 00:00:49,540

the previous flights were from a launch

16

00:00:54,240 --> 00:00:51,610

operation standpoint which is what the

17

00:00:56,250 --> 00:00:54,250

what the business we were in and the and

18

00:00:59,219 --> 00:00:56,260

and specifically the Marshall Space

19

00:01:01,710 --> 00:00:59,229

Flight Center the the launch activity

20

00:01:05,730 --> 00:01:01,720

from the first of the of the Saturn

21

00:01:08,550 --> 00:01:05,740

fives was pretty much the same that day

22

00:01:10,469 --> 00:01:08,560

as it was for the we was for the lunar

23

00:01:12,090 --> 00:01:10,479

landing it was for the first one you

24

00:01:14,010 --> 00:01:12,100

you're obviously emphasize getting off

25

00:01:16,590 --> 00:01:14,020

the pad in there and getting yourself

26
00:01:17,130 --> 00:01:16,600
into orbit the upper stages you watch on

27
00:01:18,600 --> 00:01:17,140
TV

28
00:01:21,510 --> 00:01:18,610
there's on the second and third stage

29
00:01:24,630 --> 00:01:21,520
and that and two into separation but

30
00:01:26,400 --> 00:01:24,640
from a launch operation standpoint from

31
00:01:28,350 --> 00:01:26,410
a launch vehicle so you didn't it wasn't

32
00:01:30,090 --> 00:01:28,360
any different than than the first one

33
00:01:31,620 --> 00:01:30,100
for archival purposes so than the fact

34
00:01:35,220 --> 00:01:31,630
that the mission was different we had

35
00:01:36,810 --> 00:01:35,230
gone through a series of development

36
00:01:40,670 --> 00:01:36,820
flights if you will getting at that

37
00:01:44,070 --> 00:01:40,680
point one of the the previous like this

38
00:01:45,690 --> 00:01:44,080

si8 st eight was the eighth of the

39

00:01:47,670 --> 00:01:45,700

Apollo's launches them that went

40

00:01:50,580 --> 00:01:47,680

actually a circumvented the moon that

41

00:01:52,710 --> 00:01:50,590

was that was very very significant to a

42

00:01:54,990 --> 00:01:52,720

lot of people who had never never seen

43

00:01:56,520 --> 00:01:55,000

men get outside of a low Earth orbit

44

00:01:57,840 --> 00:01:56,530

like this to actually go up and go

45

00:01:59,790 --> 00:01:57,850

around the moon so that was a very

46

00:02:01,530 --> 00:01:59,800

significant to another significant

47

00:02:04,260 --> 00:02:01,540

flight before that was the next one

48

00:02:06,990 --> 00:02:04,270

where is actually a circle the moon and

49

00:02:09,779 --> 00:02:07,000

and transferred from the Apollo capsule

50

00:02:11,850 --> 00:02:09,789

into the limb my to before it didn't

51
00:02:16,020 --> 00:02:11,860
actually go down the surface but the

52
00:02:17,910 --> 00:02:16,030
build up of this was was wasn't didn't

53
00:02:19,350 --> 00:02:17,920
wasn't routine exactly but the build up

54
00:02:21,880 --> 00:02:19,360
did in fact from a launch operation

55
00:02:24,309 --> 00:02:21,890
standpoint was like another

56
00:02:25,450 --> 00:02:24,319
if you will recognize in significance

57
00:02:28,120 --> 00:02:25,460
what was going to happen a few days

58
00:02:30,580 --> 00:02:28,130
later when they when they when they the

59
00:02:32,470 --> 00:02:30,590
lunar module was to sit down on the moon

60
00:02:37,540 --> 00:02:32,480
and that was course was was most

61
00:02:39,670 --> 00:02:37,550
important but I is from a different what

62
00:02:41,500 --> 00:02:39,680
we did differently in the forest launch

63
00:02:42,130 --> 00:02:41,510

preparation there was not that much

64

00:02:44,410 --> 00:02:42,140

difference

65

00:02:46,480 --> 00:02:44,420

the you had to go through the same

66

00:02:49,420 --> 00:02:46,490

sequence you had to look at the same red

67

00:02:53,380 --> 00:02:49,430

lines you had the same same concerns but

68

00:02:55,390 --> 00:02:53,390

it clearly after the launch the the

69

00:02:59,350 --> 00:02:55,400

press made it a little different because

70

00:03:01,449 --> 00:02:59,360

there were no interviews and TVs and

71

00:03:02,710 --> 00:03:01,459

everybody was in being some similar kind

72

00:03:04,780 --> 00:03:02,720

of question what's your thoughts about

73

00:03:07,750 --> 00:03:04,790

the day how do you feel about this and

74

00:03:08,830 --> 00:03:07,760

and I don't know whether everyone was

75

00:03:10,690 --> 00:03:08,840

like me but I hadn't really thought

76
00:03:17,770 --> 00:03:10,700
about thinking that much different about

77
00:03:23,680 --> 00:03:20,650
well the it seemed to be the norm at

78
00:03:27,760 --> 00:03:23,690
that time the difference between then

79
00:03:29,860 --> 00:03:27,770
and today is that we had one one focus a

80
00:03:32,050 --> 00:03:29,870
one one real goal and it was established

81
00:03:34,000 --> 00:03:32,060
by President Kennedy as you know to get

82
00:03:36,670 --> 00:03:34,010
him out on the moon and return safely to

83
00:03:39,700 --> 00:03:36,680
earth within a decade and and that was

84
00:03:42,160 --> 00:03:39,710
NASA's primary mission it was everybody

85
00:03:45,670 --> 00:03:42,170
in the in the system understood that

86
00:03:48,460 --> 00:03:45,680
everybody worked to accomplishing they

87
00:03:50,350 --> 00:03:48,470
in order to meet the time you had to to

88
00:03:52,090 --> 00:03:50,360

have a well laid out plan where things

89

00:03:54,640 --> 00:03:52,100

fit together you had to be able to

90

00:03:56,140 --> 00:03:54,650

expect the unexpected and be able to

91

00:03:58,060 --> 00:03:56,150

adjust to it and we did have some money

92

00:03:59,500 --> 00:03:58,070

