
Joe Lombardo
NASA

1
00:00:42,030 --> 00:00:39,480
the dawn of a new day holding the

2
00:00:45,750 --> 00:00:42,040
promise of new discoveries new

3
00:00:53,370 --> 00:00:45,760
challenges new accomplishments a new

4
00:00:59,149 --> 00:00:53,380
beginning America's space program is

5
00:01:07,800 --> 00:01:02,160
it's a whole new world out there we

6
00:01:13,410 --> 00:01:07,810
belong in space I think the shuttle is

7
00:01:14,960 --> 00:01:13,420
the epitome of flight the people that's

8
00:01:20,389 --> 00:01:14,970
what makes it really all come together

9
00:01:25,410 --> 00:01:23,160
of us have the kind of a pride and the

10
00:01:27,359 --> 00:01:25,420
feeling forget our job done that we're

11
00:01:30,620 --> 00:01:27,369
really putting that above a lot of our

12
00:01:33,210 --> 00:01:30,630
personal needs and personal activities

13
00:01:35,160 --> 00:01:33,220

these are the people of the marshall

14
00:01:37,460 --> 00:01:35,170
space flight center shuttle projects an

15
00:01:41,340 --> 00:01:37,470
integral part of that new beginning

16
00:01:45,990 --> 00:01:41,350
their job the redesign and certification

17
00:01:48,690 --> 00:01:46,000
of the shuttles propulsion elements the

18
00:01:52,620 --> 00:01:48,700
external tank the structural backbone of

19
00:01:54,510 --> 00:01:52,630
the space transportation system the main

20
00:01:56,609 --> 00:01:54,520
engines the most technologically

21
00:02:00,149 --> 00:01:56,619
advanced liquid fueled engines ever

22
00:02:02,580 --> 00:02:00,159
built and the solid rocket booster with

23
00:02:09,520 --> 00:02:02,590
the largest solid propellant motor ever

24
00:02:15,920 --> 00:02:12,020
hundreds of dedicated men and women

25
00:02:19,310 --> 00:02:15,930
across the country government and

26
00:02:47,310 --> 00:02:19,320
industry working side-by-side to a

27
00:02:47,320 --> 00:02:55,430
rebuilding the country space program

28
00:03:00,240 --> 00:02:57,720
assembling the finest technical

29
00:03:03,120 --> 00:03:00,250
scientific and management resources to

30
00:03:16,380 --> 00:03:03,130
study and analyze every aspect of the

31
00:03:21,510 --> 00:03:18,840
these exhaustive review efforts from

32
00:03:23,220 --> 00:03:21,520
outside and within the agency culminated

33
00:03:24,900 --> 00:03:23,230
with the issuance of a set of actions

34
00:03:30,059 --> 00:03:24,910
from the NASA associate administrator

35
00:03:31,710 --> 00:03:30,069
for Space Flight Bob Marshall manager of

36
00:03:34,740 --> 00:03:31,720
the shuttle project office at the

37
00:03:36,330 --> 00:03:34,750
Marshall Space Flight Center explains he

38
00:03:37,920 --> 00:03:36,340

established the requirements that he

39
00:03:40,380 --> 00:03:37,930
felt were necessary for us to have a

40
00:03:42,120 --> 00:03:40,390
safe return to flight these requirements

41
00:03:44,790 --> 00:03:42,130
are identified in a letter that she is

42
00:03:47,790 --> 00:03:44,800
dated March 24 that preceded the

43
00:03:50,190 --> 00:03:47,800
Commission report of june six 1986

44
00:03:51,840 --> 00:03:50,200
however it included the points that were

45
00:03:53,490 --> 00:03:51,850
recovered within the Commission report

46
00:03:55,290 --> 00:03:53,500
the first of these is probably more

47
00:03:57,210 --> 00:03:55,300
important was a reassessment of the

48
00:03:59,790 --> 00:03:57,220
entire program management structure and

49
00:04:01,410 --> 00:03:59,800
its operation it provided the

50
00:04:03,210 --> 00:04:01,420
requirement and we have since then

51
00:04:05,610 --> 00:04:03,220
establish that we would have a program

52
00:04:08,729 --> 00:04:05,620
line of communications which we referred

53
00:04:10,949 --> 00:04:08,739
