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DOCUMENT HISTORY OF AGENA

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4. DF (C/647), from MSD to L/DJ, subj: Weekly Diary - 1 thru 10 Oct 57, 10 Oct 57.


8. DF (C/647) from Lockheed, Palo Alto, to Comdr AFBD, subj: Letter Contract AF 04(647)-181, Proposed Development for Short-Term Improvement of New Horizon Propulsion Subsystem, Cite 1022 56167, 2 Apr 58.

9. DF, from Comdr AADC to Comdr, AFSO, Cite NO22H 7-4-6, 0319452.

10. ARPA Order No. 17-59, 4 Sep 58.

11. ARPA Order No. 17-59, Amendment No. 1, 29 Sep 58.


15. WADC Ltr, to Eq AADC, subj: Model Designation for WS-117L Engine, 9 Jan 59.


17. Deleted.


19. MS, from MSD, Sunnyvale to NP, 21 Jan 59.
20. Ltr from Lockheed Aircraft Corp to Comdr, AFRO, subj: Contract No. AP 04(647)-97, Solar APA Backup Program, 2 May 59.

21. Msg from Comdr, AFRO to Director, ARPA, 9 Feb 59.


23. Memorandum for LtCol Battle from WDCM, subj: Dual Burn Engine Capability, 6 Mar 59.


25. ARPA Order No. 17-59, Amendment No. 4, 10 Apr 59.

26. ARPA Order No. 17-59, Amendment No. 5, 13 Apr 59.


29. Msg (C/Gp3) from Lockheed to LEJP E. S. Silberman, subj: Amendments to CCH No. 23, 6 May 59.

30. ARPA Order No. 17-59, Amendment No. 6, 18 May 59.

31. WDZ Memorandum for multiple addresses, subj: ARPA Order 17-59 (as amended), 18 May 59.


34. Para 4, Weekly Diary - 11 thru 18 Juno 59 from EIC (LEJP), 18 Jun 59.

35. ARPA Order No. 17-60, Amendment No. 8, Project Code No: as indicated below, 1 Jul 59.

36. ARPA Order No. 96-60, Project Code No. 3600, 1 Jul 59.

38. Ltr from Lockheed to Comdr, C/N 1761, subj: Improvement in 3045 Engine
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41. Ltr from Comdr to AFMDM, 7 Aug 59.

42. Ltr from Lockheed to Comdr, AFRMD, subj: Contract No. AF 64(047)-347,

43. Ltr from VDEZ to WDZED (Maj Callan), subj: Minutes of MIDAS ITAM Flight

44. Ltr from VDEZ to WDZDA (LtCol Salzer), subj: Flight Termination System

45. AFRMD report, subj: Modification of AGEMIA Vehicle, 31 Aug 59, 8 Sep 59.

46. Ltr WDZEB to WDZED, subj: Discoverer Capsule Batteries, 10 Sep 59.

47. Ltr from VDEZ to WDZDA (Capt Van Dusen), subj: WTFL Flan 165-41, Study
of Attitude Sensors for Space Missions, 17 Sep 59.

48. AFRMD (VDEZM) ltr to UDZED, subj: Recommendations of LMSD-CVAC Vehicle-
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48a. LTR from Col Frederic C. E. Odor, subj: Discoverer/BAXOS/MIDAS/OCSAT/
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50. Ltr from AFRMD to Lockheed, Cite WDZE 10-5-8, 5 Oct 59.(C/Op3)

51. Ltr, Cite WDZB-10-10-E, 9 Oct 59.

52. Ltr, Cite WDZB-10-9-E, 9 Oct 59.

53. AFRPA Order No. 96-60; Amendment No. 1, Project Code No. 3600, 15 Oct 59.

54. LTR (Uncl v/c 0/Op3 atch) from VDEZM to WDZOR, subj: Space Programs
Status Report, 15 Oct 59, v/1 Atch.

55. LTR (C/Op3) from VDEZM to WDZD (Col Evans), subj: Discoverer, MIDAS,
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1/2 Atch: 1. Chart, Space Systems Progress; 2. 4 charts, Configurations,
$1 - 4, 4th chart CONFIDENTIAL, Op3.
58. Ltr from MDSS to USAF, subj: Discoverer/Comet/Agena/Comet/Agena Configurations, 17 Nov 59.

59. ARPA Order No. 95-60, Amendment No. 2, Project Code No. 3600, 3 Dec 59.

60. Ltr from AFSC to AFSC, subj: Engine Panel Designations, 18 Dec 59.


62. Ltr from AFSC Field Office, WDXN-6, to Contra AFSC, subj: Procedure for Coordination of Discoverer Engineering Approvals, 5 Jan 60, v/1 Atch: Report, subj: Procedure for Coordinating Approvals on Engineering Modifications to Agena Vehicles at Lockheed Facility at Vandenberg AFB.

63. Ltr from WDXN to WDXN, subj: Control of Agena Vehicle Changes following AF Acceptance, 3 Jan 60.

64. AFSC report, (c/op3), subj: Agena Program Progress Report as of 31 Jan 60, 12 Feb 60.

65. Ltr (c/op4) from AFSC to AEC (EMI), subj: Augmentation of Propulsion Program, 23 Feb 60.

66. Nag, Cite AFSC 73393, 27 Dec 60.

67. Ltr from Lockheed to AFSC (MDSS), subj: Standardization Provisions in the Agena Configurations - Interim Report, 4 Nov 60.

68. Nag (c/op3) from Lockheed to AFSC, Cite USAF 331760, 8 Mar 60.

69. AFSC report (c/op4), subj: Agena Program Progress Report as of 28 Feb 60, 8 Mar 60.

70. AFSC Ltr (Unsl v/o Conf/op3 Interim) to WDXN, subj: Reliability Testing of Agena Subsystem by Air Force, Agena: 9 Mar 60, v/1st Ind, same subj, 5 Apr 60.

71. Ltr (Unsl v/o C/op4 Atch), v/1 D. H. Murphy, Contracting Officer, to Contra AEC, subj: NASA Order No. S-401-0, 23 Mar 60, v/after: Statement of Task, v/1 (c) Atch, NASA Agena Launch Schedule.

72. AFSC (MDSS-1) Ltr to multiple address, subj: Agena Vehicle Captive Test Program, 11 Apr 60.

73. AFSC Daily Bulletin No. 71, 12 Apr 60.

74. NASA Agena B Program, MSFC and AFSC Management Relationships, 14 Apr 60.
77. AFEDD ltr (G/16) to Eq. WDR, subj: General Schirrmeister's Appearance before Johnson Committee, 9 June 1960, 2 Jan 60.

78. WZZ-3 ltr to Lockheed Missiles & Space Division, subj: Improvement of Agency Flight Preparation Procedures, 13 Jun 60.

79. WZZ ltr to ARDC (WZ), subj: Management Relations with the NASA Concerning the NASA Agena B Program, 16 Jul 60.

80. WZZ ltr to ARDC (WZ), subj: NASA Agena B Program, 16 Jul 60.

81. AFMD (WZG-16) ltr to WZZ (Col Lyman), subj: Agena Checkout Philosophy, 9 Sep 60.

82. WZZA ltr to WZZ-16, subj: Agena Checkout Philosophy, 19 Sep 60.

83. AFMD (WZAS) ltr (G/16) to ARDC (SRBD), subj: Request for Study--Atlas-Agena's Launch from ANR, 19 Sep 60.

84. AFMD (WZZY-1) ltr to WZZ (Col Little), subj: Test Criteria, 22 Sep 60, v/1 attch., ltr, WZZ/328772, v/atch.

85. WZZ ltr to WZZ, subj: NASA Agena B Schedule, 8 Nov 60.

86. LTR (WZZI) ltr to Lockheed Aircraft Corp, subj: Implementation of New Test Philosophy, DISCOVERER Program, Contract AP 60(647)-558, 18 Nov 60.

87. Historical report of the NASA Agena B Program for 1 Jul to 31 Dec 60.

88. Ltr (G/16) to Col Paul J. Heron to LTR (Mr. Gibson), subj: Agena Configuration, 3 Jan 61.

89. LTR (LZ/1R) ltr to Lockheed Corp, subj: Implementation of New Test Philosophy Discoverer Program Contract 60(647)-558, 3 Jan 61.

90. Historical Report, (G/16), NASA Agena "B" Program, 17 Jan 61.

91. LTR (G/16) from HQ WZLP, site LTR-103 782CD, 191189% Jan 61.

92. LTR from HQ to LSD, subj: Contract AP 60(647)-558, Implementation of New Test Philosophy, Discoverer Program, 3 Feb 61.

93. LTR from LSD (LZ2R) to Lockheed, subj: Make or Buy Structure Satellite Systems Contracts, 13 Feb 61.
95. AFL (102) Ltr to SITC and SSD, subj: Responsibilities of the Aerospace Corporation, 23 Feb 61.


101. SSD (SSZA) Ltr to All SSD Subsystem Personnel, subj: Discoverer EVA Approval Procedures, 24 Jul 61.

103. SSD (C/0p1) Ltr to AFSC, subj: Preparation of Agena Progress Report, 9 Aug 61.

105. SSD (SSZ) Ltr to Aerospace Corp (Mr. Brehmer), subj: Standardized Agenc, 14 Sep 61.

107. SSD (SSZ) Ltr to SS3 (Dr. Rockefeller), subj: Historical Summary, ARDC/AFSC Support of Army/Navy Space NASA Programs, 9 Aug 61.


111. SSD (SSZ) Ltr to Col H. L. Evans, subj: Standardizing the Agena, 14 Sep 61.

113. SSD (SSZ) Ltr to Chiefs of Offices through Branch Level, subj: Development and Utilization of the Agena V, 18 Sep 61.

115. SSD (SSZ) Ltr to Aerospace Corp (Mr. Brehmer), subj: Standardized Agena, 18 Sep 61.

117. SSD (SSZ) Ltr to Aerospace Corp (Mr. Brehmer), subj: Standardized Agena, 18 Sep 61.

119. SSD (SSZ) Ltr to Aerospace Corp (Mr. Brehmer), subj: Standardized Agena, 18 Sep 61.

121. SSD (SSZ) Ltr to Aerospace Corp (Mr. Brehmer), subj: Standardized Agena, 18 Sep 61.
111. Msg, Cite BDr25-17-10-19-6, 17 Oct 61.


115. APESW ltr (C/Gp4) to AFSC, subj: Standardized Agena Space Vehicle (Agena D), 26 Oct 61.


117. DAF Memo for Chief of Staff, subj: Standardized Agena, 3 Nov 61, w/l Atch: Memorandum for Director, DAF, 31 Oct 61.

118. SSD (SSZ) Ltr to Col Evans, subj: It is to be Considered when Accelerating the Agena B Schedule, 6 Nov 61.


120. Lockheed ltr to F. W. O'Crean, subj: Summary of Instructions Issued by Dr. Cheryk in Agena D Meeting of November 7, 1961, 9 Nov 61.

121. Ltr, subj: Organizational Changes and Personnel Reassignments, 13 Nov 61.

122. Ltr to Deputies and Chiefs of Major Staff Offices, subj: Project 662A, 20 Nov 61.

123. Ltr to Deputies and Chiefs of Major Staff Offices, subj: Establishment of Project Office 662A, 20 Nov 61.

124. MFR (Unc1 v/o C/Gp4 Atch), subj: Agena D, 20 Nov 61.

125. Msg from Hq USAF to AFSC, info SSD, Cite AFSPM 90799, 2223092 Nov 61.

126. SSD Ltr (C/Gp4) to Lockheed, subj: Agena D Structural Criteria, 24 Nov 61.

127. AFSC (SUH) Ltr (C/Gp4) to SSD, subj: Instructions on Standard Agena D Program, 24 Nov 61.


129. Memo of Understanding from HARM (Lockheed AFFRO) to Col. Henry B. Kuchman, 28 Nov 61.
129. Msg (C/Op A) from W. to AN to W. A. 65, cited JNC 8534, 063021 Dec 61.
130. Msg (C/Op A) from W. to W. O. 61, cited 30 Dec 61.
131. Msg (A/Op 2) from AF to SSZ, 30 Nov 61.
133. Gtd.
134. SSD Ltr to Deputy and Chiefs of Major Staff Offices, subj: Deputy for Agana.
135. SSD (SSZDB) Ltr (C/Op 4) to SSD, subj: Agana D/AX-21 Interface, 18 Dec 61.
136. SSD (SSZDB) Ltr to APSC (Gen Schriever), subj: Instructions on Standard
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137. Ltr SSX-1 Ltr to SSZ (Lt Col Strathy), subj: Agana D Programming Data,
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138. Msg from ISSC, Cite ISSC A071763/62-14/100, 2800302 Dec 61.
139. SSD Ltr to SSZ, subj: Procurement of Optional Equipment, 28 Dec 61.
140. Msg (C/Op 4), Cite AFSSV-60 90915, 0522342 Jan 62.
141. MFR from SSX, subj: Briefing to Dr. Chary, 5 Jan 62, (C/Op 4).
142. Ltr (C/Op 5) from SSD (SSZDB) to Distribution, subj: Fund Requirements
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143. SSD (SSZDB) Ltr to SSZ (Mrs. Arnold), subj: Sole Source Justification
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144. SSD (SSZDB) Ltr (C/Op 4) to SSZK (Major Lochry), subj: Agana D
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145. SSX MFR, 23 Jan 62.
147. SSD (SSZDB) Ltr to SSD (Kaj Kanoer), subj: Additional Instrumentation
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148. SSD MFR, subj: Discussions with Mr. O'Green and Staff, 13 Feb 62.
149. SSD Ltr to SSZ, SSD and SSF, subj: Agana D Advanced Component Improva-
ments, 20 Feb 62.
150. LTR, subj: Mr. Maj Gen Ritland and Mr. Kelly Johnson, 26 Feb 62.

151. LTR, and Maj Gen C. J. Ritland and Clarence L. Johnson to Gen B. A. Schriever, 27 Feb 62.

152. Msg from AFSC, Cite SSK-23-2-46, 261927Z Feb 62.

153. LTR (C/Op4) from SSKD to SSZ and SSX, subj: Agena D Weight, 2 Mar 62.

154. LTR (C/Op3) from SSKD to SSZ, subj: Agena D Delivery Schedule, 2 Mar 62.


156. Msg Cite SGGH-7-3-12, 071503Z Mar 62.

157. Lockheed LTR to AFSSD (SSZ), subj: Comparison of Costs - Agena B vs Agena D, 6 Mar 62.

158. SSD (SSVXX) LTR to SSFR (Haj J. Albert), subj: Study of Thor Agena B Configurations, 12 Mar 62.

159. SSD (SSVXX) LTR to SSVK, subj: D4-21 Agena D FAD and AGE Modification, 13 Mar 62.

160. SSD (SSKD) LTR to SSK, subj: Contract AF 04(693)-60, Request for Authority to Use Form C Price Re-determination, 22 Mar 62, (C/Op4).

161. SSD (SSKD) LTR to Lockheed, subj: Contract AF 04-695-21 - Incentive Fee Negotiations, 22 Mar 62.


165. SSD (SSK) LTR to BNSP, subj: Requirement for Component Improvement Propulsion Advisory Committee, 2 Apr 62.

166. Negotiated Contract AF 04(695)-21, 6 Apr 62.

167. SSD (SSV) LTR to DOH (LtGen Estes), subj: Atlas Launches at ARN and FAB, 9 Apr 62, w/1 Attach: Cy LTR from Gen Estes to Gen.Ritland, 19 Mar 62, same subject.

171. SSD (SSD) Ltr to SES, subj: Attendance at Mockup, CNIL and DEI Boards, 27 Apr 62.

172. SSD (SSD) Ltr to SES (Col Borg), subj: SES (Agena D) Objectives for FY 63, 30 Apr 62.

173. SSD (SSD) Ltr to SES, subj: Contract AP 04(1545)-68 - Review of 'Make or Buy' Program Pursuant to DCAS APPI Supplement 2, 9 May 62.

174. MFR, subj: FY-62 Incremental Funding of the Agena D Contracts, 10 May 62.

175. SSD (SSD) Ltr to Lockheed, subj: Agena D Optional Equipment, 14 May 62.

176. SSD (SSD) Ltr to SSCM (LtCol Warren), subj: Underefundied Contracts, 14 May 62.

177. MFR, subj: Modernization of Industrial Facilities Bell Aerosystems Company, 16 May 62, w/1 Atch; MFR same subj dtd 15 May 62, w/1 Atch, Cy Ltr to APPEO from Bell, no date.

178. SSD (SSD) Ltr to SSDM (LtCol Elms), subj: Technical Support Contract, 21 May 62.

179. NASA Ltr to Hon Brockway McMillan, on 21 May 62.


181. Mag (C/Gp4) Cite SSE-1-6-4, 1 Jun 62.

182. Mag (C/Gp4) Cite SSE-2-6-7, 2 Jun 62 (S/Gp4).

183. SSD (SSD) Ltr to APPRO (Col Voyles), Lockheed, subj: APPR Surveillance of 68 Contract Spares Procurement, 4 Jun 62.

184. Mag from DCMSF to SSD, info HMSC, Cite LDF 12-6-23, 121105Z Jun 62.

185. Ltr (Uncl v/o S/Gp3 Atch), subj: Request for Information by the Space Technical Objectives Task Group, 13 Jun 62, w/1 Atch: DODB Summary

186. Mag (C/Gp4) from Douglas Aircraft Co Inc, 15144Z Jun 62.

190. SSD, Cite SSD 22-5-5, 22 Jul 62

191. SSD (SSDA) Ltr. (C/Spk) to multiple address, subj: Agena D Optional Equipment Weight Status, 3 Jul 62.

192. SSD (SSWU) Ltr to SSD, subj: Conversion of ARM Complex 14 to an Atlas/Agena Configuration, 5 Jul 62.

193. SSD (SHA) Ltr to multiple address, subj: Agena D Configuration Control, 9 Jul 62.

194. SSD (SSU) Ltr to multiple address, subj: Configuration Control of Agena D, 11 Jul 62.


196. SSD (SSZD) Ltr to SINMT and SSW, subj: Program Designation Change, 12 Jul 62.

197. SSD (SSH) Ltr (C/Spk) to SSU-1 (Col Wickland), subj: International Programs, 12 Jul 62.


199. SSD (SSH) Ltr to SSKR (Mr. Montgomery), subj: Preliminary Impact Evaluation of Impending Aerospace Industry Strike on SSD Programs (Reports Control Symbol (RCS) AF-XDL-62, v/1 Atch: Report.

200. SSD (SSUAA-2) Ltr to 6593 Test Group, subj: IHS1 Rocket Engine, 20 Jul 62.

201. SSD (SSWIA) Ltr to Lockheed, subj: Agena Multiple Start Engine Compatibility with DOD Missions, 25 Jul 62.

202. SSD (SSH) Ltr to SSD, subj: Request for Type Designation, Agena D Vehicle, 26 Jul 62.

203. Tag from Douglas Aircraft Co Inc to Lockheed, 1 Aug 62.

204. SSD (SSHAK) to SSD, subj: AF 04(695)-194, Authority for Non-Competitive Negotiated Procurement, 1 Aug 62.

205. Tag from SSD to ARDC, cite SSD 2-8-1, 2 Aug 62.
207. SSD (SSZ) Ltr to multiple address, subj: Technical Materials for Agena D, 10 Aug 62.

208. SSD (SSZK) Ltr to SSD (Kaj Karne), subj: Transfer of Agena D Program Management, 13 Aug 62.


210. SSD (SSZHD) Ltr to multiple address, subj: Auto-DRAPE Orientation, 16 Aug 62.


214. Mag from SSD to Lockheed, Cite SSH 27-0-33, 27 Aug 62.


216. SSD (SSZCK) Ltr to multiple address, subj: Authorization for type of Contract; Contract AP 04(695)-198, 7 Sep 62, v/l attch.

217. SSD (SSZK) Ltr to SSZ, subj: Agena D FY-63 Funding Requirements to Support SSZ Program Requirements, 11 Sep 62.

218. SSD (SSH) Ltr to SSZV, subj: Agena D FY-63 Funding Requirements to Support NASA Program Requirements, 11 Sep 62.

219. Mag from SSD to CSAF, Cite SSH-13-9-10, 13 Sep 62.

220. Mag from SSD to AFSC, Cite SSH-13-9-11, 13 Sep 62.

221. SSD (SSZAA) MFR to Capt George W. Watts, 17 Sep 62.

222. SSD (SSH) Ltr to Lockheed, subj: Production of Optional Kits under the AGENA D Contract, 24 Sep 62.

225. Lockheed Ltr to SSD (SSS), subj: Management of the S-01A Program, 1 Oct 62, w/1 Atch; Program Management Paper.

227. 1st Ind (Uncl v/o C/Cf 1 Atch), SSD to 2SWP, subj: Liquid Rocket Engine Data, 5 Oct 62, w/1 Atch: Engine Data Chart.

228. SSD (SSS) Ltr to Lockheed, subj: Ground Rules for Management of the AC-1 System, 8 Oct 62.

229. Msg, Cite SSI 12-10-23, 12 Oct 62.


232. 1st Ind, SSD (SSI) to 2SVR, subj: Agena D/Gemini Configuration, 16 Oct 62.

233. Memorandum to SSI (Col Fletcher), subj: S-01A Requirements Based on TAT Boosted Mission, 18 Oct 62.

234. SSD (SSI) Ltr to AFFR (Col Voyles), Lockheed, subj: AFFR Logistics Surveillance of Program S-01A, 19 Oct 62.

235. SSD (SSR) Ltr to 2SVR (Maj Albert), subj: Optional Equipment Requirements for S-01A Vehicles, 22 Oct 62.

236. SSD (SSI) Ltr to SSIK, subj: Sole Source Justification, Contract AF 04(695)-221, 22 Oct 62.


238. SSD (SSR) Ltr to 2SEO (Col Hedrick), subj: Agena D CBC Optional Equipment, 31 Oct 62.

239. SSD (SSR) Ltr to 2SVR, subj: Agena D FY-63 Funding Requirements to Support NASA, 1 Nov 62.

240. SSD (SSI) Ltr to Lockheed, subj: S-01A Vehicle Assignment Philosophy, 2 Nov 62.

241. SSD (SSI) Ltr to Lockheed, subj: Fixed Uplage Rocket Carrier Problem, 8 Nov 62.

242. SSD (SSSKK) Ltr to multiple address, subj: Request for Authority to Extend Definitization Data and to Obligate Additional Funds - Letter Contract AF 04(695)-62, Agena D, 14 Nov 62.

244. SSD (SSV) Ltr to multiple address, subj: Request Authorization for Letter Contract AF 04(695)-233, 16 Nov 62.

245. SSD (SSV) Ltr to LITZ, subj: Modified Test Philosophy and Blanket Removal for SLV3/S-01A/Payload FSF, 26 Nov 62.

246. Mag (C/Gp4), Cite AFSSV-XX 99313, 3021272 Nov 62.

247. SSD (SSV) Ltr to Lockheed, subj: First Article Configuration Inspection of S-01A/19, 6-23 Nov 1962, 12 Dec 62.

248. Historical Data - Jul-Dec 1962 from SSVAR to SSVEA, 24 Jan 63.

249. NASA Ltr to Gen B. A. Schriever, 25 Jan 63.


251. Ltr agd Gen B. A. Schriever to Dr. Robert C. Sevens, Jr., 6 May 63.


253. Mag, Cite NEPA 16-4-35, 1617002 Apr 63.


255. SSD (SSV) Ltr to SSV and SP-206, subj: Configuration Control Management of Program S-01A Booster Vehicles, 19 Jun 63 (C/Gp4).

256. Mag Cite AFSSEDD 76993, undated, and Mag Cite NEPA 15-7-22, 1520457 Jul 63.


260. Mag Cite NEPA 7-11-6, 071956Z Nov 63.

294. DAF (SP-1) Ltr (2/Op3) to multiple addrs., subj: Improved Agena, 13 Jun 67.


296. DAF (SP-1) Ltr (2/Op3) to S&S (Gen Cooper), subj: Improved Agena, 23 Jun 67.


299. SAMSO (ENA) Ltr (Uncv:v/o C/Op4 Attch 5 and 6) to SDL, subj: Historical Report, 27 Jul 67.


302. SAMSO (ENA) Ltr to SIDS (Gen Martin), subj: Agena D Contract Structure, 2 Aug 67.


304. DAF (SP-1) Ltr (2/Op3) to EU-2 (Gen Cooper), subj: Improved Agena Flight Test, 14 Aug 67.

305. SAMSO (ENA) Ltr to SAFEP (Gen Martin), subj: New Production Management Concept for Agena, 22 Aug 67.

306. DAF (SP-1) Ltr (2/Op3) to EU-2 (Gen Cooper), subj: Improved Agena, 30 Aug 67.

306a. SAMSO (SH-2) Ltr (2/Op3) to SIDS (Gen Martin, subj: Improved Agena, 7 Sep 67.

306b. DAF (SP-1) Ltr (2/Op3) to EU-2 (Gen Cooper), subj: New Production Management Concept for Agena, 8 Sep 67.


307. MPF and LtCol Allen J. Poor, subj: Custom Agena-Briefing to Gen Martin, 19 Sep 67, v/1 Attch: Briefing Charts, subj: Custom Agena.
310. Reg (8/67), Cite 5055; 1603302 Oct 57.


312. DAF (SP-15) Ltr to S/E, subj: Final Agena Historical Report, 1 July - 19 October 1967, 15 Apr 63.

313. List of Contracts (containing Estimated Face Value) (C/674), subj: Agena Vehicle, undated.
The following information is provided as requested in SSE letter, dated 10 December 1962.

a. Effective 1 July 1962, the Requirements and Programming Office was formed. This office combined the functions of Agena B Programming Division (Shedl) and Agena B Requirements Branch (SHER) into a single office providing staff support to the Director. The SSD Organization and Function Chart Book, dated 1 July 1962, provides a functional description of the organization.


c. Effective 14 September 1962, the S-01A Detail Specification was approved. This document is the basis for acceptance of S-01A vehicles and is the basic specification from which all programs using the S-01A vehicle prepare their detail specification.

d. SSE letter, dated 18 September 1962, Subject: "S-01A Vehicle Assignment to Using Programs," provided IASD with direction that the S-01A Vehicles that were stored, after DD-250 acceptance, would be utilized by using programs on a "first-in, first-out basis."
General B. A. Schriever, Commander,
U. S. Air Force Systems Command
Andrews Air Force Base
Washington 25, D. C.

Dear General Schriever:

As indicated in NASA Headquarters' TX 142102Z of December, management of the NASA Agena Program, excluding Gemini, has been transferred from the Marshall Space Flight Center to the Lewis Research Center. As a result of this action, Marshall and Lewis have been engaged in a cooperative effort during the month of January to effect the transition with a minimum amount of disruption to the NASA Agena Program.

The Gemini Atlas Agena target vehicle has been assigned to the Manned Spacecraft Center.

As of January 28, 1963, those NASA Agena functions previously assigned to Marshall with the exception of the Gemini target, will be transacted through Dr. S. Himmel, the Agena Systems Manager in the Lewis Research Center, Cleveland, Ohio. Marshall Agena Program personnel have been assigned temporary duty at Lewis to provide continued support to the newly established Lewis Agena group for the next few months as required.

Sincerely yours,

Homer E. Newell, Director
Office of Space Sciences
CONTRACTOR PERFORMANCE

EVALUATION REPORT

ON

AIR FORCE CONTRACT

AF 04(695)-21

WITH

LOCKHEED MISSILE & SPACE COMPANY

SUNNYVALE, CALIFORNIA

DEGRADED AT 3 YEAR INTERVALS
DECLASSIFIED AFTER 12 YEARS

DOD DIR 5200.1Q

14 FEBRUARY 1963
1. Develop and produce the Agena D as a standardized basic vehicle capable of performing a variety of space missions. The Agena D is capable of attaining a wide range and variety of orbital and space trajectories. It can perform as an intermediate stage booster, or as an orbital vehicle. An engine restart capability enables the Agena D to achieve precise, circular orbits, or permits the Agena D to make trajectory changes in space. The Agena D can be programmed to accomplish attitude changes. Its stabilization system, which may function actively or semi-actively, provides vertical as well as horizontal stabilization in orbital flights. Alternate adapters enable the Agena D to use either a Thor or an Atlas as a first stage booster. The Agena D is 23.3 ft in length and has a 5 ft diameter. It is powered by a Bell dual burn engine developing a rated thrust of 16,000 pounds with a nominal thrust duration of 240 seconds.

2. The Agena D design was directed toward a more reliable standardized space vehicle that could be used with minimum alteration by a number of using programs. Agena D design features also include the development of equipment accessibility, maintainability, and producibility. The contract also provided for a complete procurement package (specs, drawings, etc) to enable follow-on fixed price procurement plus a production capability of five vehicles per month. (See narrative Para 3 and 2)

3. The Agena D design utilized flight proven Agena B equipment wherever possible to standardize major equipment, circuits, and plumbing. Re-packaging and re-location of equipment was required to provide ready access for checkout, removal or replacement. It was required that components be installed so that removal of a component could be accomplished without disturbing other components. System assemblies, such as FM Telemetry, guidance, and electrical power, were to be modularized for maximum interchangeability and simplified checkout.

B. Government furnished equipment.

ASQ-9 program comparator -- Bendix. This item was furnished the contractor to support the factory automatic checkout equipment.
<table>
<thead>
<tr>
<th>ITEM</th>
<th>WIN (d)</th>
<th>ORIGINAL (c)</th>
<th>AS-ADVERTISED (f)</th>
<th>ACTUAL (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>%</td>
<td>Subjective</td>
<td>See Narrative Summary Paragraph 4(a)</td>
<td></td>
</tr>
<tr>
<td>Program Adaptability</td>
<td></td>
<td></td>
<td>See Narrative Summary Paragraph 4(b)</td>
<td></td>
</tr>
<tr>
<td>Ease of Checkout</td>
<td></td>
<td></td>
<td>See Narrative Summary Paragraph 4(e)</td>
<td></td>
</tr>
<tr>
<td>Weight of Vehicle</td>
<td>lbs</td>
<td>1307</td>
<td>1307</td>
<td>1296.5</td>
</tr>
<tr>
<td>Ascent Performance</td>
<td>Mpg</td>
<td></td>
<td>See Narrative Summary Paragraph 4(e)</td>
<td></td>
</tr>
</tbody>
</table>

* Based on actual average weight of the solution (Par 4(d))
<p>| |
|                          |
|-------------------------|-------------------------|
| <strong>Program Plan</strong> - per Section III Par 2(a) |
| Exhibit 640B-100 | 1 | 1 | 1 | 1 |
| <strong>PTV Test Plan</strong> - per Section III Par 2(d) |
| Exhibit 640B-100 | 1 | 1 | 3 | 3 |
| 70% Final Configuration Freeze per Section I Par 2(c) Exhibit 640B-100 | 1 | 1 | 1 | 1 |
| 100% Configuration Freeze per Section I Par 2(c) Exhibit 640B-100 | 10 | 10 | 10 | 10 |
| <strong>Aces D Detail Specification per</strong> |
| Section IV Par 1(a) Exhibit 640B-100 | 5 | 5 | 3 | 3 |
| Spec &amp; Drawings Ref. in Detail Spec. per Section IV Par 1(a) Exhibit 640B-100 | 7 | 7 | 7 | 9 |
| Environmental Specification per Section IV Par 1(b) Exhibit 640B-100 | 4 | 4 | 4 | 4 |
| <strong>Performance Specification for Factory Check Out Equipment Sec IV Par 1(d)</strong> |
| G-5 (Manual Complex) | 2 | 2 | 2 | 2 |
| G-3 (Manual Complex) | 6 | 6 | 6 | 7 |
| FACET (Factory Agent Checkout Equip.) |
| Aero, Thermo Structural &amp; Elect loads, stress &amp; deflection (Jourdel 1990) per Section IV Par 1(b) Exhibit 640B-100 | 7 | 7 | 7 | 7 |
| Reliability Plan - Per Section VII Par 1 Exhibit 640B-100 | 9 | 9 | 9 | 10 |
| First Agent D Delivery per Exhibit 640B Appendix A | 1 | 1 | 1 | 3 |
| First Launch Agent D per Air Force established schedule at inception of program | 5 | 5 | 5 | 5 |
| 7 | 7 | 7 | 7 |</p>
<table>
<thead>
<tr>
<th>ITEM TO BE COMPLETED</th>
<th>COMPLETED</th>
<th>ACTUAL</th>
<th>DIFFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>D number 12 (test vehicle)</td>
<td>10</td>
<td>10</td>
<td>None</td>
</tr>
<tr>
<td>Exhibit 44DR, Appendix A</td>
<td>10</td>
<td>10</td>
<td>None</td>
</tr>
<tr>
<td>Milestones established by Air Force and contractor Program Directors</td>
<td>1/2</td>
<td>1/2</td>
<td>None</td>
</tr>
<tr>
<td>Make-or-buy Proposal</td>
<td>1</td>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td>Firm CPUE quote</td>
<td>1</td>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td>Test specification (LNSC-1412955)</td>
<td>3</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>Functional Mockup Completed</td>
<td>3</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>Propulsion Test Assembly Hot Fire Satisfactorily Completed</td>
<td>3</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>Prototype Completed on Development</td>
<td>3</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>Test Vehicle Structures</td>
<td>3</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>Propulsion Test Vehicle Assembly Test Cycle Completed at Santa Cruz</td>
<td>4</td>
<td>4</td>
<td>None</td>
</tr>
<tr>
<td>Vehicle Acceptance Test Specification</td>
<td>5</td>
<td>5</td>
<td>None</td>
</tr>
<tr>
<td>Simulated Launch and Flight Systems</td>
<td>5</td>
<td>5</td>
<td>None</td>
</tr>
<tr>
<td>Test Completed for Agent D No. 1 Development Test Vehicle Program</td>
<td>7</td>
<td>7</td>
<td>None</td>
</tr>
<tr>
<td>at SCTA Completed</td>
<td>7</td>
<td>7</td>
<td>None</td>
</tr>
<tr>
<td>All Components Fully Qualified Prior to First Launch</td>
<td>7</td>
<td>7</td>
<td>None</td>
</tr>
</tbody>
</table>

**Note:** The table above represents the completion status of various milestones and requirements for a specific project or program.
### Part A: Terminal Evaluation - Overrun/Underrun Status

<table>
<thead>
<tr>
<th>Target Price</th>
<th>Actual Cost of Work</th>
<th>Contract Price</th>
<th>Variability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Part B: Periodic Evaluation - Overrun/Underrun Status

<table>
<thead>
<tr>
<th>Target Price</th>
<th>Actual Cost of Work</th>
<th>Contract Price</th>
<th>Variability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Part C: Periodic Evaluation - Cost Effectiveness

<table>
<thead>
<tr>
<th>Work Performed</th>
<th>Total at Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Cost</td>
<td></td>
</tr>
</tbody>
</table>

No cost effectiveness data available

DD: 3/31/75 - 8
1. In order to provide reviewing agencies the proper perspective of this contractor's performance and the Agena D Contract, it is necessary to include a brief background of events leading to and included in the contractual arrangements.