we had some problems in there and in

93

00:04:02,710 --> 00:03:59,510

launches we had some problems with the

94

00:04:05,680 --> 00:04:02,720

Gemini yeah a very significant one that

95

00:04:08,380 --> 00:04:05,690

got corrected right away when the one of

96

00:04:10,780 --> 00:04:08,390

the first EVs and environmental control

97

00:04:14,290 --> 00:04:10,790

system wasn't such that it was it was

98

00:04:15,790 --> 00:04:14,300

properly conditioned a many perspiration

99

00:04:17,560 --> 00:04:15,800

got in his eyes and that's where those

100

00:04:20,920 --> 00:04:17,570

kind of things you had to had to expect

101
00:04:23,890 --> 00:04:20,930
but at the same time you you didn't have

102
00:04:25,450 --> 00:04:23,900
to be be told that you got a problem you

103
00:04:26,470 --> 00:04:25,460
have to correct it people started

104
00:04:27,940 --> 00:04:26,480
working on the correcting a problem

105
00:04:29,530 --> 00:04:27,950
right away whether it was a launch

106
00:04:32,080 --> 00:04:29,540
vehicle problem we had some engine

107
00:04:35,080 --> 00:04:32,090
problems in the in the in the early days

108
00:04:37,450 --> 00:04:35,090
we we had good instrumentation we

109
00:04:39,430 --> 00:04:37,460
analyzed the problem and people hit the

110
00:04:41,020 --> 00:04:39,440
ground running the objective was to be

111
00:04:43,810 --> 00:04:41,030
able to solve that problem and get home

112
00:04:45,190 --> 00:04:43,820
with it and that was the norm so the one

113
00:04:47,409 --> 00:04:45,200

of the best things I think it happened

114

00:04:49,540 --> 00:04:47,419

to in within the Apollo and there was

115

00:04:51,670 --> 00:04:49,550

first off there was a plan that got us

116

00:04:53,290 --> 00:04:51,680

from one one stage to the other you

117

00:04:57,610 --> 00:04:53,300

learned something on every flight you

118

00:04:59,170 --> 00:04:57,620

you minimize duplication of effort so

119

00:05:01,840 --> 00:04:59,180

you focused on those things that you

120

00:05:04,750 --> 00:05:01,850

needed to to accomplish before you went

121

00:05:07,090 --> 00:05:04,760

to the to the next next step and as such

122

00:05:08,590 --> 00:05:07,100

when you when you recognized you didn't

123

00:05:10,330 --> 00:05:08,600

accomplish that then you had to make

124

00:05:13,120 --> 00:05:10,340

adjustments and that the planning for

125

00:05:16,690 --> 00:05:13,130

that was extremely well done and the the

126

00:05:19,690 --> 00:05:16,700

sense of responsibility of every

127

00:05:21,370 --> 00:05:19,700

individual everybody had a job to do

128

00:05:22,719 --> 00:05:21,380

they didn't have to beat oh you didn't

129

00:05:24,280 --> 00:05:22,729

have to look for a procedure he didn't

130

00:05:25,630 --> 00:05:24,290

have a procedure in those days I was in

131

00:05:27,909 --> 00:05:25,640

the early part of the day she didn't

132

00:05:30,570 --> 00:05:27,919

have a process or procedure you did what

133

00:05:31,980 --> 00:05:30,580

you had to do to solve the problem you

134

00:05:33,960 --> 00:05:31,990

you you brought that to the attention

135

00:05:36,990 --> 00:05:33,970

the right people from a decision-making

136

00:05:39,869 --> 00:05:37,000

standpoint there was no lack of of

137

00:05:42,570 --> 00:05:39,879

empowerment and and and cousin people to

138

00:05:45,209 --> 00:05:42,580

to do their job yet the the organization

139

00:05:47,129 --> 00:05:45,219

was such at you you knew when to bring a

140

00:05:49,409 --> 00:05:47,139

problem to the next highest level had to

141

00:05:50,939 --> 00:05:49,419

get got dealt with so it seemed to be

142

00:05:52,290 --> 00:05:50,949

the norm its approach there wasn't

143

00:05:53,640 --> 00:05:52,300

anything unusual it's just that's just

144

00:05:56,520 --> 00:05:53,650

the way we work we had an objective

145

00:05:59,850 --> 00:05:56,530

everybody had the same objective and and

146

00:06:02,429 --> 00:05:59,860

and as such we we focused on that

147

00:06:04,320 --> 00:06:02,439

attention that way today it would be a

148

00:06:08,610 --> 00:06:04,330

little different we would probably take

149

00:06:10,110 --> 00:06:08,620

longer between a an anomaly if we had an

150

00:06:12,959 --> 00:06:10,120

inflated nominee we probably take longer

151
00:06:16,680 --> 00:06:12,969
to with investigating teams and outside

152
00:06:19,529 --> 00:06:16,690
reviewers and and and and understand and

153
00:06:21,360 --> 00:06:19,539
analyze the problem before we went went

154
00:06:24,269 --> 00:06:21,370
forward with it with with corrective

155
00:06:26,700 --> 00:06:24,279
action so so you it would take longer

156
00:06:28,619 --> 00:06:26,710
today but then in those days you you had

157
00:06:29,760 --> 00:06:28,629
the right people you had those people on

158
00:06:31,559 --> 00:06:29,770
the programs one of the things about

159
00:06:34,619 --> 00:06:31,569
NASA at that time when NASA of course

160
00:06:37,170 --> 00:06:34,629
got established in 1958 and then we

161
00:06:39,899 --> 00:06:37,180
became part of NASA with Marshall in

162
00:06:44,430 --> 00:06:39,909
1960 that that they brought together

163
00:06:46,439 --> 00:06:44,440

NASA that some of the best best talent

164

00:06:49,490 --> 00:06:46,449

in the world and that we were with with

165

00:06:52,980 --> 00:06:49,500

the the NACA centers and they and other

166

00:06:54,930 --> 00:06:52,990

organizations that took from the Army

167