to as level 3 2 1 and we also have an

54
00:04:12,780 --> 00:04:10,959
institutional which is the center

55
00:04:14,940 --> 00:04:12,790
directors and the organizations within

56
00:04:19,500 --> 00:04:14,950
each of the centers with report today

57
00:04:22,290 --> 00:04:19,510
truly the second of his of course was

58
00:04:25,469 --> 00:04:22,300
the redesign of the joint and the SRM

59
00:04:27,420 --> 00:04:25,479
redesign is progressing very well the

60
00:04:29,880 --> 00:04:27,430
third of these was a design requirements

61
00:04:31,409 --> 00:04:29,890
verification there are some modification

62
00:04:33,300 --> 00:04:31,419
being made both to the requirements as

63
00:04:37,860 --> 00:04:33,310

well as to the hardware and as to the

64
00:04:40,080 --> 00:04:37,870
verification process the fourth of these

65
00:04:42,659 --> 00:04:40,090
is a review of the critical items list

66
00:04:44,580 --> 00:04:42,669
and a review of the theme of sale or

67
00:04:47,340 --> 00:04:44,590
theme of failure modes effects analysis

68
00:04:48,780 --> 00:04:47,350
there have been at least three rather

69
00:04:50,970 --> 00:04:48,790
significant items at

70
00:04:52,830 --> 00:04:50,980
uncovered in this reassessment which

71
00:04:54,630 --> 00:04:52,840
will help us to make the vehicle more

72
00:04:56,400 --> 00:04:54,640
safe but more importantly we have

73
00:04:58,080 --> 00:04:56,410
identified a number of the failure modes

74
00:05:00,150 --> 00:04:58,090
that can be eliminated through design

75
00:05:03,540 --> 00:05:00,160
and we are doing that in the critical

76
00:05:05,340 --> 00:05:03,550
item one type category we also are

77
00:05:07,770 --> 00:05:05,350
addressing a complete review which is

78
00:05:09,960 --> 00:05:07,780
item 5 of the operation and maintenance

79
00:05:12,720 --> 00:05:09,970
documents these documents are the KSC

80
00:05:14,700 --> 00:05:12,730
documents which provide the instructions

81
00:05:16,320 --> 00:05:14,710
for the people there to check out the

82
00:05:19,080 --> 00:05:16,330
hardware as it arrives from our design

83
00:05:20,910 --> 00:05:19,090
center additionally we are looking again

84
00:05:23,250 --> 00:05:20,920
at the launch abort and launch flight

85
00:05:25,620 --> 00:05:23,260
launch rules there are a number of those

86
00:05:27,870 --> 00:05:25,630
which are not going to be changed but as

87
00:05:29,730 --> 00:05:27,880
a result of FEMA sill will be some added

88
00:05:31,800 --> 00:05:29,740

potentially that will address final

89
00:05:33,780 --> 00:05:31,810
checks to be sure that the category one

90
00:05:36,690 --> 00:05:33,790
or critical one failures are in fact

91
00:05:38,850 --> 00:05:36,700
well checked out prior to launch the

92
00:05:41,910 --> 00:05:38,860
seventh one of these is the first light

93
00:05:44,310 --> 00:05:41,920
years operations we have addressed those

94
00:05:46,440 --> 00:05:44,320
areas with any operational part of the

95
00:05:48,240 --> 00:05:46,450
program that allow us to return to

96
00:05:50,700 --> 00:05:48,250
flight and complete our flight

97
00:05:52,860 --> 00:05:50,710
assignments like we came out of the last

98
00:05:54,810 --> 00:05:52,870
series of Lights and have not lost any

99
00:05:56,250 --> 00:05:54,820
of the enthusiasm for the people there

100
00:05:58,710 --> 00:05:56,260
more importantly any of the knowledge

101
00:06:00,780 --> 00:05:58,720
that's necessary for flight the number

102
00:06:02,700 --> 00:06:00,790
eight item from dick truely's letter is

103
00:06:04,920 --> 00:06:02,710
a development of a substantive safe

104
00:06:07,110 --> 00:06:04,930
flight rate we have reassessed that

105
00:06:08,310 --> 00:06:07,120
recently and we are now attempting to

106