Early in 1961, increased activity and mounting costs of space programs forced recognition by AFSSD of the necessity for reducing cost and increasing flexibility through standardization of the Agena stage. In order to establish the technical feasibility of this approach, on 30 June 61, the Agena Standardization Study was authorized. The results of this study were favorable and after approval by Hq USAF and DOD, on 25 August 61 the U.S. Air Force awarded Contract AF 04(695)-21 to the Lockheed Missiles and Space Company for the design, development, and production of twelve Agena D satellite vehicles which were to be standard in nature and capable of being used with a minimum degree of change in various satellite programs. First launch was scheduled for January 1963.

On 17 October 61 the Honorable Dr. Joseph V. Charyk, Under Secretary of the Air Force, appointed a special committee chaired by Mr. Clarence L. Johnson to investigate ways and means of providing a more reliable Agena on an accelerated schedule. This committee reviewed the approach proposed under the standard Agena concept and the capacity of the Lockheed Missiles and Space Company for accelerating the approved schedule. It was the conclusion of the committee that a more reliable standard Agena could be produced to support a June 62 first launch provided that extraordinary and unusual technical and contractual relationships were established and rigorously adhered to by both the Contractor and the Government. The management principles proposed by the Johnson Committee were reviewed by Hq USAF and approved as the basis for program management. In general, these ground rules apply a streamlined AF/Contractor management concept and include a DX priority, reduction in formal procedures, exclusion area in which to perform the work, and extraordinary program management channels. To insure compliance by both parties, these 'ground rules' were actually made a preamble to the contractual work statement for the accelerated Agena D program.

2. Incentive Features of the Contract.

a. In conformance with DOD policy, it was established from the outset of the Agena D program that the research and development phase was to be contracted as a Cost Plus Incentive Fee contract.
2. Based upon a target fee rate of 7% for cost and a contract target cost of $31,713,746, the Contractor will receive $739,987 if the final contract cost is $31,713,746. If the final cost of the contract is 5% more than the target price, the Contractor's fee will be reduced by $31,714; if 10% more, it will be reduced by $63,423; if 15% more, it will be reduced by $116,283 at which point the fee rate reaches the minimum of 5%.

A like procedure applies to underruns. If the final cost is 5% less than the target price, the Contractor's fee is increased by $31,714; if 10% less, the fee will be increased by $63,423 etc.

3. Schedule: As to vehicle delivery, the Contractor will receive 9% or $951,412, based upon a target cost of $31,713,746, if all vehicles are delivered to contract delivery schedule. To permit correction of all reported discrepancies resulting from Air Force Acceptance inspections and to permit delivery of a 'clean' article, the delivery formula provides a two-week grace period without penalty; if late more than two weeks, the fee is decreased by .0222% of target cost per week for five weeks to a maximum penalty of 11% of target cost per vehicle. If all twelve vehicles are seven weeks or more late, the fee would be reduced to 5% of target cost or $528,562. A detailed procedure has been evolved to determine the actual date and time of 'final' acceptance and delivery for fee purposes.

4. Performance: One of the most significant and unique features of the negotiated incentive fee relates to the payment of the 1/3 fee based upon performance. The Contractor proposed and the Air Force accepted the principle that the Air Force would unilaterally rate the Contractor's performance. LNASC officials suggested a set of criteria as the basis for rating which were similar but not identical to those finally arrived at through negotiation. It is now agreed that the 1/3 fee based upon performance shall be by a point rating system. If the Contractor's performance is rated the maximum of 60 points, the fee for performance will be based upon 9% of target cost of $31,713,746, or $291,412; a performance rating of 30 points gets the target fee of 7% or $739,987; a performance rating of 0 points gets the minimum rate of 5% or $528,562.
An Air Force board composed of representatives of the Agena Program and the Agena D Program Office will be appointed by the Commander, AFSSD, to rate the Contractor's performance within 14 days of the launch of the twelfth prototype vehicle. The board will use the following criteria: 30 points for (1) Reliability, (2) Program Adaptability, (3) Ease of Checkout; 35 points for (1) Weight of Vehicle, (2) Ascent performance.

Additionally, it has been mutually agreed between the Contractor and the Agena D Program Office that should failure to qualify all components of the Agena D vehicle prior to flight of each of the prototype vehicles delay the flight of any vehicle, a suitable adjustment of the performance fee will be made. This will be the first time that the Agena vehicle will be contractually required to have all components qualified for flight prior to flight.

3. The completion date of 30 November 1962 for this contract has been extended by the Air Force. The purpose of this extension is to allow the contractor to complete reliability life tests and selected evaluation items in support of the Agena D research and development contract. All remaining effort to complete this contract is being monitored on an individual item basis with a goal of clearing all open items by the current scheduled completion date.
The experimental performance score which is to be
assessed against the following criteria is specified under Program I
Performance Criteria IV in the subject document. Groups I and II
have equal weight with 30 points available to each. The points available
to each item are as follows:

Group I Criteria

1. Reliability - 25 points available
2. Program acceptability - 4 points available
3. Case of classical engine, manufacturing, systems test, and launch
   operation - 2 points available

Total available - 30 points
Target - 15 points

Group II Criteria

1. Weight of vehicle - 25 points available
2. Ascent performance - 25 points available

Total available - 30 points
Target - 15 points

The twelve (12) vehicles to be evaluated are to be used in programs
162 and 692F. Each vehicle will be evaluated against the using pro-
grams' requirements applicable within the scope of the -21 work statement.
Therefore, the portion of the above "points available" for each item to
be assigned to a program will be in proportion to the number of
vehicles that program will launch. Out of the total of 22 points for
reliability, for example, since 162 will launch 10 of the 12 Agena D's,
10/12 of the 22 points will be derived from the demonstrated reliability
in Program 162 and 2/12 of the 22 points will stem from 692F performance.

a. Reliability Engine System

No numerical reliability has been accorded upon as a requirement.
Since the -21 work statement states, "the basic objective shall be to
produce a more reliable standardized basic vehicle capable of performing
--", a means of comparison was constructed for the purpose of
evaluating reliability.

Program 162 Reliability. Each Program 162 Agena D vehicle which
achieves orbit, maintains attitude control to the most optimum recovery
orbit on the 4th day after launch, and reorients the re-entry vehicle
(REV) in the nose down attitude is given a score of 1. Should a failure
occur during the Agena D recovery, the recovery will be attempted
on the 3rd day the score will be 3/4, necessity for a 2nd day recovery
attempt will yield a score of 1/2, and a 1st day attempt will yield 1.
Any failure attributable to the Agena D which precludes recovery will
yield a score of 0 for that vehicle. These scores will be summed to
result in a total score, D.
A ratio will be made of the total points (2 - 5) and that the
ratio will be a number less than one. The determination of the number
of reliability points to be multiplied by 100 points, \( R \), will be computed
from the formula:

\[
P = 10 \left(1 - \frac{2}{5}\right); \quad 0 < \frac{2}{5}
\]

or

\[
P = 10 \left(1 - \frac{2}{3}\right); \quad 0 < \frac{2}{3}
\]

The maximum reliability points for 112 is 12 1/3 with a target of 9 1/6.

6. Aperson Adaptability Rating System

For this criteria item there is no basis for comparison in the Arena
history and no obvious numerical method by which to rate; therefore, the
rating scale is constructed from the qualitative opinions of those
persons charged with adapting the standard Arena to a program configura-
tion, i.e., with negligible or zero modification. The score will be -1
if the subsystem is adaptable with small modifications. The total range
is therefore -5 to +5 for each using program. The points to be assigned
to this item for both Programs 8733 and 162 will be computed using the
formula:

\[
P = \left(1 - \frac{2}{5}\right)^2 \left(1 - \frac{2}{3}\right)\frac{12}{12}
\]

where \( X \) is the signed score for adaptability as determined by the \( 6952X \)
Program and \( Y \) is the signed program 162 score.

C. Ease of Checkout Rating System

Here the vehicle is considered as a whole and as the integration of
the several subsystems. Each Arena 5 subsystem can be considered as

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As an example: for each of 5 categories, e.g., electronics, systems, and such items. The total range is therefore 15 to 45. The score assigned to this item for both Programs 698EK and 162 may be computed by the formula:

\[
\frac{15 + r}{15} \cdot (698EK \text{ Veh}) = \left( 2 + \frac{x}{15} \right) \cdot (162 \text{ Veh})
\]

where \( r \) is the signed score for this item as determined in the 698EK Program, \( x \) is the signed Program 162 score.

1. **List of Vehicle Rating System**

   It has been agreed between SSD and LCD that 1307 pounds is the accepted Permissible Equivalent Weight (CEW) for the Agona D in determining contractual weight compliance. Therefore, any Agona D C.E.W. less than or equal to 1307 pounds satisfies the requirement and shall receive the maximum points in this area.

2. **Agent Performance Rating System**

   The ascent performance is scored against the quality of achieved orbits, versus predicted spec deviations. The orbital elements of altitude of perigee, period, and inclination angle will be scored. It is assumed that the operation of the main stage booster is within specified limits and any adverse operation is not cause for penalizing the Agent D performance.

\[
\frac{162}{15} = \left( \frac{1}{2} \cdot (a_h - 5\gamma - 2z) \right) \cdot \left( \frac{158}{15} \right) = \frac{1}{2} \cdot (a_h - 5\gamma - 2z)
\]

where the \( a_h \) is the probability of exceeding a plus or minus value equal to the observed deviation of altitude of perigee for \( a_h \), period for \( \gamma \), and inclination for \( z \).

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A design freeze was accomplished on schedule on 1 December 1961. This was followed by a vehicle equipment list on 3 January 1962. A design freeze and review on 6 January 1962, with complete configuration release on 20 January 1962. The 100% configuration freeze; reference Item 4, DD Form 2500-3, applies to the configuration of the first production vehicle scheduled for and delivered in September 1962. The configuration was frozen on schedule, but the documentation reference DD Form 2500-3, did not comply with Air Force requirements for configuration control. To determine the adequacy of this documentation, a first article configuration inspection (FACI) was performed on the first production vehicle in September 1962. Results of this FACI were unsatisfactory and the contractor was directed to complete the documentation required by Air Force regulations to support configuration control procedures. Another FACI was held in November 1963, at which time the Air Force accepted the contractor documentation.

The contractor's performance evaluation report DD Form 2500-3 only includes the first and last vehicle delivery schedule. All twelve Agena D's on this contract were delivered on or before scheduled delivery; reference: Appendix A, Exhibit 5458-100 to Air Force Contract AF 04(695)-21.
LASC first cost variance filed 11 Sept 1962 was in the amount of $383,198 and the basic reason for the increased costs on Contract AF 34(695)-21 are summarized as follows:

a. Certain multiple or second source items were procured which were not covered by contract changes as anticipated.

b. Contractor accomplished changes in basic telemetry design and materials without seeking additional contract changes.

c. Material costs were substantially increased as the result of certain design changes which were required to meet specifications and insure a deliverable high quality product.

d. Additional production costs were incurred for tooling and design redraw resulting from aforementioned changes.

e. The recent change in Contractor's accounting system resulted in higher overhead costs on this particular contract.

LMSC second cost variance in the amount of $759,466 was processed 24 Jan 1963. The actual cost overrun was attributable primarily to the following:

a. Recent changes in the Contractor's accounting system resulted in higher overhead charges to this particular contract.

b. Unforeseen additional tooling costs occasioned by a change in vehicle configuration subsequent to Vehicle No AD8 and incorporation of complete S-01A capability within the LMSC complex.

c. Under estimated cost relating to implementation and capability maintenance for PAM telemetry required by the contract.

d. Under estimated costs relating to redesign and retrofit effort toward incorporating state-of-the-art changes and improvements when possible.
Dr. Robert C. Seamans, Jr.
Associate Administrator
National Aeronautics and Space Administration
Washington 25, D.C.

Dear Bob,

I have looked over the draft of a revised organizational and procedural arrangement for managing the Agana launch vehicle effort associated with the NASA unmanned space program which you sent me after our last meeting. As I am sure you understand from our conversation, I view this matter as a part of the broader problem of how best to handle Air Force cross-servicing relationships with NASA in the future. Consequently, rather than commenting on the NASA draft, paragraph by paragraph, I will outline the policy I believe the Air Force must follow in assuming responsibilities in support of NASA programs, and suggest some guidelines for preparation of a revised Agana agreement which I believe will achieve the principal goals NASA is seeking.

It is altogether apparent that the NASA and the Air Force will have continuing reason to work together on programs of mutual interest. I strongly believe, therefore, that our two agencies should set as a joint objective, arriving at conditions for cross-servicing which will minimize needless duplication.

As far as Air Force cross-servicing of NASA is concerned, as an important step toward this objective we plan to concentrate our support effort on NASA programs:

1. Which have the greatest military potential.
2. For which NASA needs Air Force support.
3. In which Air Force responsibilities are unique and clearly defined.

Of our two largest support efforts, one -- the launch vehicle portion of Mercury and now Gemini -- singularly meets the conditions mentioned above. We are vitally interested in Gemini for its military potential, as you know. Furthermore, with the changes now being made in target program management, the Air Force will be solely responsible to the NASA mission director for the vehicle development and flight operations package in Gemini as in Mercury.
In order to do all possible to make a success of our part of Gemini, we
need to dedicate substantially more resources to the program. In fact,
I find that we can very easily fully use on Gemini all of our people
previously working on the parts of the NASA Agena program which you
want to take over. Furthermore, our concern at this point will remove the
duplication of responsibility and effort which has caused friction under the
ev'ring Agena agreement.

I, therefore, agree with your proposition that a new agreement should be
developed for the NASA Agena program. I further suggest that a small
NASA-APSC task group be set up by Mr. Cortright and General Richland and prepare a new agreement with the following precepts as their point of
departure:

1. NASA to be represented on the technical groups monitoring the
development of the Standardized Atlas, and on the Configuration Control
Boards of the Standardized Atlas and the Agena D.

2. NASA to buy standardized stages from the Air Force, accepting
them on a DD 250 after they are delivered to the Air Force.

3. NASA to assume present Air Force responsibilities for flight
planning and adapting standard stages to NASA missions.

4. NASA to be responsible for launch operations from Complex 12 at
ABM.

5. Air Force to be responsible for launch operations at PMR.

If you accept these fundamental points, I suggest that they immediately
become the basis for all further planning and actions toward the next and
subsequent NASA Agena flights.

Sincerely

[Signature]
3. A. SCHRIEVER
General, USAF
Commander
ANALYSIS OF THE QUESTION OF
THE FUTURE AIR FORCE ROLE
IN THE NASA ATLAS AND THOR
AGENA PROGRAM

Purpose: To construct the basis for a revised AP/NASA agreement on Atlas, Atlas and Thor/Agena which:

1. Will preserve Air Force participation in the present NASA launch program at AMR to the extent which will contribute most to a 6555th ATW capability to handle space programs of greater military significance.

2. Will avoid over commitments of Air Force manpower resources.

3. Will not have to be changed if the Air Force undertakes a manned space program based on Gemini.

4. Will avoid overlapping or hazy zones of responsibility and authority.

5. Will permit NASA objectives to be attained and will conform sufficiently to NASA convictions on approach so that it can serve as a point of departure for more detailed negotiations.

Tasks:

1. Thor, Atlas and Agena stages for NASA unmanned missions only. (Note: The Air Force at SSD and the 6555th ATW will have complete booster responsibility for Mercury and Gemini including the Gemini target, reporting directly to the Mercury and Gemini project offices at Houston and the Cape)


1. Flight planning and systems integration.

5. At AMR: range requirements documentation, assembly, checkout, and launch operations.
1. NASA Situation

(a) NASA cites reliability as the primary purpose motivating their proposal to take over the direction of their unmanned Agena program. NASA expresses dissatisfaction over the record of Ranger and Mariner Atlas Agenas (three successes out of seven the way they keep books on this program). They are, of course, familiar with the major Air Force effort underway to improve reliability in the form of the standardized Atlas and Agena D programs. Actually, the NASA people pressing for an Agena-directed unmanned Agena program are powerfully and probably principally influenced by an ambition to run their own show, and they are organizing and manning on the assumption that they will do so.

(b) Within NASA, there was a complete shift of field responsibilities for the NASA Thor and Atlas Agena programs on the 28th of January. Lewis Research Center will replace Marshall Space Flight Center and Goddard Space Flight Center (Bob Gray who heads the Delta launch program will continue LOC at the Cape).

(c) Basically, NASA is asking for the following in a new agreement with the Air Force on the Thor and Atlas Agena programs:

1. Participation by Lewis people in the technical phases of standardized stage programs sufficient to know the characteristics of the stages they are buying and to express NASA requirements and ideas regarding standard-stage development.

2. To buy standard stages from the Air Force, accepting them on a DD 250 after they are delivered to the Air Force.

3. To have full charge of the program to adapt to their purposes and launch the stages they buy, including contract direction and control over associated facilities and equipment.

(d) The NASA Program on Stand 12 shows no shots until at least August of 1963 due to Ranger technical difficulties. Beyond that date, the planned NASA program will saturate Stand 12, probably with some overflow for which they will seek accommodation on Air Force Stand 13. For example, eleven Atlas Agena shots from AMR are planned for the NASA unmanned program in calendar 1964.

(e) NASA plans to build up to about 200 people by 1964 to carry out this program, approximately 20 of which would be located at the Cape and about 20 at contractors' plants and at SSD.
Air Force Situation at SSD

(a) Major Jack Albritt heads a 10-man group responsible for Thor and Atlas Agena boosters for all NASA programs, including the Atlas Agena target for Gemini. He is supported as required by the Thor, Atlas and Agena stage offices at SSD.

(b) The program to develop a Gemini target from the Agena D stage involves about $30 million in non-recurring costs, at least as much as the cost of developing the Standardised Agena D from the B.

(c) NASA Hq agreed to eliminate Marshall as a Gemini target technical support agency on the assurances that SSD would assign sufficient people of adequate calibre to satisfy MSC that the project will be competently managed.

(d) SSD is voluntarily offering NASA membership on the technical teams monitoring the development of the standardised Atlas, and on the Atlas and Agena D configuration control boards. These people will represent NASA interests and although they will have no veto power, can appeal unfavorable decisions through NASA channels.

3. Air Force Situation at AMR

(a) One 6555th launch crew supervises the checkout and launch of Mercury Atlases from Stand 14 and NASA Atlas Agenas from Stand 12. So far, launchings from these two stands have been sufficiently spread out so one 6555th team can handle the job.

(b) The last Mercury Atlas will be launched not later than July of this year. Stand 14 will then be modified to launch the Gemini Atlas Agena target, the first flight of which is now slated for September 1964.

(c) The next launching from Stand 12 will occur not before August of this year, and more likely about October, followed by an active NASA launch schedule.

(d) The 6555th will need to use Complex 12 and associated ACE for training purposes through June of this year. Colonel Russell concludes that beyond this date, the 6555th will make slower and faster progress toward their primary goals of achieving a basic suit launch capability on Complex 13 and preparing to do a thoroughly competent job of supporting the Gemini program on Complexes 14 and 19 if they pass the responsibility to NASA for the Stand 12 operation, restricting
Under the 17 January 1953 Webb-McKissick Agreement on Air Force relationships, NASA has the option to assume accountability for
Contract 12 if NASA becomes responsible for the launch function at this
Complex.

(i) The standardized Atlas CP IF contract ago development, production, and launch of 53 vehicles. The fact that the incentive features
of this contract cover launch services complicates transferring to NASA
the launch responsibilities which the 6555th ATW has discharged under the
previous NASA-Air Force Agency agreement. It would be preferable from
the Air Force point of view to avoid assigning to NASA the technical direction
of a part of an Air Force contract, particularly one with incentive fee pro-
visions. However, Colonel Crescenz, Chief of the Test Site Office of the
Launch Contract Management Region, concedes that there is no fundamental
reason why it cannot be done providing the NASA launch controller will agree
to adhere to the terms of the contract as interpreted by the Air Force
AGO. Moreover, the NASA will almost surely find the terms of the contract
unacceptable. The contract, with its fee in this case dependent on
performance during countdown and flight while minimizing cost, will
tolerate little interference by responsible government technical people,
within NASA or Air Force.

(g) Another solution would renegotiate the Atlas CP IF contract,
approach in three ways. One Air Force contract would cover development,
and production through plant buy-off as is done in the case of Agency D,
resulting in separate Air Force and NASA launch services contracts at
ACO. This approach has other reasons to recommend it. The Air Force
faces an unsolved problem in reconciling a CP IF contract which covers
flight performance, with a completely blue-suit launch operation. This
complication is one of the factors standing in the way of a blue suit operation
at AMR and will frustrate a blue suit operation at AMR if any standardized
boosters are launched from Stand 13 after the presently programmed series
of five vehicles which are carry-overs from the CP IF contract for Atlas
boosters antedating the standardized bird. It thus appears that incentive
coverage of countdown and launch performance and costs will have to go if
we are serious about blue-suit operations. Furthermore, any more
reservations of Atlas booster requirements by NASA or the Air Force
will require a renegotiation of the contract in any case since the boosters
now on contract will fully cover all present program orders.


(b) On the other hand, Colonel Brandsherry is satisfied
time will rise if negotiations are reopened—how much he can-
not be said. Also, this contract, with its combined performance
and incentive features, represents a significant milestone in incentive
contracting. Any abbreviation of the incentive features of this
decision would be viewed as a grave loss of hard-won ground by many
makers who are pushing the incentive-fee formula.

Conclusions

1. The trend in military development and exploitation of
space is toward manned activities in earth orbit and the use of launch
vehicles, such as the Titan III, larger than the Atlas Agena.

2. Gemini, with its manned rendezvous operations and land
recovery capability, is the only NASA program in which we stand to
gain from our supporting effort enough knowledge and experience
of these space to future military space activities to be worth the
money we would be obliged to commit.

Turning over to NASA the responsibility for the functions
formerly performed by SSD and the 4555th for the NASA unmanned Atlas
Agena program will not leave the Air Force people involved even
invisibly with little or nothing to do. On the contrary, these and
related operations will be needed to do justice to the support we are pledged to
give the NASA Gemini program, and at the same time to carry
out other programs including whatever Air Force participation
in essential spacecraft and flight missions program grows out of the
2-year NASA-DoD agreement on Gemini. For this reason, --

NASA is not duplicating an Air Force capability by
ensuring their Lewis and Goddard staffs to handle their own un-
manned program because otherwise the Air Force would have
lost our NASA support effort. This does not apply to PMR
work, the Air Force should perform all Agena launchings.

On balance, it is to Air Force advantage to assign to NASA
the full responsibility for NASA unmanned program Atlas Agena opera-
tions beyond DD 250 buy-off, except for PMR launch operations
which NASA wants the Air Force to keep anyway. Also, we have
no good excuse for retaining the responsibility in the face of a NASA
decree to run their own program. Under today's situation we cannot
accurately plead duplication. Also, now that we are dealing in
standardized launch vehicle stages and the missile R&D program is
behind us, we can no longer insist on directing the contracts for their
birds in order to insulate Air Force missile contracts from NASA
interference.
DD 260 buy-off is a logical point for transferring to NASA responsibility for their stages. NASA should not be permitted to call Air Force responsibility up to that point by installing engineering reviews in contractor plants.

The Air Force position on whether NASA should have their own launch services contract at AMR should depend on whether the standardized Atlas CPIF contract at buy-off is held by an all-blue suit operation at PMR. If we do, we should not allow NASA to buy one of NASA having their own launch services contract. If, on the other hand, we continue with the present CPIF contract, we should offer NASA the right to perform the technical surveillance function under the Air Force contract as agent for the Air Force ACO. In any case, in holding out for their own launch services contract, NASA should be asked to appeal the matter to OCS, since we should refuse the coverage of performance and cost incentives on the strength of a NASA request.

NASA will need 6555th assistance in the modification of Complex 12 for the standardized vehicle. Also, NASA will want to participate in the Air Force Atlas and Agena spares program. Furthermore, NASA, and to a lesser extent the Air Force will gain insurance if the configurations of Complex 12 and other Atlas launch facilities can be kept sufficiently standardized so launch vehicles can be moved from complex to complex should scheduling develop or a stand suffer major damage. The Air Force therefore propose as part of the new agreement a mechanism to achieve sufficient standardization of vehicles, AGE, and launch facilities to satisfy this requirement. In fact, the arrangement between the 6555th and the 6555th for accommodating the Delta program could well be proposed as the point of departure for achieving a satisfactory local relationship when Goddard assumes responsibility for the NASA unmanned Agena program.

The Air Force should no longer delay stating how far as a minimum we are willing to go in the direction NASA desires. As already, NASA is in the midst of reorganizing their Agena field activity. Thus, contractual and other preparations are underway for the next greater and subsequent NASA Agena launchings. Then, too, NASA needs to know their continuing responsibilities toward this NASA program. The situation at AMR is not so urgent, but both the 6555th and Goddard need to learn their future responsibilities as soon as possible. Finally, we can be sure that if we postpone too long telling NASA whether we will go along with their taking over the main functions SSD and the 6555th are now performing for them, NASA will take the matter to DDR&E. If we do state a minimum position at this time, planning in urgent areas can move forward while details are being negotiated by a negotiating team.
Recommendations

That the attached letter to Dr. Seams be signed. It takes a stand on the central policy matter involved which is consistent with the MRO position on our relationships with NASA in other allied areas, such as the management relationships between AFMTC and LOC at NASA. It says, in effect, that we will start more detailed negotiations with them on the bases of the four points enumerated in the letter. It is believed that this letter will be accepted by NASA as a satisfactory basis for appointing a small group consisting of about one Hq staff and one field representative from each agency to prepare a new agreement.
SECRET

20 March 1963

DECLASSIFIED, 180 days

INTERVALS NOT AUTOMATICALLY
DOWNGRADED AT 12 YEAR

SPACE SYSTEMS DIVISION

8-DIA MANPOWER PACKAGE

UNITED STATES AIR FORCE
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Appendix 1 Specific Space Program Requirements (Special Access Required)

UNCLASSIFIED
FOREWORD

1. This document is submitted in conformance with AFSC Program Management Instruction (PMI) 2-8.

2. HQ USAF has directed that the S-01A Program be funded incrementally with using program funds. The individual vehicle users transfer program dollars to fund the USAF directed S-01A production rate. Any program fluctuations (slippage, cancellation, fund release, etc.) result in chain reaction re-programming action.

3. This plan is submitted to obtain line item funding to sustain the directed S-01A production rate during FY 64 and subsequent years.

4. This plan was reviewed by the SSD Program Budget Review Committee (PBRC) on 13 March 1963 and the HQ USAF/AFSC Joint Review Team (JRT) on 18 March 1963 and received their approval.

EDWARD F. BLUM
Lt Colonel, USAF
S-01A Program Director
I. SIV.ARY

A. Vehicle Description

1. The S-01A is a standardized second stage booster capable of performing a variety of space missions. It is capable of attaining a wide range of orbital and space trajectories and can be used as an intermediate stage booster, or as an orbital vehicle. An engine restart capability enables the S-01A to achieve precise circular orbits and permits trajectory changes in space. It can also be programmed to accomplish attitude changes.

2. The S-01A stabilization system, which may function actively or semi-actively, provides vertical as well as horizontal stabilization in orbital flights. Alternate adapters enable the S-01A to use either a Thor or an Atlas as a first stage booster. The S-01A is 23.3 feet in length and has a 5 foot diameter. It is powered by a Bell dual burn liquid rocket engine developing a rated thrust of 16,000 pounds with a nominal thrust duration of 240 seconds.

B. Authorization


5. Eq USAF Message (NSAP-9-1-12) dated 9 January 1963 changing the production rate to 3 vehicles per month effective in July 1963.

6. Total vehicles authorized to date equal 97 S-01A's with deliveries at 3 vehicles per month from July 1963 through October 1964.

C. Vehicle Requirements

The S-01A production rate is established based on forecast DOD and other agency using program requirements. (Reference Section 3 and Appendix No. 1 this document). The established production rate is periodically reviewed in light of changing program requirements, with the production rate altered on an orderly basis to reflect new require-
I. SUMMARY

A. Vehicle Description

1. The S-01A is a standardized second stage booster capable of performing a variety of space missions. It is capable of attaining a wide range of orbital and space trajectories and can be used as an intermediate stage booster, or as an orbital vehicle. An engine restart capability enables the S-01A to achieve precise circular orbits and permits trajectory changes in space. It can also be programmed to accomplish attitude changes.

2. The S-01A stabilization system, which may function actively or semi-actively, provides vertical as well as horizontal stabilization in orbital flights. Alternate adapters enable the S-01A to use either a Thor or an Atlas as a first stage booster. The S-01A is 23.3 feet in length and has a 5 foot diameter. It is powered by a Bell dual burn liquid rocket engine developing a rated thrust of 16,000 pounds with a nominal thrust duration of 240 seconds.

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6. Total vehicles authorized to date equal 97 S-01A's with deliveries at 3 vehicles per month from July 1963 through October 1964.

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The S-01A production rate is established based on forecast DOD and other agency using program requirements. (Reference Section 3 and Appendix No. 1 this document). The established production rate is periodically reviewed in light of changing program requirements, with the production rate altered on an orderly basis to reflect new require-
D. Funding Requirements

1. The established funding procedures for procurement of S-01A vehicles and launch services, based on projected requirements, incur yearly costs that have to be funded with using program dollars. These costs do not change due to program fluctuations during the fiscal year, and as such become relatively fixed costs. As programs are approved and funds released, these identified (fixed cost) funds are allocated to support this effort. From this initial programming exercise any deviation to the overall space activity during the fiscal year (i.e., program approval, fund release, slippage, cancellations, etc.) requires re-programming action.

