# DOCUMENT HISTORY OF DISCOVERER



HISTORY OFFICE
CHIEF OF STAFF
SPACE AND MISSILE SYSTEMS ORGANIZATION
AIR FORCE SYSTEMS COMMAND

#### DOCUMENT HISTORY OF DISCOVERER

Prepared under the provisions of Air Force Regulation 210-3 and Air Force Systems Command Supplement No. 1 thereto as part of the United States Air Force Historical Program.

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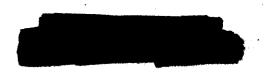
# DOCUMENT HISTORY OF DISCOVERER VOLUME 1

Prepared by

S. A. Grassly

November 1971

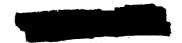
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History Office

CHIEF OF STAFF

SPACE AND MISSILE SYSTEMS ORGANIZATION



#### DOCUMENT HISTORY OF DISCOVERER

#### VOLUME 1

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#### LIST OF SUPPORTING DOCUMENTS

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- 2. ARDC Form 111 (C/Gp3), Title: Advanced Reconnaissance System, 31 Jan 57.
- 3. R-W Document GM67.3-49, subj: Proposed Use of IRBM as Booster for Multi-Stage Vehicles, 1 Apr 1957.
- 4. DD Form 613 (C/Gp3), Project Number: 1764, 2 Apr 57.
- DD Form 613 (C/Gp3), Project Number: 8727, 2 Apr 57.
- 6. Ltr, The Ramo-Wooldridge Corporation to Col E. N. Hall, from R. F. Mettler, subj: Transmitting copy of GM67.3-49, 3)May 57, w/o Inclosure. /See inclosure under date of 1 Apr 57/.
- 7. Memorandum for Colonel Terhune, subj: AFPTRC Support of WDD System Development, 23 Jul 57.
- 8. Memorandum for WDT and WDO, subj: Joint WDTN and WDOTA Staff Visit Report to Hq ARDC on Elimination of AFPTRC as a Separate Center of ARDC, 19 Nov 57.
- 9. Memorandum for the Record, subj: Telephone Call from Colonel Nunziato to General Ritland, 31 Dec 57.
- 10. Msg, from Comdr AFBMD to Comdr Hq ARDC, WDG-1-2, 3 Jan 58.
- 11. Ltr (C/Gp3), Lockheed Aircraft Corporation to MajGen Bernard A. Schriever, subj: Contract AF 04(647)-97, Proposal for Acceleration of WS 117L Program, 6 Jan 58.
- 12. Development Plan (C/Gp3), cover and introduction only for WS 117L, 6 Jan 58.
- 13. Conference msg regarding ARDC Five Year Projected Astronautics Program, 6 Jan 58.
- 14. Ltr (C/Gp3), WDP to Chief of Staff USAF, subj: Thor Program Acceleration, 6 Jan 58, w/4 Inclosures: 1. Program Summary; 2. Fund Summary; 3. Augmented Schedules; 4. Fund Summary (R&D Augmentation).

- 15. Ltr, ARDC (RDTHW) to Comdr AFBND, subj: Elimination of AFPTRC and Assignment of Specific Human Factors Functions to AFBND, 13 Jan 58.
- 16. Memorandum for the Record, WDTD, subj: Long-Distance Call from Colonel Attwood ARDC re "Recoverable Package," 13 Jan 58.
- 17. Memorandum For the Record, MCPTA, subj: Plan for Acceleration of the WS 117L Program, 21 Jan 58.
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- 19. Msg, from Hq USAF to Comdr AFBMD, cite AFCGM 39578, 222106Z Jan 58.
- 20. Msg, Hq USAF to Comdr ARDC, info Comdr AFBMD, Cite AFDDC-SP 55521, 222214Z Jan 58.
- 21. Weekly Diary 16 thru 23 Jan 58 from MCPTA to MCPT AMC/BMC7, 23 Jan 58.
- 22. Memorandum for Record, WDTIM, subj: Lockheed/Douglas WS-117L Co-ordination Meeting, 27 Jan 58, 28 Jan 58.
- 23. Msg, Hq USAF to Comdr AFBMD, info Comdr AFBMC/AMC, Cite AFCGM 56224, 061543Z Feb 58.
- 24. Memo to File, subj: Thor-II7L Integration, 12 Feb 58.
- 25. Memorandum for the Secretary of Defense (C/Gp3), subj: Thor and WS-117L Program, 14 Feb 58.
- 26. Msg, Attn: Colonel F. C. E. Oder, WDTR, from F. W. O'Green, Lockheed Missile Systems Div Palo Alto Calif, subj: WS 117L Reconnaissance Capsule, 18 Feb 58.
- 27. Memorandum for the Director of Guided Missiles, OSD, sgd Malcolm A. MacIntyre, Under Secretary, 21 Feb 58.
- 28. GO No. 11, ARDC, 27 Feb 58.

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- 32. WDTSR Memorandum for Major General Funk (C/Gp3), subj: Reorientation WS 117L Program IIA, 14 Mar 58.
- 33. Memorandum for the Director, ARPA, OSD, subj: Air Force Man-in-Space Program, 19 Mar 58.

- 34. Memorandum for Vice Chief of Staff, sgd MajGen J. S. Mills, subj: Man in Space Program, 20 Mar 58.
- 35. WDTSR Memorandum for Colonel Terhune, subj: Reply to Inquiry, 24 Mar 58.
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- 38. Memorandum for Colonel Evans, sgd Col C. H. Terhune, Jr., subj: Man in Space Responsibilities, 28 Apr 58.
- 39. WDGO Memorandum for Col Terhune, sgd BrigGen O. J. Ritland, subj: Eio-Medical, Thor Boosted WS 117L Program, 5 May 58.
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- 51. Ltr, ARDC (RDTH) to Comdr Air University, subj: Responsibilities of School of Aviation Medicine in the ARDC Biosatellite Program, Sub-System L WS-117L, 12 Aug 58.

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- 59. Msg from Comdr ARDC to Comdr AFBMD, RDZGW-11-39-E, 262100Z Nov 58.
- 60. ARPA Memorandum for the Secretary of the AF, (C/Gp3), subj: WS-117L Program, 4 Dec 58.
- 61. ARPA Memorandum for the Under Secretary of the Air Force (C/Gp3), subj: Discoverer-Thor Project and Sentry Programs, 5 Dec 58.
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- 74. Msg from Comdr AFBMD to Dir ARPA, Info CofS USAF, Comdr ARDC, Lockheed Missiles and Space Div, Ch, AFBMD Field Office, Palo Alto, WDZW 3-15-E, 17 Mar 59.
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- 95. ARPA Order No. 48-60, Amendment No. 6, 20 Jul 59.
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- 101. Discoverer Program Progress Report, 9 Nov 59.
- 102. Management Report, Advanced Reconnaissance System, 13 Nov 59.
- 103. Secretary of Defense Memorandum for the Secretary of the AF subj: Transfer of the Discoverer Development Program to the Department of the Air Force, 17 Nov 59.
- 104. SO Number 20, AFBMD, 27 Nov 59.

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- 109. Ltr (C/Gp4) from AMC/BKC (LBZJR, subj: Discoverer Schedule Revision, 4 Oct 60.

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- 112. Msgs from Hq ARDC, RDGP-12-10-2 and RDGP-12-10-1, 12 Oct 60.
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- 117. Msg from ARDC to AFBIAD, RDEP 7-12-16, 071924Z Dec 60.
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- 119. Msg from AFBMD (WDEC) to WDG, subj: Presentation of Discoverer XIV Capsule, 9 Dec 60.
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- 121. News Release 61-30, subj: Mackay Trophy for 1960.
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- 123. Discoverer Program Chronology, 1 Jul 31 Dec 60, (C/Gp4), 24 Jan 61.
- 124. 552 Airborne Early Warning and Control Wing (ADC) News Release: 1-4, 17 Feb 61.
- 125. Ltr, AFBMD (WDZJS-1, subj: Request for PR Initiation, 13 Mar 61.
- 126. AMC (LBZJP) ltr, subj: Authorization for Type of Contract, 28 Mar 61.
- 127. Ltr (S/Gp3), from Comdr, PMR to Comdr AFBMD, subj: Bioastronautics Orbiting Space System (BOSS) Development Plan; comments on, 28 Mar 61.
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- 131. Ltr (S/Gp3) from Hq USAF (AFDRT) to ATC and AFSC, subj: Radiation Shielding, 8 Jun 61.
- 132. Ltr (S/Gp3) from Hq USAF (AFFDDC) to AFSC, subj: Bioastronautics Orbital Space Program (BOSP), 12 Jun 61.
- 133. Ltr (S/Gp3) from Hq AFSC (SCRBS) to SSD (AFSC) and ATC, subj: Bioastronautics Orbital Space Program (BOSP), 22 Jun 61.
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- 142. UPI and AP News Releases, 12 Dec 61.
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- 144. ADO No. 35 (C/Gp3), subj: Advanced Development Objective for a Bioastronautical Space Test Program, 18 Feb 62.
- 145. Ltr from SSD (SSZDB) to SSVX, subj: Discoverer Performance Improvement, 27 Feb 62.
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- 155. History of Program 162, 1 Jan 63 to 30 Jun 63 (S/Gp4).
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- 157. Ltr sigd HajGen Ben I Funk to AFSC (MSF), subj: Air Force Support of Bioastronautics Program 698AA, 26 Nov 63.
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(UNCLASSIFIED) INTEGRATION OF QUALITATIVE PERSONNEL RÉQUIREMENTS ACTIVITIES AT WESTERN DEVELOPMENT DIVISION:

Sign Mills

(UNCLASSIFIED) In May 1956, AFPTRC established a liaison office at WDD for the purpose of coordinating Qualitative Personnel Requirements activities. Since that date, personnel and training requirements studies have been initiated on all weapon systems being developed by WDD. Two formal reports have been issued on System 107A-1, and an initial report published on System 315A. An initial report on System 107A-2 is scheduled for April 1957. The impact of these studies on development activities is much greater when ARIX has been assigned responsibility for the Initial Operational Capability since ARXX becomes the implementing agency in these cases. The QFRT reports have been used to propare manning documents, determine over-all training requirements, plan training courses, and to provide a source of data for technical manuals. In view of the above, it is apparent that a satisfactory and useful QPRI program has been established at (RUTDIT, Capt. Nichols, ext 32). WDD.