00:06:56,730 --> 00:06:54,940

the Marshall split was game became the

168

00:06:58,680 --> 00:06:56,740

Marshall Space Flight Center we had to

169

00:06:59,969 --> 00:06:58,690

we had the the very best talent in the

170

00:07:02,040 --> 00:06:59,979

world we had the knowledge all the

171

00:07:05,040 --> 00:07:02,050

knowledge that was really needed to be

172

00:07:08,010 --> 00:07:05,050

able to accomplish them a lunar landing

173

00:07:09,899 --> 00:07:08,020

in return was focused within the agency

174

00:07:11,640 --> 00:07:09,909

and that's that that was that was one

175

00:07:14,279 --> 00:07:11,650

benefit was recognized that that

176
00:07:15,779 --> 00:07:14,289
capability existed not one among

177
00:07:17,159 --> 00:07:15,789
ourselves but on the outside the

178
00:07:19,439 --> 00:07:17,169
Congress recognized that the

179
00:07:21,240 --> 00:07:19,449
administration recognized that industry

180
00:07:22,950 --> 00:07:21,250
recognized they're there they put their

181
00:07:24,809 --> 00:07:22,960
best people on it so the combination of

182
00:07:27,839 --> 00:07:24,819
industry and government you had the best

183
00:07:30,089 --> 00:07:27,849
best available talent in the world to do

184
00:07:37,000 --> 00:07:30,099
that and that's a and we focused on the

185
00:07:43,900 --> 00:07:41,110
in 1965 i was in i moved to florida

186
00:07:45,610 --> 00:07:43,910
representing the the saturn program

187
00:07:47,740 --> 00:07:45,620
manager be able to work for Marshall

188
00:07:50,040 --> 00:07:47,750

when I was stationed at in Florida so I

189

00:07:53,230 --> 00:07:50,050

got the benefit of of working through

190

00:07:55,630 --> 00:07:53,240

all the the Saturn launches and all the

191

00:07:59,920 --> 00:07:55,640

the pre-launch is up to that time on the

192

00:08:01,810 --> 00:07:59,930

night of the of that the actual sip when

193

00:08:04,690 --> 00:08:01,820

Armstrong set foot on the moment I was

194

00:08:06,430 --> 00:08:04,700

lived in Titusville near the Cape and I

195

00:08:08,250 --> 00:08:06,440

was at home and I watched it on TV and

196

00:08:11,650 --> 00:08:08,260

like a lot of other people so that was

197

00:08:15,430 --> 00:08:11,660

that that was it was something I think

198

00:08:16,930 --> 00:08:15,440

that nobody in it had anything to do

199

00:08:19,240 --> 00:08:16,940

with space or knew anything about what

200

00:08:22,090 --> 00:08:19,250

was going on maybe around the country

201
00:08:24,700 --> 00:08:22,100
but at least in the in Brevard counter

202
00:08:27,070 --> 00:08:24,710
in Florida who who who was interested

203
00:08:29,320 --> 00:08:27,080
and knew about what was going on I think

204
00:08:32,980 --> 00:08:29,330
everybody was watching that that

205
00:08:36,100 --> 00:08:32,990
historic moment the if your spectator

206
00:08:38,950 --> 00:08:36,110
and I've never been as a spectator to

207
00:08:40,420 --> 00:08:38,960
launch so I'm not sure how how that that

208
00:08:43,000 --> 00:08:40,430
works I've always even if I've been they

209
00:08:44,710 --> 00:08:43,010
have always been been in the in the

210
00:08:47,950 --> 00:08:44,720
launch facility associated with the

211
00:08:49,810 --> 00:08:47,960
launch activity there's a certain amount

212
00:08:52,690 --> 00:08:49,820
of discipline that you have to have and

213
00:08:54,790 --> 00:08:52,700

and and perform a countdown that

214

00:08:57,520 --> 00:08:54,800

discipline was the same that day as any

215

00:08:59,980 --> 00:08:57,530

other day up to the time we had we had

216

00:09:01,680 --> 00:08:59,990

lifted off and and gone through you know

217

00:09:03,610 --> 00:09:01,690

when you recognize at your first stage

218

00:09:05,920 --> 00:09:03,620

successful in the second stage and

219

00:09:08,950 --> 00:09:05,930

you're monitoring us on telemetry and TV

220

00:09:10,960 --> 00:09:08,960

and the third stage is successful that

221

00:09:13,570 --> 00:09:10,970

says that the the launch vehicle has

222

00:09:17,290 --> 00:09:13,580

done most of its job at least to get the

223

00:09:20,110 --> 00:09:17,300

the the third stage and the and they the

224

00:09:22,390 --> 00:09:20,120

Apollo capsule and lunar module into

225

00:09:25,540 --> 00:09:22,400

orbit that that's the time for

226

00:09:28,200 --> 00:09:25,550

celebration and and that's the time that

227

00:09:32,860 --> 00:09:28,210

the the launch facility or the launch

228

00:09:34,120 --> 00:09:32,870

activity is is in pretty well focused in

229

00:09:35,860 --> 00:09:34,130

there was at that time into Houston

230

00:09:38,500 --> 00:09:35,870

because it becomes a flight operation so

231

00:09:40,510 --> 00:09:38,510

you can relax to the point that that

232

00:09:41,860 --> 00:09:40,520

you're still concerned about how the the

233

00:09:43,960 --> 00:09:41,870

RET the other stages are going to work

234

00:09:45,900 --> 00:09:43,970

but then there's there's a lot of

235

00:09:48,150 --> 00:09:45,910

jubilant obviously and the

236

00:09:50,160 --> 00:09:48,160

and then you start recognizing you

237

00:09:52,830 --> 00:09:50,170

become more like a spectator as opposed

238

00:09:55,590 --> 00:09:52,840

to a part of the launch operation it's a

239

00:09:57,450 --> 00:09:55,600

discipline in the system where where you

240

00:09:58,860 --> 00:09:57,460

don't you're not talking about this as

241

00:10:00,840 --> 00:09:58,870

being a different launcher you're

242

00:10:03,120 --> 00:10:00,850