2. This management package is being submitted to identify the S-01A vehicle and launch services costs by fiscal year to obtain line item funding for these costs.

E. Launch Services

1. Launch Services constitute those services and materials required to launch and to maintain the capability to launch Program S-01A space vehicles at Vandenberg Air Force Base, Pacific Missile Range and Atlantic Missile Range. This effort involves system and subsystem checkout, servicing and launch of the Satellite System and those associated activities necessary to support this effort such as: AGE maintenance, equipment modifications, reports and documentation, "Blue Suit" training, spares provisioning, handling of propellants, equipment calibration, supply, etc.

2. Launch Complexes servicing the S-01A flight test vehicles are as follows:

Vandenberg Air Force Base

- 75-1, Pad 1 and 2
- 75-3, Pad 4 and 5

Pacific Missile Range

- PALC-1, Pad 1 and 2
- PALC-2, Pad 3 and 4

Atlantic Missile Range

- Launch Complex 12
- Launch Complex 13
- Launch Complex 14
III. S-01A Vehicle System

A. Purpose and Capability

1. The S-01A has been developed as a standardized vehicle capable of performing a variety of space missions. The concept that permits optional equipment to be combined with, or installed in place of, the basic equipment on a standardized vehicle enables the S-01A to display a versatility not provided in other vehicles or in earlier Agena models. This improved design simplifies manufacture, maintenance, launch preparation, and space operation.

2. The S-01A is capable of attaining a wide range and variety of orbital and space trajectories. It can perform as an intermediate stage booster, or as an orbital vehicle. An engine restart capability enables the S-01A to achieve precise, circular orbits, or permits the S-01A to make trajectory changes in space. The S-01A can be programmed to accomplish attitude changes. Its stabilization system, which may function actively or semi-actively, provides vertical as well as horizontal stabilization in orbital flights. Alternate adapters enable the S-01A to use either Thor or an Atlas as a first stage booster.

B. S-01A Vehicle Systems

1. S-01A incorporates five systems that perform the basic vehicle functions. These systems are: spaceframe, propulsion, electrical, guidance and control, and electronics. A brief description of each system is contained in paragraphs 2 through 6.

2. Spaceframe. The vehicle spaceframe consists of four major sections: forward section, tank section, aft section, and booster adapter section. The spaceframe provides the aerodynamic and structural shape of the S-01A vehicle and houses and supports the various vehicle system components and modules.

   a. The S-01A forward section carries guidance, flight control electronics, telemetry, command, tracking, electrical power, and propellant pressurization equipment. The forward section also provides mounting provisions for payload and optional equipment. Equipment installed in the forward section is readily accessible. Removable doors permit easy access to test plugs and components for checkout or replacement. The telemetry, guidance, and electrical power components are module-mounted for simplified checkout and interchangeability. Equipment that is not module mounted is readily accessible and can be removed without disturbing other equipment already installed.
4. Electrical System. The electrical system supplies various types of electrical power to operate S-01A and some using program equipment from prelaunch until the end of vehicle active life. The system consists of primary batteries, AC and DC power conversion and control equipment, wiring harnesses for all power and signal circuits, and separate circuitry for the pyrotechnic and destruct functions. Optional equipment available for the system permits variations in battery power and a capability to measure power consumed in flight.
The reference telemeter and the electronics circuitry contained in the flight control electronics and the junction boxes provide the ability to accommodate a variety of programmed operations. Attitude control signals are generated by means of the horizon sensor, gyro-stabilizing techniques and pre-programmed events. Actual vehicle control is achieved by means of hydraulically gimballing the rocket engine and cold gas thrust valves. A velocity meter is used to measure pre-selected velocities to be gained and to provide an engine shutdown signal when the correct velocity has been reached. Attitude reference is provided by the horizon sensor and the inertial reference package. The system has the necessary capability to establish the proper S-01A trajectory for attaining a desired orbit and to stabilize the satellite in four orientations in space. These orientations are nose up, nose down, nose forward, or nose backward.

6. Electronics System. Electronics system equipment installed in the S-01A is used in conjunction with the ground-based communications and control network to provide command and orbital programing, gathering and transmitting telemetry data, and tracking functions. The S-Band beacon and 15 channel decoded system provides tracking and real time command and the alternate C-Band beacon system provides only tracking capability. Telemetry from the basic S-01A and payload is provided by the option of either a 16 channel X/K system or a P/K system consisting of 16 main channels and a 128 channel sub-multiplexer.

C. S-01A Basic and Special Features

1. S-01A design has been directed toward production of a more reliable and standardized space vehicle that could be used with a minimum of alteration by a number of using program organizations. Since the using program requirements vary as to performance of ascent, orbital, and space functions, the S-01A must be capable of performing various missions without major structural modification. S-01A design features have also included the development of equipment accessibility, maintainability and producibility.

2. The S-01A makes use of flight proven S-01 equipment wherever possible to standardize major equipment, circuits, and plumbing. Equipment is located so that it is readily accessible for checkout, removal, or replacement. Equipment components are installed so that removal of a component may be accomplished without disturbing other components. Certain system assemblies, such as the X telemetry, guidance and electrical power, are modularized for maximum interchangeability and simplified checkout.

D. S-01A Equipment Description

1. To meet the requirements of performing various mission functions, the S-01A vehicle utilizes three categories of equipment.
These categories are basic equipment, mission peculiar equipment, program peculiar equipment, and optional equipment. Basic equipment consists of structure and equipment which are common to most of the using space programs. S-01A basic capability is provided by installing a group of qualified optional basic items and adding a first-stage booster vehicle. The mission capability is then established by installing a second group of items identified as program or mission peculiar items.

2. Basic Equipment. Basic equipment, that which is required for most of the programs using the S-01A, consists of essential items of structure and equipment necessary to perform basic ascent, orbital, or spatial functions. Basic equipment includes items that are required in the vehicle spaceframe, propulsion, electrical, guidance and control, and electronics systems to achieve the generic mission. For example, the rocket engine, propellant tanks, highway doors, and guidance module are items of basic equipment. A "Basic S-01A Vehicle" has everything required for an elementary ascent mission except for payload, nose fairing, batteries, beacon, and telemetry transmitter. Certain launch-base-installed basic equipment items such as the pyrotechnics and engine nozzle extension are transported directly to the launch site for installation in the S-01A vehicle during launch preparations.

3. Optional Equipment. Add-on extras required by more than one using program are designated as optional equipment and facilities for installation are provided in this basic vehicle. A group of fully qualified optional extras are manufactured by the S-01A program and provided in kit form. Optional equipment kits are designed to perform specific functions, such as delayed engine restart, command destruct, or propellant dump. The kits are complete installations, that is, they include the wiring, bracketry and plumbing necessary for installation and operation. Mounting provisions for optional equipment kits are provided in the basic S-01A to permit installation without disturbing other equipment or components.

4. Program Peculiar Equipment. Program peculiar equipment is that equipment other than basic or optional that is essential to perform the requirements of a particular program mission. This equipment is in the form of add-on assemblies for which space, but not mounting provisions, is provided in the S-01A vehicle. Each program is expected to supply, as required, a program peculiar forward assembly consisting of appropriate nose fairing, fairing attach structure, payload, payload mating structure, and separation devices (if required). The program peculiar equipment supplied, developed, and qualified by the using program may also include special guidance or control equipment such as reaction wheels, secondary propulsion system, etc. To the maximum degree possible, this equipment is located so as to prevent sacrificing the ability of the S-01A to
E. Program Configuration of S-01A Vehicles

1. General Concept. The S-01A vehicle configuration employed by a particular using program bears the same name as that program. The program configuration consists of a "basic" S-01A to which selected "optional" and "program peculiar" items of structure and equipment have been added. Instances may occur where not all the equipment supplied with the basic S-01A is required in the program configuration. This may be due to mission peculiarities or to the inclusion of optional kits which substitute alternate equipment items or change equipment requirement. In these instances, to avoid weight and space penalties, specific items that are designated as "permissible removals" may be removed.

2. Vehicle Assembly Procedures. The basic S-01A is assembled into the defined configuration and tested by S-01A Manufacturing. At this point the vehicle is "cold" to the Air Force Satellite Systems Division (AFSSD) by 8250 procedure. Thereafter, the basic vehicle is assigned by AFSSD to a using program, as Government Furnished Equipment (GFE). Optional and program peculiar equipments are now installed in the basic S-01A vehicle to adapt it for a given mission. In addition, selected items may be removed from the basic vehicle; these are identified as "Permissible Removal" in the basic vehicle master breakdown.
Letter of Understanding Between NASA Lewis Research Center and USAF Space Systems Division for Transfer of NASA Agreements Contracts

To: (See Distribution)

1. Tabulated below are the agreements established in the discussions between NASA Lewis Research Center (LeRC) and USAF Space Systems Division (SSD) on 8 May 1963. These discussions involved the pending transfer of Air Force contracts on the NASA Agency programs from SSD to LeRC.

a. Block of contracts with Lockheed Missiles & Space Company (IMSC) (-592, -59, L/C -291, L/C-314, PGOO contract which will be -284).

   (1) LeRC will assume contractual and technical direction of these contracts with a target date of 17 June 1963.

   (a) Following 17 June 1963, SSD will provide to LeRC, as may be requested, normal technical and procurement/contracting support for scheduled contractual actions which occur prior to 1 July 1963, based on existing schedules. Should negotiation schedules slip, SSD will furnish on an “as available” basis such technical support for this purpose as LeRC may request.

   (2) Sr. Orinovsky, the SSD Procurement Contracting Officer, will take immediate action to formally notify IMSC and the IMSC/AFR Administrative Contracting Officer (ACO) of the following:

      (a) All vouchers cleared through the ACO prior to 1 June 1963 will be presented for payment through current Air Force channels.

      (b) Beginning 1 June 1963, all vouchers cleared through the ACO will be mailed to LeRC for payment action (Mr. Beckett, LeRC, will provide Mr. Orinovsky with the mailing address for these vouchers).

      (3) The SSD Comptroller will notify immediately the applicable Air Force paying station of the actions indicated in paragraph (2) above.

      (4) The PGOO contract (-284) will be negotiated and distributed by SSD prior to contractual transfer to LeRC. To support this effort LeRC will expedite transmission of a NASA funding citation to SSD to enable the SSD Comptroller to apply funds citing NASA rather than Air Force funds against the PGOO contract.
3. Final Integration Contract (-189) with General Dynamics/Astronautics (G3/A).

   (1) Dr. Himmel, LeRC, and Dr. Johnson, Eq NASA, will coordinate action to formally notify Langley Research Center (LRC) that LRC is to assume contractual and technical direction of the -189 contract.

   (2) Upon receipt of information copies of correspondence relative to the actions of paragraph (1) above, SSD will coordinate with LRC to affect an expeditious transfer of the -189 contract.

c. Guidance Equations Contract (-175) with Space Technology Laboratories (STL).

   (1) The supplemental agreement to the -175 contract, which involves block changes to the guidance equations, will be negotiated and definitized by SSD with LeRC contracting and technical personnel in attendance. Negotiation of this supplemental agreement is scheduled for completion prior to 1 July 1963. Contingent upon this action, LeRC will officially assume contractual and technical direction of the -175 contract, after a cut-off date has been established and appropriate time span for fiscal processing.

d. GD/A 040 Mission Peculiars covered by CON #16 to the -240 contract.

   (1) Transfer of contractual and technical direction of this effort was discussed, and the inability of SSVR to provide technical direction beyond 1 July 1963 was acknowledged. Resolution of the problems involved was postponed pending further discussions between Dr. Himmel and Col. Brandeberry, SSVZ, scheduled for 9 May 1963.

ROBERT W. HOFFMAN  
Colonel, USAF  
Deputy for Engineering

SEYMOUR C. HUNGERB
Manager, Agena Project  
Lewis Research Center

2 Attachs
1. Attendance list, LeRC/SSD
   Mtg. 8 May 63
2. Distribution List
ASSOCIATE LIST

LaRC/SSD Meeting on Base Agency Contracts Transfer

8 May 1963

NASA

J. B. Kohan
Dr. S. C. Himmel
E. C. Moore
V. H. Beckett
P. E. Bartowee
D. E. Haden

Kasa Headquarters

Kasa Lewis Research Center

SSD

Col. W. B. Hoffman
Col. L. J. Button
Col. F. E. Brandeberry
Col. G. A. Wurstie
Col. W. H. Wert
Col. D. E. Snyder
Col. R. D. Bann
Col. E. P. H. Risemann
Sgt. Ldr. A. Pickering
Capt. B. C. Landers
Capt. A. L. Hayes
Capt. J. F. Kemp
Mr. J. S. Silberman
Mr. J. E. Bender
Mr. J. G. Gaughan
Mr. S. Lusas
Mr. R. H. Simon
Mr. L. Orinovsky

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Configuration Control Management of Program S-QIA Booster Vehicles

1. References:


b. Letter to SSD and SQA, Subj: Configuration Control of Program/Agena D Booster Vehicles, dated 9 Jun 63.


d. Letter to SSD from LNC, Subj: Contract AF 04(695)-92 Configuration Control Management, LNC-10602-30, dated 26 Jan 63.

e. Letter to SSD from LNC, Subj: Contract AF 04(695)-102 Configuration Control Management, LNC-10602-30, dated 26 Jan 63.

2. Various changes in organizational responsibilities which have occurred since the Memorandum of Agreement (Ref 1a) dictate a re-assignment of the configuration management agreement of Paragraph 7 (Ref 1a) and the guidelines further delineated in Ref 1b. Since both the AF Contracts 04(695)-92 and -102 are no longer administered by the S-QIA Directorate but rather by contracting officers directly supporting the S-QIA and S-QA Program Offices, the responsibilities of our respective offices have substantially changed from those called out in Ref 1b.

a. The original plan for processing Program S-QIA Vehicle Engineering Change Proposals (ECP's) was essentially as follows: The LNC Director Program Office would initiate ECP's and process them through the LNC S-QIA Office which would in turn forward them to the USAF S-QIA Directorate (SSQA). We would review the ECP's for compliance with system directives and forward them to the USAF Program Offices concerned (SSQA and EP-206) for your engineering review and Configuration Control Board (CCB) action. You would then send SQA a Configuration Control Board Directive (CCBD) for each ECP indicating approval or disapproval, and the SQA contracting officer would issue either a Contract Change Notice (CCN) author-
during the change or a request to NPG or P-01A personnel of the program and the reason therefor. The P-01A office would then process any approved change and would authorize the NPG Booster Program Office to proceed with the change. At the same time, the NPG P-01A office would reflect the change in the Configuration Distribution Status and Status Reports for the booster program examined. These reports would be forwarded from the NPG P-01A Office to SECA for subsequent distribution to SECA and SE-226.

b. However, since the SECA and the Program Offices now have both the CDP and the contract administration function, the inclusion of the 5-01A Discrepant in this cycle appears of dubious value and might even be a deterrent to the expeditious processing of the change proposals and the distribution of reports.

c. We therefore feel that it would be of advantage to our respective offices that SECA's configuration management responsibilities to the Program Offices be assigned to the following:

(1) Assist and advise SECA and CP-226 as called upon in establishment of their program's configuration management functions.

(2) Review and coordinate Program/C-01A vehicle and associated equipment (excluding AF) specifications.

(3) Perform First Article Configuration Inspection (FACI) and establish the baseline for the program booster then as requested by the Program Office.

d. The Program Offices' assigned responsibilities are as follows:

(1) Submit Program/C-01A booster vehicle specifications to SECA for review and coordination.

(2) Establish a Configuration Management Office (CMO) and/or Configuration Control Board (CCB) to accomplish configuration control functions.

(3) If SECA is to perform FACI for the Program Office, notify SECA of the estimated date of delivery of the first Program/C-01A Vehicle so a date for FACI may be established and provide notice for the FACI team, notifying SECA of these designated sufficiently prior to FACI so necessary team coordination may be accomplished.

(4) Receive, process and act upon EC7's relating to the Program/C-01A equipment.

(5) Process resulting CCMs, forwarding them to the contracting offices concerned for issuance of CCMs or other contractual directives.
to execute the CCF.

(6) Forward courtesy copies of all CCP's and CCF's to SSA for
information only.

(7) Call on SSA as required for aid or advice on configura-
tion management and control functions.

3. Although there is no longer a requirement for SSA to be in the ECP
processing cycle of CCP and CF-ED, the ECP C-01A Office will still
handle the configuration management and control functions for the C-01A
Vehicle and the Booster Program Vehicles and should have uniform procedures
in dealing with each. It is therefore recommended that the implementing in-
structions to LCC for the Booster Program be patterned after those for
the C-01A Office. A copy of the implementing instructions presently being
negotiated for the C-01A Office is attached for your information.

4. In response to an LCC letter from Mr. R. B. Martin to
 Brig. Gen. (MC/AG), dated 1972),... and configuration management relaxation planned for the C-01A Program with the ECP-
Officers and requesting LCC to submit cost proposals to incorporate changes in the CCP and CCF cycles to contractually cover LCC's configuration
control activities. (Ref 10) The contractor subsequently submitted proposals (Refs 14 and 15) which were not completely acceptable to the Air
Force, and further meetings were held to reach agreement on the proposed
work statement changes. Since the CCP and CCF cycles are now adminis-
tered by your contracting officers rather than SSA's, action must be
initiated by your office to incorporate the work statement changes into
your contract if you plan to initiate or continue configuration management
control procedures. Should you decide to do so, a copy of the recommended
work statement change for your program office is attached.

SIGNED

EDWARD F. WILSON
Colonel, USAF
Director, C-01A Space Project

2 Attach
1. C-01A Implementing Instructions
2. Recommended Work Statement
Change

CONFIDENTIAL
FM HQ USAF WASH DC
TO HQE AFF/AFSC ANDREWS AFB MD
INFO HQE AFF/AFSC (SCSS) (COLONEL CRIS tap) ANDREWS AFB MD
RMHRE/SSD (BS2A (LT COLONEL LEXEY) LOS ANGELES CALIF
RMHRE/ROCKET PROPULSION LAB (DOOD) EDWARDS AFB CALIF
AF GRUC

HT
UCLASS FROM AFSTD 76993
SUBJECT: HYBALINE PROGRAM. REFERENCE OUR MESSAGE 75215, 1 JULY 1963,
SAME SUBJECT. UNDER SECRETARY MCMILLAN HAS CLARIFIED HIS REQUEST FOR
INFORMATION ON THE HYBALINE PROGRAM. HE WOULD LIKE A PRELIMINARY
DEVELOPMENT PLAN PUT TOGETHER FOR A HYBALINE FUELED AGENA WHICH INDICATES
THE QUANTITIES AND TIME PHASING OF HYBALINE REQUIRED. HE HAS STATED
THAT THIS PLANNING DOES NOT NECESSARILY INDICATE THAT WE WILL PROCEED
WITH AN ENGINE DEVELOPMENT PROGRAM EVEN IF THE PRESENT EFFORT IS
SUCCESSFUL. DR. MCMILLAN HAS ASKED FOR A BRIEFING ON THE PRELIMINARY
DEVELOPMENT PLAN AROUND THE END OF JULY. PLEASE CONFIRM DATE THIS
BRIEFING WILL BE AVAILABLE:

P 1520457
FM DCSAF ANDREWS AFB MD
TO RENARR/SSD LOS ANGELES CALIF
RMHRE/RED BOLING AFB WASH DC
INFO RENARR/ROCKET PROPULSION LABORATORY EDWARDS AFB CALIF

HT
UCLASS NAF 15-7-22
FOR SSV (COL BRUM). RED FOR KMP; RPL FOR DODD. THIS CONFIRMS 12 JULY
1963 TELECOM BETWEEN COL BRUM (SSV) AND MBF/A PERSONNEL. REQUEST SSD
COMPLY WITH USAF MESSAGE AFSTD 76993. FURTHER REQUEST RED ASSIST SSD
IN PREPARATION AND PRESENTATION OF THE REQUIRED PLAN. THIS OFFICE
UNDERSTANDS THE BRIEFING WILL BE AVAILABLE WEEK OF 29 JULY. WE WILL
NOTIFY HQ USAF ACCORDINGLY AND ADVISE OF PRESENTATION SCHEDULE AS SOON
AS IT IS FIRM.

13-1, Sec 13, AFSC (USAF) Preliminary
Development Plan for Hybaline-Fueled
Advanced Space Vehicle, System No.
SS-01-B, 26 Jul 63

Your particular attention is invited to Section V which requires that this agreement be implemented in an orderly and expeditious manner. It is requested that any problems involved in carrying out the provisions of this agreement be brought to the attention of this Headquarters.

FOR THE COMMANDER

RODNEY NUDENBERG
Colonel, USAF
Assistant Deputy to the Commander
Manned Space Flight
USAF—NASA MEMORANDUM OF AGREEMENT
NASA OFFICE OF SPACE SCIENCES
AGENA LAUNCH VEHICLE PROGRAM

I. Purpose: The purpose of this agreement is to define interface areas and delineate responsibilities between NASA and USAF pertaining to those NASA (OSS) programs using the Atlas, Atlas/Agena and Thor/Agena launch vehicles. This document supersedes the 14 February 1961 Schriever-Seamans Agreement "NASA Agena B Launch Vehicle Program Management and Organization". This agreement specifically excludes those launch vehicle efforts covered by separate agreement between the USAF and NASA (MSC).

II. Definitions: See Attachment 1 for standard nomenclature for launch vehicles and stages.

III. General:

A. USAF (AFSC) has assigned to the Space Systems Division (SSD) development, procurement and delivery of space boosters and stages. Launch responsibility for the DOD missions has been delegated to the 6555th Aerospace Test Wing at AMR and the 6595th Aerospace Test Wing at PMR.

B. NASA has assigned vehicle systems management of the launch vehicle portions of NASA programs using Atlas, Atlas/Agena and Thor/Agena to the Lewis Research Center (LeRC). NASA launch responsibility for these vehicles has been delegated to the Field Projects Branch of the Goddard Space Flight Center at both AMR and PMR. For these functions, the Field Projects Branch is under the technical direction of the LeRC.

C. Direct negotiation on the aforementioned vehicle programs will be conducted by these USAF and NASA organizations at the appropriate level.

IV. Policies and Procedures:

A. Development and Production of Launch Vehicles and Stages

1. USAF will have responsibility for design, engineering and acceptance testing of basic Atlas and Thor vehicles and Agena D stages. Standard vehicles and stages will not be identified for NASA or USAF assignment prior to DD-250 acceptance. Standardized optional equipment
for the basic vehicle stages is considered as part of the standard vehicle or stage and is designated by the user as required to fulfill specific missions.

2. NASA will have membership on the Configuration Control Boards (CCB) for launch vehicles and stages.

3. A coordination group shall be established for each launch vehicle and/or stage. This group shall consist of the NASA Project Manager and the appropriate USAF vehicle or stage project officer or their agents. This coordination group will afford NASA opportunity to review, on a current basis, all design features of the vehicles, stages and their components and proposed changes thereto, quality control procedures, reliability, test procedures, performance capability, etc., pertinent to the flight performance and mission objectives of these vehicles. A memorandum of understanding shall be prepared providing for the functions and procedures of this group.

4. NASA and USAF will provide to each other available bibliographies of technical reports and documents for the launch vehicles and stages, systems and subsystems. Documentation selected from these bibliographies will be exchanged as requested.

5. NASA may visit the stage and vehicle portions of the prime and associate contractor's plants for the purposes of witnessing systems, subsystems and integrated systems tests, observing factory operation and having technical discussions with contractor technical personnel, etc. Such visits shall be coordinated with the appropriate USAF launch vehicle project director's office and the contract management region resident representative's office. NASA personnel shall not directly or by implication provide technical direction to these contractors relative to USAF contracts.

6. NASA personnel, after suitable arrangements with the appropriate USAF offices, may participate on the development team(s) for the standard Atlas vehicles.

B. Procurement of Standard Launch Vehicles and Stages: NASA will procure from the USAF the Atlas, Thor and Agena D stages. Costs will be paid by NASA according to the established vehicle costs as well as a proration of any costs incurred due to NASA reprogramming or additional development requirements. NASA will furnish timely written requirements and schedules directly to the appropriate launch vehicle office at SSD for procurement. SSD will inform NASA of funding requirements to support requested procurement.
C. Mission Adaptation and Flight Planning

1. NASA will assume responsibility for the remaining Agena D's in the NASA programs and for System Test Complexes C-7 and C-13.

2. Subsequent to receiving basic stages and boosters after DD-250 acceptance, NASA will be responsible for all booster and stage modification, spacecraft installation, and systems integration, which may be accomplished by direct NASA contract. These responsibilities will include, but not be limited to, flight test documentation, design and fabrication of Aerospace Ground Equipment (AGE) for both NASA in-plant and launch base operations, performance analysis, trajectory computation and mechanization of Atlas ascent equations.

3. For those current and future USAF contracts in which NASA participates, the USAF will include provisions so that NASA integration services contractor(s), in the performance of their integration services functions, will receive information, cooperation, and participation from the USAF contractors. Costs incurred by USAF contractors in providing these services will be reimbursable by NASA.

4. If it is considered to be in the best interest of the government and mutually satisfactory to the cognizant organizations, NASA will enter into direct contracts for launch services and for AGE installation required on Complex 12 or mission peculiar AGE in Hangar E. In order to protect interests of the government, NASA will coordinate with the USAF organization having similar responsibility in USAF programs to assure consistency and efficiency.

D. Launch Operations

1. NASA will be responsible for launch operations on all NASA programs from Complex 12 AMR. This will include complete responsibility for Complex 12 AGE required to accomplish their missions. Interchange of information will be effected to maintain, insofar as practicable, consistent and compatible test plans, test procedures and equipment between NASA controlled Complex 12 and USAF controlled Complexes 13 and 14. Necessary documentation will be maintained by USAF and NASA to reflect the current configuration of assigned launch complexes.

2. Should either NASA or the USAF have occasion to use a launch complex controlled by the other agency, the user shall have the option of using its own launch crew. The agency responsible for the launch complex shall be afforded sufficient participation to protect the integrity of the complex.
3. For "common usage" equipment and facilities now in being at AMR such as Atlas Hangars, Agena Hangar E, GE guidance ground station and Burroughs computer, the USAF will retain the basic contracts, facility assignment, and technical control and direction; however, during tests on NASA vehicles or during NASA pre-launch or launch operations, NASA will have access and operational control for NASA activities. NASA will be responsible for accepting or rejecting all tests supporting their operations. Scheduling conflicts regarding use of personnel and facilities will be resolved locally by the USAF and NASA. Costs incurred by NASA on these contracts will be reimbursable to the USAF.

4. USAF will be responsible for launch operations at PMR for vehicles and stages covered under this agreement. NASA will provide its requirements for the preparation and launch of NASA vehicles at PMR to the USAF 6595th Aerospace Test Wing who will supervise the participating contractors. For NASA missions launched from PMR, NASA shall provide the 6595th ATW all required technical data pertaining to the vehicle system.

E. Coordination

1. USAF and NASA will maintain liaison in order to exchange technical information concerning related NASA and USAF programs and vehicles.

2. To insure effective utilization of facilities, spare parts supply, etc. used jointly, NASA and USAF will coordinate requirements.

3. By mutual agreement technical group memberships may be interchanged.

4. To protect interests of the government, a concerted effort will be made to restrict any unnecessary expansion of the contractors' organizations which would result in cost increases, duplication of facilities, or internal competition for highly qualified employees.

F. AFPR Support: The USAF will make available and NASA shall utilize, the capabilities and services of the AFPR.

G. Transportation: NASA will arrange with appropriate USAF authorities for transportation of launch vehicles and stages.

4
V. Implementation: Implementation of this agreement will be accomplished in an orderly and expeditious manner. The USAF will continue to provide support and technical advice during the period of transition.

Approved:

[Signature]
HOWELL M. ESTES, JR.
Lieutenant General, USAF
Vice Commander
Air Force Systems Command

Approved:

[Signature]
ROBERT C. SEAMANS, JR.
Associate Administrator
National Aeronautics and Space Administration
LAUNCH VEHICLES
(LV)
STANDARD LAUNCH VEHICLES
(SLV)

LV-1 Generic, Scout
LV-1A - Aerojet Senior (ALGOL II) (First Stage Only)
SLV-1A - LV-1A/02A/B/C - NASA/DOD Scout (Guided)
SLV-1B - S-02A/B/D/E - Blue Scout Jr. (Unguided)
LV-1B - S-02A/B/C - Blue Scout Jr. (Modified)

LV-2 Generic, Thor
SLV-2 - Standard Launch Vehicle, Thor
LV-2A - Thor, thrust augmented (TAT)
LV-2B - Thor, Blk I, 150K engine
LV-2C - Thor, Blk I, 150K engine, ASSET mods

LV-3 Generic, Atlas
SLV-3 - Standard Launch Vehicle, Atlas
LV-3A - Atlas D
LV-3B - Mercury Atlas
LV-3C - Centaur Atlas

LV-4 Generic, Titan II
LV-4A - Gemini Launch Vehicle, Titan II

LV-5 Generic, Titan III
SLV-5A - Standard Launch Vehicle Titan III core & transtage
SLV-5B - (Reserved for future use)
SLV-5C - Standard Launch Vehicle Titan II core & transtage and 2 solids
SLV-5D - (Reserved for future use)

Attachment 1
STAGES
(S)
STANDARD STAGES
(SS)

S-01 - Generic, Agena

SS-01A - Standard Stage, Agena D
S-01B - Agena D (Performance Improvement Program)
S-01C - Agena D - Gemini Target

S-02 - Generic, Scout

S-02A - XM-33 (CASTOR)
S-02B - ABL-254 or 259 (ANTARES I or II)
S-02C - ABL-248 or 258 (ALTAIR I or II)
S-02D - AJ10-41 (ALCOR)
S-02E - XM-85 NOTS (CETUS)

S-03 - Generic, Able Star

SS-03 - AJ10-104

S-04 - Generic, Delta

S-04A - AJ-10-101
S-04B - AJ-10-118
S-04C - ASSET

Note: The following definitions apply:

Standard Launch Vehicle (SLV) - A first stage vehicle used in DOD space programs which is produced to a definite set of specifications established to insure maximum vehicle reliability and interchangeability. Modifications will only be made to improve reliability and will be introduced as block changes to the production line. Only these vehicles will be designated as STANDARD LAUNCH VEHICLES (SLV).

Launch Vehicle (LV) - A launch vehicle developed and produced for a special limited use or an SLV modified to meet specific mission requirements and accomplished through a modification line separate from that which produces the SLV.
**Standard Stage (SS)** - An intermediate vehicle, not designed as a part of the first stage launch vehicle that provides thrust for ascent and orbit injection. The SS is produced to a definite set of specifications established to insure maximum reliability and interchangeability. Modifications will only be made to improve reliability and will be introduced as block changes to the production line. Only these stages will be designated as STANDARD STAGES (SS).