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(3) Reviews reports of progress and findings received from contractor or other agencies pertaining to personnel requirements, training and personnel evaluation. Wakes recommendations for acceptance of these reports and for implementing RAD outcomes in system operations.

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- (4) Determined requirements for technical assistance, information and services of various AFFIRC agencies, or other Air Force agencies, and provides technical assistance as required by WDO. Makes appropriate requests for assistance in the planning and conduct of work for which WOO is responsible.
- (5) Coordinates personnel and training Rab activities with other offices of WDO, and with other Air Force agencies participating in the human factors program.
- (6) Establishes procedures for the nutual enchange of information between VMD and AUFFRC.

#### DRAFT

#### AFFIRC DIRECTIVE

SUBJECT: AFFTRC Participation in WS-107A and WS-315A

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- 1. <u>Purpose</u>. The purpose of this document is to define the participation of AFPTRC in WS-107A and WS-315 and to indicate a manner of integrating this effort with the other portions of the human factors program.
- 2. Scope. This document reflects the methodology and procedures to be employed in the human factors program as visialized at this time.
- 3. Responsibilities. AFFTRC is designated the responsible agency for the completion of the tasks defined in ARDC Reg 22-14. The tasks which are of greatest interest to this project are:
  - a. Qualitative Personnel Requirements Information (QPRI)
  - b. Proficiency Standards and Evaluation both individual and team.
  - c. Command Communications Operability.
  - d. Control of Morele Factors.

- e. Social and Community Relation Studies.
- 4. Integration. The accomplishment of some of the tasks listed above will be aided by the use of a dynamic system mockup, a simulation device or array of devices that will react to controls end display information in the same menner as the operational system. This dynamic mockup will also be used for other human factors work such as human enginering, and may also be used in the training of cadre personnel. To obtain optimum results, the dynamic mockup willbe built undo the sponsorship of WDD and will be controlled by a staff representing all interest agencies. The location of the mockup and the exact composition of the operational effectiveness staff have not been decided at this time; the planning in progress now is sized at providing the most complete and efficient program.
- 5. Immediate Procedures. Until such time as the entire human factors program has been approved and implemented, the following steps should be taken by AFFTEC:

- on. Generation of QPRI from the data provided them by the associated contractors. The Technical Directive establishing the procedures for the Contractors to provide this information has been issued to those major contractors associated with WS-107A.
- b. The establishment of a Special Project Officer in residence at WDD, to be empowered to represent AFPTRC on all matters within the scope of an approved WDD human factors program. The representative will be attached to WDD. Administrative support for the office will be provided by WDO, however, the nature of program development and the functions involved require that this officer's services be available to all staff associes of WDD. His duties will be as follows:
  - (1) Provides information to WEO staff agencies on status, plans and progress of all activities of personnel and training R&D activities related to weapon system development for which AFPTRG is responsible. Specifically, these activities inclose
    - (a) Qualitative personnel requirements information.
    - (b) Participation in operations and personnel analysis program.
    - (c) Individual and team training studies.
    - (d) Relevant portions of the AFPTRC technical program.
  - (2) Formulates and recommends requirements to WDO pertaining to R&D activities in the personnel and training area.
  - (3) Reviews reports of progress and findings received from Contractor or other agencies pertaining to personnal requirements, training and personnal evaluation. Holiza recommendations for acceptance of these reports and for implementing DAD outcomes in system operations.

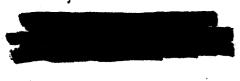
- (4) Determines requirements for technical assistance, information and services of various AFPTRC agencies, provides personnel technical assistance as required by WDO and/or makes appropriate requests for such assistance in the planning and conduct of work for which WDO is responsible.
- (5) Coordinates AFPTRC personnel and training R&D activities with other offices of WDO, and with other Air Force agencies participating in the human factors program.
- (6) Establishes procedures for the mutual exchange of information between WDD and AFFTEC.

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(U) Advanced	l Reconnaissance System	WS 117L - MR #3
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USN/CND-1, US	SA/C/S-I, Other / CIA-I	02
12. APPLICABLE AREA	AS	
A. TECHNICAL	, B. TEST C. PUNDS	D. MATERIEL E. PACILITIE
F. MANPOWER	G. PERSONNEL H. TRAINING	I. T CONTRACTS J. AIRCRAFT

#### 18. NARRATIVE

10

- a. Authorization to obligate an additional \$2,000,000 beyond the \$3,000,000 previously authorized for System 117L was received 7 December 1956, in TWX, HQ USAF, AFDDP-B 33590.
- b. Letter Contract AF 04(647)-103 was let with the Massachusetts Institute of Technology on 25 Jan 1957. Work to be performed is in the Guidance and Control problem area. Funds allocated against this contract total \$500,000.
- c. Authority to obligate up to a total of \$10,000;000 for FY 57 on the WS 117L program in TWX, HQ ARDC RDSCBC-1-16-E, dated 15 Jan 1957, was received.
- d. Subsystem Project Plans are in the process of being written and Project number and task number assignments have been established. Upon completion of the writing of the Project Plans, a revision will be made to the System Development Plan. Target date for completion of these actions is the anniversary date of the WS 117L Development Plan, 2 April 1957.
- e. Inclosed is a list of project number and task number assignments made during the process of writing Project Development Plans.
- f. (1) PR #57-WDD-196-I dated 22 Jan 1957 was initiated to add \$5,563,000 to the Lockheed Aircraft Corporation Contract AF 04(647)-97.
- (2) OA #57-17 dated 25 Jan 1957 was initiated to transfer \$320,000 to RADC for continued effort in the Data Processing and Dissemination area for WS 117L.
- (3) OA \$57-15 dated 25 Jan 1957 was initiated to transfer \$195,000 to WADC for continued effort in research on conversion equipment for nuclear auxiliary power units and for continued research on solar auxiliary power units for WS 117L.
- (4) OA #57-16 dated 25 Jan 57 was initiated for transfer of \$422,000 to AFCRC for continued research in the Geophysical Environment Area for WS 117L.





WD-57-00437



g. The summary of FY 57 funds initiated on WS 117L is:

Lockheed Aircraft Corporation Massachusetts Institute of	AF 04(647)-97 AF 04(647)-103	\$8,563,000 <b>500,</b> 000
Technology		
WADC	OA #57-15	195,000
RADC	OA #57-1817	320,000
AFCRC	OA #57-16	422,000
TOTAL		\$10,000,000

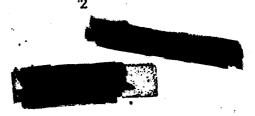
h. Reproduction and distribution of this report is forbidden except on express approval of the WS 117L Project Office.

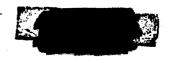
1 Incl
 Project Number Assignment
1 page (SECRET)

CHARLES H. TERHUNE, Jr., Colonel, USAF Deputy Commander, Technical Operations

ARDC Form 111 (Cont)

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# PROJECT NUMBER ASSIGNMENT

Project #	Project	Task #'s
P 1755	Airframe	39750 - 39767
P 1756	Propulsion	39768 - 39782
P 1757	Auxiliary Power Unit	<b>39783 - 3979</b> 0
P 1758	Guidance and Control	<b>398</b> 00 - <b>398</b> 11
P 1759	Visual Reconnaissance	39812 - 39821
P 1760	Ferret Reconnaissance	<b>39822 - 3</b> 9831
P 1761	Infra-Red Reconnaissance	<b>39832 - 398</b> 39
P 1762	Ground Space Communication	<b>39840 - 398</b> 54
P 1763	Data Processing	<b>39855 - 398</b> 62
P 1764	Geophysics	<b>39791 - 397</b> 99
P 1765	Unassigned	•
P 1766	Unassigned	•
P 1767	Unassigned	
P 1768	Unassigned	
P 1769	Unassigned	,
P 8728	QÝRI	39863 - 39864



WD-57-00437

H. R. Lawrence

A. F. Donovan
P. Dergarabedian

1 April 1957

Proposed Use of IRBM as Booster For Multi-Stage Vehicles

J. B. Kendrick

The accompanying data sheets cover the work done to date on three new designs using the IRBM as booster for the following multi-stage vehicles:

#### Test Vehicles

1. Two-Stage Re-entry Test Vehicle M = 23 Payload 500 pounds.

2. Two-Stage Test Vehicle M-= 25 Payload 0 pounds.

3. Four-Stage Test Vehicle M = 29 Payload 90 pounds.

#### **Satellites**

( )

- 1. Two-Stage Vehicle. Payload 50 pounds. Orbit at 190 mi. altitude.
- 2. Three-Stage Vehicle. Payload 200 pounds. Orbit at 300 mi. altitude.

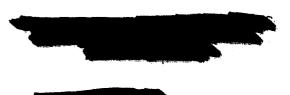
These combinations of vehicles are attained by uniting the Thor and the RTV in various stages. A brief study of the interstage connection between Thor and RTV reveals no major modifications needed to make the connection. The spin-rocket system of the RTV is also utilized in those designs (with streamlined fairings). The Thor guidance system is replaced by a simpler, lighter system for these designs. In view of the simplicity of these modifications, it is expected that the development costs involved in the above proposals will ve very nominal.

The performance and payload capabilities of these arrangements seem to justify further consideration of their potential uses. Please let us know if we can be of further assistance in the development of the idea.