following procedures you're you've got

243

00:10:04,740 --> 00:10:03,130

to you've got a job to do it's only

244

00:10:07,290 --> 00:10:04,750

after that point after you've got into

245

00:10:10,920 --> 00:10:07,300

orbit that that there's some relaxation

246

00:10:12,960 --> 00:10:10,930

and people are able to to talk about the

247

00:10:14,670 --> 00:10:12,970

thing then you become more like a an

248

00:10:19,170 --> 00:10:14,680

individual who came just to watch the

249

00:10:23,430 --> 00:10:21,630

once you lift off and when going through

250

00:10:25,980 --> 00:10:23,440

the the preparation that the engines

251

00:10:28,470 --> 00:10:25,990

fire and you clear the tower you're not

252

00:10:31,769 --> 00:10:28,480

a hick a lot you can do and so it was on

253

00:10:34,890 --> 00:10:31,779

its way the we were listening to the

254

00:10:38,400 --> 00:10:34,900

communications and and had not the think

255

00:10:40,880 --> 00:10:38,410

as Conrad was a was a commander that had

256

00:10:42,870 --> 00:10:40,890

he not been perceptive enough

257

00:10:44,460 --> 00:10:42,880

immediately and I'm not sure exactly

258

00:10:46,650 --> 00:10:44,470

what treated him to do this but he

259

00:10:48,540 --> 00:10:46,660

recognized that there there had been a

260

00:10:52,380 --> 00:10:48,550

lightning strike and he reported that

261

00:10:55,590 --> 00:10:52,390

that met then brought a different kind

262

00:10:56,850 --> 00:10:55,600

of a attention to to the hacen face feel

263

00:10:59,160 --> 00:10:56,860

not a lot you can do about it you're

264

00:11:00,660 --> 00:10:59,170

gonna go ahead and go through the the

265

00:11:03,030 --> 00:11:00,670

second and third stage it's what we were

266

00:11:05,640 --> 00:11:03,040

we're concerned about is the effect that

267

00:11:07,410 --> 00:11:05,650

that that lightning may have had on was

268

00:11:10,560 --> 00:11:07,420

a scrambling memories of resetting

269

00:11:13,320 --> 00:11:10,570

computers are are the avionics if you

270

00:11:14,880 --> 00:11:13,330

will in the in the third states so what

271

00:11:17,790 --> 00:11:14,890

we were able to do on the ground again

272

00:11:20,190 --> 00:11:17,800

with telemetry was quickly well go

273

00:11:23,430 --> 00:11:20,200

through an assessment to verify that

274

00:11:26,370 --> 00:11:23,440

nothing and nothing had been disrupted

275

00:11:29,579 --> 00:11:26,380

with that so it was again and though to

276

00:11:32,490 --> 00:11:29,589

do that was one the early recognition of

277

00:11:35,280 --> 00:11:32,500

what happened and and then because of

278

00:11:37,860 --> 00:11:35,290

that a knowledge of what was of the

279

00:11:39,570 --> 00:11:37,870

system and the the telemetry feedback

280

00:11:42,180 --> 00:11:39,580

which we had plenty of on on those

281

00:11:43,949 --> 00:11:42,190

missions it was easy for the engineers

282

00:11:46,560 --> 00:11:43,959

to be able to to make that assessment

283

00:11:51,440 --> 00:11:46,570

and come to to about free pretty easy

284

00:11:56,300 --> 00:11:54,200

he was at all the launches always press

285

00:11:59,060 --> 00:11:56,310

conferences there was always reviews of

286

00:12:01,580 --> 00:11:59,070

the of the readiness of the the launch

287

00:12:04,340 --> 00:12:01,590

vehicle he was he was in the blockhouse

288

00:12:06,800 --> 00:12:04,350

and in and at every launch and and

289

00:12:09,560 --> 00:12:06,810

that's where I was so so I had contact

290

00:12:12,020 --> 00:12:09,570

with him from a from an Operations

291

00:12:14,390 --> 00:12:12,030

standpoint I didn't report directly to

292

00:12:16,130 --> 00:12:14,400

him I reported to the to the program

293

00:12:20,210 --> 00:12:16,140

manager Saturn program manager who did

294

00:12:24,020 --> 00:12:20,220

impact report directly to him in in 1969

295

00:12:26,450 --> 00:12:24,030

I did when I move back to Huntsville

296

00:12:29,540 --> 00:12:26,460

I was the technical assistant to von

297

00:12:33,260 --> 00:12:29,550

Braun's deputy dr. hard Ries and as such

298

00:12:36,920 --> 00:12:33,270

I was in the in the suite the night

299

00:12:39,650 --> 00:12:36,930

floor suite and and it became a lot more

300

00:12:42,230 --> 00:12:39,660

exposed to him until he is in 1970 when

301
00:12:47,690 --> 00:12:42,240
he went to went to Washington and that

302
00:12:50,330 --> 00:12:47,700
that consisted of most all reviews no

303
00:12:53,960 --> 00:12:50,340
matter what program we we had lunch

304
00:12:56,690 --> 00:12:53,970
together and a staff every day very

305
00:12:59,630 --> 00:12:56,700
interesting very interesting individual

306
00:13:01,940 --> 00:12:59,640
to be around whether a social standpoint

307
00:13:04,370 --> 00:13:01,950
or technical standpoint so yeah I had

308
00:13:07,130 --> 00:13:04,380
more more direct contact with him on a

309
00:13:10,130 --> 00:13:07,140
daily basis afternoon from between 1969

310
00:13:11,870 --> 00:13:10,140
and 1970 when he left if you ever met

311
00:13:14,980 --> 00:13:11,880
had an opportunity medium he had a a lot

312
00:13:18,920 --> 00:13:14,990
of charisma very intelligent person very

313
00:13:21,680 --> 00:13:18,930

eager to to expand his own knowledge of

314

00:13:24,530 --> 00:13:21,690

whatever I mean if it had been any any

315

00:13:26,300 --> 00:13:24,540

association with science he was he was

316

00:13:30,500 --> 00:13:26,310

totally open to the discussion he