**Stage (S)** - A stage developed and produced for a special limited use or an SS modified to meet specific mission requirements and accomplished through a modification line separate from that which produces the SS.
1. During this reporting period thirty-one (31) Agena vehicles were launched, twenty (20) of which were Agena D's. To date a total of twenty-four (24) Agena D's have been launched. Twenty-one of these have successfully been injected into orbit and one had no chance due to booster failure. On the 12th of July 1963, the 100th Agena space vehicle was launched. (c)

2. In April 1963, approval was received for development of the S-01B, an advanced version of the Agena Space Vehicle, having additional basic performance capabilities. This program is nearing completion and the first production vehicle of the series will be delivered in early December 1963. (U)

3. Design and development of the YLR61-BA-13 multi-start rocket engine and the Bell Model 8250 Secondary Propulsion System for the Gemini Agena target vehicle, which started in the summer of 1962, are nearing successful completion. These developments will provide unprecedented flexibility for maneuverability in space. (U)

4. From March to August of 1963, a study was conducted to demonstrate the feasibility of converting the Agena rocket engine for use with Hybaline A5 fuel instead of UDMH. This study consisted of full scale tests of engine thrust chamber and gas generator as well as more basic tests to determine the physical characteristics of the fuel. Preliminary design studies based on results of these feasibility tests show that substantial performance gains can be achieved with minimum impact on both airborne and ground interfaces. There is considerable high-level interest in this program and the Under Secretary of the Air Force, Dr. McMillan, requested that a preliminary development plan be prepared and presented to him in July 1963. The briefing was favorably received and Dr. McMillan directed that a small-scale effort be continued on the development of a gas generator suitable for use with Hybaline and that this program be scheduled for presentation to the Launch Vehicle Panel. It is expected that this presentation will occur in early October 1963. (U)
5. During the past year the Aerospace Ground Equipment Division has completed the following launch complex activations in support of Air Force and ARPA space programs. Each of these activations was completed in a timely manner to support the scheduled space missions.

   a. Activation of Point Arguello Launch Complex No. 2 for the S-01A portion of the SAVEP 206 Program was completed under IMSC Contract AF 04(695)-131 on 31 May 1963 at a cost of $15,301,706. A Vehicle on Stand capability was attained on Pad 3 on 15 February 1963 and on Pad 4 on 7 May 1963. (U)

   b. AMR Complex 13 was converted from an Atlas E configuration to an ARPA SLV-3/S-01A/Program 823 configuration under IMSC Contract AF 04(695)-135. A Vehicle on Stand capability for the Program 823 S-01A vehicle was attained on 20 June 1963. Total cost of this project for the 823/S-01A phase was $4,406,814. (C)

   c. PALC-1, Pad 1 was converted from a SLV-3/S-01A/Program 461 configuration to an SLV-2A/S-01A/Program 162 configuration. Under the terms of IMSC Contract AF 04(695)-354, this configuration was completed and the VOS capability attained for the S-01A vehicle on 27 September 1963. (C)

EDWARD F. BLUM
Colonel, USAF
Director, S-01A Space Project.
The Advanced Research Projects Agency (ARPA) of the Office of the Secretary of Defense announced today that two identical experimental nuclear detection satellites are now in orbit, having been placed from a single launch. These research and development satellites will provide data on the operation of nuclear test detection sensors in space and necessary information on the natural radiation environment in which the sensors must function.

This satellite program was a joint AEC/DOD effort under the over-all supervision of the Nuclear Test Detection Office of the Defense Department's Advanced Research Projects Agency. The spacecraft were designed, fabricated, and tested by a team of scientists and engineers from the Los Alamos Scientific Laboratory, Sandia Corporation, Space Technology Laboratory, and Aerospace Corporation. Detailed technical supervision was provided by an AEC/AF Joint Technical Group under the leadership of the Air Force Space Systems Division, Air Force Systems Command. The launch operation was conducted by the Air Force.

The program for satellite detection began in 1959 when the Los Alamos Scientific Laboratory began studying the problems associated with the detection and identification of nuclear detonations in space. Since then, the effort has progressed through a series of ARPA sponsored "hitch-hiker" flights on other vehicles to this recent full-scale launch.

Each nuclear detection spacecraft is five feet in diameter and weighs about 500 pounds. The spacecraft is a regular polyhedron with twenty triangular surfaces. The triangular surfaces are covered with solar cells for conversion of radiant energy from the sun into power for the operation of the spacecraft. A central cylinder houses the orbit injection rocket, and provides structural rigidity and strength.

Much of the radiated energy from a nuclear blast is in the form of a pulse of X-rays less than a millionth of a second long. Because of nuclear processes, gamma-rays and neutrons are also radiated. The recently launched spacecraft contain instruments designed to detect all of these types of radiation. They will also provide data on the natural background.

The X-ray detectors are the box-like structures at the corners of the spacecraft. The neutron and gamma radiation detectors are located inside the satellite. Inclusion of three types of detectors should make it possible to distinguish between radiation from nuclear blasts and natural background.
UNCLASSIFIED NSFA 7-11-6. SSD FOR SSAVT.
REQUEST YOU PREPARE SUMMARY OF SSD ACTIVITIES ACCOMPLISHED ON THOSE AGENDA PROGRAMS RECENTLY TRANSFERRED TO NASA/LEWis, INCLUDING STATEMENT OF TERMINATION ACTIONS PENDING ON YOUR PART. NO SPECIAL FORMAT REQUIREMENTS. LETTER REPORT ACCEPTABLE.
PREFER ALL ACTIVITIES RELATED TO ONE PROJECT TO BE SUMMARIZED UNDER THAT PROJECT HEADING WITH SEPARATE GENERAL AREA IF NECESSARY. SUMMARY DESIRED THIS HQ (NSFAN) NOT LATER THAN 2 DEC 1963.
UNCLAS MSFA 7-11-6. SSD FOR SSVAT.
REQUEST YOU PREPARE SUMMARY OF SSD ACTIVITIES
ACCOMPLISHED ON THOSE AGENA PROGRAMS RECENTLY
TRANSFERRED TO NASA/LE WIS, INCLUDING STATEMENT OF
TERMINATION ACTIONS PENDING ON YOUR PART. NO SPECIAL
FORMAT REQUIREMENTS. LETTER REPORT ACCEPTABLE.
PREFER ALL ACTIVITIES RELATED TO ONE PROJECT TO BE
SUMMARIZED UNDER THAT PROJECT HEADING WITH SEPARATE
GENERAL AREA IF NECESSARY. SUMMARY DESIRED THIS
HQ (MSFAN) NOT LATER THAN 2 DEC 1963.
HI
TRANSFER REPORT

Transfer of NASA Agena Program
from APSSD to NASA LeRC

This is a final SSD program office close-out report summarizing the Air Force responsibilities for program peculiar modification and system integration on ten NASA Agena vehicle programs which were transferred from HQ Space Systems Division to NASA Lewis Research Center (LeRC) during 1963. This report does not cover the remaining SSD responsibilities on these programs (procurement of boosters, stages, spares and launch operation services) which are still under Air Force contracts, funded directly by LeRC and directed by other SSD offices.

31 December 1963.

Gemini Agena Division
S-01A Space Project Directorate
Deputy for Engineering
Headquarters Space Systems Division
Los Angeles, California
<table>
<thead>
<tr>
<th>Paragraph</th>
<th>Title</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NASA Agena Programs - Management-History</td>
<td>1, 2</td>
</tr>
<tr>
<td>2</td>
<td>NASA Agena Programs - Contracts Summary</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Program Summary - Ranger</td>
<td>4, 5</td>
</tr>
<tr>
<td>4</td>
<td>Program Summary - Mariner R</td>
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<td>5</td>
<td>Program Summary - Mariner C</td>
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<td>6</td>
<td>Program Summary - EGO</td>
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<td>Program Summary - POGO</td>
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<td>8</td>
<td>Program Summary - FIRE</td>
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<td>9</td>
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<td>10</td>
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<tr>
<td>11</td>
<td>Program Summary - A-12</td>
<td>15</td>
</tr>
<tr>
<td>12</td>
<td>Program Summary - S-27</td>
<td>16</td>
</tr>
</tbody>
</table>
1. NASA AGENA PROGRAMS - PROGRAM HISTORY

a. The Ranger program (the first NASA program to use the Air Force Agena) was established under NASA Order No. 3443-C, dated 23 March 1960. In April 1960, the NASA Agena B Directorate (KDZJA) was established under the AFEMD Deputy Commander for Space Programs and was assigned the Air Force responsibilities for Ranger, although a final AF/NASA agreement concerning those responsibilities had not yet been reached. In June 1960, the program office title was changed to NASA Agena B Division (KDZJA).

b. The Schriever-Seamans' agreement, "NASA Agena B Launch Vehicle Program Management and Organization" was signed on 14 February 1961. Under this agreement, NASA had overall program responsibility and the specific responsibility and authority for accomplishment of the launch vehicle program was assigned to AFSSD. The program office title under the newly formed SSD Deputy for Engineering was the Director of Ranger (SSVR) effective in April 1961.

c. In March 1962, the program office was redesignated the Program Integration Division (SSVR) within the SLV III Directorate and the NASA Agena B Program was revised and expanded to 36 vehicles including additional Ranger lunar vehicles, the Mariner Venus program, the Nimbus satellites, the Exocentric Geophysical Observatories (EGO), the ECHO and Rebound passive communication satellites, the Canadian 5-27 program, the Polar Orbiting Geophysical Observatories (POGO), the Orbiting Astronomical Observatory (OAO), the FIRE program and Gemini rendezvous target vehicles.

d. In December 1962, the program office was redesignated the Unmanned Spacecraft Directorate (SSVR) and the NASA Agena program missions were expanded to a total of 41 vehicles.

e. During January 1963, a realignment of responsibilities occurred within NASA resulting in a transfer of the launch vehicle program from NASA Marshall Space Flight Center to NASA Lewis Research Center. Also during the first quarter the USAF and NASA reviewed their basic support agreement covering these programs. This review resulted in the decision to transfer the peculiar modification and system integration contracts from SSD to NASA LARC, with the exception of the Gemini Agena Target Vehicle program which would remain at SSD under the overall program management of NASA Manned Spacecraft Center. Final authority to transfer non-Gemini peculiar
modification and system integration contracts from SSD to NASA, so that the Air Force would procure only basic boosters and standard second stages for NASA, was requested in a message from MajGen Funk to MajGen Ritland on 3 April 1963. This request was confirmed by AFSC message to MajGen Funk on 16 April 1963.

f. By mid-July 1963, six of the eight Air Force contracts affected had been transferred to NASA and the SSD program office was transferred from the Deputy of Engineering to the Assistant for NASA Programs and was designated the Gemini Agena Directorate, SSMR.

g. On 9 August 1963, the "USAF-NASA Memorandum of Agreement NASA Office of Space Sciences Agena Launch Vehicle Program" superseded the 1961 Schriever-Seaman's agreement and confirmed the transfer of systems management responsibilities to NASA LaRC.

h. By September 1963 only one contract remained to be transferred and the SSD program office was redesignated the Gemini Agena Division, SSV/T, under the S-01A Space Project Directorate, Deputy for Engineering.

i. On 20 December 1963, the SSD program office relinquished technical cognizance of the one remaining non-Gemini contract. An earlier AF/NASA agreement had been made to maintain it as an Air Force contract under technical monitoring by NASA LaRC.
<table>
<thead>
<tr>
<th>Former USAF Contract Number</th>
<th>Current NASA Contract Number</th>
<th>Contractor</th>
<th>Value (Millions of $)</th>
<th>Scope</th>
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<tbody>
<tr>
<td>AF 04(647)-552</td>
<td>NAS 3-3800</td>
<td>LMSC</td>
<td>88.0</td>
<td>Systems Integration, Peculiar Modifications to Agema B Vehicles, Shrouds, Adapters.</td>
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<tr>
<td>AF 04(647)-59</td>
<td>NAS 3-3801</td>
<td>LMSC</td>
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<tr>
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<td>LMSC</td>
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<td>Systems Integration, Peculiar Mod. to Agema B, Adapters, Shrouds, AGS (B63 capability for SLM) and capability for System Test Complex 13.</td>
</tr>
<tr>
<td>AF 04(695)-311</td>
<td>NAS 3-3804</td>
<td>LMSC</td>
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<td>Systems Integration, Peculiar Mod. to Agema B, Adapters, Shrouds.</td>
</tr>
<tr>
<td>AF 04(695)-284</td>
<td>NAS 3-3805</td>
<td>LMSC</td>
<td>2.7</td>
<td>Systems Integration, Peculiar Mod. to Agema B, Shrouds.</td>
</tr>
<tr>
<td>AF 04(695)-189</td>
<td>NAS 1-2122</td>
<td>CDA/A</td>
<td>1.2</td>
<td>Systems Integration, Ascent Guidance Mechanization.</td>
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<tr>
<td>AF 04(694)-240</td>
<td>Unknown</td>
<td>CDA/A</td>
<td>1.66</td>
<td>Peculiar Hardware and Test.</td>
</tr>
<tr>
<td>(CDA/OS negotiated on 10 Sep 63 as</td>
<td></td>
<td></td>
<td>(-1.66 contract)</td>
<td></td>
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<tr>
<td>two new contracts: AF 04</td>
<td></td>
<td></td>
<td>4.43</td>
<td></td>
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<tr>
<td>(695)-458 and AF 04(695)-453</td>
<td></td>
<td></td>
<td>(-1.65 contract)</td>
<td></td>
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<tr>
<td>AF 04(695)-275</td>
<td>None</td>
<td>STL</td>
<td>0.95</td>
<td>Oxidizer equations for the CDA-Burroughs radio guidance system.</td>
</tr>
</tbody>
</table>

Note: The table describes the contracts and their corresponding values and scopes within the NASA Agema Program.
## NASA AGEMA Program - Contract Support

<table>
<thead>
<tr>
<th>Former NASA Contract Number</th>
<th>Current NASA Contract Number</th>
<th>Contractor</th>
<th>Value (Millions of $)</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF O6(647)-59</td>
<td>NAS 3-3400</td>
<td>LMSC</td>
<td>88.0</td>
<td>Systems Integration, Peculiar Modifications, Agema B Vehicles, Shrouds, Adapters.</td>
</tr>
<tr>
<td>AF O6(647)-59</td>
<td>NAS 3-3401</td>
<td>LMSC</td>
<td>4.6</td>
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<td>AF O6(695)-190</td>
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<td>AF O6(695)-125</td>
<td>None</td>
<td>STL</td>
<td>0.95</td>
<td>Guidance equations for the AGS Surrogate missile guidance system.</td>
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(Contingent)
a. PROGRAM MISSION AND OBJECTIVES. The Ranger program objectives are to demonstrate the technology of delivering scientific equipment from Earth to the Moon and to produce scientific and environmental data in support of the United States Manned Lunar Flight program.

(1) Three series of launches were originally planned using the Atlas/Agena B launch vehicle:

(a) Block I: (2 launches) System tests for engineering development of the Ranger vehicle and ground systems.

(b) Block II: (2 launches) Moon impact with the same four experiments carried on each mission; a vidicon camera, a gamma-ray detector, a radar altimeter to obtain reflectivity data, and a seismometer. The seismometer and its radio transmitter were designed to withstand 3,000 g deceleration on impact, then to measure and transmit lunar seismic activity.

(c) Block III: (4 launches) Moon impact to acquire knowledge of lunar topography sufficient to determine gross effects on lunar landing vehicles.

(2) In late 1962, NASA added an additional series of launches using an Atlas/Agena D combination:

(a) Block IV: (5 launches) Moon impact planned as an extension of the Block III objectives by using high resolution T.V. cameras to give better definition of the lunar surface.

b. PROGRAM FUNDING. Initial funding for the NASA Agena B Programs (which included Ranger and Mariner R) was received on 27 March 1960 on NASA Order No. 2-6601-0 in the amount of $1,100,000. The total funding received on this order was $75,723, 913 at the time of transfer to NASA LeRC.

(1) $100,000 from NASA Order N-49600 was used to start the Block IV program. An additional $700,000 for this program was received prior to contract transfer.

c. CONTRACTUAL INFORMATION. A Cost Plus Fixed Fee contract, AP 04(647)-992, was let with Lockheed Missiles & Space Company (LMSC) on 17 April 1960, which covered the Ranger, Mariner R, Nimbus, A-12 and S-27 programs. A Letter Contract, AP 04(695)-314, was signed by LMSC on 1 May 1963 to cover the Block IV program. Both contracts were transferred to NASA LeRC on 14 June 1963.
d. **SIGNIFICANT EVENTS**

(1) **Block I vehicles:**

(a) RA-1 was launched from AMR Pad 12 on 23 August 1961. The Agena engine malfunctioned during the second burn start sequence causing the Ranger spacecraft to be separated and placed in a near-earth orbit. Commands were sent to the spacecraft and all experiments were confirmed to be functioning.

(b) RA-2 was launched from AMR Pad 12 on 18 November 1961. The Agena roll gyro was inoperative at lift-off and second burn was not achieved because of the resulting vehicle instability. Separation of the spacecraft was achieved resulting in a near-earth orbit.

(2) **Block II vehicles:**

(a) RA-3 was launched from AMR Pad 12 on 26 January 1962. Forty-nine seconds after lift-off, lock between the Atlas pulse beacon and the ground guidance station was lost. Due to lack of ground guidance commands, the spacecraft was injected at excess speed and altitude. The spacecraft missed the moon by approximately 22,000 miles.

(b) RA-4 was launched from AMR Pad 12 on 23 April 1962. Launch and injection was completed as planned. Due to an undefinable difficulty in the spacecraft, usable telemetry was not received and commands could not be given. The spacecraft impacted on the far side of the moon. This was the first lunar impact of a spacecraft launched by the United States.

(c) RA-5 was launched from AMR Pad 12 on 18 October 1962. Launch and injection was completed as planned. A problem within the spacecraft prevented the solar panels from supplying power for spacecraft operation. Battery power was depleted before a mid-course correction could be made. The spacecraft passed within 4,500 miles of the moon.

(3) At the time of transfer to NASA, Block III and Block IV launches were scheduled for the 1964-1965 time period.
4. PROGRAM SUMMARY - MARINER 2

II. PROGRAM MISSION AND OBJECTIVES. The Mariner 2 objectives were to validate the spacecraft's long-range communications system and to make scientific measurements in the interplanetary space between Earth and Venus and in the vicinity of Venus.

1. Two launches were planned and accomplished using Atlas/Agena B vehicles.

2. The SSD technical responsibilities relating to this program terminated at completion of second launch. Data interpretation by NASA is continuing.

b. PROGRAM FUNDING. See paragraph 3.b. (Ranger funding).

c. CONTRACTUAL INFORMATION. See paragraphs 2. (Contracts Summary) and 3.c. (Ranger contractual information).

d. SIGNIFICANT EVENTS

1. Mariner R-1 was launched from AMR Pad 12 on 22 July 1962. The launch was normal until the flight deviated in trajectory because of erratic steering commands. The vehicle was destroyed by the Range Safety Officer prior to Agena separation.

2. Mariner R-2 was launched from AMR Pad 12 on 27 August 1962. The launch resulted in a successful injection of the spacecraft. The spacecraft accomplished the Venus fly-by on 14 December 1962, approaching within 21,000 miles of the planet. Scientific data was successfully collected and transmitted to Earth.
5. PROJECT HISTORY - MARINER C

a. PROGRAM MEDIA AND OBJECTIVES. The Mariner C objectives are to make scientific measurements in the interplanetary space between Earth and Mars and in the vicinity of Mars.

(1) Two launches are planned for the fourth quarter of 1964 using the Atlas/Agena D launch vehicle.

(2) The program time span is from 1 February 1963 to 15 February 1965.

b. PROGRAM FUNDING. Initial funding for the Mariner C program was received on NASA Order No. H-49690, dated 7 December 1962, in the amount of $500,000. An additional $2,650,000 was allotted on 17 May 1963 by Amendment #1 to the original NASA order. On 13 June 1963, Amendment #2 decreased funds by $100,000. Total funding received prior to transfer was $3,050,000.

c. CONTRACTUAL INFORMATION. A Letter Contract, AF 04(695)-291 was let to Lockheed Missiles & Space Company on 1 February 1963. This Letter Contract was transferred to NASA-Lewis Research Center on 17 June 1963.

d. SIGNIFICANT EVENTS. None. In the four and one-half months the contract had been in effect prior to transfer, technical progress was normal and no major problems had been encountered.
III. MASTER SCHEDULES

A. The projected S-01A vehicle requirements are based on the current AFSSD master schedule (Master Schedule 2-20, dated 12 Nov 62) updated to 12 March 1963. These vehicle requirements are based on the launch schedules and time phased to allow for program peculiar requirements.

B. The S-01A vehicle requirements versus production rate are reflected on the master schedule chart on the following page. The vehicle requirements shown on this chart are totals, specific using program requirements appear in the sensitive appendix. (See Appendix 41).

C. Vehicle requirements are forecast through FY-64, with the FY-66 through FY-68 period carried as unknown. The production rate is forecast at a 3 vehicle per month rate through FY-68 and all financial data is based on this rate. Total vehicles authorized to date equal 97 S-01A's with deliveries scheduled through October 1964. The production rate can be varied to respond to changing overall space requirements with a six month lead time.

D. The AFSSD policy in the assignment of production S-01A vehicles to using programs is based on a revolving inventory concept. This establishes a first in-first out assignment of vehicles to meet using program requirements. A vigorous adherence to this policy is required to negate storage obsolescence due to fluctuations in using program requirements.
<table>
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<th>8-01A</th>
<th>FY-63</th>
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<td>CUMULATIVE PRODUCTION BALK</td>
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**CONFIDENTIAL**
SECTION IV

FINANCIAL REQUIREMENTS
II. S-01A Vehicle

1. Funding Guidance

a. Eq USAF message (AFSSV-EC-92346), dated 22 October 1962, directing using program funding for S-01A.

b. Eq USAF directive, 25 June 1962, to prorate general support (SCTB, Reliability, storage, repair, manuals) costs to using programs.

c. Eq USAF message (AFSSV-EC-92346), dated 22 October 1962, directing using program funding for sustaining engineering.

2. S-01A Forecast Costs

a. All costs associated with the S-01A vehicle until delivery to the using program, plus logistic support of the S-01A vehicle until launch are included in the financial estimates on the following page. These estimated S-01A funding requirements will be adjusted to reflect negotiated fixed price contracts.

b. The S-01A funding requirements in this management package provide for the following: basic vehicle, spares, optional equipment, production propellants, manuals, storage, repair and logistic support plus prorated general support costs.

c. Examples of costs not included in this package are: using program peculiar costs, first destination transportation, using program system test, and launch propellants.

B. Launch Services

1. Launch Services provides supplies and services, including launch propellants, but does not include manufacture or procurement of Space Vehicles or Aerospace Ground Equipment, components or spares.

2. The Launch Capability Contracts are entirely Satellite System Program funded. Satellite System Program Offices fund against actual costs.

3. Launch Services are contracted on a calendar year basis.

4. Vehicle DD 250 shortages and program modifications will be taken care of by Program Office and not by the Launch Services Contracts.
5. Modifications which can be completed within the normal space vehicle turn around time such as:

a. Minor equipment modifications necessary to insure mission success as caused by late Satellite System Program changes.

b. Minor complex modifications for updating and launch-to-launch program changes that can be completed with the normal vehicle turn-around time.

6. Launch schedule or rate changes are subject to CCN action.
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<tr>
<th>DESCRIPTION</th>
<th>MPC</th>
<th>FY-64</th>
<th>FY-65</th>
<th>FY-66</th>
<th>FY-67</th>
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Appendix No. 1.

SPACE SYSTEM'S DIVISION
UNITED STATES AIR FORCE
S-OLA MANAGEMENT PACKAGE

20 March 1963
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<th>PROGRAM SCHEDULE - 4 Years</th>
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16/1700Z ZUS AFB MD
TO
LOS ANGELES CALIF
WASHINGTON
NASA
23 RESEARCH CENTER NASA 21000 BROOKPARK RD CLEVELAND OHIO

16/1700Z APR RBATF

1963APR16 PH 1:37
INFO SSGE

For SSG NASA FOR DR. P. FORSYTHE, LEVIS RESEARCH CENTER
FOR DR. S. C. HIMEL, YOUR SSG 3-4-3. YOU ARE AUTHORIZED
TO IMMEDIATELY PROCEED WITH ACTIONS PERTINENT TO TRANSFER OF
CONTRACTS FOR SPECIFIC MODIFICATIONS AND SYSTEM INTEGRATION
PORTIONS OF THE NASA/AGENA LAUNCH VEHICLE EFFORT TO LEVIS
RESEARCH CENTER.

16/1707Z APR RBATF

said 17APR63 11877
The objectives of the Geostatic Geophysical Observatories (EGO) program are to prove the capability of a new type, standard design spacecraft and to gather data concerning the geophysics of the outer regions of the earth's environment.

(1) The 900 lb. EGO spacecraft will be of standard GOO (Orbiting Geophysical Observatories) design. GOO is the generic name of a standard spacecraft design capable of carrying fifty different types of experiments and incorporating its own communications and control system. It has been dubbed the first "Space bus" for geophysical measurement equipment.

(2) The EGO spacecraft will be launched by an Atlas D/Agena B combination into an elliptical earth orbit with an apogee of 50,000 nautical miles and a perigee of 160 nautical miles.

(3) EGO will be launched from AMR Pad 12. The launch azimuth will be 106 degrees with an inclination angle of 31 degrees prograde. Two launches are scheduled, the first in 1964 and the second in 1965.

b. PROGRAM FUNDING. Funding for the system integrating portion of the EGO program was made a part of the overall funding provided by NASA Order NAS 8-73 (originally S-4601-G) for NASA Agena B Programs. This order did not break-out funding for individual programs. The total funding received on this order was $73,723,313 at the time of transfer to NASA LeRC.

c. CONTRACTUAL INFORMATION. In early 1962, the Lockheed Missiles & Space Company was requested to quote on the integrating contractor function of the EGO program and the cost of supplying two Agena B vehicles. The proposal was negotiated in September 1962 for $5,939,500, and the EGO effort was added as Part 2 to the basic Ranger/Mariner contract AP 04(647)-592. The contract was transferred to NASA LeRC on 14 June 1963.

d. SIGNIFICANT EVENTS. At the time of transfer to NASA LeRC, the EGO contract with LMSC was progressing normally. The earlier severe restrictions placed upon the Agena B by the EGO mission had been solved. The required payload weight capability exceeded that of a "standard" Agena B. The requirement was met by extensive re-design of the forward equipment rack, the guidance junction box and the electrical system. The program was on schedule at time of contract transfer.
Preliminary Effort - POGO

1. PROGRAM OBJECTIVES. The objectives of the Polar Orbiting Geophysical Observatories (POGO) program are to prove the POGO spacecraft concept (see paragraph 6.4.1, POGO program) and to obtain measurements within the ionized belts surrounding the earth.

(1) The 900 pound POGO spacecraft will be launched by a Thor/Agena D combination into a polar orbit with a 500 nautical mile apogee and a perigee of 160 nautical miles.

(2) The Nimbus type shroud, supplied by Douglas Aircraft Company, will provide the necessary protection to the spacecraft during ascent. Following injection, the mission of the launch vehicle is complete.

(3) Two launches are scheduled, one in 1964 and the second in 1965.

b. PROGRAM FUNDING. Initial funding for POGO contract AF-04(695)-284 was received on 23 May 1963 by NASA Order C-1221A in the amount of $800,000. No additional funding on this order was received prior to transfer of the contract to NASA LeRC.

(1) The preliminary POGO study effort was funded from NASA Order NAS 8-73 (previously Order S-4601-G) which was the basic order funding NASA Agena B programs. Approximately $64,000 was expended on this study effort prior to March 1963 termination.

c. CONTRACTUAL INFORMATION. In July 1962 the Air Force submitted a request for bid to LMSC for the effort required to adapt an Agena D to the POGO mission and for the system integration function. Contract AF-04(695)-284 was negotiated in June 1963 for $2.47 million dollars. The contract was transferred to NASA LeRC on 1 July 1963.

(1) Earlier, a small effort was let to LMSC under the provisions of contract AF-04(695)-592 (Ranger/Mariner) to conduct the long-lead study effort required for the POGO program. The period of performance on this study was December 1962 to April 1963. All effort on this portion of the -592 contract had been completed prior to negotiation of the prime POGO contract.

d. SIGNIFICANT EVENTS. None. Contractor performance had not progressed beyond study effort phase at time of transfer.
b. PROGRAM MISSION AND OBJECTIVES. The FIRE program was established to determine by flight test the problem associated with re-entry in the lower speed range. This includes investigation of total heat transfer, hot air radiance, materials response and radio blackout effect at approximately 37,000 feet per second re-entry speed. Only crude approximations exist of the environmental conditions for these re-entry speeds and there is no current prospect that research in ground facilities alone will resolve the uncertainties.

(1) Two flight tests, a primary and a backup four months later are planned. The FIRE spacecraft will be placed into a ballistic trajectory by the Air Force LV-3A space booster. The X-259 solid rocket motor included in the velocity package portion of the spacecraft will be ignited such that the re-entry package portion of the spacecraft arrives at an established re-entry point with the desired initial conditions, including a 37,000 fps speed.

(2) A recording system in the re-entry package which is scheduled to playback between the end of radio blackout and splash make recovery unnecessary and no recovery efforts are planned.

c. PROGRAM FUNDING. By NASA direction, $200,000 which had been received on NASA Order 30220 for booster procurement was used to initiate the FIRE systems integration contract. This $200,000 was to be repaid to the NASA booster fund by NASA Langley Research Center (LRC). Additional funding was received specifically for the FIRE contract on Amendments 4 and 7 to NASA Order 30220. When the contract was shifted from SSD to LRC on 10 July 1963, a total of $950,000 had been received.

c. CONTRACTUAL INFORMATION. On 26 June 1962, CCN #190 entitled Project FIRE - Dynamic Analysis was issued to the booster procurement contract AP 04(647)-699 with GD/A. This was followed on 6 July 1962 by CCN #197 to the same contract which was titled Project FIRE - Integration Activity. Letter Contract AP 04(695)-189 with GD/A was distributed in August 1962 and established GD/A as the system integrator for Project FIRE.

(1) In November 1962, Amendment 1 to the Letter Contract was issued - establishing the statement of work for the generation and checking of booster ascent guidance equations for the FIRE Program.

(2) The CPFFF definitized contract AP 04(695)-189 was distributed in April 1962 and on 10 July 1963 was transferred from SSD to Langley Research Center as NASA contract NAS 1-3122.
9. PROGRAM HISTORY - OAO

a. PROGRAM HISTORY AND OBJECTIVES. The primary objective of the Orting Astronomical Observatory (OAO) program is to place above the earth's atmosphere a precisely oriented stable platform (spacecraft) on which telescopes and other scientific apparatus will be mounted for the acquisition and transmission of data relative to astronomical phenomena. The launch vehicle will consist of an Atlas booster on which is mounted a completely encased Agena D second-stage booster and spacecraft. The Program span extends from 1 January 1962 through 15 May 1965 with one launch approved.

b. PROGRAM FUNDING. Initial funding for the OAO Program was received via Marshall Space Flight Center, message M-LAM-P-11-1, dated 9 November 1961, which authorized initiation of $250,000 of the funds made available under Amendment 10, dated 27 September 1961, to NASA Order NAS A-2. Total funding received from NASA at the time of transfer of the LMSC contract to Lewis Research Center (LeRC) was $2,625,000 excluding the funding for Atlas and shroud effort which was provided for under the lump sum funding for General Dynamics/Astronautics (GD/A) contracts covering Atlas boosters for all Program Office missions.

c. CONTRACTUAL INFORMATION. Letter Contract AF 04(695)-59 was issued 13 November 1961 for the LMSC effort required to provide a mission modified Agena D and to perform the role of overall launch vehicle systems integrating contractor. Contract target cost and fee (7.1%) were negotiated for a total of $4,551,750 and the definitized CPIF Contract was issued 28 December 1962. This contract was transferred to NASA LeRC 14 June 1963.

(1) Original contractual direction to GD/A to provide a mission modified Atlas and shroud structure for the Agena and spacecraft was covered by CCN 6 to Letter Contract AF 04(694)-47, 11 November 1961. Because of contractual realignments; CCN 16 to contract AF 04(694)-240 was negotiated as the covering contract. A target cost of $5,665,000 for this CPIF contract (-240) was negotiated 10 September 1963. Although negotiated as a CCN to a single contract, subsequent to 10 September 1963 negotiations, the Work Statement was broken into two separate work statements for two new contracts, AF 04(695)-458 and AF 04(695)-453.

(a) Contract AF 04(695)-458 covering the mission modified SLV-3 only was to be retained by SSD. Target cost and fee (7.45%) was negotiated for a total of $1,661,739.
(b) Contract AF 04(695)-453 covering the launch vehicle shroud system, mission peculiar AGE, and the integrated structural, functional, dynamic test program, was to be transferred to NASA, LeRC. Target cost and fee (7.45%) was negotiated for a total of $4,425,304.