JBK:gg

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J. B. Kendrick

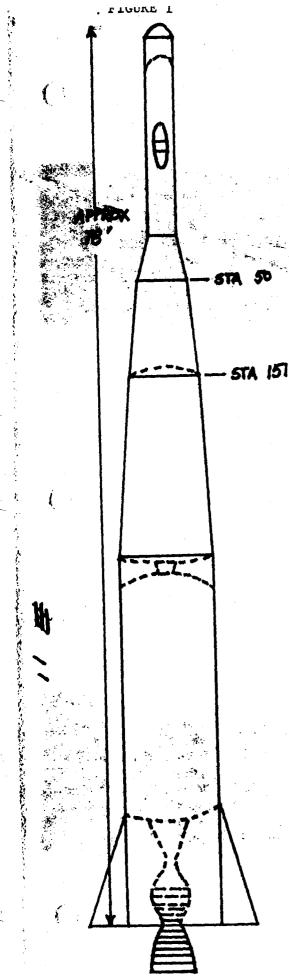


#### SUMMARY

- 1. The present proposal is to assemble multi-stage rocket vehicle using the IRBM "Thor" as first stage or booster, and the T-65 as second stage. The plan appears to be feasible without extensive changes to the booster or to the T-65 (see Figs. 1 and 2). The nose cone of the Thor may be removed and the interstage adaptor attached at Sta. 50. The standard T-65 motor and spin rocket installation as used on the RTV are assumed for the second stage. Some weight saving modifications to the guidance and control equipment aid power supply are assumed, and specified.
- 2. The payload-velocity-range characteristics of the resulting twostage vehicle are as follows:

Payload, lbs.	Max. Velocity, ft/sec.	Max. Range, n mi.
0	25,400	-
500	23,300	5 <b>,30</b> 0
1,000	21,500	4,150
2,500	18,700	2,800

- 3. The bending moment imposed on the interstage connection by the sudden application of 30 motor tip at burnout of Stage 1 is about 500,000 in.1b applied load. This imposes a stress on the booster at Sta. 141 of 2500 psi and on the T-65 motor of 6000 psi. These moderate stresses are higher than any gust load condition would impose, but seem to indicate that the structural problems involved in the proposal would not be critical.
- 4. Given the IRBM booster and the T-65 motor with spin-up rocket installation as used on the RTV, the cost of assembling the two-stage vehicle is seen to be very nominal. In fact, this is the lowest cost rocket vehicle havin a range of about 5000 miles which has come to the author's attention.
- 5. In addition to its suggested use as a Re-entry Test Vehicle for tests on a half-size nose cone of the ICBM, many other applications may be devised, such as a weapon, decoy or reconn. vehicle. By virtue of the ease of adaptability from available parts, the latter possibilities should be given further consideration. Some interesting possibilities can also be obtained by use of three-and-four-stage combinations of available parts.
- 6. A two-stage satellite vehicle capable of orbiting a payload of 50 lbs. can be obtained, by modifications to the Thor guidance, autopilot and power supply, and be use of an 18:1 expansion ratio nozzle on the T-65. With similar modifications, a three-stage satellite capable of carrying a payload of 200 lbs. can be obtained.
- 7. If a four-stage vehicle is assembled with the IRBM booster and all three stages of the RTV, a Mach number of M = 29 can be attained with a payload of 90 obs. Using the low-thrust attitude-control system after Stage 1 burnout, it is possible to provide re-entry angles of 20 degrees or less with range values of about 2000 miles.



#### PROPOSED INO-STAGE ROCKET WENTER

USING IRBM BOOSTER

WITH T-65 SECOND STAGE

Payload 500 lbs

Maximum Range 5,300 n mi

Stage 1 Burnout Altitude 210,000 ft

Stage 1 Burnout Velocity 12,600 ft/sec

Stage 2 Burnout Altitude 400,000 ft

Stage 2 Burnout Velocity 23,300 ft/sec

Apogee  $4x10^6$  ft.

Re-entry Angle 20./ degrees from horizontal

#### Plan of Operation

Fire Stage 1. Climb vertically for 10 seconds, then programmed turn to angle of 20 degrees using programmer and autopilot mounted in Stage 1. Conventional Stage 1 controls with vernier & anti-roll to stage burnout and for 6 seconds thereafter.

Separate and fire spin-up rockets to get 4 revs/sec.

Fire Stage 2, after separation and spin-up initiated by programmer. Spin velocity will maintain constant attitude to about 1 degree.

Separate nose come by pyrotechnic or mechanical expulsion unit, initiated by time fuze, after burnout of Stage 2.

Mose cone has no attitude control; hence will re-enter at any angle and will tend to oscillate.

Stability, damping, temperatures, pressures and radiation effects can be measured under conditions comparable to ICBM re-entry.

Data can be telemetered to ground stations.

#### TWO-STAGE TEST VEHICLE PROPOSAL

The present proposal is to assemble a two-stage rocket vehicle using an IRBM as booster, with a standard T-65 motor as the second stage. This two-stage vehicle might be used as a Re-entry Test Vehicle, capable of carrying an ICBM nose cone (one-half size) weighing 500 lbs., with a re-entry Mach number of about M - 23.

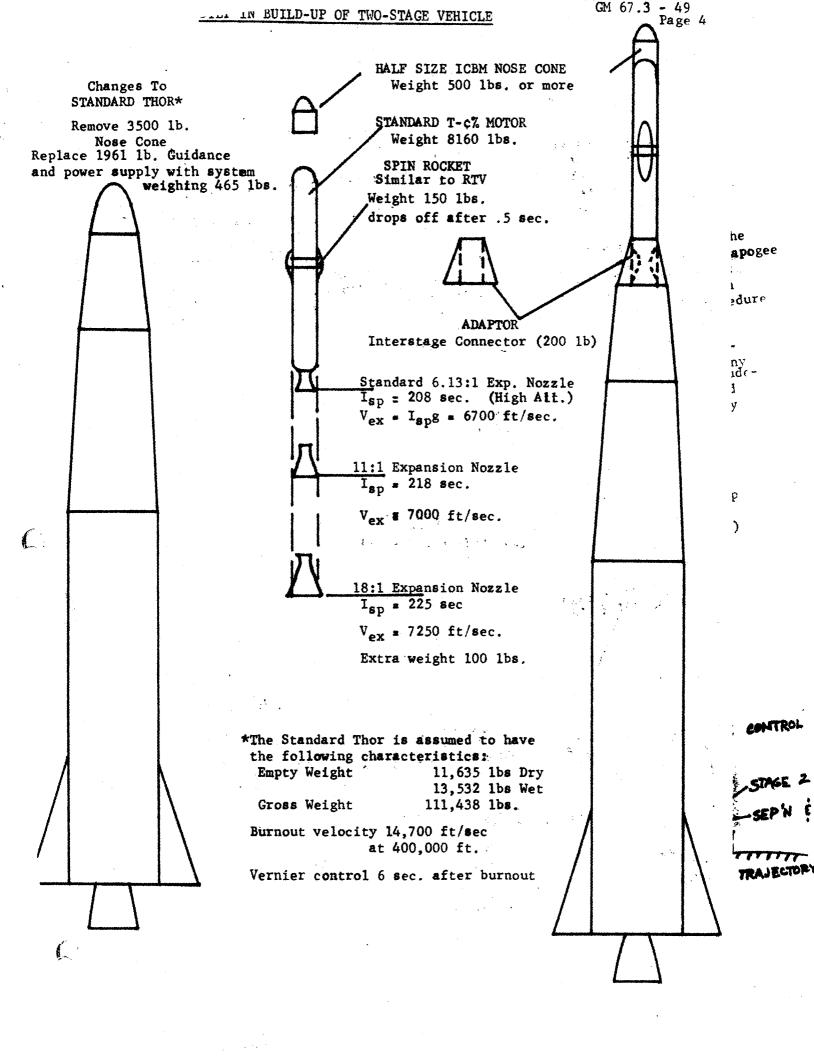
The basic Thor vehicle is not changed except to remove the nose cone and replace it with an adaptor which supports the second stage (see Fig. 2). The gross weight of the two-stage vehicle is about 5000 lbs. greater than the original Thor, but the burnout velocity of Stage 1 is still about 12,600 ft/sec. with the two-stage missile carrying 500 lbs. payload. The original guidance and autopilot system is assumed to be repalaced by a lighter system for such tests.

The flight plan (see Fig. 1) is to use the conventional IRBM controls and anti-roll & verniers through the boost period and for 6 seconds thereafter, then to separate and fire the second stage immediately. The RTV spin rocket system gives 4 revs/sec., which provides stability and attitude control during the second stage burning period. After burnout the nose cone separates and continues on trajectory without attitude control. Its shape is believed to provide sufficient stability to cause it to align itself with the flight direction on re-entemperature effect and stability characteriestics may be measured and telemetered to the ground.

The ICBM nose cone weighing 3500 lbs. consists of approximately fifty (50) percent warhead and an equal amount of shell and structure. The same deceleration would be obtained on a model in which the drag/weight ratio was held constant. For a half size model, the drag is reduced by a factor of four due to the reduction in size, and the weight should also be reduced by a factor of four, to give the same deceleration. Hence, the weight of the half size model would be 875 lbs., or of a one-third size model 390 lbs. The weight of a scale model varies as the cube of the scale; hence the half size model would weigh 1/8 of 1750 lbs. or 220 lbs., while the 1/3 size model would weigh only 65 lbs. Ample weight is then available for extra skin gage and for telemetering equipment

The re-entry angle can be varied from values of the order of 20 degrees corresponding to the ICBM to much higher angles, by adjusting the autopilot programmer during the launch phase. The similitude conditions to be expected for the proposed Re-entry Test Vehicle are as follows:

the heat de Gozdinien  Similitude Condition	ICBM		Re-entry Test Vehicle 1/2 Size 1/3 Size		
Re-entry Velocity, ft/sec	23,000	23,300	23,300		
Re-entry Angle, degrees	18	18 - 90	<b>18 -</b> 90		
Reynolds Number	R <sub>O</sub>	1/2 R <sub>o</sub>	1/3 R <sub>o</sub>		
Max. Deceleration. "g's"	60	60	<b>6</b> 0		
Heating Period, sec.	to	t <sub>o</sub>	to		



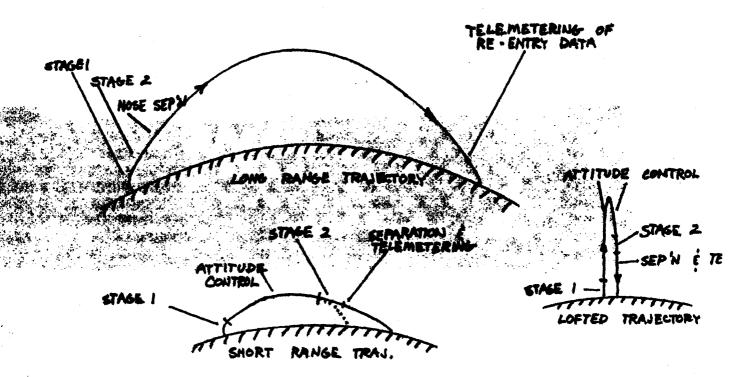
#### TRAJECTORIES AND GROUND STATIONS

Long Range Trajectories. The two-stage test vehicle can be launched a long range trajectory of about 5300 n. mi. by tipping over to an angle of about 20 degrees near the end of Stage 1 burning period and holding that angle constant during Stage 2 burning period, which is assumed to commence about 6 seconds after Stage 1 burnout. Ground stations for this type of eperation may be the same as successful to the ICBN long range trajectories. The two-stage may load to successful to impact within about 100 miles of the siming point the its is leastering range during range during to the long range at the trajectory.