00:06:10,050 --> 00:06:08,320
make sure that we have a safe flight

107
00:06:13,230 --> 00:06:10,060
rate that is somewhere in the

108
00:06:14,820 --> 00:06:13,240
neighborhood of 14 to 16 the last item a

109
00:06:16,140 --> 00:06:14,830
dick Trudy's letter was referred to as

110
00:06:21,060 --> 00:06:16,150
the bottom line

111
00:06:22,980 --> 00:06:21,070
do have in fact an organizational

112
00:06:25,170 --> 00:06:22,990
structure staffed with the kinds of

113
00:06:27,210 --> 00:06:25,180

people in the proper positions that

114
00:06:30,150 --> 00:06:27,220
allow us to return to flight safely and

115
00:06:31,890 --> 00:06:30,160
maintain the kind of decision trail that

116
00:06:34,850 --> 00:06:31,900
is necessary to assure that we don't

117
00:06:37,200 --> 00:06:34,860
have another type accident of the 51 m

118
00:06:38,850 --> 00:06:37,210
overall the marshall center in my

119
00:06:41,790 --> 00:06:38,860
opinion as well as our contractor

120
00:06:43,170 --> 00:06:41,800
friends are at this point improved

121
00:06:45,420 --> 00:06:43,180
substantially and not on the

122
00:06:47,550 --> 00:06:45,430
communications but through outlook and

123
00:06:51,690 --> 00:06:47,560
their participation in the program and i

124
00:06:54,270 --> 00:06:51,700
believe as I look down toward 1988 there

125
00:06:56,220 --> 00:06:54,280
will be a readiness for launch we will

126
00:06:58,830 --> 00:06:56,230
have covered all of the quote basis

127
00:07:01,140 --> 00:06:58,840
unquote and we will be in a position at

128
00:07:03,900 --> 00:07:01,150
a posture to have a fight that is safe

129
00:07:17,290 --> 00:07:03,910
and again put this nation back into

130
00:07:22,850 --> 00:07:20,330
with clearly defined guidelines and

131
00:07:24,950 --> 00:07:22,860
objectives each project is involved in

132
00:07:28,790 --> 00:07:24,960
the business of returning to safe flight

133
00:07:31,309 --> 00:07:28,800
operations Porter Bridwell manager of

134
00:07:35,809 --> 00:07:31,319
the external tank project shortly after

135
00:07:38,420 --> 00:07:35,819
51 L we aggressively stepped into the

136
00:07:41,659 --> 00:07:38,430
reassessment activities what we wanted

137
00:07:44,450 --> 00:07:41,669
to assure our self of in reassessing the

138
00:07:46,939 --> 00:07:44,460

toll hardware on the tank was to assure

139
00:07:48,709 --> 00:07:46,949
herself number one we had identified all

140
00:07:52,670 --> 00:07:48,719
the single point where years an external

141
00:07:54,579 --> 00:07:52,680
tank and secondly after doing that is to

142
00:07:57,860 --> 00:07:54,589
assure ourselves from a test

143
00:08:00,529 --> 00:07:57,870
verification design standpoint that

144
00:08:02,689 --> 00:08:00,539
those were acceptable risk for the next

145
00:08:06,589 --> 00:08:02,699
slide of the external tankers has

146
00:08:08,480 --> 00:08:06,599
protected Thomas worth vice-president

147
00:08:10,339 --> 00:08:08,490
external tank project for Martin

148
00:08:12,320 --> 00:08:10,349
Marietta while the return to flight

149
00:08:13,999 --> 00:08:12,330
activities are going on we still are in

150
00:08:16,459 --> 00:08:14,009
production here at Martin Marietta miss

151
00:08:18,589 --> 00:08:16,469
you we are also looking at how we build

152
00:08:21,260 --> 00:08:18,599
a tank to certify that that process is

153
00:08:23,300 --> 00:08:21,270
correct taking the design requirements

154
00:08:25,490 --> 00:08:23,310
how they're implemented down through the

155
00:08:28,189 --> 00:08:25,500
bill procedures and then actually how

156
00:08:31,010 --> 00:08:28,199
the tank is built I'm happy to say that

157
00:08:33,500 --> 00:08:31,020
in review of this process we have found

158
00:08:34,969 --> 00:08:33,510