(c) These contracts had not been distributed at the time that this program office was relieved of all mission responsibilities in September 1963.

d. SIGNIFICANT EVENTS. The peculiar "dumbbell" configuration of OAO (a 10-foot-diameter Atlas mated to a 5-foot-diameter Agena upon which is mounted a 9.5 foot-diameter spacecraft) necessitates a 10-foot-diameter shroud system approximately 53 feet in length which is mounted on the Atlas and encloses the entire Agena and spacecraft. Early in the program it was determined that this novel split-beam, cantilever configuration would require extensive testing. An integrated structural, functional, dynamic testing program was developed to cover a 34-week span; testing to be conducted by GD/A (with participation and support by LMSC and Grumman Aircraft & Engineering Co., spacecraft contractor to NASA, Goddard Space Flight Center (GSFC)) at the Point Loma test facilities. To be tested were an Atlas test tank, the flight Atlas tank, booster and spacecraft test adapters, an Agena test vehicle, a simulated spacecraft and a complete shroud system. The first test set up was in progress during mid-September 1963 when all technical and contractual direction to GD/A for the OAO program was assumed by the SSD Atlas office.
10. Program Summary - Nimbus

a. Program Mission and Objectives. The Nimbus Naurorological Satellite is a direct outgrowth of the experiences and results of the Tiros series satellites. The Nimbus objectives are to obtain full picture coverage of day-time cloud cover of the entire Earth, to supply data for electromagnetic radiation maps of the Earth and its atmosphere, to obtain data for maps of night-time cloud coverage, and to conduct experiments to determine the Sun's effect on Earth's atmosphere.

(1) The Nimbus R&D satellite, containing hi-resolution TV cameras and infra-red scanning equipment, will be launched into a 600-nautical mile circular "high noon" orbit with an 80-degree inclination. The launch vehicle will be a Thor/Agena B combination. Two R&D satellites were scheduled for launch in late 1963 and early 1964 at time of contract transfer.

(2) The Nimbus Operational satellite will be launched into a 750-nautical mile circular "high noon" orbit with an 80-degree inclination. The launch vehicle will be a Thor/Agena D combination. Three Operational satellites were programmed at time of contract transfer.

b. Program Funding. Funding for the Nimbus program was made a part of the overall funding provided by NASA Order NAS 8-73 for NASA Agena B Programs. This order did not break out funding for individual programs. The total funding received on this order was $73,723,313 at the time of transfer to NASA LeRC.

c. Contractual Information. A Cost Plus Fixed Fee contract, AF 04(647)-592, was let with Lockheed Missiles & Space Company (LMSC) on 17 April 1960, which covered the Ranger, Mariner R, Nimbus, A-12, and S-27 programs. The contract was transferred to NASA LeRC on 14 June 1963.

d. Significant Events. At the time of contract transfer, there were no technical problems and progress was normal on the peculiar modification and system integration portions of the program. The several slippages in launch schedule were due to spacecraft development problems (NASA monitored contracts).
11. PROGRAM SUMMARY - A-12

a. PROGRAM MISSION AND OBJECTIVES. The A-12 EXO Passive Communications Satellite program objectives were being re-evaluated at the time of transfer of the system integration contract from EXO SSD to NASA LMSC. At the time of transfer, the objectives were to document the use of large inflatable spheres as communications reflectors, to flight test rigid spherical passive satellites, and to conduct scientific studies on the environmental behavior of large lightweight structures. No communications experiments are planned for orbital flights, but monostatic radar measurements will be made to determine the size and condition of the spherical surface.

(1) The A-12 inflatable spacecraft (NASA developed) will weigh 684 pounds. It will be placed in a near-earth orbit for limited duration by a Thor/Agena B launch vehicle.

(2) At the time of contract transfer, two A-12 launches from PNR were programmed.

b. PROGRAM FUNDING. Funding for the A-12 program was made a part of the overall funding provided by NASA Order NAS 8-73 for NASA Agena B Programs. This order did not break out funding for individual programs. The total funding received on this order was $73,723,313 at the time of transfer to NASA LMSC.

c. CONTRACTUAL INFORMATION. A Cost Plus Fixed Fee contract, AF 04(647)-592, was let with Lockheed Missiles and Space Company on 17 April 1960, which covered the Ranger, Mariner R, Nimbus, A-12, and S-27 programs. The contract was transferred to NASA LMSC on 14 June 1963.

d. SIGNIFICANT EVENTS. At the time of contract transfer, there were no technical problems and progress was normal on the peculiar modification and system integration portions of the A-12 program. The several slippages in launch schedule were due to spacecraft development problems (NASA monitored contracts).
a. **PROGRAM MISSION AND OBJECTIVES.** The objectives of the S-27 Ionospheric Topside Sounder program were to inject a spacecraft provided by the Canadian Defense Research Telecommunications Establishment (CDRE) into an 80-degree prograde, 540 nautical mile circular orbit by means of a USAF launch vehicle system consisting of Thor and Agena B with Air Force launch services. The spacecraft was designed to:

1. Measure the electron density distribution in the ionosphere above the F-2 layer maximum,
2. Study for a period of one year the variations of electron density distribution with time of day, latitude under varying magnetic and auroral conditions and with particular emphasis on high latitude effects,
3. Perform scientific studies and data collections on the ionosphere above the F-2 layer maximum: cosmic noise level, plasma frequency at orbital altitude, electron density gradient, and cosmic particle density.

b. **PROGRAM FUNDING.** Funding for the S-27 program was made a part of the overall funding provided by NASA Order NAS 8-73 for NASA Agena B Programs. This order did not break out funding for individual programs. The total funding received on this order was $73,723,313 at the time of transfer to NASA LeRC.

c. **CONTRACTUAL INFORMATION.** A Cost Plus Fixed Fee contract, AF04(647)-592, was let with Lockheed Missiles and Space Company (LMSC) on 17 April 1960, which covered the Ranger, Mariner R, Nimbus, A-12, and S-27 programs. The contract was transferred to NASA LeRC on 14 June 1963.

d. **SIGNIFICANT EVENTS.** The S-27 was launched from Vandenberg AFB, Complex 75-1-1, on 28 September 1962. Operation of all systems through the Agena second burn shutdown successfully placed the Agena and S-27 spacecraft (Alouette) in a nearly circular orbit at the intended altitude. Spacecraft performance was very successful and the backup launch vehicle was assigned to another program after thirty days of data was received from the orbiting satellite.

1. This was the first joint United States—Canadian space effort and the first launch of a spacecraft produced completely by a nation other than the U.S. or U.S.S.R.
2. Tracking and data exchange involved the NASA Minitrack Net along with Canadian and British Stations.
Summary of Transferred NASA Ames Programs

1. The attached report is submitted in accordance with Eq AWEC direction message NASA 7-31-6. The report summarizes the NASA Ames program effort which was transferred from Eq SED to NASA Ames Research Center (LARC) and NASA Langley Research Center (LRC) during 1963. It should be noted that the transfer applied only to responsibilities of the SED program office (SNWA). This included coordination and liaison activities relating to component procurement subject to technical direction of peculiar specification and system design contracts. Procurement of launch vehicles, vehicles, and launch services is now being ordered directly by NASA from the appropriate SED offices.

2. The individual program summaries contained in the report are lacking in detail in some instances. Original NASA direction and funding for SED programs was grouped under the overall title NASA Ames Programs. Air Force contracts covered these same programs subject to funding apportioned for individual projects. However, summary program reports were not written for individual programs. In addition, these reports were not written for individual programs subject to Air Force funding. In addition, with three exceptions, the efforts assigned to the transferred NASA programs are no longer assigned to Eq SED. Detailed information on the programs monitored by these officers has therefore been difficult to gather.

3. This report constitutes final close-out action by SNWA on all NASA programs other than Gemini Ames Target Vehicles. Following the transfer of individual contracts and programs, only "Pearl Harbor" files were retained by SNWA. Because all SED program office activity of the transferred NASA programs has now been terminated, these files are being prepared for shipment to permanent Air Force storage.

SIGNED.

CHIEF, GEMINI AMES DIVISION

2-CIA SPACE PROJECT DIRECTORATE

1 Atch

NASA Ames Summary Rpt, 31 Dec 63
Throughout the reporting period this organization has been directed by Col. Edward F. Blum and has been assigned to the Deputy for Engineering (SSV). In addition to the previous responsibilities, the Gemini Agena Division (SSVAT), under the direction of Maj. Charles A. Wurster, was assigned to SSVA in October 63. At that time also, a Command Control Section was established within the Vehicle Engineering Division (see attach 2). (U)

On the 12th of July 63 the 100th Agena space vehicle was launched. During the reporting period fourteen (14) Agena D and one (1) Agena B vehicles were successfully launched and injected into orbit. All remaining vehicles under production contract AF 04(695)-68 were accepted during this period and some vehicles produced under the AF 04(696)-194 were accepted. The final S-01A vehicle was accepted in December 1963. Those vehicles under the present production contract (-194) which incorporate the features of contract AF 04(695)-191 are designated as S-01B. (U)

Development of the XLR 81-BA-13 engine has continued during this period. Its purpose is to provide a multi-start capability for the Gemini Agena Target Vehicle. The feasibility study for converting the Agena engine for use with Hybaline fuel instead of UDMH extended into this period. Interest in this area continues and a follow-on test program was initiated. (U)

The most significant completed achievement of the AGE Division was the reconversion of PALC-1, Pad 1 under contract AF 04(695)-354. A Vehicle on Stand capability was attained on 27 September 1963. (U)

Significant briefings presented during this period:


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b. Col Blum briefed Gen Funk on 3 September 63 on a Procurement Plan for the YLR 81-BA-11 Engine. The plan recommended buying the Agena engine directly from Bell Aerosystems Co with an estimated annual saving of $800,000. After due consideration of all factors this plan was rejected.

c. As a member of a party headed by Gen Funk, Lt Col Barnes briefed Gen Schriever on S-01A Reliability on 2 October 63.

d. Hybaline Fuel Briefings:

(1) Col Blum, Lt Col Le Beck and Lt Col Goppert briefed at AFSC and USAF on 29-31 July 1963.

(2) Lt Col Le Beck briefed at RTD, AFSC and USAF (Dr FLAX) on 10-11 September 1963.

(3) Lt Col Le Beck briefed the Aeronautics and Astronautics Coordination Board Launch Vehicle Panel on 21 November 1963.

6. Detailed historical data is presented by each Division of this Directorate in attachments 1-6.

EDWARD F. BLUM
Colonel, USAF
Director, S-01A Space Project

CONFIDENTIAL

6 Atch
1. Historical Data, SSVAc (C)
2. " " SSVAB (O)
3. " " SSVAC (C)
4. " " SSVAB (U)
5. " " SSVAc (C)
6. " " SSVAT (C)

Filed Dec. 25, 1963, filed in General Target File
1. —(c) Reconversion of PAIC-1, Launch Stand 1 to an SLV-2A/S-01A configuration (which began 19 April 1963) was completed under Contract AF 04(695)-354. A Vehicle on Stand (VOS) capability was realized on 27 Sep 1963. The conversion schedule of less than six months was one of the most ambitious undertaken by AFSSD to date. Work remaining to be accomplished under the -354 Contract is the conversion of PAIC-1, Launch Stand 2, to an SLV-3/S-01A configuration. This contract has had a total of four (4) CCNs, two of which are no cost. The remaining two CCNs (CCN-1 and CCN-4) are both credit CCNs, a result of program redirection. The first CCN deleted a planned dual capability on both pads and the fourth CCN changed the required configuration of Launch Stand 2 from a 4805 vehicle to a 1172 vehicle. This CCN also consolidated all three previous CCNs. The -354 Contract was negotiated for 4.6 million dollars. The Contractor's proposal for CCN-4 is a $590,000 credit. Authority for this conversion is SSOS secret letter, subject: PALC-1 Complex, dated 29 March 1963.

2. (U) Efforts continued on the conversion of AMR Complex 14 to a S-01C configuration under LMSC Contract AF 04(695)-287. In addition, Secondary Propulsion System (SPS) support requirements were procured under Supplemental Agreement Number Two to this contract. The presently scheduled Vehicle on Stand capability date is 1 Nov 1964. A total of $2,132,500 in FY-63 funds were obligated. An additional $2,500,000 are programmed for FY-64. Authority for this conversion is SSVZ0 letter, subject: Conversion of AMR Complex 14 to an Atlas/Agena Configuration, dated 5 Jul 1962.

3. (U) A memorandum of understanding was negotiated with the Sacramento AFRL Depot (SWANA) to provide storage of the Disaster Pool AGE which is to be delivered March through May 1964. This equipment consists of eleven items of AGE which is being procured under LMSC Contract AF 04(695)-317. The items selected have a three month or greater lead time that from previous experience has been determined to be subject to major damage in the event of a launch stand disaster. The equipment will be stored at SWANA and will be available for immediate issue; thus greatly reducing the time that would be required to refurbish a damaged launch stand to a usable condition. The contract has been negotiated for $970,000, fixed price, and all equipment is to be delivered by 1 March 1964. Authority for the procurement of Disaster Pool AGE is SSVZ0 letter, subject: Agena Items for Disaster Pool Backup, dated 6 Jun 1962.
4. (c) PALC-2, Stand 4, was converted to Program 206 configuration under OSR-3 to LMSC Contract AF 04(695)-131. This conversion was completed on 1 Nov 1963 at a cost of $1,194,000 which was funded from 5630 monies. Authority for this conversion was SAPR-206 confidential letter, subject: Modification to Pad 1, dated 24 Apr 1963.

5. (e) PMR Launch Capability Contract AF 04(695)-233 Supplemental Agreement Number Seven was negotiated and definitized at $2,191,000. The added effort covered by the supplemental agreement included round the clock support for GS as requested by Program 206, launch accelerations and pad changes for Program 162, full operation of PALC-1, Pad 1 after 26 Sep 1963 in support of Program 162 plus other added miscellaneous efforts. PALC-1, Pad 1 and Pad 2 were not carried on the Launch Capability Contract from 1 Jul 1963 to 26 Sep 1963 and 1 Aug 1963 to 31 Dec 1963 respectively due to pad modification being accomplished by LMSC under Contract AF 04(695)-354.

6. (U) Action was taken to initiate a contract with LMSC for launch services at PMR during CY-64 as a follow-on to Contract AF 04(695)-233 which terminated on 31 Dec 1963. The follow-on letter contract, AF 04(695)-501, was costed by LMSC for a total of $32,825,000 including fee. Fact finding session was held at VAFB during November. Negotiations have been scheduled for 27 Jan 1964. The definitized contract will be CPIF with incentives for both cost and performance.

7. (U) Supplemental Agreement Number Five to the AMR Launch Capability Contract, AF 04(695)-198 with LMSC, was negotiated and resulted in a credit of $1,872,000 to the contract resulting in a total contract cost of $4,120,000. Program redirection, as covered by Supplemental Agreement Number Five, was necessary due to the cancellation of all launches for the period 1 Jan 1963 to 31 Jul 1963. This contract terminated 31 Dec 1963.

8. (U) Action was taken to initiate a contract with LMSC for launch services at AMR during CY-64 as a follow-on to Contract AF 04(695)-198 which terminated on 31 Dec 1963. The follow-on letter contract, AF 04(695)-499, was costed by LMSC for a total of $6,111,925 including fee. Fact finding session was held at VAFB during November. Negotiations have been scheduled for 27 Jan 1964. The definitized contract will be CPIF with incentives for both cost and performance.

9. (U) AGS work statement evaluation, cost proposal evaluation and negotiation; technical direction of equipment development, and monitoring of design fabrication and installation and checkout continued during the past six months for the following programs: 162, 698B-1C, 206, Gemini, 461, 823, and 526.

10. (U) Specific developments in support of Air Force and NASA programs were as follows: Standardized Pyrotechnic Checkout Equipment, PCM and Digital Command System, and Secondary Propulsion System Propellant Loading Equipment.
1. The Procurement Division provides procurement management functions for the Agena and also lends this support to designated SSD and NASA Program Offices. A summary of the existing contracts follows:

<table>
<thead>
<tr>
<th>CONTRACT NUMBER</th>
<th>PROGRAM</th>
<th>VALUE</th>
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<tbody>
<tr>
<td>AF 04(695)-21</td>
<td>RAD of Agena D</td>
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<td>AF 04(695)-32</td>
<td>PNR Launch Capability</td>
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<td>AF 04(695)-62</td>
<td>Advent</td>
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<td>AF 04(695)-68</td>
<td>Agena D Production</td>
<td>36.3M</td>
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<td>AF 04(695)-79</td>
<td>Mission Peculiar Equipment</td>
<td>3.5M</td>
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<td>AF 04(695)-129</td>
<td>Gemini - Agena Target Veh</td>
<td>8.6M</td>
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<td>Gemini - Agena Phase II</td>
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<tr>
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<td>AF 04(695)-194</td>
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<td>AF 04(695)-198</td>
<td>AMR launch capability</td>
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<tr>
<td>L/C AF 04(695)-221</td>
<td>Agena Repair &amp; Logistics</td>
<td>7M</td>
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<tr>
<td>AF 04(695)-233</td>
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<td>AF 04(695)-266</td>
<td>Santa Cruz Support</td>
<td>2.5M</td>
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<td>AF 04(695)-257</td>
<td>Launch Pad Modification</td>
<td>3.3M</td>
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<tr>
<td>AF 04(695)-254</td>
<td>Agena Technical Manuals</td>
<td>3M</td>
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<tr>
<td>AF 04(695)-317</td>
<td>A.G.E. Disaster Pool</td>
<td>5M</td>
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<tr>
<td>AF 04(695)-376</td>
<td>Agena storage contract</td>
<td>3M</td>
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<td>L/C 04(695)-499</td>
<td>Launch capability</td>
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<td>L/C 04(695)-451</td>
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<tr>
<td>L/C 04(695)-501</td>
<td>Launch Capability</td>
<td>32.8M</td>
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2. SSVAK has as of this time, negotiated all Agena D production contracts on a fixed price incentive bases. The definitive production contracts are AF 04(695)-68 and -194. Pending negotiation, also on an FPI bases is letter contract -451.

3. The Launch Services letter contracts for AMR and PNR have been proposed by INSC on a CIFI bases, with both a cost incentive and a performance incentive. While in the past, these contracts have been negotiated only on a cost incentive, the Air Force has reached agreement with the contractor that all future contracts will also have performance incentives.
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
One January 1964 - 30 June 1964

1. During this time period 16 Agena (14 Agena D) flights were recorded, bringing the total to 130. The Agena D success ratio is presently 91%. First Article Configuration Inspection (FACI), on S-01B Vehicle AD 68 and numerous new optional kits, was successfully conducted in Feb-April 1964. The first S-01B Vehicle was successfully launched on 19 June 1964.

2. Five (5) new contracts were issued along with the definitisation and administration of 21 additional contracts for a total of approximately $350,000,000 on contract. Hq USAF approval was received in April 1964 for a follow-on S-01B production contract to AF 04 (695)-451. Refer to attach 3 and 5 for comment on negotiation of L/C AF 04(695)-129. Significant contracting accomplishment was achieved in the agreement with LMSC to include the provision for both cost and performance incentives in the Launch Services Contracts (see attach 2 and 3).

3. During this period the Gemini Agena Division participated in the joint preparation of NASA MSC and USAF SSD Management and Responsibilities Agreement for the Gemini Atlas Agena Target Vehicle System Program. Negotiations were also completed for the Program's guidance equations. Mission objectives for this program were slightly redefined during this period (see attach 5). The Reliability Plan for this program was approved in May 1964 and the Gemini "Extra Care" Program was approved in April 1964.

4. The first series (Round 1) of the Production Reliability Evaluation Program (PREP) was completed in May. Round II is almost complete, Round III started in March and the detailed planning for Round IV is almost complete.

5. The Aerospace Ground Equipment Division completed conversion of PALC-1, Launch Stand 2 during this period. This Division's activities were also broadened with the incorporation of applicable portions of AFSCM 375-1 in the AGE area for contract AF 04(695)-129 (Gemini Agena).
6. At the end of this reporting period, several personnel changes are imminent. Lt Col Robert Le Beck will become Deputy Director, Lt Col Cecil Riddle will become Chief of the Vehicle Engineering Division, and Maj William Jones will become Chief of the Requirements and Programming Division. At this time it appears that the Directorate will be almost fully manned at the end of the summer rotation cycle.

7. Refer to all attachments for detailed reports of this Directorate's Divisions, as no attempt is made in this letter to cover all aspects of the Directorate's activity.

EDWARD F. BLUM
Colonel, USAF
Director, S-01A Space Project

6. attch:
   Historical Data --
   1. Vehicle Eng Div
   2. Aerospace Grnd Equip Div
   3. Procurement Div
   4. Requirements & Program Div
   5. Gemini Agena Div
   6. Configuration Management Div
The Vehicle Engineering Division consists of two Branches, Astro-Vehicle Branch and Electronics Branch. The Astro Vehicle Branch has two sections: Space Frame Subsystem and Propulsion Subsystem. The Electronics Branch consists of Electrical Power Subsystem, Guidance and Control Subsystem and Communications and Control Subsystem.

The following briefly summarizes the major activities for the various sections of the Vehicle Engineering Division for the period 1 January 1964 to 30 June 1964:

During this period a First Article Configuration Inspection (FACI) was conducted on the seventh production 501B vehicle number AD-68. This FACI was acceptable with exceptions mainly in the quality of drawings and other documentation.
activities of the Spaceframe Section

The following summary activities of the Spaceframe Section for the period. The major Section effort was provided to support the ABC Program, FACT of AD-68, the Gemini Target Vehicle, and G-60/6 Coordination Control with review and action on design change and assembly. In addition, continued support has been given to all programs with major effort during the period.

**ABC Program**

Support of the ABC Program consisted mostly of review and comments on ABC qualification and evaluation reports. The major new structural assemblies were the forward rack, containment and scavenging tanks, and forward adapter. Several new optional kits required qualification tests. In addition, new specifications for the above assemblies and optional kits were reviewed.

**FACT**

FACT of AD-68 and approximately fifteen new optional kits occurred during February, March and April. In addition, members of the Section participated in acceptance of vehicles AD-62 through AD-67.

Members of the Spaceframe Section work on the AD-68 FACT Drawing Committee. Approximately 150 to 200 drawings were reviewed for acceptability and agreement with the vehicle hardware. All major assembly and sub-assembly drawings as well as a sampling of part drawings were reviewed.

During FACT of the optional kits, the kits along with all the associated drawings and specifications were checked for being correct and complete.

**Gemini Target Vehicle**

In support of the Gemini program, this section has been primarily concerned with design and qualification of the Forward Auxiliary Rack, Forward Section, Art Section, and program peculiar equipment installations. To date all articles have been subjected to both dynamic (sinusoidal) and structural tests. Final reports are now being submitted for review. The only testing in the structure area that remains is an acoustic test which is planned for the near future at CTB in conjunction with PTVTA firing of the G-67 engine. The acoustic test has been recommended by LMSC loads and dynamics rather than simulating the random vibrational environment with mechanical excitation.

This section also has provided support to a failure mode analysis study which is being undertaken by LMSC. Certain situations which might
4. Effort has also been directed by this section in analyzing the thermal problems associated with the MTR and its mission. Investigations have been made into the problem of thermal insulation for the SPS modules as well as joint patterns for the main propellant tanks.

A. Separation Shock

Continued emphasis has been placed on determining methods of reducing pyrotechnic shock and parameters of shock propagation.

Program Plan 102 included a series of ten tests on a booster adapter and art rock with different separation joint configurations. Ten grain MNE was used as the separation charge on all tests but one with 5 grain FLSC. It was concluded that a significant reduction in shock could not be obtained with either 10 grain MNE or 5 grain FLSC, at least with the prescribed rate of shock testing. Two of these tests, one with shock mounted equipment and one without, showed that a significant reduction in shock could be obtained with shock mounting.

Program Plan 135 has resulted in the development of a shock testing facility. The design is a barrel section with stiffening rings and longitudinal. It has removable panels for mounting equipment. Shock excitation is provided by easily installed MNE ring charges. The facility closely simulates the actual separation shock spectrum and has been used practically to test the art Safe/Arm J boxes. Now, that equipment can be tested in the shock environment more accurately, DSC 6117D will be revised with up-to-date shock requirements.

5. Vibration/Analysis

A. Test model tests on a complete Agena vehicle were conducted during this period. The principal purpose of the testing was to prove the DSC mathematical model used for the 20 cps oscillations.

The Spectrum Section was instrumental in procuring Agena B vehicle 702 from storage with all attachment and adapter hardware for NASA.

NASA will conduct full scale vibration testing with the Agena mounted on a shock booster at Langley Research Center. The purpose of the testing is to exceed qualification tests on spacecraft structures. The 20 cps oscillations will be added to the test.

6. Separation Joint Redesign

A crash program occurred during May and June to develop a new booster adapter separation joint with reduced separation shock. The redesign
1. **Propulsion Subsystem (SS/3)**

1. **YMD-2**

This engine has been used in the S-01 space vehicle since December 1960. During this reporting period two of these engines were used for flight with successful engine performance.

2. **YMD-BA-11**

This is the present production engine and is being utilized as the primary propulsion unit with the S-01A/S-01B space vehicles. Fourteen engines have been flown during this reporting period with successful engine operation on all flights. This engine is the same as the YMD-BA-2 with minor modifications, principally a redesigned turbine exhaust duct.

3. **YMD-BA-13**

This engine is a modification of the YMD-BA-11 and is being developed to provide multi-restart capability for the Gemini Agama Target Vehicle (GATV).

During this reporting period the design was finalized and PFRP initiated. In the conduct of PFRP several more problems have manifested themselves. The major problems are in the area of material process control on the start-tanks and corrosion resistance of the encapsulation bonding in the oxidizer gas generator valves. Engine level PFRP testing has been completed but some component requalification is required to validate the design changes as a result of the PFRP anomalies.

The first two production engines were delivered in February 1964.

4. **Hydrazine Fueled Engine (BAC Model 0367)**

The follow-on program to establish a gas generator design which could operate for the full duration engine run was terminated when it was concluded that a complete turbine-pump-gas generator redesign would be necessary. This redesign would be required due to the heavy deposit build-up at the mixture ratio at which it was necessary to operate the gas generator.

The program to determine adverse characteristics of the Hydrazine which would affect pumping the propellant was completed by the Rocket Propulsion Laboratory, Edwards Air Force Base. The program showed that there were no problems with the propellant during pumping but that handling procedures and contamination were critical.
In February 1964, the Preliminary Flight Testing (PFTT) of the Model 8230 Secondary Propulsion System (SPS) was begun in early February. Several problems were encountered during the PFTT which have caused a slip in the schedule. A shift in engineers and testing personnel during the PFTT had contributed to the slips.

4. Propellant valve seating. This was traced to a teflon coated aluminum alloy on which the teflon coating could be punctured permitting the valve to seat. This problem was eliminated by replacing the aluminum teflon coated valve with a PTFE seated valve.

5. Unit II (16 lb) thrust chamber had a hole burn in its side. This problem is attributed to either propellant boiling or formation of a mixture of teflon and water in the thrust chamber during high temperature testing. A separate test program is being established to determine more definitely the cause of the burnout. PFTT status with regard to this problem will be decided after the cause and fix have been determined.

6. Leakage during cold tests. The majority of this problem is attributed to test instrumentation fittings and the rest to lax quality control during the test set up. The problem was eliminated by moving the test instrumentation outside of the cold box and tightening up the quality control.

The first two production modules were delivered to LMCC in March 1964 and were installed in a Propulsion Test Vehicle Assembly for hot firing at LMCC Santa Cruz Test Base.

6. Propulsion Test Vehicle Assembly (PTVA)

The OATV PTVA first hot firing was on 16 June 64 with both primary propulsion system (PPS) (the YL61-VA-12) and the SPS operating. This test consisted of two SPS Unit I (16 lb) thrust chamber firings, two SPS Unit II (200 lb) thrust chamber firings and two PPS main engine firings. There will be two additional PTVA firings, one in July and one in August 64.

A complete OATV is scheduled for hot fire in the Nov-Dec 1964 time period.

7. Propellant Feed, Load, and Pressurization System

The OATV development effort in the area of propellant feed, load and pressurization system is essentially complete.

One flight demonstration has been made of the single burn configuration (small bellows sphere and no propellant isolation valves) with complete success.

Some minor effort still remains to be performed on the propellant isolation valves due to system considerations, but all major qualification testing is complete.
8. Electro Explosive Device Range Requirements

The test and analysis program at Franklin Institute Laboratory was completed with the conclusion that the Agena vehicle ED's could satisfactorily withstand a RF radiation environment of 100 watts per square meter.

9. 9K500 Retro Rockets

During ground tests being conducted by NASA several of these rockets failed to fire. Investigation showed that the igniters functioned but failed to ignite the main charge. Further investigation showed variations of the igniter configuration from lot to lot and within any given lot. Firing tests showed flame pattern variations between igniters. A program was established to re-identify and manufacture the igniter configuration which was used during the rocket qualification program. This was done and a limited requalification program was conducted to demonstrate that the new igniters were acceptable for flight use.
C. Electrical Power System (E/P)

1. Type XII Battery - Technical feasibility of continued development of this Hydrogen-Oxygen (H2O) system has been supported by demonstrating repeatability of cell test results. Phase II of development will include multi-cell buildup, qualification testing and development of a prototype unit to be delivered late in Fiscal Year 1965. Based on continued development success, production units should be delivered in Fiscal Year 1966.

2. Electro-Explosive Device Testing - Testing and evaluation of all standard Agena EED's for sensitivity to direct current and radio frequency stimuli has been completed. Adequate margins of safety were demonstrated in handling, installation, checkout and installed modes, providing compliance with all range safety requirements.

3. Power Conversion Equipment - Satisfactory results of vehicle compatibility testing of the newly developed Type XII, three phase, 400 cycle inverter has led to its use as a basic Agena component. Its open Delta design, enabling maximum phase unbalance, made possible the deletion of the Type X three phase, 400 cycle inverter and the Type IA Power Amplifier. This replacement while made to increase vehicle capability also resulted in a seven pound vehicle weight decrease and a component cost decrease.

4. Electromagnetic Interference (EMI) - The EMI Test Program has been established as a continuing effort. Testing of all EMI generating and/or EMI susceptible components will continue with regular EMI Review Board Meetings being held to insure MIL STD compliance and vehicle compatibility. A portion of the cost of this program has been utilized to engage consultants from Sprague Electric Company and to provide for EMI training for IMSC design engineers. The monitoring and direction of this program will be continued under the cognizance of the Communication and Control Section.

5. Ground Test Failures - An excessive failure rate of components in non-flight operation, principally of the Type IX DC/DC power supply, required an extensive investigation of component test and systems test procedures and techniques. Implementation of resulting recommendations has sharply reduced failure rates caused by improper testing. Continued emphasis is being placed on review of test procedures and techniques, augmented by extensive and detailed failure report analysis.

6. Flight Anomalies - Emphasis on elimination of short circuits during flight, principally at the time of separation from the 1st stage booster, led to the redesign and requalification of the forward and aft safe arm junction boxes and redesign of pyrotechnic circuit logic as well as a number of using program changes. Effort to completely eliminate this problem area is continuing.
The modification of the 25-CI vehicle to provide additional basic capability was completed in April. In the GIC area this provided considerably more program flexibility in the use of GIC equipment, and incorporated for the first time, the improved Mod IIE horizon sensor as standard basic equipment. Equipment development was accomplished or is proceeding as follows:

a. **Horizon Sensors**

As a result of a flight failure of a relay which is identical to the ones used in both the Mod II A and Mod II C horizon sensors, most sensors are being reworked to replace this suspect item.