Short Range Trajectories. In case it is desired to reduce the range of the feet seemed, one effective method is to fixe the first stage, the latter to apogee and beyond using low-thrust attitude-control nossies, when so fixe the latter ond stage on the downward leg, at whatever re-entry angle is desired, and at such altitude that burnout will occur above an altitude of 400,000 ft. This procedure will reduce the range to about 2000 miles for 20 degree re-entry angles.

Lofted Trajectories. By firing the first stage nearly vertical, and delaying Stage 2 firing until the downward leg, the range may be reduced to any small value desired. This technique is feasible by use of low-thrust attitudecontrol nozzles, utilizing the remaining LOX tank gas pressure. Such lofted trajectories will give rather steep re-entry angles, of course, but such may be desired for some tests. The attitude control may work in two ways:

- 1. Maintain the missile nose up until ready to fire Stage 2. Then separate, spin-up and fire Stage 2, which points downward.
- 2. Tip the missile over to nose down attitude. Then separate, spin-up and fire Stage 2. (The latter technique requires gyros capable of operation through a range of about 180 degrees change in attitude.)



#### WEIGHT SUMMARY AND PERFORMACE ESTIMATE

#### TWO-STAGE RE-ENTRY TEST VEHICLE WITH SPIN-UP

	•			
Present weight empty of IRBM (Dry) Residual Propellant	11,635 lbs. 1,897			
Present weight empty of IRBM (Wet) Usable Propellant	13,532 lbs. 97,906			
Gross weight of present IRBM		111,438	1bs.	
Items to be removed  Nose cone Structure forward Sta. 151 A C guidance unit Autopilot units, supports, batterie Reduce size of vernier tanks	3,500 382 991 s 227 200	-5,461		
Items to be added		<b>≠</b> 465		
Autopilot and programmer Power supply	1 <b>5</b> 0 115			
Adaptor for T-65	200			
Net weight of Stage 1		106,442		
Add T-65 and 500 lb. Payload Model payload and fitting 500 T-65 with standard nozzle 8160 (including 6978 lbs. propellant) Spin-up rocket installation 150 (dr	o <u>p off afte</u> r	8,810	(0 1	8.310
Launch weight of Stage 1 Less usable propellant		115,252 97,906	lbs.	
Empty weight of Stage 1		17,346	1bs. 1	L <b>6,</b> 846
Estimated Burnout Velocity - Stage 1 **	270,000 ft	12,600	ft/sec 1	2,800
Velocity increment - Stage 2 = $6700*1g_{\overline{1}}^{8}$	660 682 -285 <b>=</b>	10,700	<u> </u>	2,600
Estimated Burnout Velocity - Stage 3		23,300	ft/sec 2	25,400
		(M = 23.	.9) (1	1 = 26.

 $*I_{sp} = \frac{1.309 \times 10}{6978} \times \frac{1.66}{1.494} = 208; I_{sp} \times g = 6700 \text{ ft/sec.}$ 

(Standard 6.13:1 expansion nozzle)

\*\*dv/dw = -.44 ft/sec/lb. See Fig. 4

#### WEIGHT SUMMARY AND PERFORMANCE ESTIMATE

#### TWO-STAGE SATELLITE VEHICLE

Present weight empty of IRBM (Dry) Residual Propellant	11,635 lbs. 1,897		
Present weight empty of IRBM (Wet) Usable Propellant	13,532 lbs. 97, 906		
Gross weight of present IRBM  Items to be removed  Nose cone Structure forward Sta. 151  AC guidance unit Autopilot units, supports, cables Power converter, supports, batteries Reduce size of vernier tanks  Items to be added	3,500 382 991 161 227 200	111,438 -5,461	lbs.
Autopilot and programmer Power supply Adaptor for T-65 Control of attitude - system*.	150 115 200 20	4403	
New weight of booster stage Add T-65 and Orbiter installation Orbiter payload and fittings 50 T-65 with 18:1 nozzle** 8260 (including 6978 1bs propellant) Apin-up rocket installation 150		106,462 8,460	lbs.
Launch weight of Stage 1 Less usable propellant		114,922 97,906	
Empty weight of Stage 1	•	17,016	lbs.
Estimated Burnout Velocity - Stage 1 12,	750 ft/sec@ 27	5,000 ft	10,750@10 <sup>6</sup> ft.
Velocity Increment - Stage 2 = 7250**1g = 831	0 =		13,250
Earth's Rotational Velocity		-	1,500
Estimated Burnout Velocity - Stage 2			25,500 ft/sec
Required Orbit Velocity at 106ft. (190 mi)	r ·		25,400 ft/sec

\*Standard vernier system (6 sec. after burnout) coatinues until altitude is about 350,000 ft. Long duration jetsystem may utilize LOX tank gas to turn body to horizontal and hold it for about five (5) minutes, while coasting to apogee.

\*\*
$$1_{sp}$$
\*  $\frac{1.309 \times 10^6}{(18:1 \text{ expansion nozzle})}$  = 225;  $I_{sp} \times g$  = 7250 ft/sec.

#### STRUCTURAL CONSIDERATIONS

(See Figure 3)

Case 1. Consider bending moment on interstage connection due to sharp edge side gust of 60 ft/sec., applied at maximum dynamic pressure condition of qmax = 800 lbs/sq ft., Altitude = 35000 ft., Velocity = 1500 ft/sec.

Change in angle of attack = 60/1500 = .04 rad.

Side force on nose =  $C_L$  qS = 2.0 x 800 x 4.9 x .04 = 315 lbs.

Bending moment at rear of Sgt. = 315 x 300 = 100,000 inch lbs. (applied)

Case 2.. Consider bending moment at interstage connection due to suddern application of control on the main motor. One degree tip of main nozzle gives a moment of

$$M_{cg} = \frac{153,000}{57.3} \times 45 = 120,000 \text{ ft } 1bs/0$$

Angular acceleration about the center of gravity will be

$$cg = \frac{M}{I} = \frac{120,000}{300,000} = 0.4 \text{ rad/sec}^2/0 \text{ (near burnout)}$$

Moment at interstage connection will be

M/o = I = 
$$\frac{\text{MI}^2}{3}$$
 =  $\frac{9000}{3 \times 32}$  x 20<sup>2</sup> x 0.4 = 14,400 ft 1b/o = 172,000 in 1b/o

\*Present T=65 is designed for hoisting moment of 505,000 in 1b. and hence could take at least 3 degrees of motor tip.

Bending stress on Sta. 151; 
$$f = \frac{M_y}{1} = \frac{500,000 \times 37}{x_{37}^3 \times .05}$$
  
= 2500 lbs/sq in

This corresponds to an increase in tank pressure of about 7.5 psi.

Bending stress on rear of T-65 = 
$$\frac{500.000 \times 15.5}{\text{ } \times 15.5^3 \times .125}$$
  
= 6000 lbs/sq. in.

Reaction to resist Bending Moment R = M/d

Where d = 36 in. R = 
$$\frac{500,000}{36}$$
 = 14,000 lbs.

It is simple to carry this load on two rings of adaptor.

\*For further analysis of T-65 load conditions, refer to Thiokol Report SP - 59 "Preliminary Model Spec, Rocket Motor, Solid Prop. T-65, 24-KS-50,000. SP-59". 5 July 55. (Conf.)

SEPARATION OF STAGES: REMAINING GAS IN FUEL TANK MAY BE DUMPED INTO CYLINDER BEHIND T-65

(JOINT AT STATION 50 - DIAM. 54" - SIMILAR)

REPLACE THOR NOSE WITH INTERSTAGE CONNECTOR

-

# PROPOSED THREE-STAGE SATELLITE VEHICLE .USING IRBM:BOOSTER WITH TWO STAGES OF RTV

200 1tm

Stage 2 and 3 weight 9,980 lbs. including payload Boosber burnout velocity,12,050 ft/sec

Stage 3 9,000 5,700

Rerth's Motation 1500 ft/sec

Total Velocity Stage 3 23,930 ft/sec

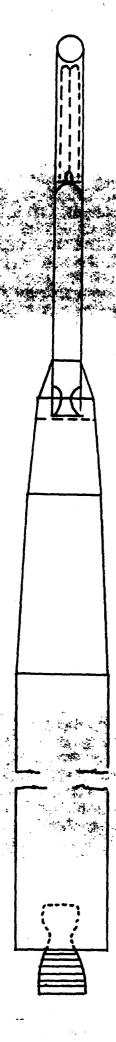
#### Plan of Operation

Fire Stage 1. The vehicle then executes a programmed turn to horizontal at apogee, using autopilot. Conventional controls to burnout, with low-thrust vernier to apogee for attitude control.

Separation, Spin-up and Stage 2 Ignition. The second stage is ejected using pyrotechnic or mechanical ejector unit, initiated by programmer on Stage 1. Motion of separation causes spin-up rocket ignition. Stage 2 motor ignition, and initiation of time fuze for Stage 3 ignition.

Stage 3 Ignition. After time fuze ignites Stage 3 it is launched through guide rails attached to empty Stage 2, thus minimizing its dispersion.

Payload Separation. Depending on the purpose of the flight, payload may or may not be separated from its empty rocket case.



### WEIGHT SUMMARY AND PERFORMANCE ESTIMATE

## THREE-STAGE SATELLITE VEHICLE WITH SPIN-UP

Present weight empty of IRBM (Dry) Residual Propellant Present weight empty of IRBM (Wet) Usable Propellant	11,635 1bs. 1,897 13,532 1bs. 97,906
Gross weight of present IRBM	111,438 lbs.
Items to be removed - Same as p. 7 Items to be added - Same as p. 7	-5,461 -485
Net weight of Stage 1	106,462
Weight of Stage 2	9,980
Satellite Payload	200
Three Recruit Cluster (including 3 x 263 lbs. propellant	1,270 1470 Gross Wt. Stage 3
T-65 motor with 18:1 nozzle (including 6978 lbs. propellant)	8,260
Spin-up rocket installation	150
Launcher for Stage 3	100
Launch weight of Stage 1	116,442 lbs.
Less usable propellant	97,906
Empty weight of Stage L	18,536 lbs.
Estimated Burnout Velocity - Stage 1 1	2,050 ft/sec@255,000ft 7,730 @ 300 mi
Velocity increment Stage 2 = 7250 1g283	9,000
Velocity increment Stage 3 = 7400 lg 14	70 5,700
Earth's rotational velocity	1,500
Estimated Burnout Velocity - Stage 3	23,930 ft/sec
Velocity required to orbit at 300 mile	altitude 23,900 ft/sec.