that the process is right and the tanks

159
00:08:38,209 --> 00:08:34,979
are building are built to the

160
00:08:40,819 --> 00:08:38,219
engineering our scale is a 100

161
00:08:43,219 --> 00:08:40,829
their attitude and their performance

162
00:08:45,619 --> 00:08:43,229
particularly in production there is

163
00:08:48,410 --> 00:08:45,629

somewhere between 95 two hundred percent

164
00:08:51,100 --> 00:08:48,420
because we are building better parts out

165
00:08:53,480 --> 00:08:51,110
here now even even better than before

166
00:08:56,360 --> 00:08:53,490
NASA's overall commitment to mission

167
00:08:57,980 --> 00:08:56,370
success is the the overriding factor

168
00:09:07,190 --> 00:08:57,990
here and i want to say the shuttle fly

169
00:09:12,060 --> 00:09:09,450
Space Shuttle main engine project

170
00:09:14,310 --> 00:09:12,070
manager Joe Lombardo we were feeling

171
00:09:17,400 --> 00:09:14,320
quite confident with the ssme as it flew

172
00:09:20,340 --> 00:09:17,410
in the prior 25 flights but we saw the

173
00:09:22,940 --> 00:09:20,350
opportunity given this downtime to go

174
00:09:25,200 --> 00:09:22,950
ahead and through design analysis

175
00:09:27,200 --> 00:09:25,210
develop some product improvements and

176
00:09:29,850 --> 00:09:27,210
then subject them to grant test exposure

177
00:09:32,520 --> 00:09:29,860
many many good ideas were developed by

178
00:09:34,760 --> 00:09:32,530
the combined government and prime

179
00:09:39,660 --> 00:09:34,770
contractor team that is Rocketdyne

180
00:09:41,340 --> 00:09:39,670
division of rockwell international we we

181
00:09:43,830 --> 00:09:41,350
were able to get these changes into

182
00:09:45,720 --> 00:09:43,840
hardware get him to the test stand and

183
00:09:49,170 --> 00:09:45,730
we started a very aggressive ground test

184
00:09:51,300 --> 00:09:49,180
program ray to lender the Marshall Space

185
00:09:54,120 --> 00:09:51,310
Flight Center resident office manager at

186
00:09:55,800 --> 00:09:54,130
rocketdyne a really significant thing in

187
00:09:57,570 --> 00:09:55,810
this program right now is in the last

188
00:10:00,330 --> 00:09:57,580

six months that we have tremendously

189
00:10:02,460 --> 00:10:00,340
accelerated the test program and this is

190
00:10:05,520 --> 00:10:02,470
where it really all comes together with

191
00:10:07,380 --> 00:10:05,530
the ssme we can truly simulate what we

192
00:10:09,720 --> 00:10:07,390
do in flight on the ground in each and

193
00:10:11,940 --> 00:10:09,730
every test we can do it on multiple

194
00:10:14,400 --> 00:10:11,950
samples and over and over again and

195
00:10:16,260 --> 00:10:14,410
through that process we really find out

196
00:10:18,720 --> 00:10:16,270
what our margins are where our weak

197
00:10:20,490 --> 00:10:18,730
links are where our strong points are it

198
00:10:23,710 --> 00:10:20,500
gives us the confidence to get back into

199
00:10:27,500 --> 00:10:23,720
flight safely and efficiently

200
00:10:29,750 --> 00:10:27,510
Bob pastor vice president ssme program

201
00:10:31,910 --> 00:10:29,760
manager for Rocketdyne we have a lot of

202
00:10:34,820 --> 00:10:31,920
hardware the build a lot of testing to

203
00:10:37,160 --> 00:10:34,830
perform we're working hard hours and

204
00:10:38,960 --> 00:10:37,170
we're all working together both

205
00:10:40,430 --> 00:10:38,970
Rocketdyne and again and NASA team in

206
00:10:43,580 --> 00:10:40,440
accomplishing what has to be done before

207
00:10:46,610 --> 00:10:43,590
we fly again all the employees take a

208
00:10:48,410 --> 00:10:46,620
personal pride and delivering Hardware

209
00:10:51,020 --> 00:10:48,420
in an engine that has to perform

210
00:10:53,450 --> 00:10:51,030