Development of the ATL Mod III H/S was terminated because of increasing costs, schedule slippage, and the loss of a requirement.

b. **Velocity Meter Counter**

The development including qualification and EMI testing of the Mod IIA counter was completed in June. Susceptibility to electronic noise (always a serious problem with its predecessor) has been greatly reduced. This counter will become standard basic equipment in Sept of this year.

c. **Flight Control Electronics**

A small transformer used in twenty-five different applications within the FCE has developed a failure mode associated with temperature cycling of the component. This problem was first discovered in production reliability testing and later in the ground test of a flight vehicle. This transformer has been redesigned to accommodate the stresses caused by temperature variations.

d. **Yaw Sensor**

A device capable of determining satellite yaw attitude with respect to the orbital plane was delivered to this office in April for test flight. This sensor was developed at MIT under contract with SST. This office performed the role of cognizant engineer. All arrangements have been completed for the test flight. Flight test will be accomplished when and if a vehicle becomes available.
Communications & Command Subsystem (C/C/3)

a. Command Destruct Kit - The Command Destruct Kit is now considered fully qualified. The initial qualification testing, which was completed early in the year, was found to contain certain discrepancies both in the results of the tests and in the procedures used in the testing. The test data showed that the unit did not fully meet EMI requirements. This condition was remedied by the incorporation of three minor design changes. In the original test, the unit was not operating during the vibration tests; the vibration test was rerun. The final test results showed that the Command Destruct Kit fully met all requirements.

b. Telemetry Commutator - The motor driven commutator used in the Sampling Switch Module of the Type V Telemeter has not performed satisfactorily over a period of several months. Although there have been only a few cases of failures in flight, there have been many failures encountered in ground testing. These failures consist of excessive speed fluctuations and failures to start. Extensive testing of the motor used in the commutator have been conducted during this reporting period. Recent test data indicates that the problem may be solved by reducing brush arcing by filling the commutator with helium at two atmospheres of pressure rather than filling it with a helium-air mixture at one atmosphere.

c. Three Way Coax Switch - At the beginning of this year a program was initiated to develop a three way coax switch that will provide 90db attenuation of radiated signals. The purpose of the switch is to provide umbilical-accrteen antenna-orbit antenna switching for the telemeter and the tracking beacons; two separate switches are now required for this function. The program has encountered some schedule slippage due to difficulties in achieving the 90db of isolation, in hermetically sealing the unit and in subjecting the unit to 6117D levels of vibration. It now appears that these difficulties have been eliminated. The final qualification testing of the switch is scheduled to begin in the near future.

d. Gemini C/C Equipment Review - A review of equipment specifications, test plans and qualification test results for the Gemini C/C equipment was conducted in May 1964. This review was conducted on the Fly-by #1 equipment since it represented the first delivered hardware. This review revealed a general weakness in the areas of preparation of test procedures and of data recording. Because of incomplete data and of unexplained out-of-specification conditions, it was recommended that the ECM telemeter be considered not yet qualified. As a result, the telemeter has been scheduled for a partial re-qualification test which will start in the near future.

e. Because a special program utilizing the Standard Agena-D Vehicle has need for a Pulse Amplitude Modulation (PAM) type of telemetry module, a program was initiated. This plan includes the engineering, manufacturing and testing effort necessary to accomodate the Type VIII PAM telemeter components onto a module compatible for installation in the S-01B vehicle. The overall effort includes preparation of drawings, schematics, specifications and test procedures; reactivation and modification of necessary test equipment; fabrication of new panels, cables, brackets, and miscellaneous hardware; and evaluation, acceptance, and compatibility testing of the redesigned PAM telemetry module. The initial effort under this plan is in progress, and completion of all phases is expected within four months.
1. (U) The conversion of PALO-1, Launch Stand 2 to an SLV-3/S-91,117, configuration was completed under LMSC Contract AP 04(695)-237. Vehicle on Stand (VOS) capability was attained on 15 May 1964. CCN 4 to the -35 Contract, which was a credit CCN, was finalized for $720,954, cost and fee. This credit CCN combined three previous CCNs and changed the configuration of Launch Stand 2 from a 405 vehicle to a 1172 vehicle. An additional CCN 5 to the contract, also a credit CCN, was negotiated for $9,751, cost and fee. This CCN deleted use of a Facility Checkout Vehicle (FCV) during validation of Stand 2. Total cost of this contract is $4,369,295. Authority for this conversion is SSVZ secret letter, PALO-1 Complex, 29 March 1963.

2. (U) Installation and Checkout of Aerospace Ground Equipment (AGE) under LMSC Contract AP 04(695)-237 for the conversion of Eastern Test Range (ETR) Complex 14 is underway. CCN 12 to this contract, which called for Gemini peculiar modifications and purchase of a Vehicle Function Generator (VFG), was negotiated for $207,009.00. Total value of this contract is $4,655,306. Authority for this conversion was SSVZ secret letter, Conversion of AMR Complex 14 to an Atlas Agena Configuration, 5 July 1962.

3. (U) All equipment for the Disaster Pool purchased under LMSC Contract AP 04(695)-17 has been delivered to Sacramento and is in storage at SMAMA. Complete drawings for all equipment are to be delivered by 15 July 1964. Total contract cost is $970,000, fixed fee. Authority for the procurement of Disaster Pool Aerospace Ground Equipment is SSVZ secret letter, Agena Items for Disaster Pool Backup, 6 June 1962.

4. (U) A Letter Contract AP 04(695)-501 for Agena launch services during CY 64 was awarded LMSC on 16 January 1964. The contractor's initial cost proposal was in the amount of $32,825,000, cost plus incentive fee (cost and performance). Several directorates and program offices assisted SSVAC in the development of performance incentive parameters for the contract and on 14 March 1964 an Air Force position was reached on the incentive plan. The procurement committee was briefed on 20 March 1964 and the negotiations with the contractor started on 31 March 1964. In early April the differences in cost and manpower were resolved, but considerable difficulty has been experienced in negotiating the incentive fee. On 30 June 1964 negotiations were still not completed; however, the estimated cost plus incentive fee will be approximately $26,800,000 when negotiated. A fund ceiling of 70% has been approved for the letter contract and $18,743,491 has been obligated to date.
5. (U) Negotiations with INSC for the definitization of Letter Contract AF 0-(695)-99 to provide Agana Launch capability at the Atlantic Missile Range (AMR) were commenced 11 February 1964. The -99 Contract is a one-year (FY 64) CIPF contract with both cost and performance incentive features. Prolonged negotiations were required to gain agreement on the form of the performance incentive, on the performance incentive criteria, and on the balance between the cost and performance incentives. Final agreement was reached on 27 April 1964, but the final cost of the negotiated effort could not be determined until 11 May 1964 because of rate negotiations which were independently underway 27 April 1964. As of 30 June the -499 Contract had not been definitized due to the requirement for committee and higher headquarters review. No flights were made under the performance incentive during the reporting period.

6. (U) The work statement and other supporting documents required preliminary to issuance of the RFP for the Follow-On 1965 Atlantic Missile Range and Pacific Missile Range Launch Capability Contracts were completed by this office and forwarded to SSVAK.

7. (U) During the period of this report First Lieutenants Robert H. Kehe, AO 105429 and Richard J. Briones, AO 07776 completed their active duty requirements and were released from extended active duty. Captain Ernest W. Rousseau, 6454A was assigned as replacement for Lieutenant Kehe. Major Robert H. Knapp, AO 751 was reassigned to the Inspector General's Office, HQ AFC.
1. The Procurement & Protection Division (SSVAK) supported the Agena Space Directorate during this period by issuance of 5 new contracts and definitization and administration of an additional 21 contracts. Total value of these contracts is approximately $350,000,000.

2. During the period prolonged negotiations, which commenced on 28 Oct 63 for the definitization of L/C AF 04(695)-129 amend. 7 broke down. These negotiations were in process for five months and ended in failure on 8 April 64. On June 23 LMSC submitted a combined and complete request for definitization of/amends 7 and 11. This contract provides AF support to the Gemini Mission, a NASA and AF jointly funded program. Negotiations are scheduled to reconvene on 14 July.

3. During the period, letter contracts AF 04(695)-191 and AF-194 were definitized for the sustaining engineering support of the Agena Vehicles and for production of the vehicles. The Agena space vehicle is produced on a standard production line basis by LMSC and is furnished as GFP and modified by the using Program Agencies to conform to the peculiarities of the mission being supported.

4. During the period, SSVAK issued and definitized Contract AF 04(695)-551 with Space Technology Laboratories for Guidance Equation support to the Gemini Program. Contract was CPFF (Cost only) for slightly over $1,000,000.

5. A significant accomplishment was achieved with the agreement by LMSC to include in the launch service contracts provisions for the inclusion of both cost and performance incentives. These incentives were actually negotiated into contract AF 04(695)-499 for ANR and similar performance requirements are anticipated for the definitization of L/C AF 04(695)-501 for FN. The incentives features provide for measurement of the Agena Vehicle performance as relates to the specific program for which it is launched.

6. Fiscal year 1965 production requirements were received early enough during this period to hopefully preclude the necessity to issue a letter contract for a follow on production contract. It is also anticipated that this 4th production buy will be made on a straight fixed price basis, as requested in the Request for Proposal.
1. (C) **Agena Flight Summary**

On 1 March 1964, SSSA disseminated to several program and staff offices within SSV and Eq AFSC an Agena Flight Summary Report which described and assessed all Agena flights through 31 December 1963. During the period of 1 January 1964 to 30 June 1964, 16 Agena vehicles were flown bringing the total number of flights to 130. All but two of the 16 flights were of the current Agena D configuration. The overall success ratio of the Agena D now stands at 91%.

2. (U) **Contract Overrun**

On 4 June 1964, the Commander SSS approved variance funding in the amount of $16.2 million on LMSC Contract AF 46(695)-21.

3. (U) **Gemini Extra Care Program**

The Gemini Extra Care Program was approved on 16 April 1964. The purposes of this program are to preserve the Agena Target Vehicle's inherent reliability and to improve workmanship by providing faster response to problems and their solutions.

4. (U) **Launch Stand Scheduling**

The first meeting of the SSV Launch Stand Scheduling Committee was held on 2 April 1964 in accordance with SSS Regulation 27-7. The Committee is made up of representatives from each of the launch vehicle and stage offices in SSV and is chaired by Lt Col Cam, SSVZ. The official SSS Launch Stand Utilization Charts are published as a result of the monthly meetings.

5. (U) **LMSC Operating Schedule**

LMSC Official Operating Schedule, Issue #24, was distributed to the Program Offices on 19 February 1964. The Lockheed Schedule depicts the milestones, systems test and launch stand loading for all programs using the S-01A vehicle. SSVAR acts as the SSD central point of contact for LMSC in coordinating and obtaining approval for the information presented.
6. (U) Personnel Changes:

   a. Lt John R. Straton, Jr. was assigned to the Division in January 1961.

   b. Lt Curtis H. Orsburn, Jr. departed in January 1963 for SSVAT.

   c. Capt George M. Sloan was assigned to the Division on 25 Apr 64.

   d. Capt John A. Piebelkorn departed in June 1964 for an AFIT assignment.

7. (U) Production Reliability Evaluation Program

   During this period the Production Reliability Evaluation Program (PREP) testing continued. The purposes of this program are to insure that the quality and reliability of Agena Production hardware are maintained at the required levels and to provide data for development of improved reliability assessments. The first series of tests (Round I) was completed in May 1964. The second series of tests (Round II) continued through this period and was about 95% completed on 30 June. Round III started in March 1964 and the detailed planning for Round IV was essentially completed by 30 June 1964.

8. (U) Reliability Plan - Agena Target Vehicle

   The Reliability Plan for the Gemini Agena Target Vehicle Program was approved on 20 May 1964.

9. (C) 5-01B Production Authority

   On 10 March 1964 a letter was forwarded to AFSC requesting authority for a follow-on 5-01B production Contract AF 04(695)-451. Based upon using program requirements projected through 1966, authority was requested to produce 43 vehicles at a rate of three per month beginning in October 1965. By UCAF approval was received on 22 April 1964 to procure 22 vehicles in the October 1964 through June 1965 time period.

10. (C) Work Statements

    During this reporting period work statements were prepared and submitted to SWAK for the following efforts:

    a. 5-01A/5-01B vehicle storage from July 1964 through June 1965. Work Statement issued 4 February 1964.


I. GENERAL

a. Responsibility - The Configuration Management Office (CMO) is responsible to the Director, 3-01 Space Project, for the implementation and administration of configuration management and control procedures in accordance with Air Force Systems Command Manual 375-1 for the production version of both the Standard Agena Vehicle (excluding AGV) and the Gemini Target Vehicle (including AGV).

b. Organization - The CMO is established as a separate division within the project directorate.

c. Personnel - Present authorization and manning is as indicated in (1) below. Additional manpower authorization shall be required as a result of the assumption of configuration management responsibility for the Gemini Target Vehicle and associated AGV as indicated in (2) below.

(1) Present:

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<th>Title</th>
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<tr>
<td>Lt Colonel</td>
<td>6516</td>
<td>Major 6516</td>
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<tr>
<td>Major</td>
<td>28468</td>
<td>Major 28468</td>
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<tr>
<td>Captain</td>
<td>2725</td>
<td>Captain 2725*</td>
</tr>
<tr>
<td>Captain</td>
<td>2616</td>
<td>Captain 2616</td>
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<tr>
<td>GS-12</td>
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<tr>
<td>GS-4</td>
<td>70250</td>
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*Scheduled for reassignment o/a 1 Aug 64
**Scheduled for promotion to Major on 15 Jul 64

(2) Required:

<table>
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<tr>
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<tr>
<td>Lt Colonel</td>
<td>Chief, Configuration Management Office</td>
</tr>
<tr>
<td>Major</td>
<td>Configuration Control Officer (Analysis)</td>
</tr>
<tr>
<td>Captain</td>
<td>Configuration Control Officer (Agena Eng'g Change)</td>
</tr>
<tr>
<td>Captain</td>
<td>Configuration Control Officer (Gemini Eng'g Change)</td>
</tr>
<tr>
<td>GS-12</td>
<td>Specification Officer (Specs for Agena &amp; Gemini)</td>
</tr>
<tr>
<td>(S/Sgt)</td>
<td>Administrative Specialist</td>
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<tr>
<td>(GS-3)</td>
<td>Clerk Typist/File Clerk</td>
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OR

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<td>Administrative Specialist</td>
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<tr>
<td>(GS-3)</td>
<td>Clerk Typist/File Clerk</td>
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</tbody>
</table>
b. First Article Configuration Inspections - FACI's were conducted for both the Standard Agena Vehicle and for a Program Office using the Standard Agena.

(1) ABC Changes/AD-68: A FACI for the product improvements incorporated in the Agena Vehicle was performed on Vehicle AD-68 and associated optional kits. Atch 1, 13 Mar 64, presents the FACI schedule/agenda; Atch 2, 3 Apr 64, is the Optional Kit FACI Report; Atch 3, 15 May 64, is the Specification Committee Report; and Atchs 4 and 5, 1 Jun and 2 Jun 64, are the final FACI findings, including the TAB Index of Contents of the report.

b. Gemini Target Vehicle - The S-01 CMO has the responsibility for the configuration management program of the Gemini Target Vehicle (GTV), including AGE. Considerable effort was expended in establishing the requirements necessary for configuration control of this program. Atch 7, 20 May 64, references discussions for submittal schedules for the GTV specifications; Atch 8, Appendix A, from the 20 Apr 64 IMSC A602326 Statement of Work for the Gemini Agena Target Vehicle System, is the initially proposed Configuration Management and Control Implementation Instructions, subsequently amended by Atch 9, 15 Jun 64; Atch 10, 17 Jun 64; and Atch 11, 30 Jun 64, and still under negotiation for further amendments; Atch 12 is a first draft of the Implementation Instructions for the GTV AGE, with Atch 13, 2 Jun 64, proposed amendments thereto, and Atch 14, 10 Jun 64, additional negotiations; Atch 15, 19 Jun 64, presents an outline of specification requirements and procedures for both the Gemini Target Vehicle and its associated AGE.

c. Requirements, Policies, Procedures and Activities - Miscellaneous CMO functional activities are included in the following documentation:

(1) Atch 16, 6 Jan 64, is a request for deviation from AFSC to continue use of ANA Bulletin 391a in lieu of ANA Bulletin 445 on Contract AF 04(695)-194 until the new AFSCM 375-1 is officially published and distributed by AFSC.

(2) Atch 17, 9 Jan 64, establishes estimated release dates for drawings required for the Agena D.

(3) Atch 18, 28 Jan 64, presents CMO comments on Contract AF 04(695)-451 Cost Proposal.
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(4) Atch 19, 30 Jan 64, requests deviation from AFSC to certain items in AFSCM 375-1, as a result of negotiations with the contractor on the Implementation Instructions for Contract AF 04(695)-194.

(5) Atchs 20 and 21, 27 Mar 64, request publication of special orders for vehicle acceptance teams for the Standard Agena Vehicle and the Gemini Target Vehicle.

(6) Atch 22, 27 Apr 64, reports an AFSC presentation on the Systems Management Program being established by Hq AFSC.

(7) Atch 23, 29 Apr 64, reports on negotiations by SSD/LMSC personnel with vendor/subcontractor firms concerning configuration management of vendor items.

(8) Atch 24, 11 May 64, distributes copies of three policy and procedure documents governing the CMO's activities: (Atch 25) Configuration Management Responsibilities and Procedures for the S-01 Space Project Directorate; (Atch 26) SSVAC Standing Operating Procedure Number 2 for Processing of Engineering Change Proposals; and (Atch 27) SSVAC Standing Operating Procedure Number 3 for Processing of Specifications/Changes.

(9) Atch 28, 20 May 64, recommends engineering drawing requirements for both the AF 04(695)-194 and -451 Contracts.

(10) Atch 29, 12 May 64, presents a policy position of SSD in regard to Class II Change review and approval by AFPRO/LMSC prior to engineering release by the contractor.

d. Configuration Control Board - Atch 30, 22 May 64, requests publication of Special Orders for the S-01 Space Vehicle Configuration Control Board, as shown in Atch 31, 26 May 64.

e. Thor/Agena Booster Erection - The CMO was tasked with assisting in the planning and coordination of the installation of a combination Thor/Agena Booster/Vehicle (see Atch 32, 16 Apr 64) at the Los Angeles Air Force Station as a symbolic display of the Air Force role in space.

3. Paragraph 2a(2) is classified CONFIDENTIAL in accordance with the provisions of AFR 205-23. Attachments to this report are not classified.
SUBJECT: Recent Agena Flight Problems

1. I recently reviewed the flight problems of the Standard Agena Vehicle that occurred during October. The presentation made by personnel of my Space Systems Division included the results of comprehensive investigations and analyses and corrective actions taken and proposed. The information presented indicated that appropriate, timely, and adequate action had been taken in each case, confirming my belief that our normal management system can and does react responsively to problems and failures that occur.

2. I agreed with the AFSSD/LMSC conclusion that past Agena flight performance has demonstrated the validity of the present engineering design to achieve the required high reliability and that the current problems are primarily of a quality assurance nature. We cannot expect 100% success within current design, weight and cost limitations although this is certainly our desired goal. The Agena reliability has, in fact, been highly creditable for some time. Although I am fully aware of the cost and importance of each payload launched and its mission success, it does not seem to me that each problem or failure should be considered a major crisis. The recent Agena problems have been random in nature and, as such, require time to analyse. Undue pressure on the Program Office and the contractor for "quick fixes" tends to force hurried analyses and conclusions which may be erroneous and institution of changes which may be unnecessary or even possibly undesirable in the long view.

3. The corrective actions recommended in the three cases presented to me appear sound and adequate. In addition, Gen Funk discussed with Messrs Root and Kearton of LMSC, numerous non-design engineering efforts which Lockheed proposes to improve overall reliability. These include loan of Stan Buris from the Polaris Program to objectively examine Kearton's operations, increased personnel motivation and "zero defects" program, better vendor control, greater component parts analysis, expansion of critical items reviewed by top management and tighter acceptance standards and improved pre-launch environmental control.

4. The Air Force has continuing programs with Lockheed to determine and improve the quality of the Agena Vehicle. One of these is the Production Reliability Evaluation Program which provides functional, qualification stress and life testing of Agena production components randomly...
selected. Another is the Design Review and Failure Mode Analysis Program which identifies potential failures and determines means for their elimination.

5. In summary, I feel that the current Agena problems have been responsively and competently attacked and I am confident that they will continue to be in the future. I have attached for your information, a brief narrative summary of the presentation given to me, as well as copies of the charts used. Also attached is a summary of the Production Reliability Evaluation Program accomplishments. Recognizing your familiarity with and concern over these problem areas, I will be pleased to provide any additional information or briefing you desire.

3 attch
1. Summary of Agena Flight Problem Briefing (S)
2. Briefing Charts (S) SSAL-4906
3. Pdn Reliability Eval Pgm (I)
In order to determine the causes of the events, a detailed analysis of all available data was performed. The events were classified as follows:

1. **Premature Shutdown Event**
   - **Description:** The engine shut down prematurely during a boost mission.
   - **Analysis:** The data was reviewed, and it was determined that the engine was commanded to shut down due to a fault in the engine command system.
   - **Conclusion:** The engine was commanded to shut down due to a fault in the engine command system.

2. **Flashover Event**
   - **Description:** The engine experienced a flashover during a test.
   - **Analysis:** The data was reviewed, and it was determined that the flashover was caused by a short circuit in the engine harness.
   - **Conclusion:** The flashover was caused by a short circuit in the engine harness.

3. **Loss of Thrust Event**
   - **Description:** The engine lost thrust during a test.
   - **Analysis:** The data was reviewed, and it was determined that the loss of thrust was caused by a fault in the engine control system.
   - **Conclusion:** The loss of thrust was caused by a fault in the engine control system.

4. **Exhaust Gas Leak Event**
   - **Description:** There was a leak in the exhaust gas system during a test.
   - **Analysis:** The data was reviewed, and it was determined that the leak was caused by a fault in the exhaust gas system.
   - **Conclusion:** The leak was caused by a fault in the exhaust gas system.

These events were analyzed in detail, and corrective actions were implemented to prevent similar occurrences in the future.
The second major event occurred after the 95th orbit of Vehicle 170. The rapid declination of the Agena batteries to supply the necessary peak voltage at the point of ejection of the payload caused the vehicle to lose payload recovery capability. From the flight data:

- Orbit 95: 170 amp-hour power module
- Orbit 96: 170 amp-hour power module
- Orbit 97: 170 amp-hour power module
- Orbit 98: 210 amp-hour power module
- Orbit 99: 210 amp-hour power module

The more power modules loaded, the more power was lost. It is highly probable that the 210 amp-hour module had failed.
provision of battery electrolyte leading to local battery-electrode plate damage and consequent cell failure.

Manufacturing procedures dictating electrolyte plate densities had increased the effective electrolyte volumes within each cell and would require an increase in the amount of electrolyte to achieve full cell performance. Subsequent testing established that the current quantity of electrolyte was indeed too low, less than that required for rated capacity.

Measures to assure future battery performance include:

1. Battery activation with an additional 10 cc of electrolyte.
2. Additional post-activation battery and individual cell testing at the launch facilities.
3. Additional vendor cell testing to provide rain-stand, vibration and capacity assurances.
4. Incorporation of tighter vendor production and documentation control with increased Lockheed quality assurance participation.
5. Periodic re-training of launch personnel and revision of activation documentation.

4. The third flight failure involved the failure of the guidance power converter (GFC) after 70 orbits which resulted in an unstable vehicle and de-assigned back-up capsule recovery. The flight data indicated excessive thermal demands of 70 seconds duration on the GFC regulator tube and subsequent loss of regulated guidance power.

Vaporized fuel power during this critical period of 7000 watt-seconds of available heat energy to produce the 1450 KVA power capability of the converter's mathematical model.

A 1450 KVA micro-fused tantalum film filter (filter has demonstrated high level Program Test)
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Phase I of the program will be conducted in three stages or phases. The following is an outline of the phases of the program:

Phase I - Analysis and Review

This phase of the program will consist of the following activities:

1. Review of current equipment design and performance. This review will be conducted over the 30-day period following the delivery of the new equipment. The review will be conducted in the following manner:

   a. Review of current equipment design and performance.

   b. Review of current equipment design and performance.

Phase II - Design and Analysis

This phase of the program will consist of the following activities:

1. Design and analysis of current equipment.

2. Design and analysis of current equipment.

Phase III - Implementation

This phase of the program will consist of the following activities:

1. Implementation of design.

2. Implementation of design.

In addition to the above, the program will also include the following activities:

1. Implementation of design.

2. Implementation of design.

At a summary level the above discussed trends, additional efforts of long duration, to be incorporated are:

1. Initiation of a comprehensive support program to achieve maximum possible reliability with design limitation and cost effectiveness.

2. Expansion of the critical component efforts to include all major subassemblies while maintaining the same inclusive responsibilities.

3. Increase Air Force and Lockheed active participation in vendor quality assurance programs, specifically to include more frequent reviews of vendor activities.

4. Initiation of a program to improve personnel motivation programs specifically to include improved participation, briefings and participation.

5. Initiation of a program to improve personnel motivation programs specifically to include improved participation, briefings and participation.

6. Initiation of a program to improve personnel motivation programs specifically to include improved participation, briefings and participation.

7. Initiation of a program to improve personnel motivation programs specifically to include improved participation, briefings and participation.
1. AFSC requested SSD to evaluate the subject proposal. The evaluation has been accomplished with the assistance of the Aerospace Corporation and the members of the Air Force Plant Representative Offices at GD/A and Rocketdyne. Summary charts depicting our evaluation of the improved SLV-3 cost and performance and a comparison relative to the T-3X are attached for your information. Briefing charts covering the details of the technical and cost evaluation will be provided General Ritland's office.

2. The GD/A proposal which we have evaluated was submitted as a cost plus incentive fee proposal. On 17 November, they officially stated that they will accept a fixed price contract if desired by the Air Force. The SSD/Aerospace team considers the technical and performance proposal to be completely feasible and incorporates changes which have been suggested during the development of the SLV-3. Those changes have not been accepted since no increase in payload requirement existed for the SLV-3 and our emphasis was on the improvement in reliability. Our success in reliability is demonstrated by the successful firing of 23 consecutive LV-3/SLV-3's. Three of these were SLV-3's. Relative to cost, our evaluation demonstrates the cost as proposed to be realistic; however, SSD has added additional elements to the program beyond the proposal which we consider important to the successful accomplishment of the mission.

3. Our analysis indicates that the unit cost for a launched, improved SLV-3/Agena to be approximately $7,000 lbs. GD/A has given us an indicated fixed price for follow-on improved SLV-3's beyond this proposal which indicates that the improved performance can be achieved at approximately the same cost of the existing SLV-3's. There are also substantial growth potentialities which could further increase the capability of the SLV-3.
4. You are familiar with the performance and cost estimates on Titan 3-E. We obviously at this time need to develop the AFSC position relative to these two boosters. I am sure AFSC recommendations will be required by DOD.

Signed:

MGEN L. FUNK
Major General, USAF
Commander

2 Attach
1. Performance Charts (2 pgs)(C)
2. Cost Charts (5 pgs)(U)
PERFORMANCE

All ODA SLV-3K Trajectory Ground Rules, Contents and Input Parameters are reasonable and conservative as verified by ASC.

Trajectories based on 100 nautical mile circular polar orbit from WTR.

<table>
<thead>
<tr>
<th>Payload Capability</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLV-3K</td>
<td>7010 lbs</td>
</tr>
<tr>
<td>T-IIIX Payload Capability</td>
<td>7240 lbs</td>
</tr>
</tbody>
</table>

Includes Geocentric Guidance System (Increased Injection Errors by Order of Magnitude)

Propellant Conditioned to 45°C at Launch
PERFORMANCE GROWTH POTENTIAL
BEYOND THIS PROPOSAL

<table>
<thead>
<tr>
<th>Description</th>
<th>Approx. P/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft Shutdown Planning and Usage</td>
<td>123 lb</td>
</tr>
<tr>
<td>FLEX SLV-3 Configuration</td>
<td></td>
</tr>
<tr>
<td>(30% FLEX = 1600 lb)</td>
<td>4500 lb</td>
</tr>
<tr>
<td>(70% FLEX = 4500 lb)</td>
<td></td>
</tr>
<tr>
<td>48 In. Added Extension to SLV-3</td>
<td>500 lb</td>
</tr>
<tr>
<td>H-1 Engines with Optimized Tanks</td>
<td>Not Established</td>
</tr>
</tbody>
</table>
## SLY-5X TOTAL COSTS
### CONTRACTOR PROPOSALS

<table>
<thead>
<tr>
<th></th>
<th>DEVELOPMENT (NON-RECURRING)</th>
<th>PRODUCTION</th>
<th>LAUNCH SERVICES</th>
<th>SYSTEM INTEGRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL DYNAMICS</td>
<td>$7,470,315</td>
<td>$21,759,903</td>
<td>$12,513,679</td>
<td>$2,091,750</td>
</tr>
<tr>
<td>ROCKETFYNE</td>
<td>3,922,011</td>
<td>12,712,152</td>
<td>7,257,806</td>
<td></td>
</tr>
<tr>
<td>GENERAL ELECTRIC</td>
<td>NEGLIGIBLE</td>
<td>3,000,000</td>
<td>6,330,000</td>
<td></td>
</tr>
<tr>
<td>ACOUSTICA</td>
<td>150,000</td>
<td>720,000</td>
<td>672,000</td>
<td></td>
</tr>
<tr>
<td>DURROUGHS</td>
<td>NEGLIGIBLE</td>
<td></td>
<td>720,000</td>
<td></td>
</tr>
<tr>
<td>LMSC</td>
<td>300,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$14,870,326</strong></td>
<td><strong>$48,222,055</strong></td>
<td><strong>$23,173,655</strong></td>
<td><strong>$2,891,750</strong></td>
</tr>
</tbody>
</table>

**GRAND TOTAL** $88,157,816

**NOTES:**
1. ROCKETFYNE PROPOSAL INCLUDES SYSTEM INTEGRATION TO COMPLETION OF DEVELOPMENT
2. ALL COST FIGURES INCLUDE FEE
3. PROPOSAL INCLUDES SLY-5X ACTIVATION AND LAUNCH OF 25 VEHICLES FROM VTR, PALT-2, IMD-3 AND A
4. PERIOD OF PERFORMANCE - 1 DEC 1963 - 31 AUG 1987

[AL BOWYETE CORPORATION]
# Realistically Anticipated Additional Program Costs

**General Dynamics - Astronautics**

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Article Configuration Inspection</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Additional Telemetry &amp; Data Reconciliation - 3 Articles</td>
<td>$800,000</td>
</tr>
<tr>
<td>Expanded UTP and Reliability Program</td>
<td>$300,000</td>
</tr>
<tr>
<td>Bolt, Beranek &amp; Newman Inc Support - Captive Firing</td>
<td>$100,000</td>
</tr>
<tr>
<td>Spares &amp; ECP's for 24 Vehicles (3 $250,000)</td>
<td>$6,000,000</td>
</tr>
<tr>
<td>PAD &quot;Bury Off&quot; Refurbishment Kits (24 Launches)</td>
<td>$1,308,000</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>$8,598,000</td>
</tr>
<tr>
<td>Credit for Systems Integration Overquote</td>
<td>$-1,060,550</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$7,537,450</td>
</tr>
</tbody>
</table>

**Rocketdyne**

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Propellants - Development</td>
<td>$450,000</td>
</tr>
<tr>
<td>Prod. Test</td>
<td>$200,000</td>
</tr>
<tr>
<td>Logistics</td>
<td>$20,000</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>$700,000</td>
</tr>
<tr>
<td>Engineering Changes</td>
<td>$180,000</td>
</tr>
<tr>
<td>Spares</td>
<td>$250,000</td>
</tr>
<tr>
<td>Engine &amp; Component Overhaul &amp; Repair</td>
<td>$330,000</td>
</tr>
<tr>
<td>Relay Box Leads - Redundant Circuitry</td>
<td>$100,000</td>
</tr>
<tr>
<td>Small Line Freezing Protection</td>
<td>$100,000</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>$1,630,000</td>
</tr>
</tbody>
</table>

**LMSC**

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete Redesign of Adapter Section and Addition of</td>
<td>$1,200,000</td>
</tr>
<tr>
<td>Necessary Attachments Above Proposal Estimate</td>
<td></td>
</tr>
</tbody>
</table>

**Total Estimated Cost Increase** $11,367,450

**Notes:** All estimates exclude pre-RAYLAN charges based on 1.35X experience.
SLV-3X PROPOSAL EVALUATION CONCLUSIONS

1. THE COMPLETE SLV-3X PROPOSAL IS FEASIBLE

2. THE PROPOSED SCHEDULE IS REASONABLE

3. COSTS:
   A. THE TOTAL PROPOSAL COST IS $89,157,816
   B. THE TOTAL ADDITIONAL COST AS DETERMINED BY AIR FORCE/AEROSPACE EVALUATION TEAM IS $11,567,450
   C. THE TOTAL REALISTIC COST TO COMPLETE THIS PROGRAM INCLUDING ALL CONTINGENCIES IS $100,525,268

*NOTE: COST FOR TASKS EXCLUDED BY GD/A & ROCKETDYNE GROUND RULES*
# SLV-3X Total Costs
## Contractor Proposals

<table>
<thead>
<tr>
<th></th>
<th>Development (Non-Recurring)</th>
<th>Production</th>
<th>Launch Services</th>
<th>System Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Dynamics</td>
<td>$7,178,315</td>
<td>$31,759,903</td>
<td>$12,613,879</td>
<td>$2,891,750</td>
</tr>
<tr>
<td>Rocketdyne</td>
<td>$6,942,011</td>
<td>$12,712,152</td>
<td>$2,232,806</td>
<td></td>
</tr>
<tr>
<td>General Electric</td>
<td>Negligible</td>
<td>$3,000,000</td>
<td>$6,900,000</td>
<td></td>
</tr>
<tr>
<td>Acoustica</td>
<td>150,000</td>
<td>720,000</td>
<td>672,000</td>
<td></td>
</tr>
<tr>
<td>Burroughs</td>
<td>Negligible</td>
<td></td>
<td>720,000</td>
<td></td>
</tr>
<tr>
<td>LMSC</td>
<td>300,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$14,870,326</strong></td>
<td><strong>$48,222,055</strong></td>
<td><strong>$23,173,685</strong></td>
<td><strong>$2,891,750</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Grand Total</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>$89,157,816</strong></td>
</tr>
</tbody>
</table>

**Notes:**
1. Rocketdyne proposal includes system integration to completion of development.
2. All cost figures include fee.