#### DISPERSION OF STAGE 2

Deviation from direction of launch =  $\oint \frac{M}{Aw^2} \frac{\sin a wt - a \sin wt}{1 - a}$ 

where M = unbalanced moment - ft. lbs. (various causes)

A = polar moment of inertia about longitudinal axis - slug ft<sup>2</sup>

B moment of inertia about lateral axis thru cg.

 $a = \frac{A}{B}$ 

1

w = spin frequency in rad/sec.

Cause 1 = Malalignment of thrust axis 1/4 degree = .0044 rad.

So  $M = 50,000 \times .0044 \times 12^{1} = 2640 \text{ ft. 1bs.}$ 

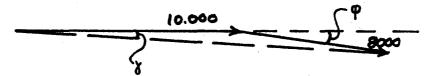
A = 2 x  $\frac{10,000}{32.2}$  x 1 = 620 slug ft<sup>2</sup> to 120 slug ft<sup>2</sup> (at burnout)

 $B = \frac{10,000}{32.2} \times 25^2 = 195,000 \text{ slug ft}^2 \text{ to } 39000 \text{ slug ft}^2$ 

a = .0032 .0032

W = 2 × 4 - 25 rad/sec using spin-up rockets.

Then  $\phi = \frac{2640}{620 \times 25^2} = .0068 \text{ rad.} = .39^{\circ}$  .034 rad.



Dispersion angle = .034  $\frac{8000}{18.000}$  = .0152 rad. = 0.87°

Cause 2 - Unbalanced mass distribution; i.e. dynamic unblance.
The empty motor can be balanced to the order of 10<sup>-6</sup>rad.

The loaded motor can also be balance to the order of 10<sup>-6</sup> rad.

This cause of dispersion is thus seen to be several orders of magnitude less that Cause 1 above.

Cause 3 - Tip-off from booster. The attitude of the booster is assumed to be held accurately to .001 rad. \* Ejection of Stage 2 and spin-up in 0.5 sec. are expected to increase this value to .002 radian; i.e. 45% of Cause 1.

Conclusion:  $y_1 = \sqrt{y_1^2 + y_2^2 + y_3^3 + \dots + y_1^2}$  is believed to be of the order of 1 degree for Stage 2.

\*Such guidance accuracy may require heavier equipment than assumed in the weight summary.

#### DISPERSION OF STAGE 3

Cause 1 - Difference in ignition timing for three (3) rockets. It may be assumed that all 3 rockets ignite, but one of them ignites .005 sec. before the others, thus giving an increment of thrust (say 1/3 of 37,000 lbs) for .004 sec. at moment arm of 3 inches.

$$M = M\frac{At}{t} = \frac{37,000}{1.53} \times \frac{18}{4} = 30. \text{ ft. 1b.}$$

$$A = \frac{2 \times 1770}{32.2} \times 4^2 = 17.5 \text{ slug ft}^2 \text{ to 8.0 slug ft}^2$$

$$B = \frac{1770}{32.2} \times 8^2$$
 = 3500 slug ft<sup>2</sup> to 1700

$$\phi_{1} = \frac{30 \text{ x}}{8 \times 25^2} - .0048 \text{ rad.}$$

$$\gamma_{1}$$
 .0048  $\frac{5200}{23,000}$  \* .0011 rad.

Cause 2 - 2% difference in thrust of one of three motors

M = .02 x 37,000 x 
$$\frac{1}{4}$$
 = 185 ft. 1b.

$$\frac{7}{2}$$
 = .0011 ×  $\frac{185}{30}$  = .0068 rad.

1 K

Cause 3 - Malalignment of thrust line of one motor  $1/4^{\circ}$  = .0044 rad.

 $M = 37,000 \times .0044 \times 6 = 980 \text{ ft. 1b.}$ 

 $y_3 = .0011 \times \frac{980}{30} = 0.035 \text{ rad.} = 2^{\circ} \text{ (Probably less)}$ 

Conclusion: 
$$\{ Y_1 = \sqrt{(Y_1^2)_1 + (Y_1^2)_2 + (Y_1^2)_3} \}$$
 is believed to be

of the order of 2 to 3 degrees, according to the above analysis. This will vary as  $1/w^2$ ; hence a slight increase in spin rate would be desirable.

## WEIGHT SUMMARY AND PERFORMANCE ESTIMATE

## FOUR-STAGE VEHICLE WITH IRBM AND RTV

Present weight empty of IRBM (Dry) Residual Propellant	11,635 lbs. 1,897	
Present weight empty of IRBM (Wet) Usable Propellant	13,532 97,906	
Gross weight of present IRBM	•	111,438 lbs.
Items to be removed - Same as p. 7	•	-5,461
Items to be added - Same as p. 7 -	•	<u>-485</u>
Net weight of Stage 1	<b>~</b>	106,462 lbs.
Weight of Stage 2		10,500
RTV 1st Stage 10,500 lbs (less fins) including 6978 lbs propellant plus spin-up rockets 150 lbs. which drop off after .5 sec.		
RTV 2d Stage 1770 lbs. including 3 x 263 lbs propellant		
Launch Weight of Stage 1		116,962 lbs.
Less usable propellant in Stage 1		97,906
Empty weight of Stage 1		19,056 lbs.
Estimated Burnout Velocity of Stage 1		11,800 ft/sec
Velocity increment Stage 2 = 7250	$\log \frac{10.350}{3,372} - 285 =$	7,800
Velocity increment Stage 3 = 7400	log <u>1.770</u> •	4,400
Velocity increment Stage 4 m 7400	$\log \frac{500}{240} =$	<u>5,<del>4</del>00</u>
Estimated Burnout Velocity - Stage 4		29,400 ft/sec

### APPENDIX

### METHOD OF COMPUTING PERFORMANCE

The performance of Stage 1 was computed on the 1103 Computer in the same detailed manner as for the IRBM. Four values of burnout weight were used; i.e., the nominal weight of the standard missile and three higher values. Burnout velocity and altitude is plotted in Fig. 4 as a function of burnout weight for the case of 97,906 pounds of usable propellant.

For later stages, the velocity increment is shown in Fig. 5 as a function of mass ratio for various vlues of effective exhaust velocity. The effect of gravity and drag for Stage 2 operation in a long range trajectory was computed on the 1103 Computer, and found to be 285 ft/sec. The velocity increments determined from the chart should therefore be decreased slightly for gravity and drag.

Range as a function of burnout velocity is shown in Fig. 6 for the IRBM family of missiles. The four points computed on the 1103 Computer are distinguished by asterisks.







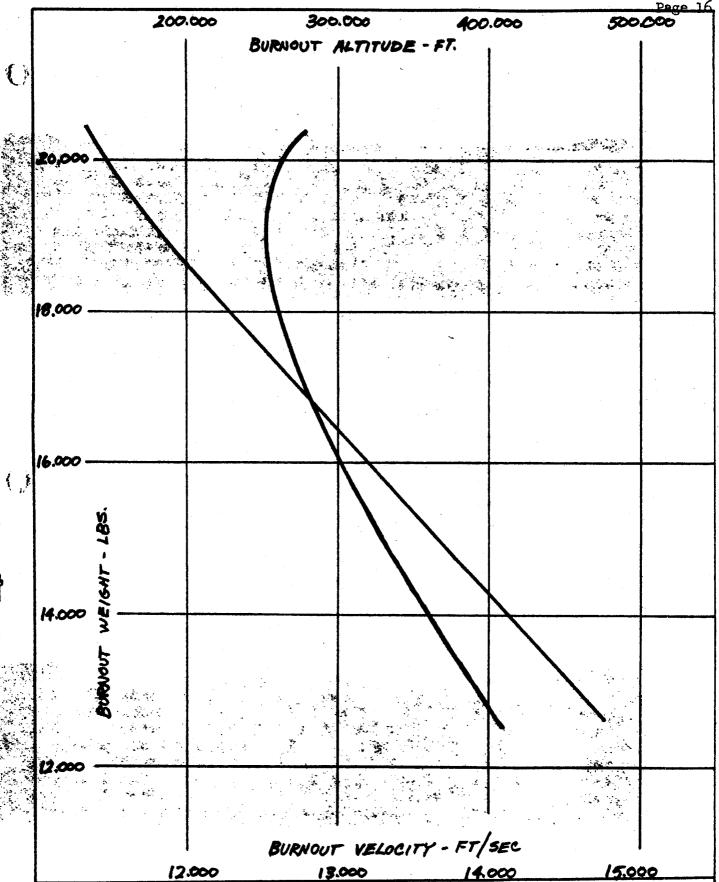
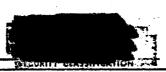


FIG. 4 BURNOUT VELOCITY AND ALTITUDE VS WEIGHT FOR STAGE !

FIG. 6 RANGE VS. BURNOUT VELOCITY

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#### 20. REQUIREMENT AND/OR JUSTIFICATION

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System Requirement No. 5 dated 17 October 1955 and subsequent letter directive from WDD dated 23 December 1955 assigned to AFCRC the responsibility for providing environmental data which affect the design and testing of ARS vehicles. Based on independent studies by the Geophysic Research Directorate the three design study contractors and conferences with personnel of the WSPO, it was concluded that in four areas of geophysical environment insufficient data were available for successful design and test of the Advanced Reconnaissance System Vehicles. The four so considered are (a) Meteor Physics (b) Density at Orbital Altitudes, (c) Solar Radiation in the U.V. and X-ray Region and (d) Thermal Radiation. Specific discussions of requirements for additional design data in each of these areas are included under each task.

# 21 a. Brief and Military Characteristics

The objective of this project is to provide environmental data considered essential to insure and simplify the design of a successful Advanced Reconnaissance System.

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2 April 19: Proj 1764

21 b. Approach

See individual Tasks. (21c)

#### 21 c. Tasks

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- 1. (a) T-39791 Solar Radiation Program in Ultraviolet and X-ray Region for ARS
- (b) This task will be accomplished through a combination of "in-house" and contractual effort. Currently the contractual effort is by Comstock and Westcott, Inc., under Contract AF 19(604)-1889. Other contractors contemplated at the moment are: University of Chicago, Chicago, Ill. and Radio Corporation of America, New York, N. Y.
- (c) Task objective is to determine the intensity of Solar U.V. and Soft X-ray radiation as it would strike the satellite and the extent of damage due to collisions of molecules; atoms and ions with the satellite surface.