317

00:13:33,140 --> 00:13:30,510

enjoyed trying on new ideas to to his

318

00:13:36,050 --> 00:13:33,150

immediate staff and and getting their

319

00:13:38,720 --> 00:13:36,060

and their input there's there is a

320

00:13:40,850 --> 00:13:38,730

obviously you can see how different

321

00:13:42,230 --> 00:13:40,860

people lead and I would put him in the

322

00:13:43,640 --> 00:13:42,240

lead if you want to make a distinction

323

00:13:46,640 --> 00:13:43,650

between the leader and manager he was

324

00:13:48,710 --> 00:13:46,650

clearly a leader he probably didn't

325

00:13:51,560 --> 00:13:48,720

always make all the the right decision

326

00:13:54,650 --> 00:13:51,570

he wasn't always right but his process

327

00:13:57,290 --> 00:13:54,660

of bringing to himself two of the system

328

00:14:00,350 --> 00:13:57,300

to a decision was such that he made the

329

00:14:01,880 --> 00:14:00,360

right decision and he did that by by

330

00:14:04,760 --> 00:14:01,890

making people feel comfortable whether

331

00:14:05,150 --> 00:14:04,770

you were my first meeting with him I was

332

00:14:55,579 --> 00:14:05,160

a

333

00:14:58,910 --> 00:14:55,589

bringing out the best in those

334

00:15:01,280 --> 00:14:58,920

individuals and and doing it in a very

335

00:15:03,259 --> 00:15:01,290

common nice way I don't know I never

336

00:15:09,559 --> 00:15:03,269

I've never been it was around him where

337

00:15:18,389 --> 00:15:13,769

now that that comes with with maturity

338

00:15:22,350 --> 00:15:18,399

and that comes with with recognition of

339

00:15:26,549 --> 00:15:22,360

the of what space can do for you at that

340

00:15:29,609 --> 00:15:26,559

time we weren't recognizing the benefits

341

00:15:31,769 --> 00:15:29,619

of of being in space from an earth

342

00:15:33,449 --> 00:15:31,779

observation standpoint environmental

343

00:15:35,579 --> 00:15:33,459

standpoint we weren't recognizing the

344

00:15:37,949 --> 00:15:35,589

benefits of microgravity research we

345

00:15:40,290 --> 00:15:37,959

weren't recognizing the benefits of of

346

00:15:41,639 --> 00:15:40,300

weather satellite so we weren't

347

00:15:44,400 --> 00:15:41,649

recognizing the benefits of

348

00:15:46,199 --> 00:15:44,410

communication now so but we did have

349

00:15:48,629 --> 00:15:46,209

recognized the objective of getting to

350

00:15:50,939 --> 00:15:48,639

the moon a lot of people you know from

351
00:15:52,590 --> 00:15:50,949
didn't really question that maybe some

352
00:15:54,059 --> 00:15:52,600
of the science people did you're not

353
00:15:55,650 --> 00:15:54,069
really gonna get that much science out

354
00:15:57,600 --> 00:15:55,660
of going to the moon I pick up gather a

355
00:15:59,549 --> 00:15:57,610
few rocks and come back that wasn't the

356
00:16:02,069 --> 00:15:59,559
objective the objective was to be able

357
00:16:05,369 --> 00:16:02,079
to get to the moon and back and that fit

358
00:16:08,819 --> 00:16:05,379
very well into the the administration's

359
00:16:11,129 --> 00:16:08,829
plans for for attacking the Cold War and

360
00:16:12,840 --> 00:16:11,139
there's no question about that so it was

361
00:16:14,369 --> 00:16:12,850
a different objective the Congress

362
00:16:17,189 --> 00:16:14,379
didn't question it because it was a good

363
00:16:18,749 --> 00:16:17,199

good a good objective the science says

364

00:16:21,929 --> 00:16:18,759

didn't didn't question because they

365

00:16:24,419 --> 00:16:21,939

really didn't have enough science

366

00:16:26,669 --> 00:16:24,429

objectives to to spend as much money for

367

00:16:27,869 --> 00:16:26,679

instance as we in space as we had spent

368

00:16:29,340 --> 00:16:27,879

on the Apollo program so we're a

369

00:16:31,650 --> 00:16:29,350

different set of objectives now what we

370

00:16:33,419 --> 00:16:31,660

prove to the world one way I think it

371

00:16:35,819 --> 00:16:33,429

went a long way to winning the Cold War

372

00:16:38,309 --> 00:16:35,829

but also approved is the if what we can

373

00:16:40,139 --> 00:16:38,319

do in space that then brought into to

374

00:16:41,609 --> 00:16:40,149

other other disciplines other other

375

00:16:43,379 --> 00:16:41,619

things to be able to and that's what

376

00:16:46,410 --> 00:16:43,389

we're faced with today it's not a bad

377

00:16:48,629 --> 00:16:46,420

deal we've now said that improving to

378

00:16:51,059 --> 00:16:48,639

ourselves at space can benefit a lot of

379

00:16:53,189 --> 00:16:51,069

things therefore you diversify when you

380

00:16:55,919 --> 00:16:53,199

diversify you don't have the single

381

00:16:58,079 --> 00:16:55,929

objective as we've had before we do more

382

00:16:59,669 --> 00:16:58,089

much more today in space than we did in

383

00:17:00,929 --> 00:16:59,679

the Apollo days from a science

384

00:17:02,309 --> 00:17:00,939

standpoint from an environmental

385

00:17:05,010 --> 00:17:02,319

standpoint from an application

386

00:17:07,380 --> 00:17:05,020

standpoint so it's a that goes with the

387

00:17:09,269 --> 00:17:07,390

territory we've proven the benefits of a

388

00:17:11,490 --> 00:17:09,279

and it's going to increase even more so

389

00:17:14,130 --> 00:17:11,500

the versification comes with it with a

390

00:17:15,659 --> 00:17:14,140

territory and and and I think that's

391

00:17:17,879 --> 00:17:15,669

good for the country we've opened up a

392