[Logo: Aerojet Corporation]
<table>
<thead>
<tr>
<th>T-3X</th>
<th>SLY-3X</th>
<th>GAVINIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Recurring</td>
<td>$18,930,326</td>
<td>$89,975,060</td>
</tr>
<tr>
<td>Recurring</td>
<td>155,250,000</td>
<td>(for 23 launched vehicles)</td>
</tr>
<tr>
<td>(for 24 launched vehicles)</td>
<td>125,274,960</td>
<td>89,975,060</td>
</tr>
<tr>
<td>Total Program</td>
<td>229,480,000</td>
<td>(for 24 launched vehicles)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT Vehicle</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Launched Cost</td>
<td>4.97</td>
<td>3.62</td>
</tr>
<tr>
<td>(Excluding Agent) (FP)</td>
<td>(FP)</td>
<td>(FP)</td>
</tr>
</tbody>
</table>

*SLV-3X Recurring Cost (Fixed Price)  
\[ \$81,594,940 + 5,256,000 = 86,850,940 \] = 3.62
MEMORANDUM FOR GENERAL FUNK
GENERAL COOPEE
(In Turn)

SUBJECT: Request for Authority to Raise Major Agena Subcontractors to Associate Status

1. The latest proposal from SSV concerning the Agena (Tab A) recommends that four major Agena subcontractors be raised to associate status. The previous recommendation made on 3 September 1963 was restricted to recommending that we buy the Agena engines directly from the Bell Aerosystems Company. This was rejected by Gen Cody by letter to SSV dated 19 September 1963 (Tab B) for the following reasons:

   a. Possibility of affecting technical performance by procurement management realignment.

   b. No assurance SSV can continue to retain capability to effectively manage technical and procurement aspects of the direct approach.

   c. Purported cost savings are too nebulous to provide a firm basis for decision.

   d. Complications of arriving at a new agreement with NASA.

2. Prior to Gen Cody's letter, the LMSC had been asked to comment on the SSD proposal to furnish BAC 8096 Engine GFE to LMSC which they did on 26 August 1963 (Tab C). Gist of the Lockheed counter against this proposal is as follows:

   a. The 8096 Engine Configuration is not Stabilised. Frequent changes on engine configuration require a system of close technical control and coordination not possible under GFE as evidenced by C&C equipment that is GTE.

   COMMENT: The changes in engine configuration are no longer frequent; however, in any case, Lockheed would still have the SE/TD responsibility which would require them to exercise the close technical
control, therefore, the technical people would be the same. The only Lockheed responsibility that would be reduced would be the procurement function. Technical control would not be involved in any case. In the event that the Air Force did take over procurement of the engine, the APRO at Bell would fully support and he is prepared to make a development engineer available on a full-time basis. Bell support is available at LMSC and would continue. With regard to the reference of the C&C equipment that is GFE, it should be pointed out that the C&C is furnished by an office other than the Agena office.

b. Present Subcontract System Highly Successful. GFE interfacing would delay response time to problems and changes, reduce design, test and manufacturing information available to LMSC; and reduce LMSC control over RAC. LMSC could not assume responsibility for satisfactory performance of the GFE engine.

COMMENT: In this case, going direct from the Air Force to Bell might, in fact, eliminate a step since Lockheed has to have its subcontracts approved by the APRO. It is true that if the engine becomes GFE we do assume the responsibility. The LMSC SE/TD responsibility would be extended to the GFE engines after acceptance by LMSC. We see no problem. In previous cases where we have substituted GFE engines in the Lockheed production line, no problems have arisen.

c. LMSC History of Progressively Lower Engine Costs. Since 1959 LMSC has brought unit price of 8096 engine from $245,000 to $127,000.

COMMENT: The last buy on a Bell engine was for $141,000. It is felt that the Air Force management team -- to include the APRO -- has contributed as much to the reduction in engine cost as any other factor. There is every reason to believe that the Air Force could do as good a job or better than Lockheed in reducing engine cost. There has been a normal reduction under conditions of repetitive production contracts. Costs will not increase under Air Force procurement.

d. Warranty Cost and Risks. While Bell has insisted on warranty risk coverage of $12,000, $5,000, and $6,000 per engine on various contracts, LMSC has assumed all warranty risk coverage or obtained agreement from Bell to cover part at no cost from Bell and assumed the remainder themselves.

COMMENT: It is Air Force policy not to pay extra for a warranty. We buy to a specification. Every charge on the maintenance contract is
already charged to the government as well as to the charge for the technical membership entailed.

e. **Cost Savings through Negotiation and Administration.** LMSC’s effective management has resulted in cost savings which more than offset the fee received by LMSC.

**COMMENT:** There is no reason to believe that Lockheed can buy any engines any cheaper from Bell than we can. Had Bell run into extensive problems with the engine, there would not be the cost savings which Lockheed has credited to negotiation and administration. The improvements or development changes have been charged to the LMSC development contracts, not production.

f. **Manpower.** Success has come about by cooperative participation of a large number of LMSC personnel, a great deal of which Air Force would have to be prepared to provide.

**COMMENT:** The Lockheed personnel who would be affected by GFE procurement of Bell engines are procurement people. Lockheed would still be responsible for SE/TE. These functions which Lockheed would drop would be picked up partly by the AFFPRO and partly by the SSV office. There would be no effect on Lockheed systems people. The additional cost to the government would be approximately $50,000 in TDY funds over a two-year period plus two spaces for additional engineers in SSV.

g. **Repairs and Replacement Parts.** Components are constantly being sent back to Bell for repair. This procedure requires coordination and creates an additional administrative burden. If Air Force assumed this responsibility, the remedial reaction time required to support manufacturing schedules may be hampered.

**COMMENT:** Repairs to Bell engines have been relatively insignificant. If major overhaul is required, the engine has to be shipped back to Bell for replacement. Whether the engine is procured by the government or by Lockheed, the government pays for the repairs. It is difficult to see that reaction time would be any less under the government than under Lockheed.

h. **NASA Interface.** Air Force would have to effect agreement with NASA by which NASA engines would also be GFE. Otherwise, the Air Force would be faced with possibility of opening separate contracts with Bell thereby increasing the unit cost of engines as a result of duplicate setup, costs, etc.
COMMENT: Lockheed's position is not considered valid since NASA has asked the Air Force to provide delivered Agena vehicles complete. Therefore, it would make no difference to NASA whether the engines were GFE or Lockheed procured. All Agena requirements are consolidated and Agenas are not assigned to a program until approximately three to four months before delivery.

1. Delivery Schedule. Delivery requirements of two types of engines can be more effectively monitored from a single point.

COMMENT: Government procurement would also provide for monitorship from a single point.

j. Effect on Prime Contract Incentive Fee. Air Force would have full responsibility and LMSC would be entitled to relief on prime contracts in area of performance or delivery incentives for any inadequacies in the engines or late deliveries to Lockheed.

COMMENT: There is no reason that GFE engines should degrade the Agena vehicle. Lockheed would still have full responsibility for Agena performance and delivery incentives except insofar as late delivery of a GFE engine is concerned. We have no problem with Bell deliveries; they are not operating to capacity.

3. Discussion:

a. The SSV letter requested approval of all major Agena subcontractors to associate status. Such an approach is being and has been successfully pursued in the case of other programs. While the Lockheed Agena program has been highly successful, experience has proven that it can be just as successful using the associate contractor approach. The associate contractor approach, by decreasing multiple fees, would provide savings to the government. It would be in furtherance of the massive DOD cost reduction effort. In addition, we know that the GAO has been looking into the Lockheed situation. From both the point of view of higher headquarters' direction and possible GAO criticism, we would be responsive by adopting the associate contractor approach. There would also be an additional bonus from the point of view of SSD. In general, SSV feels that Lockheed has a tendency to be somewhat arbitrary and highhanded. The associate contractor approach will provide for tighter control over Lockheed by narrowing their sphere of effort.

b. With regard to cost savings, if the four major Agena subcontractors were raised to associate status, the savings would be $37,655 per vehicle or

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$1,317,986 total for the 35 vehicles. This can be compared with the cost to the government to achieve this which is estimated to be $100,000 in TDY funds over a two-year period plus four manpower spaces for additional engineers in SSV. If only the engines are made GFE, the savings would be approximately $19,000 per vehicle or $665,000 for the 35 vehicles. The cost to the government is estimated to be $50,000 in TDY funds for a two-year period and manpower spaces for two additional engineers.

c. Were the Agena only for SSD and NASA projects, there would be no question but that the associate contractor program should be instituted at the earliest, however, the majority of Agena vehicles are procured for SAFSP. In view of the success of the Agena program, SAFSP may be unwilling to see anything done to the Agena program which has the potential for creating perturbations in the program. This risk can be minimized, but it does exist. In this connection, it should be pointed out that Lockheed has as much to lose as SSD, and that they will therefore do everything they can to insure that the new system works.

4. Recommendation:

That approval be given to proceed with the new contract specifying that the BAG engines will be provided as GFE. Limiting the associate contractor status to Bell only at this time will permit the SSV program office to concentrate their effort on Bell and also stop the Lockheed fee on the highest cost subcontractor item. Phase-in of other associates can occur at a later date. The above recommendation is predicated on obtaining the concurrence of SAFSP. I understand that SSV must soon go forward to Lockheed to increase the buy from 22 to 57 vehicles. In order that they may proceed, an early decision is required.

J. L. HAMILTON
Colonel, USAF
Asst for Staff Support

3 Atchs
1. Tab A (IOC, SSV to SSG 25Nov64 w/attach) (Conf)
2. Tab B (IOC, SSGA to SSV 19Sep63) (U)
3. Tab C (LMSC ltr to SSVA 26Aug63 w/attach) (U)
Request for Determination and Findings Pursuant to AFDPI 3-214

AFSC (WAL-3)
Andrews AFB
Wash DC 20331

Eq. U.S.A. (AFSEP-CA)
Wash DC 20330

IN TUNE

1. (c) A Secretarial Determination and Findings is requested authorizing the negotiation of contracts pursuant to Title 10 U.S. Code, Section 2304(a)(2).

2. (c) The proposed procurement is set forth below, in accordance with the format and requirements of the Armed Services Procurement Regulation.

Category 1 - Local Sufficiency

a. The procurements contemplated by this request are as follows:

(1) The XE 61-MA-11 and XE 61-MA-15 Rocket Engine, both models utilized by the 301 Advanced Space Vehicle, hereinafter collectively referred to as the 301 Primary Propulsion Engine, will be produced at the rate of four (4) per month. A contract was awarded in FY 65 for long leadtime materials necessary to achieve this rate of production, beginning in FY 66. Followon contracts were awarded in FY 63, 64 and 65 for long leadtime items required for additional 301 engines. The proposed FY 65 procurement will likewise provide for long leadtime materials to permit continuous production into FY 66.

(2) Optional equipment to be used by a number of satellite programs will depend on their individual mission. The design, qualifications, and initial use of optional equipment were made in FY 66. The FY 63 requirement will include the optional determined necessary to accompany engines delivered in FY 66.

(3) Spare parts and technical support for engines procured and delivered in FY 65. The spare parts contemplated will support the engines delivered in that period, most of which are peculiar to the 301 and are not of a type which can be obtained in the open market.
(4) Component Improvement Program, including studies and design, which are to be performed on a rate-of-effort basis. A similar program was obtained in FY 69-65 with requirements generated from the results of flight tests and other sources. The end purpose of the component improvement program is to maintain and improve the quality and reliability of the SSI Primary Propulsion Engine in order to satisfy the requirements of the user satellite program.

b. The SSI Primary Propulsion Engine is an integral part of the SSI Apex Satellite Vehicle. This satellite vehicle performs its ascent and orbital mission within a space environment which demands an exceptional degree of component reliability, and the ability of all components to operate effectively with a number of satellite systems and associated ground equipment. It must satisfy the requirements of both an upper stage booster vehicle, and the more complex requirements of an orbital satellite with recovery capability. The SSI must further be adaptable to the mission requirements of a number of satellite programs, and must therefore be designed with regard to an interface between both the Thor and Atlas missiles as a first stage, and the various satellite programs payload. It is a basic ascent and orbital vehicle for programs sponsored by not only the Air Force, but also the NASA, Army, and AHS.

c. The procurement for FY 69 is estimated as follows:

<table>
<thead>
<tr>
<th>Engines</th>
<th>$5,100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spares and Spares Repair</td>
<td>$50,000</td>
</tr>
<tr>
<td>Engineering Support</td>
<td>$90,000</td>
</tr>
<tr>
<td>Technical Support</td>
<td>$790,000</td>
</tr>
</tbody>
</table>

(1) The Government has made a substantial investment toward acquiring the capability to create the SSI Primary Propulsion Engine, both in the form of subsidies for research and development, and in the form of Government-furnished industrial facilities and specialized tooling and test equipment. To date, the Government has provided Ball Aerospace Company approximately $3.3M of industrial facilities, practically all of which will be used to produce the engines. Therefore, it would not be feasible to transfer the facilities to some other company. In addition, the Government has an investment of approximately $1.2M in tooling, special test equipment and devast equipment which likewise could not be transferred to any other contractor.
3. Prime contracting with Bell Aerosystems Company to replace the existing subcontracts will result in a net saving of approximately $751,000 over a delivery period of 10 months commencing October 2075 and involving 29 engines. These direct rather savings will result from eliminating programmed profits and demonstrating a substantial portion of Lockheed Martin and Bussa Company borrow charges.

4. This letter is classified Confidential since it reveals the extended DCA delivery rate during FY 89.

(Signed)

REN I. FUNK

[Attachment]

MIF-draft to Log Center (11 tabs)
DEPARTMENT OF THE AIR FORCE
DETERMINATIONS AND FINDINGS

AUTHORITY TO NEGOTIATE CONTRACTS

1. This procurement will consist of one or more contracts for the YLR 81-BA-11 and YLR 81-BA-13 Rocket Engines, both models utilized by the 501 Agena Space Vehicle, hereafter referred to collectively as the 501 Primary Propulsion Engines; Optional Equipment necessary to accompany engines; Improvement Studies and Design; Initial Spare Parts, and Technical Support for 501 Primary Propulsion Engines.

2. The authority herein granted to negotiate for spare parts is limited to those spare parts which are determined, not later than 90 days prior to the scheduled acceptance of the last article under contract, to be necessary to support the end item being procured under authority of this determination and findings and are not identical to parts previously procured by the Air Force on other than the contracts to which this determination and finding is applicable.

3. The 501 Primary Propulsion Engine is designed to become an integral part of the 501 Agena Space Vehicle which performs ascent and orbital missions within a space environment demanding an exceptional degree of component reliability and the ability of all components to operate effectively with a number of satellite systems. Both the Government and the Bell Aerosystems Company have made substantial investments to achieve the capability to produce the 501. The Government has invested approximately $3.41 for industrial facilities, special tooling and test equipment, and checkout complexes. The Contractor has invested approximately $29.20 for industrial facilities; independent research; and the training of personnel. The Government would have to duplicate its investment of approximately $4.91 if this procurement were to be made from another source other than the one which is presently producing the items. Also, it would not be feasible or practical to furnish a new supplier with duplicate Government-furnished property, in that present producer is using all Government-furnished parts in performing on existing subcontracts that will not be completed until calendar year 1965. All of this investment is an essential contribution to the capability of producing 501 Primary Propulsion Engines. The present supplier has achieved the know-how and capability to produce this highly complex satellite engine over a period of approximately seven years. Of this time, another supplier would require at least 24 months of preparation time before the first prototype could be produced.
In light of the findings and determinations above, I hereby determine that the proposed procurement is for technical and special property requiring a substantial initial investment and an extended period of preparation for manufacture, and that solicitation advertising would be likely to result in additional cost to the Government by reason of duplication of investment, and may require duplication or preparation already made, which would unduly delay procurement.

Upon the basis of the determinations and findings above, I hereby authorize the negotiation of a contract for this procurement pursuant to 10 U.S.C. 2309(a)(24).
1. (U) The Agena Directorate is responsible for the management and technical direction of contractor efforts for the definition, design, production, modification, storage, logistic support, test and launch support of the Agena vehicle for all using programs. This includes certain engineering and procurement support to specified programs. The Directorate provides Aerospace Ground Equipment engineering support and facilities activation for all using programs and is responsible for the management and direction of the Agena Launch services contracts for the Eastern and Western Test Ranges. The Directorate is also responsible for all program functions for the acquisition and launch of the Gemini Agena Target Vehicle. On 1 September 1964, Col William C. Nielsen was assigned as Director, due to the pending retirement of Col Edward F. Him. Those personnel assignments specified in the previous report have been in effect throughout this period. In accordance with direction from the Deputy for Launch Vehicles, this Directorate established a Burner II Task Group, headed by Lt Col J. G. Coppert. This Group functions as a provisional staff office in anticipation of the mission responsibility being assigned to the Directorate when Phase II of the Program receives final approval.

2. (C) During this reporting period, 24 Agena vehicles (21 Agena D's) were flown, bringing the total to 154 flights. The overall success ratio of the Agena D now stands at 91%. Round IV of Production Reliability Evaluation Program testing was initiated during this period and planning for Round V is essentially completed. See attach #1.

3. (U) Four new contracts were issued during this period and four letter contracts were definitized. These, along with 38 active contracts, total approximately $400,000,000. A request was submitted for procurement of additional vehicles extending through December 1966, and approval was received for even more vehicles than requested (see attach #1). Letter Contract AF 04(695)-129, Amendment 11 was definitized as Contract AF 04(695)-545 for the Gemini Agena Target Vehicle Program, and additionally an Amendment was issued to incorporate Aerospace Corp technical support into this Program. The status of all Launch Services Contracts is covered in attach #2 and #4. A compromise settlement of fee for CCN 33 to Contract AF 04(695)-194 was reached after some months of negotiation.
4. (U) In the engineering area, this Directorate continually has an abundance of activity, particularly in view of having a self-contained "Utility Suit" capability. The propulsion subsystem has continued its highly reliable performance. During this period, testing has continued on both the engine modification providing multi-start capability and the Secondary Propulsion System; two S-013 restart missions were flown with successful restart achieved. Separation Joint redesign was studied during this period and a Zip-Cord Separation Joint is still under evaluation, however; the present design is not being subjected to a crash change program. Increased thermal control, minor design modifications and increased surveillance of quality assurance were installed in order to assure higher reliability of the primary flight batteries. The Mod IIIC Horizon Sensor was flight tested during this period and should provide significant improvement in performance and reliability. An Integrated Guidance Module has been proposed by DSC and is under consideration at this time. The MIT Instrumentation Laboratory was contracted to study the stability aspects of the Gemini Agena Target Vehicle. Significant improvements have been made in the telemetry system during this period. Another accomplishment toward increasing Agena reliability was the completion of electromagnetic interference testing of practically all electronic equipment used on the Agena vehicle. A problem area exists in the Gemini Agena Target Vehicle Command & Control System, particularly in the Command Programmer; extensive management engineering effort is being conducted in this area. See attach #3.

5. (U) Negotiations for Launch Capability Contract (LOC) AF 04(695)-501 were completed in July 1964 and during this period 19 vehicles were launched under this contract, 16 of which were covered by the performance incentive criteria. Five flights were conducted under the performance incentive feature of Launch Capability Contract AF 04(695)-499. All equipment and drawings for the Disaster Pool have been delivered to SMAMA. Eastern Test Range Complex 14 was converted to an Agena D configuration (completed during this period) and Vehicle on Stand Capability was attained on 31 December 1964. See attach #3.

6. (U) During this period, the Proposed Mission Plan for First Agena Rendezvous Flight (Gemini Atlas Agena Target Vehicle) was altered twice. In October 1964, the Gemini Agena Program Office requested from NASA/NCC their best estimate of the NASA mission plan, ultimately relating to mission flexibility. Since the eighth vehicle was terminated from this program in December 1964, it is now based upon seven vehicles, six launches. The Target Vehicle launch schedule was redirected by NASA in August 1964, slipping the first rendezvous mission by six months, thus correcting a discrepancy between the Target Vehicle and the Gemini Launch Vehicle/Spacecraft launch dates. Further information on this Program's activity and Program Milestones is contained in attach #5.

7. (U) During the period of this report, the Uniform Specification Program for the Gemini Agena Target Vehicle Program was established. A major feature of this was the decision to place Aerospace Ground Equipment under configuration management. Another Uniform Specification Program was established incorporating the new APSEC 375-1 on contract for a new program.
Air Force/USAF Configuration Management pipeline meetings were established during this period in order to improve the USAF configuration management efforts.

8. (U) This Directorate participated in a study involving the Titan III E/Standard Agena, and a work statement was issued in August 1964. Another study, this on Improvement of the Standard Agena, resulted from an inquiry by Mr. Hall, DDRAD. This study, prepared by Lt Col R. K. Le Beck, was completed in December 1964 and prepared for presentation to HQ AFSC, HQ USAF, SAF, and Mr. Hall in early January 1965. Also during the period of this report, the Agena Directorate proposed that major subcontractors to USAF, involved in the production of Agena vehicles, be elevated to associate contractor status. It was subsequently recommended to limit this consideration to Bell Aerospace Corp. At the end of this period, the final decision had not been reached by the Deputy for Launch Vehicles.

9. (U) Refer to all attachments for the individual reports of this Directorate's Divisions as no attempt is made in this letter to cover in detail all aspects of our activity.

WILLIAM C. KIMBER
Colonel, USAF
Director, Agena

6 Atch:
1. Historical Data
2. Requirements & Programs Division (C)
3. Procurement Division
4. Vehicle Engineering Division
5. Agena Ground Equipment Division
6. Gemini Agena Division
7. Configuration Management Division

Cy to: SSV (no atch)
1. *(c)* Agena Flight Summary

On 1 October 1964, SSVAR distributed the Agena Flight Summary Report to program and staff offices within SSD and to Eq AFSC. This report described and assessed all Agena flights through 30 June 1964. During the period 1 July 1964 to 31 December 1964, 24 Agena vehicles were flown making a total of 154 flights. Of these 154 flights, 10 were of the current Agena D configuration. The overall success ratio of the Agena D now stands at 91%.

2. *(U)* Production Reliability Evaluation Program

During this period the Production Reliability Evaluation Program (PREP) testing continued. The second series of tests (Round II) was completed in August 1964. PREP Round III was approximately 92% completed on 31 December 1964. Round IV was started in August 1964 and was approximately 67% completed by 31 December. Detail planning for PREP Round V was essentially completed on 31 December 1964.

3. *(U)* Reliability and Quality Programs - Agena Target Vehicles

During this period the Reliability section of SSVAR effected a 2.5 million dollar withholding on Contract AF 04(695)-545. This action was necessary due to the contractor's laxity in meeting the schedule for Reliability documentation. The contractor made several changes in management personnel and the schedule was subsequently met.

4. *(c)* Agena Production Authority

On 18 September 1964 SSVAR submitted to AFSC an Agena D requirements and delivery schedule calling for 8 additional vehicles. These 8 vehicles were in addition to the 22 vehicles previously approved for the period Oct 1965 through June 1966. In addition, SSVAR requested that approval for procurement be extended beyond June 1966 through December 1966 at the rate of 3 1/2 veh. per month. A total of 51 vehicles would have been procured under this proposal.

On 10 December 1964, AFRPA 96778 TMX authorized a new and revised production schedule and follow-on procurement action for a total of 57 Agena D vehicles, 6 more than requested. The first 22 vehicles had been previously authorized by AFRDD 71625 TMX,
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dated 22 April 1966, and the remaining 35 vehicles constituted new procurement authority to extend through Dec 1966. The revised delivery schedule, including the total follow-on procurement is as follows:

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5. (C) Work Statements

During this period work statements were prepared and submitted to SSVAK for the following efforts:


1. The Procurement & Production Division (SSYAK) supported the Agena Space Directorate during this period by issuance of four (4) new contracts, definitization of four (4) letter contracts and administration of thirty-eight (38) active contracts. Total value of these contracts is approximately $400,000,000.

2. During the period, Letter Contract AF 04(695)-129, Amendment 7 and 11 was definitized as Contract AF 04(695)-545; Definitive Contract amount was $50,289,000. This contract provides AF support to the Gemini Program by development and delivery of the Gemini Target vehicles. It is a Air Force and NASA jointly funded program. Also, during the period, Amendment No. 27 to Letter Contract was issued to incorporate Aerospace Corporation technical support to the Gemini Program Office. As yet, no cost has been negotiated for this effort.

3. During the period, negotiations were completed for launch services by Lockheed Missiles & Space Company at WTR. Letter Contract AF 04(695)-737 will be issued effective 1 January 1965 to cover services at both ETR and WTR. The issuance of the Letter Contract to cover WTR which has been negotiated, is necessary to fund the effort in that the definitive contract could not be processed by 1 January 1965, the date for commencement of the Launch Services. Period of Performance at WTR is from 1 January 1965 to April 1966, ETR Period of Performance is for Calendar Year 1965.

   a. Incentives, both Performance and Cost have been negotiated for the WTR Contract AF 04(695)-689. The Performance incentive features provide for measurement of the Agena Vehicle performance as relates to the specific program for which it is launched.

   b. During the period, definitization of Letter Contract AF 04(695)-501 for Launch Services at WTR from 1 January 1964 to 31 December 1964 was accomplished. This contract included for the first time both Performance and Cost incentives. As of the end of December 1964, the Contractor had underrun the target cost by approximately $1.6 million, and it appears that he met par on performance; however, all flight evaluations have not been completed. Contract AF 04(695)-499 which covered launch services at ETR for the period 1 January 1964 to 31 December 1964 and also had incentive features for performance and cost is expected to have a final underrun of approximately $650,000, and indication is that par performance will be exceeded.
4. During the period, proposals were requested for the follow-on support engineering effort and the follow-on production efforts. Contract AF 04(695)-693 was negotiated on a fixed price basis for a five year period, commencing 1 January 1965 for 2350 man-months of support engineering. The contract provides for all purchased services and materials subcontracting on a cost reimbursable basis. RFP-270 for the production effort will be quoted in January by LMSC.

5. During the period, Agena Production Contract AF 04(695)-451 was definitized.

6. During the period, a significant difference of positions between the Air Force and LMSC was encountered with respect to fee settlement for the definitization of CCN No. 33 superseded by CCN No. 151 to Contract AF 04(695)-194. The interpretation by both parties of application of weighted guidelines caused the situation which necessitated an undue amount of higher management consideration and/or participation in negotiations which were conducted on and off for a period of five (5) months. Final settlement of fee at 8% was a compromise by both parties exclusive of weighted guidelines considerations.

7. During the period, it was proposed that the major Sub-contractors to LMSC involved in the production of the Agena vehicles be raised to associate status through the issuance of direct contracts to them for subsequent Agena buys. Presentations were made to Generals Funk, Greer, Cooper and Martin. During the course of these briefings, it was recommended that consideration be limited to Bell Aerospace Corporation. Final decision was left to the SSV Deputy. As of 31 December 1964, final decision had not been made and issuance of a Letter Contract to LMSC has been withheld for follow-on production pending final decision. The Agena 1965 buy is the largest to date and is currently out to LMSC on RFP-270.
The Vehicle Engineering Division consists of two Branches, Astro Vehicle Branch and Electronics Branch. The Astro Vehicle Branch has two sections: Spaceframe Subsystem and Propulsion Subsystem. The Electronics Branch consists of Electrical Power Subsystem, Guidance and Control Subsystem and Communications and Control Subsystem.

The following briefly summarizes the major activities for the various sections of the Vehicle Engineering Division for the period 1 July 1964 to 31 December 1964.
A. Spaceframe Subsystem (BB/A)

The following items summarize major activities of the Spaceframe Section during the subject time period. Principal section effort was provided for the Gemini Target Vehicle, Titan III propellant separation joint redesign, S-01A/B Configuration Control, with review and action on design changes and review of Program Plans. In addition, continued support was given to programs using Agana.

1. Gemini-Agana Target Vehicle

This office has provided continuing support to the GATV program in the form of insuring complete flight qualification of primary structural components, reviewing of IMEC thermal environment predictions, and maintaining a file on all pertinent BB/A documents which are to be reviewed prior to and during "FACT" of the vehicle.

During the past year all major structural components were qualified both statically and dynamically, including subjecting all items to a S/BE acoustical environment in conjunction with the PTV/A firings. The latter, very realistically, exposed the structures to a random vibration condition comparable to that experienced in flight.

Other work included analyzing the results of inner bulkhead reversal tests. Reversal was induced by an oxidizer tank overpressure. The aim of this test was to determine the failure mode of the diaphragms in the event of a meteorite puncture on the fuel side and the resulting sudden pressure drop. A delta "P" of approximately 8.5 psi will collapse the diaphragms and instant hypergolic detonation will take place. It therefore is critical that a pressure monitoring device be provided to the astronauts to sense any adverse pressure differential.

A problem yet to be resolved is that of the flight worthiness of the procured A-12, Comsat type, aerodynamic shroud. This item experienced a separation failure during early 1964 which has finally prompted IMEC to consider it to be a non-flight qualified item. As such the contractor has requested additional funding to incorporate engineering changes and to conduct a series of evaluation tests. To date OPO, Houston, has been critical of these modifications and has requested IMEC to perform a thorough analysis of the problem. This office, together with Aerospace assistance, is presently involved with this study.
Acceptance was also completed on the second of two standard Agena vehicles to be provided to the CATV program.

2. Separation Joint Redesign

The program on separation joint redesign was continued during this period. The main effort was in the form of Control System Stability studies of the spring-band joint effects on Atlas and Thor by General Dynamics/Astronautics and Douglas Aircraft. These studies were required because the spring-band joint added non-linear effects to the booster/Agena system. In September these studies were stopped and the spring-band joint was dropped from consideration because of too many unknown parameters.

In October 1964, IMSC recommended that the present separation joint not be changed on a crash basis because of a series of successful flights. AFSSD concurred with this recommendation. It was reasoned that shock mounting of certain aft section components and several electrical circuit changes had corrected the "shorts" problem occurring during the separation sequence. However, it was still considered desirable to reduce the severity of the shock and contamination environment.

3. Zip-Cord Separation Joint

As a result of some promising development work completed by the SCTB on a new separation joint, the Agena Directorate has funded IMSC to further develop the device in hopes of eliminating contamination at separation as well as lower the existing pyrotechnically-induced shock. The latter has been the scapegoat for reoccurring electrical short circuits. The joint consists of a core of MDF contained within a polyurethane or plastic-type jacket which will also enclose the detonator block. The device, when detonated, expands and shears the magnesium structure, and at the same time contains the MDF residue.

A Phase I effort of this program has been completed. The results indicate that the existing polyurethane jacket cannot withstand the thermal environment (100 - 350°F) it may ultimately be subjected to. Consequently, prior to initiating any Phase II work which is to include design, analysis and development testing, an interim effort is to be conducted by a team from the SCTB and Palo Alto Research in hopes of finding a suitable encapsulating material. Various plastics and elastomers are being considered. This office is presently reviewing all work performed thus far and evaluating the necessary effort to be undertaken in the future.