# Requirement and/or Justification

Vehicle design will be affected by radiation in the solar ultraviolet and X-ray region. It has been shown by GRD that the quantum yield of photoelectric effect on metals exposed to short wavelength ultraviolet is about 250 times as great as that of the conventional photoelectric effect in the visible an near UV. Thus, since a vehicle traveling at 500 km is essentially receiving unfiltered solar radiation of low wavelength, one must consider a possible "charging up" of the metal due to the loss of photoelectrons from the surface. This charge can theoretically rise to a high voltage, depending on the wavelength and intensity distribution of the incident radiation. Such a charging-up could influence the telemetering or other electronic functions of the equipment in the vehicle. Also, it is known that short wavelength ultraviolet causes deterioration of a plastic surface. This could fog plexiglass and damage rubber-like materials. Present data are inadequate to evaluate this effect simply because we do not know within several factors of ten the solar intensity above the atmosphere at wavelengths below 1500 Angstrom Units and we believe that design purposes can therefore not be satisfied.

There might be heating of the vehicle to contend with, due to recombination of atoms on the surface as well as impacts with other atoms and molecules. Such a heating effect would be super-imposed on that due to solar radiation and would act even at night when the vehicle is shielded from the sun by the earth. Since solar ultraviolet and X-ray radiation is part of the total picture of the integrated interaction of the sun and the earth's atmosphere and data of this kind are extremely scarce the measurements of these variables at vehicle altitude would be unique. These measurements would give us information as to the physical mechanisms operating in the ionosphere and delimit in an essential fashion thereonospheric functioning by giving us a better understanding of the nature of atmospheric ionization. This would assist in the forecasting of ionospheric propagation and could contribute toward the solution of the satellite communications problem.

(UNCLASSIFIED TITLE) Geophysical Environment Short Title: ARS Environment

Proj 1764

# (d) Approach

At the present time, there are two main areas of research:

(1) A laboratory investigation of the effect of collisions of particles, atoms, molecules and ions on solid surfaces (sputtering) conjoined wit the effect of recombination of atomic species on solid surfaces.

This laboratory study will be carried on mainly in-house, but with modest contract let for auxiliary studies.

Primary in this research will be the problem of developing ultra high vacuum mass spectrometer tubes for study of the effect of ion bombardment of surfaces. Such a tube would require suitable component parts, valve sealants, tubing and pumps to obtain this vacuum. This is necessary to duplicate in the laboratory pressures at satellite altitudes. The feasibility of this development has already been established by in-house work. About half of this is finished, leaving principally design engineering.

Different techniques, among them molecular beams, will be used for the acceleration of the non-charged particles on receiving test plates the nature of which will be determined by vehicle design. In particular, the effect on metals will be examined. The plates will be tested by a variety techniques, microscopes, etc., for possible damage due to momentum transport (sputtering).

(2) Solar ultraviolet and X-ray study -- The goal set in this research is the measurement of absolute intensities of the solar spectrum from 1500 Angstroms down to a few Angstroms. This program is divided into three phases, laboratory investigations, measurements of solar intensities in rockets and finally, construction of the satellite instrumentation by miniaturization of rocket instrumentation.

This region of the spectrum is relatively unexplored; hence, a whole new system of monochromators, sources and detectors must be constructed. First, there must be the calibration against a primary detector, thermocouple not calorimetric. These secondary detectors must be reliable and reproducible. In type, they may be dependent upon the interaction of radiation with a filling gas or on the effect of radiation upon a cathode. Therefore, laboratory work will be needed to select adequate detectors.

The monochromators to be constructed are unique in design and rather elaborate in the equipment necessary to perform the desired calibration. They have already been designed and are presently under construction. To put them into actual operation will take an extensive period of working-out of the manifold details and problems involved.

The construction of detectors will be to a large extent

under contract.

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Because the interaction of matter with radiation in this region is as yet little understood, the objectives can only be reached by an extensive deepening of our insights into the nature of these processes. For example, a predicted phenomena is that of photoconductivity effect. This, when more fully investigated, may yield a possible secondary type of detector.

The process of building suitable detectors can only go on simulateneously with this type of exploratory research. After the laboratory phase, the instruments will be flown in Aerobee-Hi rockets to measure the radiation intensity above the earth's atmosphere. The number of flights necessary will be at least six, possibly increasing to eight or nine depending on results.

# 2. (a) T-39792 Interplanetary Matter and Meteor Physics in Relation to ARS

- (b) This task will be accomplished through a combination of "inhouse" and contractual effort. Currently the following contracts are in effect:
  - (1) AF 19(604)-1894 Temple University .
  - (2) AF 19(604)-1908 Oklahoma A and M
  - (3) AF 19(604)-1901 Smithsonian Observatory
  - (4) AF 19(604)-1892 Stanford Research Inst.

No other contracts are contemplated at the moment.

(c) The objective of this task is to determine the possible hazard from meteoric bombardments to a vehicle above the earth's atmosphere and to provide data as to the spatial distribution, size, composition, and velocity of micrometeoric matter.

## Requirement and/or Justification

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The hazard from meteoric collision with a body essentially in interplanetary space, unprotected by the earth's atmosphere is not very well known. The probability of collisions intense enough to destroy the vehicle or affect its operation is very important in the design of a protective "meteor bumper" to insure proper operation of the vehicle. These meteoric collisions may result in dangerous surface erosions affecting heat exchange properties and optical windows. Stability, temperature control, reliability may all be influenced by meteoric bombardment.

Information regarding the influx of meteoric material into the earth's atmosphere has been collected by the following methods: visual observations, photography, radio reflections from meteor trails, and telescopic observations. From such studies and measurements, the diurnal and seasonal variations in the influx of sporadic meteors, velocities and radiants of shower meteors, velocity distribution of sporadic meteors, mass distribution of meteors, and spatial density of meteors have been determined. These measurements give a value for the rate of influx of interplanetary material into the earth's

2 April 1957 Proj 1764

atmosphere of 5 x  $10^6$  gm per day. However, these ground-based methods are limited and a grave anomaly, of importance to the ARS, exists. Since the visual and photographic methods are only sensitive to meteors of visual magnitude +5  $(10^{-2}$  grams mass,  $10^{11}$  ergs energy) and the radio and telescope methods to visual magnitude of the order of +8 (mass x  $10^{-4}$  gm, energy 6 x  $10^9$  ergs), information derived from these methods regarding meteoric particles with mass less than  $10^{-4}$  gm is seriously lacking. These smaller particles are far more numerous and therefore have a high probability of encountering a vehicle above the earth's atmosphere.

The anomaly on the influx of interplanetary matter arises from various indirect measurements of the fine interplanetary matter. These measurements include determination of the density of matter in the zodiacal cloud, or the interplanetary dust cloud, by S. C. Van de Hulst and C. W. Allen; measurements of the nickel content in deep sea ocean sediments by H. Pettersson and H. Rotsch; and initial rocket soundings from V-2 and Aerobee rockets. These measurements indicate a rate of accretion of interplanetary matter by the earth as high as  $5 \times 10^{10}$  gm per day, up to a factor of  $10^4$  times higher than predicted from regular methods of observation. It seems, also, that this high rate of influx may be necessary to explain the presence of the E region ionization during the night. This higher rate leads to a'probably encounter for visual magnitude 15 (energy 10<sup>10</sup> Bev) of one hit per square meter per second. Such impact rates are significant for a vehicle with a required lifetime of about a year. These impact rates may possibly be further increased by a factor as great as  $10^4$  to  $10^6$  if geomagnetic focusing of cosmic dust particles, suggested also by S. F. Singer, was detected experimentally.

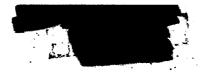
From the standpoint of ARS, the hazard to space vehicles in an interplanetary environment seems closely dependent upon the effects of interplanetary matter, as well as such other factors as cosmic radiation, atmospheric drag, and energetic solar radiation. On the one hand, relatively large impacts may result in penetration of the vehicle surface and subsequent destruction of important equipment, affecting the usefulness of the vehicle, while smaller impacts would result in an abrasion affecting the usefulness of lenses and photosensitive surface areas, etc.

It is therefore necessary to determine the probability of collisions with interplanetary particles as a function to time, and the effect of the individual collisions on the vehicle in order to determine design criteria for ARS. These requirements may be fulfilled by a measurement program involving high altitude rockets and satellite type vehicles, and direct laboratory studies of high speed impact interactions. Related studies that would support direct probing methods are also of interest in order to afford a higher degree of validity to the experimental results.

#### (d) Approach

The areas of investigation in this task may be broadly divided into rocket and satellite experiments and laboratory studies.





# (1) Determination of the influx of meteoric material by rocket experiments

This includes the design and construction of equipment and launching of rockets containing this equipment for the detection of meteoric material. The equipment for detecting meteoric material will operate on the principle of detecting the vibrational energy generated upon impact. This apparatus includes piezoelectric accelerometer, an amplifier, and a telemetering system with its associated ground-based receiver-recorder. Aero bee and/or Nike-Cajun rockets will be used to carry out the program. It is important that a statistically valid sample of meteoric material be obtained for final design of the ARS.

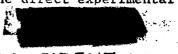
The program of research for direct rocket probing of interplanetary matter involves first the design and development of a basic piezoelectric accelerometer capable of measuring the spatial distribution and mass of interplanetary particles. Such equipment has been used by Prof. Bohn in 1949 and was used again during 1955. Hence, only minor development and calibration methods are required prior to construction of the basic unit. Such equipment is sensitive enough to detect particles of visual magnitude 25. Approximately ten to twenty detection units will be built on a semi-mass production basis. Approximately five to ten successful experimental firings from Holloman Air Force Base using Aerobee rockets are required prior to establishing a weighted statistical figure for the intensity and probability of a particle impact with a vehicle. About five successful firings at a high latitude would be required to establish the extent of a latitude dependence particularly by small meteoric particles.

(2) Design and development of equipment for detection of meteoric material for inclusion in the ARS.