00:17:19,889 --> 00:17:17,889

new frontier it's a new territory it's

393

00:17:22,279 --> 00:17:19,899

it's and I don't think we found all the

394

00:17:24,740 --> 00:17:22,289

the benefits of this yet

395

00:17:26,360 --> 00:17:24,750

once we get more into more learn more

396

00:17:28,340 --> 00:17:26,370

about the planetary system the the

397

00:17:30,049 --> 00:17:28,350

Hubble telescope you're going to find

398

00:17:31,580 --> 00:17:30,059

more and more things too that need to be

399

00:17:34,070 --> 00:17:31,590

explored and then I think it's going to

400

00:17:35,330 --> 00:17:34,080

even diversify more so it's that just

401
00:17:38,750 --> 00:17:35,340
happens and I think it's a good thing

402
00:17:41,360 --> 00:17:38,760
for space I I don't see I think the

403
00:17:43,250 --> 00:17:41,370
Apollo satisfied part of that objective

404
00:17:46,549 --> 00:17:43,260
I think rose to where we are prove it we

405
00:17:49,240 --> 00:17:46,559
can do things and and now we need to do

406
00:17:51,799 --> 00:17:49,250
with the for the limited budgets we have

407
00:17:54,049 --> 00:17:51,809
we need to be fiscally responsible and

408
00:17:56,690 --> 00:17:54,059
we need to ensure that we are in fact

409
00:18:03,050 --> 00:17:56,700
getting more as much a return on our

410
00:18:08,420 --> 00:18:05,290
and a lot of respect it would have been

411
00:18:10,880 --> 00:18:08,430
it went a lot easier we would have been

412
00:18:13,100 --> 00:18:10,890
able to do a lot of computations a lot

413
00:18:15,050 --> 00:18:13,110

faster we'd have been able to do a lot

414

00:18:16,760 --> 00:18:15,060

more analysis and maybe in some cases

415

00:18:18,680 --> 00:18:16,770

less tests

416

00:18:21,500 --> 00:18:18,690

we might even been able to do the near

417

00:18:24,860 --> 00:18:21,510

do the program faster I might haven't

418

00:18:28,250 --> 00:18:24,870

been able to get to the to the moon

419

00:18:30,170 --> 00:18:28,260

before 1969 I'm not sure that's the case

420

00:18:31,490 --> 00:18:30,180

though because they were still there's

421

00:18:33,140 --> 00:18:31,500

certain things that you have to do you

422

00:18:34,430 --> 00:18:33,150

have to build hardware you have to get

423

00:18:37,670 --> 00:18:34,440

you're gonna have to test it you're

424

00:18:41,150 --> 00:18:37,680

gonna have to have to launch it I would

425

00:18:43,040 --> 00:18:41,160

say that the we would have maybe more

426

00:18:45,380 --> 00:18:43,050

confidence and I don't know how to have

427

00:18:49,070 --> 00:18:45,390

to judge this whether how much lack of

428

00:18:50,750 --> 00:18:49,080

confidence if people had in in our

429

00:18:52,700 --> 00:18:50,760

ability to be able to to accomplish

430

00:18:54,620 --> 00:18:52,710

submission but there would have been

431

00:18:56,570 --> 00:18:54,630

more confidence I think and Advanta days

432

00:18:58,730 --> 00:18:56,580

environment and having that that

433

00:19:02,300 --> 00:18:58,740

computational capability the other thing

434

00:19:05,660 --> 00:19:02,310

that that you learn to do is is

435

00:19:08,930 --> 00:19:05,670

communicate know where you we don't have

436

00:19:11,720 --> 00:19:08,940

fax machines which you you learn to to

437

00:19:13,090 --> 00:19:11,730

talk to have confidence first off that

438

00:19:16,130 --> 00:19:13,100

was another thing about the program

439

00:19:18,070 --> 00:19:16,140

everybody pretty well knew everybody in

440

00:19:20,810 --> 00:19:18,080

the program who had a who had a

441

00:19:22,850 --> 00:19:20,820

responsibility or who's who had an

442

00:19:24,530 --> 00:19:22,860

expertise um it's it was a big program

443

00:19:25,940 --> 00:19:24,540

but it's somehow that that you

444

00:19:27,590 --> 00:19:25,950

recognized that you regularly were

445

00:19:29,960 --> 00:19:27,600

people were identified on who had the

446

00:19:32,210 --> 00:19:29,970

knowledge in that and at which group was

447

00:19:33,740 --> 00:19:32,220

it was hell responsible and and there

448

00:19:35,990 --> 00:19:33,750

they felt respond even to be told they

449

00:19:37,330 --> 00:19:36,000

felt response like something about brown

450

00:19:39,350 --> 00:19:37,340

used to talk about its automatic

451
00:19:42,050 --> 00:19:39,360
responsibility that means everybody in

452
00:19:43,580 --> 00:19:42,060
the system has responsibility to if they

453
00:19:45,380 --> 00:19:43,590
see something wrong or something needs

454
00:19:47,420 --> 00:19:45,390
to be done or corrected they have

455
00:19:50,390 --> 00:19:47,430
responsibility to bring that to the

456
00:19:52,130 --> 00:19:50,400
attention of you take care of themselves

457
00:19:54,320 --> 00:19:52,140
or bring to the attention of someone who

458
00:19:57,200 --> 00:19:54,330
can you learn to trust people there was

459
00:20:00,980 --> 00:19:57,210
a lot of trust in them when you say give

460
00:20:04,580 --> 00:20:00,990
a person information over the phone then

461
00:20:06,560 --> 00:20:04,590
and it's critical to the launch then the

462
00:20:08,630 --> 00:20:06,570
there was a come a personal thing you

463
00:20:11,720 --> 00:20:08,640

understood you accepted that you didn't

464

00:20:15,290 --> 00:20:11,730

have to have it you know fifty

465

00:20:16,910 --> 00:20:15,300

signatures on every document that that

466

00:20:18,920 --> 00:20:16,920

process came only later

467

00:20:20,810 --> 00:20:18,930

it came after the Challenger by the way