perfectly every time there's not only a

211
00:10:55,820 --> 00:10:53,460
technical commitment to the ssme but

212
00:10:58,280 --> 00:10:55,830
there's also emotional commitment the

213
00:11:07,340 --> 00:10:58,290

shuttle it's one of the greatest things

214
00:11:12,200 --> 00:11:09,890
solid rocket booster project manager

215
00:11:15,410 --> 00:11:12,210
Gerald Smith we're in the process of

216
00:11:17,660 --> 00:11:15,420
redesign of the the joints in a solid

217
00:11:20,630 --> 00:11:17,670
rocket motor and other parts of the

218
00:11:24,650 --> 00:11:20,640
motor that we found where we could

219
00:11:27,200 --> 00:11:24,660
provide performance margin and so that's

220
00:11:28,730 --> 00:11:27,210
a major activity that is required to be

221
00:11:31,970 --> 00:11:28,740
completed as a part of our return to

222
00:11:34,130 --> 00:11:31,980
flight we initially established a team

223
00:11:36,200 --> 00:11:34,140
at Marshall to work very closely with

224
00:11:40,070 --> 00:11:36,210
Morton Thiokol in the redesign of the

225
00:11:41,630 --> 00:11:40,080
solid rocket motor this team drew on a

226
00:11:43,910 --> 00:11:41,640
nucleus of people from our science in

227
00:11:46,220 --> 00:11:43,920
his new directory who had past

228
00:11:49,160 --> 00:11:46,230
experience or on the SRB program and

229
00:11:52,730 --> 00:11:49,170
then the discipline areas to support a

230
00:11:54,410 --> 00:11:52,740
redesign it's my assessment this merging

231
00:11:56,990 --> 00:11:54,420
of the two teams and specially the team

232
00:11:59,540 --> 00:11:57,000
in place if I call has none exactly what

233
00:12:01,250 --> 00:11:59,550
it was intended to do it has a lot of

234
00:12:03,280 --> 00:12:01,260
their close working relationship a

235
00:12:07,490 --> 00:12:03,290
report of the established between the

236
00:12:09,500 --> 00:12:07,500
government contractor team Royce

237
00:12:11,810 --> 00:12:09,510
Mitchell manager of the solid rocket

238
00:12:15,350 --> 00:12:11,820

motor project we recognize there would

239
00:12:18,260 --> 00:12:15,360
be many analyses many tests many reviews

240
00:12:21,650 --> 00:12:18,270
and in order to speed things up to

241
00:12:23,960 --> 00:12:21,660
ordinary base of understanding we just

242
00:12:26,150 --> 00:12:23,970
brought the people to the job it'll

243
00:12:29,150 --> 00:12:26,160
speed things up it'll result in a better

244
00:12:31,910 --> 00:12:29,160
product the test program from for the

245
00:12:34,070 --> 00:12:31,920
solid rocket motor redesign starts in

246
00:12:38,240 --> 00:12:34,080
the lab literally at the microscopic

247
00:12:41,810 --> 00:12:38,250
level progresses on through component

248
00:12:43,460 --> 00:12:41,820
level subsystem assembly levels and then

249
00:12:46,920 --> 00:12:43,470
finally to the finished product which is

250
00:12:52,560 --> 00:12:49,440
the full scale static motor firings of

251
00:12:54,930 --> 00:12:52,570
course the culmination of all our test

252
00:12:57,329 --> 00:12:54,940
program they are the verification that

253
00:13:00,769 --> 00:12:57,339
all of our sub assembly and laboratory

254
00:13:03,630 --> 00:13:00,779
tests have led us in the right direction

255
00:13:06,510 --> 00:13:03,640
Carver Kennedy vice president of space

256
00:13:09,540 --> 00:13:06,520
programs for Morton Thiokol this is one

257
00:13:12,000 --> 00:13:09,550
of the most extensive development and

258
00:13:14,160 --> 00:13:12,010
testing programs I personally have ever

259
00:13:17,250 --> 00:13:14,170
been associated with in some 30 years in

260
00:13:18,930 --> 00:13:17,260
this business we believe the program we

261
00:13:22,550 --> 00:13:18,940
have laid out and the testing activities