It is expected that development work in the rocket phase of detection of meteoric material will aid greatly in the development of equipment of a similar nature to be included in the early oribiting and non-orbiting ARS test vehicles. It is important that the apparatus be designed with a high degree of reliability, yet be lightweight, and have a low power requirement.

(3) Theoretical and laboratory studies and high speed impact phenomena

Essential to the measurement of interplanetary matter is a knowledge of the relation of the intensity and frequency distribution of the accoustical energy generated by high speed meteoric impacts to the mass, the mass density, and the velocity of collision with the meteoric particle. Thereby, the surface erosion and the distribution function of meteoric material in space may be determined from the ARS measurements. Polished plate experiments on rockets that may be recovered will yield some information, but high speed impact measurements in the laboratory for the study of collisions of solids with gases and surfaces are required to support this subtask. In addition, optical and radio measurements of meteor influx and atmospheric interactions will also assist in the direct experimental studies.



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(UNCLASSIFIED TITLE) Geophysical Environment Short Title: ARS Environment

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2 April 1957 Proj 1764

High speed impact studies of particles with surfaces are possible at this time only by a method using shaped charges, since only by this means have particle velocities comparable with meteor velocities been generated in a laboratory basis. The physics of high speed interactions is not well understood, and experimental measurements at velocities up to 50 km/sec are highly desirable. Even then, it is difficult to predict the degree of success of this technique, but this approach is presently available at relatively low cost. Because the energy density of the impacting reactions may be as much as a hundred times greater than previously observed, considerably different effects than theoretically predicted are to be expected.

# (4) Theoretical studies

This subtask is concerned with the correlation and application of various data applicable to the problem of determining the hazard from interplanetary matter upon ARS. Where possible, information from shock tube studies, radio and optical meteoric studies, investigations of meteoric craters, deep see ocean sediments, microchemical analysis of rare gas constituents, etc., that contribute to the overall problem of the determination of the hazard from interplanetary matter will be considered. In this manner, the reliability of the information derived from the direct experimental program may be further evaluated.

The primary emphasis of the approach of the 4 subtasks, therefore, is the determination of the spatial distribution of interplanetary matter, the size distribution, and the mass density of this material, and thus with suitable laboratory studies to be able to predict the probability that meteoric material may penetrate a given thickness of satellite skin per unit time, and the rate of erosion per unit area for a surface exposed above the earth's atmosphere. An improved understanding of the physics of hypersonic interactions in the velocity range equivalent to an energy of 50 to 1000 electron volts is also of importance.

The rocket program for detection of meteoric particles would require approximately ten successful rocket flights up to altitudes as high as 150 km before sufficient data to make a satisfactory estimate of the rate of influx of interplanetary matter. It should be stressed that ten successful flights corresponds to a total measuring time of about a quarter of an hour above altitudes of 50 km. (Measurements below this altitude would be contaminated by terrestrial material). From considerations of the normal difficulties experienced in past experimental programs using high altitude rockets, probably instrumentation for fifteen rockets will be necessary. The estimated cost of development and construction of this instrument is 60M to 100M based on cost of 5M per instrumentation. The cost of rockets for this work based on 30M for a single Aerobee rocket would be 450M for 15 Aerobees. However, since the meteoric detection equipment may be used on a Nike-Cajun rocket system, also, the overall rocket cost is expected to be much lower than the



estimate using Aerobee because the Nike-Cajun system when it becomes available would cost less than half as much as an Aerobee. The fund requirements however, are based upon rocket requirements using Aerobees.

Upon availability of an ARS vehicle as a platform for the measurement of meteoric particles, a relatively large sampling time for making measurements of interplanetary matter will be available. It is therefore of importance that meteoric detection equipment be mounted on such an early test vehicle. Such equipment must be very reliable and capable of operation over a long period of time, while its weight should be kept to a minimum. The development of equipment for the ARS is estimated to cost 50M over a two-year period, while flight and rocket testing would involve an additional 40M.

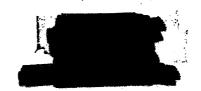
The program on research on high speed impact phenomena will be based on studies using shaped charges, and also investigations of dynamic interactions of meteoroids in the atmosphere. The estimated cost of the initial phase of this work is 80M over a two-year period.

- 3. (a) T-39793 Atmospheric Density Determination at Altitudes
  of Artifical Earth Satellites.
- (b) This task will be accomplished through a combination of "inhouse" and contractual effort. Current contracts in effect are as follows:
  - (1) AF 19(604)-1871 University of Michigan
  - (2) AF 19(604)-1890 University of Michigan
- (c) The objective of this task is to obtain reliable values of atmopheric density, pressure and kinetic temperature between the altitudes of 200 to 400 miles.

## Requirement and/or Justification

The primary objective of this task is to obtain reliable values of atmos pheric density, pressure and kinetic temperature in the vicinity of 200 to 400 miles altitude, the altitude of a proposed satellite system. These data are needed in solving various problems on the design of the ARS vehicle. Some of these problems are:

- 1. What altitude must be maintained by a satellite vehicle of specified size and shape in order that the atmospheric drag be sufficiently small to permit a minimum specified life time of the satellite.
- 2. How does temperature rise on the skin of the satellite vehicle due to aerodynamic heating (friction between itself and the molecules of the atmosphere) vary with altitude below 400 miles altitude.
- 3. What is the minimum value of mass to cross-section area ratio of a satellite which will permit the required lifetime to be achieved at specific



orbiting altitudes. The present estimates of the magnitudes of these properties are quite uncertain. Pressure and desnity may be in error by factor of 100 or-1000 at 350 miles altitude because they are based on extrapolation of values at 100 miles and on unconfirmed theories. Extension of measurements to 200 miles or 250 miles altitude would greatly improve the reliability of extrapolation to 300 miles, while measurements at 300 miles would be even better.

The task involves the study and implementation of two basically different methods for obtaining the necessary data. The first method involves the direct measurement of the drag force on a sphere falling from great altitudes after its ejection from a rocket. This method is of special interest since it is the drag force on the satellite which ultimately determines its life Results of this measurement are free from effects of contamination from the rocket. The limitation of this method lies in the fact that the sphere must fall from an altitude of 10 to 20 percent higher than that for which the drag data are desired.

The second method for obtaining these data involves a selective ionization gauge for measuring number density of particular constituents as well as total number density. This method in principle may be used to the peak of rocket trajectory but is adversely affected by contamination from the mother rocket. Various outgassing and ejection techniques under study will minimize this limitation.

A secondary objective of this task is to develop the necessary techniques and devices for measuring pressure, temperature and density from ARS test vehicles. This phase depends in part upon the success of the primary objectives, although the conditions for outgassing are sufficiently different to materially simplify the accomplishment of this objective.

### (d) Approach

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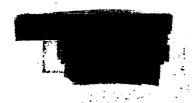
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At this writing, the task appears to involve eight steps.

(1) Feasibility study of two proposed methods for measuring the required parameters.

The feasibility of two methods for the measurement of atmospheric density, pressure and temperature are being explored. These methods are (1) an extension of the falling sphere experiment and (2) the ionization gauge experiment currently being employed up to altitudes of 75 to 100 miles.

The present falling sphere experiment involves the ejection of a sphere from a rocket at high altitudes, and the measurement of the drag force of the atmosphere on the sphere as it moves though space. (It may be ejected anytime after the end of rocket powered flight and hence will rise to a peak slightly lower than that of the rocket.



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The sphere contains an accelerometer which measures drag acceleration as a function of time to 1% accuracy, independent of orientation. The sphere also contains a radio transmitter which relays the accelerometer signal to a ground recorder. The double integration of the total acceleration yields sphere altitude as a function of time to a reasonable accuracy for high angle flights. An independent complicated analytical reiteration method yields sphere velocity and altitude versus time independently. The determination of atmospheric density depends upon a knowledge of drag coefficient at the mach numbers and Reynold's numbers experienced by the sphere. These values of drag coefficient have been measured in ballistic ranges and hypersonic wind tunnels.

The present ionization gauge experiment involves the measurement of ion current from ionized air molecules on one or more chambers on the surface of a rocket. The knowledge of air pressures around conical surfaces with known orientation to the air stream leads to a value of ambient pressure and to temperature if the relative velocity of cone to air is known. This sytem requires some kind of tracking for high accuracy although integration of pressure and temperature values results in approximate altitudes.

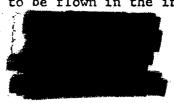
Extending the sphere experiment to higher altitudes involves increasing the area to mass ratio of the sphere, shifting the range of the accelerometer to very low values (this essentially eliminates its use at higher accelerations, corresponding to lower altitudes). The system does not work at or near zenith since the velocity is too low (approaching zero for a verital flight) for drag to be measurable.

The extension of the ionization gauge method involves three main steps: (a) Adapting to rocket use existing ionization gauges designed for ver low pressures (Alpert type); (b) eliminating the effect of contamination of the measurement from rocket outgassing by housing the gauges in a separate thoroughly outgassed body which will be spring ejected from an evacuated cavity at high altitude; (c) Eliminating the uncertainty of molecular dissociation by making the gauge sensitive to only one or two specific molecular species through simple mass spectrometer techniques.

The feasibility study of the use of these methods at high altitudes is currently under way and involves a study of (a) the theoretical limitation (b) inherent sources and estimates of errors (c) engineering difficulties (d) space and weight requirements (e) estimated cost per flight. An analysis of these studies will determine which method has the better chance of success, but at present it appears that both should be tried. Perhaps both may be flown simultaneously in each, rocket vehicle.

(2) Design and construction of preliminary models of equipment for one or both methods

This step of the task involves the design and construction of the equipment which is expected to be flown in the initial series of rocket



flights. This step may include wind tunnel tests or rocket flight tests of speci ic portions of the total instrumentation for the method, as well as the final packaging of at least two sets of the equipment for the rocket flights of each of the two methods.

# (3) Initial rocket flights of the equipment for one or both methods

This step includes the field operation involved in preparing the equipment for actual rocket flight together with the necessary operation of the rocket flights for each method. The preparation for two flights is insurance against rocket or other failure during the first flight.

# (4) Evaluation of flight performance and necessary redesign of equipment

This step involves the detailed study of the telemeter record of the flight to determine the performance of the various parts of the measuring equipment, as well as the transcription of recorded data to usable form for computation of the required atmospheric parameters. Deficiencies in the performance of the equipment detected by the record are then to be removed by suitable redesign. Because of the urgency of the program, major portions of the equipment should already have been constructed at this point for the series of data-gathering flights and it will be necessary to take the chance of having to modify some of the components at this stage of the task.