468

00:20:23,150 --> 00:20:20,820

we didn't have to have all you had to

469

00:20:24,320 --> 00:20:23,160

have maybe one or two signatures but you

470

00:20:26,060 --> 00:20:24,330

didn't have to have hundreds of so

471

00:20:28,550 --> 00:20:26,070

everybody in the system didn't have to

472

00:20:30,860 --> 00:20:28,560

sign up you if the man said it's it's

473

00:20:32,960 --> 00:20:30,870

ready to go have confidence in this you

474

00:20:34,400 --> 00:20:32,970

believed it and because he believed it

475

00:20:36,080 --> 00:20:34,410

and because he did his job he was

476
00:20:38,660 --> 00:20:36,090
everybody had the same objective

477
00:20:40,730 --> 00:20:38,670
nobody had any objective to to get away

478
00:20:42,440 --> 00:20:40,740
with anything or to to circumvent the

479
00:20:44,450 --> 00:20:42,450
system and to be able to do anything

480
00:20:46,280 --> 00:20:44,460
unsafe is not that didn't factor in

481
00:20:53,670 --> 00:20:46,290
everybody had the same objective to get

482
00:21:01,260 --> 00:20:58,380
the disadvantages of the Apollo in the

483
00:21:04,020 --> 00:21:01,270
Apollo era is that we we did in fact get

484
00:21:07,530 --> 00:21:04,030
ourselves as an agency so engrossed in

485
00:21:11,430 --> 00:21:07,540
the and the Apollo program that we we

486
00:21:13,740 --> 00:21:11,440
fail to to focus and they in the later

487
00:21:16,350 --> 00:21:13,750
part of the program or in the mid part

488
00:21:18,540 --> 00:21:16,360

on where we were going to go from there

489

00:21:21,480 --> 00:21:18,550

no new programs they've mentioned the

490

00:21:25,500 --> 00:21:21,490

Skylab was little after the fact almost

491

00:21:29,160 --> 00:21:25,510

that it was recognized we had this very

492

00:21:31,260 --> 00:21:29,170

competent agency focused on in unmanned

493

00:21:34,470 --> 00:21:31,270

systems the best in the world with the

494

00:21:36,120 --> 00:21:34,480

industrial team and yet we were going to

495

00:21:39,020 --> 00:21:36,130

we were going to finish the Apollo one

496

00:21:41,490 --> 00:21:39,030

day and and we didn't have any programs

497

00:21:42,990 --> 00:21:41,500

plan that would would keep that

498

00:21:44,880 --> 00:21:43,000

infrastructure in place keep that

499

00:21:48,810 --> 00:21:44,890

capability in place and that's how the

500

00:21:50,940 --> 00:21:48,820

the Skylab evolved it was it was built

501
00:21:53,190 --> 00:21:50,950
on utilization as you know of Apollo

502
00:21:54,390 --> 00:21:53,200
equipment but that was a program in fact

503
00:21:56,100 --> 00:21:54,400
it turned out to be a this country's

504
00:21:59,670 --> 00:21:56,110
first space station and a very good one

505
00:22:01,380 --> 00:21:59,680
but it also kept kept the the agency

506
00:22:03,600 --> 00:22:01,390
together kept the technical competence

507
00:22:05,580 --> 00:22:03,610
there we did have to go through quite a

508
00:22:07,320 --> 00:22:05,590
reduction in not only in the agency but

509
00:22:09,240 --> 00:22:07,330
in the and industrial community which

510
00:22:11,220 --> 00:22:09,250
said I didn't think was good but at

511
00:22:13,920 --> 00:22:11,230
least we we kept the program going there

512
00:22:16,410 --> 00:22:13,930
the Apollo Soyuz was another one that

513
00:22:18,720 --> 00:22:16,420

was the first cooperation with the with

514

00:22:22,320 --> 00:22:18,730

with the Russians that wasn't exactly a

515

00:22:24,030 --> 00:22:22,330

lot of a big deal as far as a drawing

516

00:22:28,350 --> 00:22:24,040

board kind of thing it was more of

517

00:22:32,100 --> 00:22:28,360

sending up astronauts with the with the

518

00:22:34,980 --> 00:22:32,110

the Apollo Hardware to be able to to to

519

00:22:39,060 --> 00:22:34,990

mate with the Soyuz and the Russians the

520

00:22:42,270 --> 00:22:39,070

he was in that time it we were we were

521

00:22:46,700 --> 00:22:42,280

focusing pretty much on the on the

522

00:22:49,380 --> 00:22:46,710

shuttle it was in 1969 that even

523

00:22:51,990 --> 00:22:49,390

President Nixon recognized that there

524

00:22:54,660 --> 00:22:52,000

had to be some some type of a policy

525

00:22:57,720 --> 00:22:54,670

someplace for the for the country to go

526

00:23:00,450 --> 00:22:57,730

after Apollo and he set up a space space

527

00:23:02,340 --> 00:23:00,460

task group and that that space task

528

00:23:04,830 --> 00:23:02,350

group was headed by then vice president

529

00:23:06,140 --> 00:23:04,840

Agnew and I there were four points that

530

00:23:09,170 --> 00:23:06,150

came out of that I don't remember

531

00:23:10,760 --> 00:23:09,180

for him but two of them were to one

532

00:23:12,710 --> 00:23:10,770

internet I don't know what this right

533

00:23:15,440 --> 00:23:12,720

order but internationalized space was

534

00:23:19,130 --> 00:23:15,450

one and the other was to develop a

535

00:23:21,650 --> 00:23:19,140

reusable system it was obvious it to the

536

00:23:23,690 --> 00:23:21,660

world that a reusable system should be

537

00:23:25,010 --> 00:23:23,700

cheaper and should be more operable and

538

00:23:28,400 --> 00:23:25,020

you wouldn't have to throw all that

539

00:23:30,260 --> 00:23:28,410

Hardware away and and two things that

540

00:23:32,930 --> 00:23:30,270

came out of that in that time period was

541

00:23:35,540 --> 00:23:32,940

was the shuttle and that that's a

542

00:23:38,560 --> 00:23:35,550

reusable system and we were working in