4. Shock Testing

IMSC effort under Program Plan 135 was completed during this period. The "barrel tester" was developed under this program and is now satisfactory as a component shock qualification facility. The tester uses the same shock-producing mechanism as the separation joint on the Agena. The shock spectrum produced is very similar to the Agena spectrum and is sufficient to produce an overtest for
qualification. Shock levels on the tester can be varied by using various MEF charge sizes and separation joint thicknesses. The levels can also be varied by moving the component a greater distance from the separation joint on the tester.

LMSC is presently drafting changes to LMSC 6117D environmental specification to make use of the "barrel-tester".

5. Vibration Analysis

The evaluation of the tank modal tests on an Agena vehicle was completed during this period. The original purpose of the testing was to verify that the LMSC mathematical model of the Agena correctly predicted dynamic flight loads produced by the Thor 20 cps oscillations. However, it was determined that the mathematical model was not satisfactory, and in fact predicted loads 26% less than loads calculated from flight data. As a result LMSC recommended that flight-derived dynamic loads be used for further load predictions on the Agena. The Agena loads document has now been revised to reflect flight-derived loads instead of the calculated loads from the math model.

6. Titan III/Agena

It has been proposed to use the Agena with the Titan IIIA booster. Evaluations have been completed on the LMSC preliminary redesigns necessary to mate the Agena to the Titan III. Major changes will be a new booster adapter, aft rack structure and roller changes for increased roller loads and electrical harness changes. Depending on the high altitude wind criteria that will be used, changes to heavier forward section beryllium skins and increased propellant tank pressure may be required. Essential features of the new booster adapter are flaring of the adapter from the 60 in. diameter Agena to the 120 in. Titan, varying from a semi-monocoque design at the Agena separation joint to a longeron structure with unstressed skin at the Titan/Agena mating joint, and large access openings to the Agena aft rack. The longeron-unstressed skin design is necessary to make the load paths in the adapter compatible with the longeron-unstressed skin structure of the Titan.

7. Plumbing Improvement Progress

With the continued subject of Agena tubing and fitting assemblies, etc., to the severe environments of ascent and extended orbital flight, it has been a widespread problem to maintain a leak-free condition in a high pressure, rarified gas system. Many components previously qualified under aircraft standards, i.e. "AN", cannot hold up under space vehicle stress. Such problems as torque relaxation, stress corrosion, galling tendencies and the like, have to a varying degree on various items indicated either a poor basic design or inadequate quality control.
This office, therefore, has been working in cooperation with LMSC in an attempt to review the entire spectrum of the problem. As a consequence of this effort the following practices, to name a few, have been or will be instituted:

a. Retooling nitrogen tubes commencing with AD-92.
b. Improve means of recording discrepancies - FEDR's.
c. Installing soft-nose "O" ring plugs for proof pressurization of tubes.
d. Elimination of "AN" parts.
e. Install new flaring equipment.
f. Training of personnel in all areas so that poor quality hardware can be recognized.
g. Better inspection procedures.

With the future intention of qualifying better designed components, a series of preliminary tests will be conducted at LMSC. These tests include evaluation of new, highly calibrated torque wrenches and the use of elevated torque levels. The latter will be placed on a series of existing fitting assemblies in order to establish a failure mode history, the results of which may be compared to MIL-F-5506A and thereafter be available during qualification testing. In addition a follow-on, interim test will be performed on the new attitude control gas assemblies presently on AD-92 and up. This test will consist of two identical units, one at elevated torquing, being subjected to the vibration and shock environments established by 6117D. In the event the latter passes all testing, these higher torque levels will then be available for use provided a leaking condition persists in a high quality installation. However, it is hoped that with use of high quality components no leak problems will occur.

A final qualification effort under consideration will include the qualification of a new Wiggins "DL" nut, design and fabrication of three-dimensional check-out fixtures, design review of installations, and an industry survey primarily of those companies taking part in either Project Gemini or Project Apollo.

8. High-Pressure Helium Sphere

A requirement was established to qualify a new high pressure (3600 psi) helium sphere in light of data obtained on the 8096 engine inlet pressures for the 8-01B carrying a heavy payload. Since Air Force approval was granted, LMSC has directed the vendor to fabricate
assemble and qualify a 1612 cu. in. pressure vessel. The latter is of the same general configuration and dimensions as the original standard sphere with the following exceptions:

a. The wall thickness will be increased proportionally to maintain the same tensile strength capability at the higher pressure.

b. The new sphere, except the two qualification units, will incorporate a female boss with an "M" male fitting to facilitate cleaning.

c. A new temperature monitor will also be qualified for use which will include a contoured base and a small plate under the beads to provide better adhesion characteristics.

To date, both qualification units have successfully completed all phases of qualification testing. Moreover, the ultrasonic cleaning process met with approval and the new temperature monitor functioned adequately throughout, including the burst test. In fact the monitors, after having come off due to burst, were still intact and functionally sound.

B. Propulsion Subsystem (SS/3)

1. YLR61-BA-11

This is the present production engine and is being utilized as the primary propulsion unit with the Agena Space Vehicle. Twenty-two engines have been flown during this reporting period with successful engine operation on all flights. Premature shutdown was encountered on one flight due to an erroneous shutdown signal; however analysis indicates a vehicle control circuit malfunction rather than an engine problem. During this reporting period the turbine exhaust duct was redesigned and qualified to a circular cross section from its recent elliptical cross section. This change was made to provide a more uniform configuration and to facilitate duct alignment prior to flight.

2. YLR61-BA-13

This engine is a modification of the YLR61-BA-11 and is being developed to provide multi-restart capability for the Gemini Agena Target Vehicle (GATV).

During this reporting period the majority of the PFRT penalty testing was completed. Some minor oxidizer gas generator valve verification remains to be accomplished but the flight configuration appears finalized.

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3. Secondary Propulsion System

a. EPRT - The Model 6250 Secondary Propulsion System (SPS) completed Preliminary Flight Rating Test (PFRT) on 20 August 1964. The only major problem was the burnout of the 300-lb thrust chamber. A test program was conducted on two of these chambers. This program established that the problem was acoustic resonance caused by high temperature propellants. To eliminate the possibility of a burnout, the predicted on-orbit propellant temperatures were reduced and the firing duration above 70°F was also reduced.

b. Launch/Hold Test - A demonstration program was conducted on the first flight module to extend the hold-time capability to a total of 40 days. This was successfully completed in early November 1964.

c. Regulator Redesign - Throughout the SPS development program the gas regulator has shown a tendency to increase regulated outlet pressure over a period of several months. To correct this creeping problem the regulator was modified very slightly. A test program is currently in progress to verify the redesign.

4. Propulsion Test Vehicle Assembly (PTVA)

The GATV PTVA final two firings were completed during this period. Both the primary propulsion system (the XLR11-BA-13) and the secondary propulsion system (BAC Model 6250) demonstrated compatible and successful operation.

5. Vehicle 5001

The two PTVA SPS modules and the first production XLR11-BA-13 engine are installed on Vehicle 5001 for hot firing at Santa Cruz Test Base. This firing will occur in January 1965. The first two flight SPS modules for Vehicle 5001 were acceptance tested at Bell Aerosystems and are ready for shipping.

6. Propellant Feed, Load, and Pressurization System

During this reporting period system compatibility testing was performed to verify tank pressures required and engine pre-valve (Propellant Isolation Valve (PIV)) sequencing for restart missions. Testing indicated that pressures in the main propellant tanks would have to be raised in order to assure reliable restart. PIV sequencing tests indicate that engine refill will be accomplished successfully with the increased tank pressures. During this period two 8-OIB restart missions were flown with successful restart achieved (Mariner Mars - 64). Passive ullage orientation was not demonstrated, however, as a small nitrogen thruster (0.1 pound thrust max) was utilized during coast to prevent main tank propellant deorientation.
During PEP Round IV testing, it was discovered that the fill coupling would not go the required 15 days on-pad when exposed to liquid oxidizer. The testing did confirm a 7-day capability. The poppet valve in the coupling will be redesigned to meet the 15-day hold requirement. In addition, a non-interchangeability feature will be incorporated to prevent the possible inadvertent interchange of the fuel and oxidizer service connections.

Final qualification testing and pad-hold demonstrations of the Pyro-Helium Control Valve were completed. The valve has been flown successfully on 4 flights.

7. 908500 Retrorocker's

The verification-qualification program established to verify the configuration of the rocket motor igniter and to determine acceptance/rejection criteria for the igniter was completed. The igniter was demonstrated acceptable for flight use, and 40 were successfully flown. Criteria were determined by which to accept or reject igniters prior to installation in the motors. These criteria will be used as a basis for acceptance testing future lots of igniters.

8. Sensor Bar Pinpuller

During a 38-day on-pad test, the pin in the sensor bar pinpuller corroded, preventing operation. A material substitution was made on the pin and retaining spring. The pinpuller was then retested to the corrosive portion of the 38-day test. During this test, one of the pins failed to retract the required amount. Investigation showed that the bending process used in making the retaining spring was more critical for the new stainless steel spring than for the original spring. It was concluded that the basic design of the device was marginal and a redesign will be accomplished.
C. Electrical Power System (E/P)

1. Ground Test Failures

To reduce the number of ground failures, modifications to both the Type IX and Type X converters are now in process. The new features will enable the units to withstand ground-handling and human problems while improving flight confidence.

2. Piece-Part Problems

There were several problem areas with piece-parts involving capacitors and relays:

a. Tantalum foil capacitors - leaky capacitors caused several problems on the conversion equipment. At high Temperatures, the capacitors were highly-stressed such that electrolyte leaked out from the non-hermetic seal case. The problem was solved when true hermetic seal tantalum capacitors became available and are used in the modified converter.

b. Relays

(1) Rusted relays were discovered in the aft safe/arm J-box. A new relay was already in the process of being qualified and in-line changes are to be made on all affected vehicles. Some using programs were directed to retrofit their boxes with the newly qualified relays. The faulty relays were removed from stock.

(2) A second type of relay failure occurred due to teflon particles breaking off from a teflon-coated actuator bead in the relay. This condition caused improper relay contact to be made. Since this relay is used in the aft safe/arm and discrete/destruct J-boxes, immediate action was taken to obtain another relay and replace it in the affected boxes.

3. Battery Failures

After an extended period of satisfactory performance of silver oxide-zinc primary batteries, two occurrences of in-flight battery failures resulted in one instance of flight failure and one of mission curtailment. Extensive testing and investigation in this area has led to increased system thermal control and to minor modifications of battery design. Simultaneously, with this effort, vendor quality assurance has received increased surveillance and assistance from the prime contractor.

4. Type XIV Battery

Development of this zinc-liquid oxygen (ZOX) hybrid battery as a future power source is expected to be reinitiated in early 1965. This electro-chemical system should satisfy power requirement in the 40 to 60 kilowatt-hour range for mission duration of up to two weeks with comparable power/weight advantages of fuel cells but with greater simplicity and considerably less cost.
Historical Report

D. Guidance and Control Subsystem (36/9)

1. Horizon Sensor System

The Mod III Horizon Sensor was flight tested in October and, in general, performed better than the Mod IIA. The Mod III plus recent retrofit and modifications (relays, transformers, bolometer solder connections, potting compounds, etc.) should provide significant improvement in the performance and reliability of the horizon sensor system. Production effectiveness was vehicle AD-70.

2. Inertial Reference Package

An improved Inertial Reference Package was proposed by Minneapolis-Honeywell. The proposed package is electronically and mechanically interchangeable with the present Mod III system and offers improvements in weight, volume, accuracy, performance and reliability. These improvements are made possible by the use of advanced packaging techniques, reduced parts count, further derating of component application and incorporation of MIG gyro's in place of the two HIG gyro's used in the present system. Action on this proposal is being delayed pending a decision on the Integrated Guidance Module proposal which specifies use of the Mod IV Inertial Reference Package.

3. Velocity Meter Counter

The Mod IIA Velocity Meter Counter which completed qualification testing in April 1964 became standard equipment on Agana D vehicles at vehicle AD-92. The Mod IIA counter should provide improved performance and reliability over that of the previously used Mod II Counter.

4. Sequence Timer

Studies were performed on the Sequence Timer to determine design improvements that would eliminate existing marginal characteristics of the counter assembly and the switch actuating mechanism. The ultimate objective was to improve overall reliability of the timer. The results of these studies were submitted to AFSSD as a redesign proposal in December. From a technical point of view, the proposed redesign is desirable and is currently under consideration.

5. Flight Control Electronics Assembly

A small transformer, which is used in twenty-five different applications within the Flight Control Electronics Assembly, developed a failure mode associated with temperature cycling during early 1964.
Testing of an improved transformer to correct this deficiency is nearing completion; and, thus far, the new transformer exhibits no deficiencies. Incorporation in early 1965 is planned.

6. **Guidance Junction Box**

Failure investigations in December verified the existence of contamination in Hi-rel Relay (LS 8453) which is used in twenty-three different applications within the Guidance Junction Box. Contamination is due to deterioration of the teflon coating on the glass bead that moves the arm of the relay contacts. Corrective action is currently under investigation.

7. **Pneumatic Regulator**

The Sterer pneumatic regulator which has been under development and test for the past two years was approved for flight and installed on vehicles AD-82, 83, 84 and 85. This equipment has undergone more extensive testing than the Whitaker regulator, which is standard equipment, and has proven superior in most respects; i.e., smoothness of regulation, flow and temperature limits. In the future, both Sterer and Whitaker units will be purchased on a competitive basis and used interchangeably.

8. **Control Moment Gyro, Mod II**

The Mod II Control Moment Gyro experienced many difficulties during late 1964 including the failure of the qualification unit. These problems, which were all related to quality control, have been corrected; and manufacturing procedures have been changed to preclude any similar failures in the future. The new qualification unit is undergoing acceptance testing and will start formal qualification testing in February 1965. Current production rate is one unit per month.

9. **Integrated Guidance Module**

In late 1964, the Integrated Guidance Module (IGM) was again recommended by NASA as an improved guidance and control system for the Agena D vehicle. This submission was relatively unchanged from previous submissions. It proposed consolidation of all guidance and control components (excluding actuators and thrusters) into a single module and addition of a low thrust attitude control system. The major benefits obtainable are improved performance and reliability and decreased weight and size. The recommendation is under consideration.

10. **Design Review and Failure Mode Analysis**

Phase I of a two phase Design Review (DR) and Failure Mode Analysis (FMA) on the Guidance and Control Subsystem was completed in late 1964. This effort involved an evaluation of the existing
11. **Guidance and Control Engineering Analysis Report**

An Engineering Analysis Report (EAR) on the Guidance and Control Subsystem was published in late 1964. It contains equipment descriptions, illustrations, schematics, and analysis showing system functions along with their limitations and inaccuracies. It was prepared for the specific purpose of describing the Guidance and Control Subsystem to persons knowledgeable in the guidance and control field but unfamiliar with the particulars of the Agena system.

12. **Guidance and Control Equipment Display**

The guidance and control equipment of the Agena D with the exception of the classified components are now on display in the AFSSD Agena Vehicle Engineering Office. The equipment is mounted to facilitate easy disassembly and, hence, provides a significant aid to engineering personnel.

13. **MIT Stability Studies (Gemini)**

Subsystem D personnel prepared and managed two contracts with the MIT Instrumentation Laboratory concerning stability aspects of the Gemini Agena Target Vehicle.

a. The first contract May-Sep 64 was concerned with the overall stability of the Spacecraft-Agena in the docked configuration with the Agena main engine thrusting. With the two vehicles joined by a relatively weak and flexible docking adapter, there appeared to be an unstable bending mode. Both MIT and MSC have studied the problem and have developed tentative solutions. A final decision as to which fix, if any, is needed will be made when the docking adapter parameters (stiffness and damping) are better known. Structural tests to develop this information are scheduled for January 1965 at McDonnell Aircraft Company.

b. In August 1964, MSC (NASA) requested AFSSD to look into the feasibility of connecting the Agena Control System to the hand controller so that the astronaut could "hand-fly" the docked combination. This method of flight was desirable if it could reasonably simulate booster control modes where the astronaut acts as a back up controller of the booster. (Apollo is such a vehicle). Simulation was accomplished by modifying the then existing analog simulator at MIT. The results showed that the astronaut could control the docked combination; however, the possible Agena control modes could not closely simulate any of the Apollo modes. This additional capability will not be designed into the Gemini Target Vehicle.
E. Communications & Command Subsystem (SS/II)

1. Command Destroy Receiver - A series of design changes have been proposed for incorporation into the presently qualified Command Destroy Receiver. These changes have been examined, and sixteen have been approved. They include transistor changes (improved performance), filter changes and relocation, and other piece part substitutions designed to greatly improve performance and reliability. Inclusion of the changes will necessitate some qualification and Electromagnetic Interference testing. The actual changes and testing will be accomplished in early 1965.

2. Telemetry System - Great improvement has occurred in three assemblies of the Type V Telemetering System.

   a. Mod Amp and Time Delay: Redesign, fabrication, and qualification of new A.C. Modulation Amplifiers and Universal Time Delay units have taken place. These units were redesigned incorporating specially selected "Hi-Bol" parts. A selection of units of each type underwent reliability stress testing and 127 days of accelerated (one hundred per cent duty cycle) life testing. All units of each type completed electrical functional tests at conclusion of life testing, and performance was entirely satisfactory. The new Mod Amp and Time Delay are currently scheduled for incorporation into the Type V Telemeters being fabricated.

   b. Commutators: Over a period of more than a year, failure of the commutators has been a top priority problem. The main difficulties have been (1) failure to start (2) erratic speed of operation. Since the commutators are electro-mechanical in nature and employ a small D.C. motor, the primary attention was directed toward improved or different motors. The problem has now been solved satisfactorily, with the completion of qualification of two commutators (Produced by Lind Instruments, Inc.). Three additional commutators (produced by Fifth Dimension, Inc.) are ready for qualification testing, with this effort expected to be complete in early calendar year 1965. One solution of the commutator problem was the use of a Japan Micro Motor, with a special rotating disc (precious metal) brush. Tests of this ingenious motor have produced excellent results, with performance much superior to conventional D.C. motors. An alternate solution also available: is a modified 4-brush type (Globe, Inc.) model 611A109 motor. The modification consists in replacing the standard version brush assembly by a split brush arrangement (4-brush type). A further additional commutator arrangement is a double-motor (2-Globe unmodified motors) type.
3. **FM Telemeter System** - The engineering evaluation testing, manufacturing fabrication effort, and vehicle compatibility testing of the Pulse Amplitude Modulation (PAM) Telemeter, Type VIII, were completed satisfactorily. Although a variety of input impedance, case ground, and data level problems were discovered, all were satisfactorily resolved, and the three PAM VIII units delivered.

4. **Three-Way Coaxial RF Switch** - The development program for the three-way coaxial switch has continued throughout the reporting period. The purpose of this switch is to provide umbilical-ascent antenna-orbit antenna switching for the telemeter and the tracking beacons. The new switch will provide 90-db attenuation of unwanted radiation of signals and will eliminate one of the two switches used in the present system. All electrical requirements have now been achieved. The most serious problem encountered in the program was in meeting the random vibration test requirements of IMEC Environmental Specification 61170. A schedule slippage of approximately three months was encountered in solving this problem. By the end of the reporting period, approximately 75% of the qualification tests were successfully completed. Fully qualified status should be achieved by mid-February 1965.

5. **Electro-Magnetic Interference Test Program** - An extensive electromagnetic-interference (EMI) test program was completed during the reporting period. This program involved the testing of almost all pieces of electronic equipment used on the Agama Vehicle. The tests measure the amount of electrical noise that can be generated by a particular piece of equipment. The determination of effect of this generated noise on other items of equipment was also studied. The susceptibility of each unit of equipment to external generated noise was also determined by testing. All test data was thoroughly evaluated by a joint board of Lockheed/Air Force engineers. The EMI program has resulted in a collection of data that should be especially useful and significant for reducing undesirable EMI in future designs of electronic equipment. The reduction of such interference will greatly increase the reliability of the Agama.

6. **Gemini C & C Equipment** - During the current reporting period, the magnitude of the difficulties with the Lockheed (IMEC) designed and fabricated items of Gemini C & C equipment has begun to be apparent. Unless proper corrective measures are instigated and great improvements accomplished, the probability of failures of the C & C Gemini equipment is so high that success or failure of the Gemini/GATV mission is in question.
a. **PCM Seliecter System:** During the last reporting period, the PCM Selecter System was rejected as unqualified. Subsequently, requalification testing started in November 1964 and has been completed with only minor difficulties (apparently). Final report has not been submitted yet, for Air Force engineering evaluation.

b. **Tape Recorder Type IX:** Although the Tape Recorder, Type IX, is generally felt to be a good item of C & G equipment, Qualification testing was completed on 29 January 1964, but no final Qual report has been submitted for review as of the end of this reporting period.

c. **Command Controller, Type IV:** The original qualification results on the Command Controller were rejected by MSC Quality Control personnel. The unit was subsequently required to undergo additional high temperature testing. No qualification report has been submitted to USAF engineers on this equipment, but it already has a fairly extensive failure report history. A serious problem with triggering of the Emergency Reset Timer (ERT) was discovered and several fixes attempted. A low pass filter type circuit was installed, and has since been modified to help alleviate the problem. Integrated circuit bugs are used extensively in three modules of the Controller. MSC has now been directed by the Air Force and funded to revise their method of installation of these devices into modules. The reliability of these affected modules should be appreciably improved, when the new fabrication technique is incorporated.

d. **Command Programmer, Type XVI:** The Command Programmer, Type XVI, represents the single most critical item of Gemini C & G equipment. It is impossible to have a successful Target Vehicle - Gemini Spacecraft mission with the programmer malfunctioning. Every Programmer XVI thus far built by MSC has had many failures at the piece part module, tray assembly, and top assembly levels. Some critical modules have had in excess of 30 individual functional failures. The majority of these failures have never been completely analyzed, so that complete and adequate corrective action has not taken place. With every functional acceptance test of complete programmers, trays, and modules, a new group of failures occurs. When items do eventually pass an acceptance level test, it is generally after an extensive failure, rework, retest, cyclic history. The Air Force engineers on this equipment have continually brought these problem areas to the attention of the MSC Gemini program office and the cognisant engineers. Improvements are starting to appear, but an overall unsatisfactory situation still exists.
e. **Fly-By #1 C & C Equipment**: A group of C & C items known as Fly-By #1 was conditionally accepted on 17 Nov 64, on a DD 250, with exceptions clause attached. The "exceptions clause" provides that all discrepancies in drawings, specifications, test procedures, etc., must be corrected to the satisfaction of AFFRO and APSSD within 90 days of the DD 250 is cancelled.

f. **Fly-By #2 Programmer**: The Fly-By #2 Command Programmer, Type XVI, Memory Assembly was severely damaged by IMSC negligence in late June 1964. The failure and rework history on this unit is documented on IMSC FDR 230633, which extends more than 35 pages. The original trouble began when miswiring placed 40 volts onto the 5.7 volt buses, with subsequent module (19 modules) and component failures, plus severe over-stressing of other modules and circuit components. This unsatisfactory situation is still not resolved after more than six months of rework and retest operations.

g. **Welding-Soldering Consultants**: In July 1964, IMSC was directed by APSSD to employ two welding-packaging-soldering consultants from Electro-Optical Systems. This resulted from numerous design and fabrication difficulties observed in the Lockheed electronics fabrication and assembly area. The consultants made a short review of the IMSC facilities and electronic manufacturing techniques, then prepared a report outlining many of these deficiencies. The majority of these deficiencies have not been resolved or corrected as of the end of the reporting period.

h. **Stanford Research Institute (SRI) Review**: Because of the continuing problems in the Programmer XVI Memory area, the IMSC Gemini program office was directed to employ Stanford Research Institute (SRI) to make a comprehensive design review. Their efforts, beginning late November 1964, will continue into 1965, and will be detailed in subsequent reports. Certain "soft" areas of module design have been explored, and the SRI effort is expected to be beneficial in establishing proper circuit designs.

i. **Component Piece Part Difficulties**: Extremely large failure histories have accumulated against many "hi rel" and specially procured piece parts (i.e., transistors, diodes, resistors, capacitors, relays, transformers, etc.). This problem is compounded since many of the failures occurred in modules, and the cause of failure of the piece part was not determined. What per centage of this component is attributable to "bad" piece parts is therefore questionable. Because IMSC did not carry out full and complete corrective action per MIL-Q-9858A, as required, much valuable information has been lost.
1. Major Robert A. Wells, 49325A, and Lt Stanley F. Martin, Jr., A03121326, were assigned to the AGE Development Branch.

2. Agreement was reached with LMSC on a drawing standard, using MIL-STD-7 as a guide, for test and checkout equipment identified in vehicle test procedures that is not in the AGE Inventory. This equipment is commonly called Test Aids or Auxiliary Test Equipment. The Contractor is to provide a complete inventory of these items early in CY 1965.

3. Negotiations for Launch Capability Contract (LCC) AF 04(695)-501 were completed on 15 Jul 1964. The contract period was for CY 1964. The negotiated price was $26,173,025 compared to $32,825,000, the original LMSC proposed price. The contract included cost and performance incentives.

4. General Funk and General Greer were briefed on the contract and the performance incentive package during the week of 21 Jul 1964. Col Newton and Col Worthington of the 6595 AW were briefed at VAFB on 27 Jul 1964.

5. The first launch under the performance incentive criteria was launched on 5 Aug 1964. During the period 1 Jul to 31 Dec 1964, 19 vehicles were launched under LCC -501 with 16 of these vehicles covered by the performance incentive criteria.

6. Negotiations for the Follow-On Launch Capability Contract, AF 04(695)-669 were completed 16 Dec 1964. The period of the contract is from 1 Jan 1965 through 31 Mar 1966. The negotiated price was $30,763,488 compared to $31,622,454, the original LMSC proposal price. This contract also includes cost and performance incentives.

7. The conversion of Eastern Test Range (ETR) Complex 14 to a basic Agena D configuration was completed under LMEC Contract AF 04(695)-237. Vehicle on Stand (VOS) capability was attained on 31 Dec 1964. CON-13, extension of mast cabling, was negotiated for $3,005, cost and fee. Total contract value is $4,653,311. Outstanding is a termination action which deleted installation of Launch Complex 14 of the Secondary Propulsion System (SPS) Equipment being used at Santa Cruz Test Base. This SPS Equipment installation will be done under another contract. Authority for this conversion is BSV52 letter, Conversion of ANH Complex 14 to an Atlas/Agena Configuration, 5 Jul 1962.
8. All equipment and drawings for the Disaster Pool, purchased under INSC Contract AF 04(695)-317, have been delivered to SSVZO, Sacramento. Total contract value is $970,000 including fixed fee. Authority for the procurement of Disaster Pool Aerospace Ground Equipment is SSVZO letter, Agena Items for Disaster Pool Backup, 6 Jun 1962.

9. A letter contract, AF 04(695)-715, for Agena AOE Environmental Improvements was awarded INSC on 1 Dec 1964. This effort will provide an improved environmental climate for the Agena vehicle during transportation and launch base checkout periods. The INSC cost proposal work is $681,000.

10. The Launch Capability Contract, AF 04(695)-499, was issued to the Contractor on 8 Sep 1964. The negotiated price of the contract was $5,413,000 as opposed to the Contractor proposal price of $6,111,925. Performance incentives negotiated on the Launch Capability Contract were operative during the reporting period and there were five flights under the performance incentive. The Contractor's performance under the ascent and countdown incentives was average, and he earned approximately target fee as a result.

11. Negotiations were begun on the Follow-On Launch Capability Contract, AF 04(695)-638, on 8 Dec 64, but because it was obvious that the difference between the Contractor's proposal and the Air Force evaluation of the effort, required during the contract period, was too great to permit definitization by 1 Jan 65, negotiations were interrupted to permit further discussions between the Air Force and the Contractor and issuance of letter contract AF 04(695)-737. After much discussion, new understanding of the work effort resulted in changes to work statement. The Contractor was asked to furnish a revised proposal which incorporated the revisions to the work statement. Negotiations were scheduled to resume during January.
HISTORICAL REPORT FOR THE AGENA CONFIGURATION MANAGEMENT DIVISION

1 July 1964 through 31 December 1964

1. ORGANIZATION: The Configuration Management Division is established by the Program Director, Agena Directorate. Management responsibilities for the Configuration Management Division are as prescribed in SOP 1. (See attachment #1).

2. PERSONNEL: The manning of the Configuration Management Division, for the period of this report, was changed one time. The Division Chief was transferred to Headquarters AFSC. The replacement for the chief was selected from within the Division. This action decreased the manning of the Configuration Management Division by one officer.

3. MAJOR POLICY AND PLANNING DEVELOPMENTS:

   a. There were three major policy developments during the period of this report.

   (1) The Uniform Specification Program for the Gemini Agena Target Vehicle System was established. One of the major aspects of this program, policy wise, was the decision to place Aerospace Ground Equipment (AGE) under configuration management. This was the first time the Agena Directorate placed AGE under configuration management. See attachment #2 for implementing instructions governing AGE configuration management.

   (2) The Uniform Specification Program for a new program (name not given for security reasons) was started. The major policy aspect of this program was the application of the new Air Force Systems Command Manual 375-1. This is the first time the new manual was placed on a contract being managed by the Agena Directorate.

   (3) The Engineering Change Proposal (ECP) Program for the Gemini Agena Target Vehicle System was established. The major policy aspect of this program was the decision for ECP's to be submitted through the local government representative. Attachment #3a and #3b constitute the ECP processing policy documents. See attachment #5 for AFSC ECP checklist.

   b. The major planning developments during the period of this report were as follows:

   (1) The entire configuration management effort, after the First Article Configuration Inspection (FACI), on the Gemini Agena program was planned and correlated to current and past developments on the Gemini Agena configuration management planning chart.
(2) The Configuration Management Division started initial planning on the total configuration management effort for the new program mentioned previously in this report.

4. MISCELLANEOUS ACTIVITIES:

a. In September 1964, the Configuration Management Division created SOP 4. (See attachment #4). This SOP improved the overall effectiveness of the Configuration Management Division by streamlining and standardizing (wherever possible) the total Agena Directorate configuration management effort.

b. The Configuration Management Division wrote, and is presently coordinating, an interface working group proposal. If approved by the Deputy for Launch Vehicles, the proposal will be presented as a policy document in the next Historical Report.

c. The Configuration Management Division wrote the Gemini Agena-AFFPRO Memorandum of Agreement. Attachment #5 is the rough draft copy presented to the AFFPRO, LMSC, Sunnyvale, California for coordination and comment. This will also be a policy document in the next Historical Report.

d. The Agena Configuration Management Division, aided in the planning and provided the recorder for another program FACI. Attachment #6 is FACI team orders.

e. On 22 December 1964, the Gemini Agena Configuration Control Board (CCB) was established. (See attachment #7).

f. On 4 November 1964, the Gemini Agena FACT team was established. (See attachment #8).

g. On 20 October 1964, the Gemini Agena Specification Control Group was established. (See attachment #9).

h. The Configuration Management Division, revised the Standard Agena Configuration Control Board orders to reflect a change in command. The current CCB Chairman, is the new Agena Program Director. (See attachment #10).

i. The Deputy for Range Safety Engineering, Pacific Missile Range, requested the Agena Configuration Management Division to brief one of his staff members on configuration management and discuss planning aspects of applying configuration management to the Range Safety System. This was accomplished in September 1964.
j. An improvement to the LMSC configuration management effort was establishment of the Air Force-LMSC, Configuration Management Pipeline meeting. These meetings, conducted on a regular basis proved to be a valuable aid in increasing understanding and resolving configuration management problems.

5. This completes the narrative portion of the report, attachments follow.

LAWRENCE S. NOLAN
Major, USAF
Chief, Configuration Management Div
Agena Directorate

20 Attachments:
1. CMO SOP #1
2. Implementing Instructions Governing AGE
3. a. CMO SOP #2
   b. CMO ECP Flow Chart
4. CMO SOP #3
5. AFFNO Checklist
6. FACI Orders
7. CCB Orders
8. FACI Orders
9. Specification Control Group Order
10. Configuration Control Board Order