262
00:13:25,199 --> 00:13:22,560
which we have undertaken will in fact be

263
00:13:28,170 --> 00:13:25,209

successful and give us great confidence

264
00:13:31,710 --> 00:13:28,180
that will return to flight on the

265
00:13:34,170 --> 00:13:31,720
schedule that nASA has established gene

266
00:13:36,690 --> 00:13:34,180
Kegel senior vice president of programs

267
00:13:39,090 --> 00:13:36,700
and operations for USB I booster

268
00:13:42,630 --> 00:13:39,100
production company incorporated we've

269
00:13:44,670 --> 00:13:42,640
also suspected 1l of going back and made

270
00:13:46,440 --> 00:13:44,680
some changes that will enhance the

271
00:13:49,199 --> 00:13:46,450
performance the hardware they did a more

272
00:13:51,780 --> 00:13:49,209
reliable and safe a hardware that was

273
00:13:52,920 --> 00:13:51,790
really a main goal it's become a lot of

274
00:13:55,290 --> 00:13:52,930
this thing with a recertification

275
00:13:57,540 --> 00:13:55,300
program they'll make to you overall

276
00:14:00,360 --> 00:13:57,550
before must be better and more reliable

277
00:14:03,090 --> 00:14:00,370
safe hardware I go on at the month I

278
00:14:04,440 --> 00:14:03,100
mean I'm that confident what I've seen

279
00:14:04,950 --> 00:14:04,450
in all the motors that I've been

280
00:14:08,340 --> 00:14:04,960
involved

281
00:14:11,640 --> 00:14:08,350
I love the formula I think it's everyone

282
00:14:13,350 --> 00:14:11,650
else's obligation to do our best every

283
00:14:16,500 --> 00:14:13,360
day on they have excellent people

284
00:14:19,530 --> 00:14:16,510
working on program very highly motivated

285
00:14:21,300 --> 00:14:19,540
and we all have a common goal less work

286
00:14:40,620 --> 00:14:21,310
toward making this thing as safe and

287
00:14:45,579 --> 00:14:43,570
well it's just a tremendous period for

288
00:14:48,180 --> 00:14:45,589

swear I ain't taking this opportunity to

289
00:14:50,410 --> 00:14:48,190
stop and relook and where we've been and

290
00:14:54,130 --> 00:14:50,420
now we're starting a look at where we're

291
00:14:56,380 --> 00:14:54,140
going jr thompson director of the

292
00:14:59,010 --> 00:14:56,390
marshall space flight center everybody

293
00:15:01,750 --> 00:14:59,020
that I've seen throughout NASA is very

294
00:15:03,370 --> 00:15:01,760
enthusiastic about the program we

295
00:15:13,610 --> 00:15:03,380
understand its risk but we're ready to

296
00:15:20,400 --> 00:15:17,490
each passing day brings NASA closer to

297
00:15:22,590 --> 00:15:20,410
renewed space flight operations due in

298
00:15:25,860 --> 00:15:22,600
large part to the efforts of these

299
00:15:28,380 --> 00:15:25,870
people it is a marvelous flying machine

300
00:15:30,350 --> 00:15:28,390
and i think that the agency needs it

301
00:15:34,530 --> 00:15:30,360
we're working hard to make that happen

302
00:15:37,710 --> 00:15:34,540
their teamwork an inspiring example of

303
00:15:39,720 --> 00:15:37,720
the human spirit this is a very unique

304
00:15:42,000 --> 00:15:39,730
capability that the country has and

305
00:15:44,940 --> 00:15:42,010
we're doing our best to maintain and

306
00:15:47,910 --> 00:15:44,950
preserve if you pass it on and I think

307
00:15:50,810 --> 00:15:47,920
that others ought to and will keep up

308
00:15:53,910 --> 00:15:50,820
that heritage their dedication a

309
00:15:57,450 --> 00:15:53,920
commitment to the hopes dreams and

310
00:16:02,550 --> 00:15:57,460
expectations of an entire nation I'm

311
00:16:05,070 --> 00:16:02,560
ready let's go right now t minus 10 nine

312
00:16:09,150 --> 00:16:05,080
we have a go for main engine start and

313
00:16:12,670 --> 00:16:09,160

we have main engine start four three two