543

00:23:41,480 --> 00:23:38,570

earnest Sunday on the shuttle in

544

00:23:43,100 --> 00:23:41,490

parallel with this for years we had been

545

00:23:45,170 --> 00:23:43,110

working on a space station and the

546

00:23:48,890 --> 00:23:45,180

agency had to decide which direction to

547

00:23:50,480 --> 00:23:48,900

go reusable system our space station and

548

00:23:52,520 --> 00:23:50,490

it was concluded that if we built a

549

00:23:54,230 --> 00:23:52,530

reusable system then it would be good

550

00:23:56,210 --> 00:23:54,240

for ultimately building a space station

551
00:23:58,390 --> 00:23:56,220
it was just where we're going today

552
00:24:00,590 --> 00:23:58,400
and so those those two things were

553
00:24:02,870 --> 00:24:00,600
prevalent on the on the drawing board

554
00:24:06,080 --> 00:24:02,880
one with space transportation and a man

555
00:24:09,410 --> 00:24:06,090
system standpoint we had that we were

556
00:24:11,660 --> 00:24:09,420
working on that time the the plans for

557
00:24:13,340 --> 00:24:11,670
the Hubble telescope which is up now

558
00:24:14,630 --> 00:24:13,350
that was that that work was done here at

559
00:24:16,670 --> 00:24:14,640
the Marshall Space Flight Center the

560
00:24:19,700 --> 00:24:16,680
early concept definition and the detail

561
00:24:22,040 --> 00:24:19,710
definition was done that done here from

562
00:24:24,560 --> 00:24:22,050
an international standpoint to be able

563
00:24:28,610 --> 00:24:24,570

to to bring the Europeans in to the end

564

00:24:31,850 --> 00:24:28,620

of the man fold if you will and into the

565

00:24:35,480 --> 00:24:31,860

reusable era of the of the shuttle we

566

00:24:37,400 --> 00:24:35,490

established the what later became the

567

00:24:40,160 --> 00:24:37,410

Space Lab program it started out as a

568

00:24:41,930 --> 00:24:40,170

the sortie can that that work was done

569

00:24:42,980 --> 00:24:41,940

here the early design definition was

570

00:24:44,990 --> 00:24:42,990

down here at the Marshall Space Flight

571

00:24:48,290 --> 00:24:45,000

Center in fact I had the benefit of

572

00:24:50,660 --> 00:24:48,300

imagine that task team in the 1972 time

573

00:24:54,410 --> 00:24:50,670

period and I became a program manager

574

00:24:55,790 --> 00:24:54,420

for the space station space lab in 1973

575

00:25:00,050 --> 00:24:55,800

that was an international cooperative

576

00:25:02,000 --> 00:25:00,060

program between the ten European

577

00:25:04,520 --> 00:25:02,010

countries and and NASA which we took the

578

00:25:06,170 --> 00:25:04,530

lead in here that International

579

00:25:07,550 --> 00:25:06,180

Corporation has continued that was the

580

00:25:08,750 --> 00:25:07,560

first of the real international man

581

00:25:11,510 --> 00:25:08,760

programs today

582

00:25:13,250 --> 00:25:11,520

the space station is much broader over

583

00:25:16,040 --> 00:25:13,260

the international cooperation there's

584

00:25:17,960 --> 00:25:16,050

always been since I can remember an

585

00:25:19,970 --> 00:25:17,970

international cooperation between the

586

00:25:22,720 --> 00:25:19,980

science community you don't hear a lot

587

00:25:25,159 --> 00:25:22,730

about that because it's in the form of a

588

00:25:28,070 --> 00:25:25,169

different kind of satellites and science

589

00:25:30,200 --> 00:25:28,080

it's not quite as well publicized as as

590

00:25:31,669 --> 00:25:30,210

a joint mission between the United

591

00:25:33,380 --> 00:25:31,679

States and the Russians or what-have-you

592

00:25:35,210 --> 00:25:33,390

but those are the kind of things are on

593

00:25:36,919 --> 00:25:35,220

the drawing board at that time and most

594

00:25:39,230 --> 00:25:36,929

of them came into fruition now the

595

00:25:41,840 --> 00:25:39,240

problem is we we didn't have enough of

596

00:25:43,430 --> 00:25:41,850

the detail on the drawing board I think

597

00:25:46,039 --> 00:25:43,440

soon enough and I think that hurt us

598

00:25:48,169 --> 00:25:46,049

after the Apollo program was a status

599

00:25:50,840 --> 00:25:48,179

quo of NASA if you will after the Apollo

600

00:25:53,299 --> 00:25:50,850

if you see what happened and do that so

601
00:25:55,159 --> 00:25:53,309
it's a the the the direction could have

602
00:25:57,380 --> 00:25:55,169
been and I think people like von Braun

603
00:26:00,020 --> 00:25:57,390
and a few other people in the space

604
00:26:02,120 --> 00:26:00,030
business would have liked to have said

605
00:26:04,430 --> 00:26:02,130
okay we finish this objective we'll put

606
00:26:05,900 --> 00:26:04,440
the man on the moon return him now let's

607
00:26:08,150 --> 00:26:05,910
do it for Mars I think there would have

608
00:26:09,740 --> 00:26:08,160
been a if you were interviewed probably

609
00:26:10,880 --> 00:26:09,750
his was interview at that time which you

610
00:26:13,700 --> 00:26:10,890
get to talk to him today he would

611
00:26:16,340 --> 00:26:13,710
probably say that would be an objective

612
00:26:18,860 --> 00:26:16,350
I think realism though that that the

613
00:26:21,230 --> 00:26:18,870

country wasn't in a position to to go

614

00:26:24,020 --> 00:26:21,240

forward with that at that time was was

615

00:26:25,340 --> 00:26:24,030

probably also recognized so there were

616

00:26:27,919 --> 00:26:25,350

never any I don't think any really

617

00:26:31,190 --> 00:26:27,929

serious consideration to to do any more