# (5) Major series of data gathering rocket flights

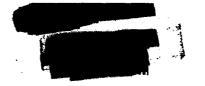
This step of the task involves the flying of three to ten sets of instrumentation for density and or pressure measurements in special 300 mile altitude rockets presently being designed for AFCRC or in non-orbiting ARS Weapons System test vehicles or both. Contact will be made with the ARS Weapon System office to obtain space in these test vehicles. If the first three flights indicate sufficient self-consistency the balance of the data gathering flights can be cancelled.

The special 300 mile altitude rocket is a multi-stage system made up of existing rocket components, i.e., Cajun rockets and Nike bcosters. An engineering study presently contracted for will result in engineering drawings for the necessary fins and coupling devices and nose cone necessary to combine the propulsion system into an atmospheric data gathering rocket system capable of carrying 40 lbs. of instrumentation to 200 - 300 miles. Upon completion of this engineering study, engineering drawings will be available from which the necessary parts and propulsion units may be built and purchased at an estimated cost of \$20,000 per rocket system.

# (6) Analysis of data and preparation of revised atmospheric model

This step of the task involves the reading of telemeter records, the computation of the values of the atmospheric parameters, and





the compilation of these data into consistent atmospheric models. This step is not necessarily limited to follow step (5) chronologically, but will follow each rocket flight from which usable data results.

# (7) Repackaging of equipment for test satellite vehicles

This step involves the electrical mechanical redesign of the equipment used in the rocket firings of step (5) or planned in steps (1) and (2) to make that equipment suitable for gathering desired atmospheric data from ARS test vehicle.

(8) Installation and flight of density and pressure measuring equipment in satellite vehicle

This phase involves the field operation of a program for measuring atmospheric density and pressure at orbital altitudes of satellite test vehicles, and would be followed by a reapplication of step (6).

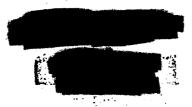
# 4. (a) T-39794 - Thermal Radiation Program for ARS

- (b) This task will be accomplished through a combination of "in-house" and contractual effort. Present contractor is the University of Colorado under Contract AF 19(604)-1899. Additional contracts are contemplated.
- (c) The objective of this task is to measure the intensity of irradiant heat sources above the atmosphere.

The radiation environment is one of the external conditions which may grievously affect the period during which information can be obtained from an oribiting satellite.

To be operational, the design of the satellite must be engineered so as to maintain within pre-determined limits the temperatures of vital communication components, such as electronic units, batteries, etc. If and when nuclear sources are used for power, then the excess energy must be radiated away from an external heat exchanger; its design requires a knowledge of the radiation exchange environment.

The temperature of a satellite in orbit at given times and places can be calculated. Required for these calculations are a knowledge of the interstellar heat sink into which it is radiating energy -- thus cooling it -- and a knowledge of the intensities of the thermal fluxes which tend to warm it. Estimates of the equilibrium temperature of the satellite can be verified only by measurements within the orbiting satellite. Under the worst condition the



temperature within the communication equipment may cause it to fail before any information is received. A slightly more favorable but undesirable condition would be a premature failure of communcation, (Thus, should the absorptivity--equal to emissivity--of the skin of the satellite change while in orbit, the equilibrium temperature of the satellite might differ drastically from that calculated on the basis of design specifications.)

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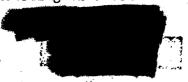
The objective of this task is, then, the development and testing of devices adequate for the measurement of the three irradiant sources—direct solar energy, solar energy reflected jointly from earth and atmosphere (I.E., albedo) and earth emissivity (in the infrared)—and the flux from a satellite into interstellar space.

It is proposed that flux measuring devices should be installed on the earliest test vehicles so that flux measurements can be obtained so long as communication with the satellite is continued. Should communications then cease, and should the thermal, flux measurements seriously disagree with the values in the design calculations, at least one source of possible trouble should be identified.

During the development and testing of the devices for measuring the three sorts of radiation, balloon and rockets equipped with these devices will be flown. As scientific by-products of the testing program, some confirmation of current estimates of the intensities of the three sources will be obtained. Our present information on the radiation environment is next summarized.

Reliability of Present Estimates of the Solar Constant and the Albedo and Infrared Emission of Earth Plus Atmosphere

- a) The solar constant is believed to lie between 1.946 and 2.05 gram calories centimeter  $^{-2}$  minute  $^{-1}$ , a deviation of 3% from the mean of 2.0 gm cal cn $^{-2}$  min $^{-1}$ (1,396 watts meter  $^{-2}$ ).
- b) For this discussion, the term albedo applies to the solar radiation reflected directly from the earth's surface and scattered and reflected from the atmosphere with its content of clouds. From point to point in the orbit of a satellite with orbital distances as now stated the albedo will be highly variable. Deviations may be expected of at least plus or minus 20 30 per cent from the mean value of the albedo which may be taken as lying between 36-56 per cent (I.E. approximately 36-56 per cent of the solar constant is diffusely reflected or scattered back from the earth).
- c) The infrared emission of the earth may be estimated by theory. Current estimates for the various zones of latitude obtained by deduction may well be in error by 20 to 50 per cent; on the average energy to about 32 per cent of the solar constant is diffusely emitted as infrared radiation from the unit consisting of earth and atmosphere.





### (d) Approach

# I. Introduction The following subtasks are foreseen:

- (1) The design, development, testing and calibration of devices for the measurement of radiation of the following kinds.
- (a) Total radiation from 0.27 to 2.7 microns (By "total" is a single detector which integrates the energy in the specific spectral region non-selectively -- i.e., recording to heating value, not by number of photons.)
  - (b) Total radiation from 4 to 20 microns.
- (2) The design, development, testing and calibration of temperature sensors.
- (3) Considered, but at present neither planned, funded nor contracted, would be the study of the temperature of a model of the satellite in a simulated radiation environment in a test chamber in the laboratory, or balloon-borne to an altitude where the air pressure approximates ten millibars (about 100,000 feet).
- (4) A subtask within scope of this task, but deserving separate discussion will result in new techniques, design experience, and data important to ARS as vehicles for reconnaissance. This subtask is amplified specifically in Section II, Activities in "(4) Activities -Infrared Background Studies".

#### II. Activities

### (1) Activities - General

The statement of the task may be amplified by noting that the satellite in its orbit will be warmed by energy from sun and from earth and cooled by radiating energy outward. Its native temperature will vary between upper and lower limits determined by intrinsic qualities (skin absorptivity and emissivity for various parts of the spectrum from ultraviolet through far ultraviolet and the heat capacity), and the trajectory (portion of period of orbit when irradiated by sun plus earth, or in the eclipse shadow of earth wher irradiated by earth emission only; and the distances from earth at apogee and perigee, and whether these occur in sunlight or in shadow.



2 April 1957 Proj 1764

Further, it is probably that various other sources of heat may be added as the development of the satellite proceeds from the preliminary phases of design, construction, and test to the more sophisticated, complex designs. For example, possibly a fission reactor may serve as source of power for attitude control and for electronic equipment. The introduction of such a heat source will complicate the engineering considerations because the efficiency of the removal of the excess heat will depend on the thermal environment of the heat exchangers.

### (2) Activities --- Model Study

A possible activity which, as noted above, has not passed beyond the discussion stage, is that of the Model Study for obtaining approximate values of the equilibrium temperatures under working conditions a simulated satellite might be studied. By appropriate choice of the model, which would incorporate such devices as quartz windows inserted into the sphere, probably supplemented by isolated heat - detecting receivers, it is probably that significant information could be obtained. Such a model could be tested in a "Stratospheric Chamber" equipped with appropriate radiant heat sources. Or, the model satellite could be carried by balloon to high altitudes ---about 100,000 feet where pressures approximating 8 mm Hg, would minimize convective cooling.

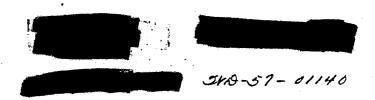
In such studies numerous experimental details would have to be carefully watched. For the receivers consideration would have to be given to the absorption of radiation by the receiving surfaces ("blackness" to different spectral regions to the "color temperature" of the radiant flux), also to the conditions for the conductive removal of heat, and to the necessary precautions against convective cooling, since in the satellite at orbital altitudes there would be no convective cooling.

Departures from anticipated temperature by the satellite in its early history would be reason to look for unique influence -- heating by collision with meteoric matter, shortwave radiation with more than the expected intensity of gamma radiation.

Such a model might lend itself to experimental work in the design of a satellite to be powered by a fission device.

# (3) Activities -- Design and development of the temperature and radiation sensing equipment

It is recognized that measuring the temperature of the skin and of the important points within the satellite in order to confirm the adequacy of the design is primarily the concern of the contractors. However, the themal flux sensors and the temperature sensors both will most likely be built around thermistors, hence, for reasons of design efficiency they would be parts of a common system. All thermal flux devices have high temperature coefficients, and the design will require a reference standard for absolute temperature determination.



2 April 1957 Proj 1764

(UNCLASSIFIED TITLE) Geophysical Environment Data for ARS, WS117L Short Title: ARS Environment

It has been noted the type of thermal flux detector used should be "total" and "non-selective." As distinguished from photo-conductive detectors, the preferred type would be the "temperature" detector, i.e., the absorbed energy is measured by temperature change using a thermocouple or a thermister or equivalent.

Hence, the development and testing (including calibration) of the radiation sensors involves the use of the same accessory electronic equipment for imparting information to the telemetering system as would be used when thermistors are employed for obtaining temperature data within the satellite. A minor activity from the viewpoint of both man-hours and dollar costs, is therefore involved adding the responsibility for development, testing and calibration of the temperature sensing devices to the identical responsibilities for the devices for measuring thermal flux.

Timely and detailed reports of progress on this task will be provided so that designs of the temperature sensors and accessory electronic equipment will be available to the prime contractor for his use in instrumenting early test vehicles.

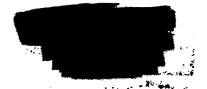
Approximately six months have passed since Contract AF 19(604)-1899 for \$40,000 was awarded to the University of Colorado for work on this task. Relatively good progress has been made in the design of compact lightweight transistorized thermal flux detectors available soon for testing in high altitude balloon flights. However, for quantitative thermal flux measurements one accepted technique is alternately to expose the radiation sensor to the thermal flux to be measured and then to view a reference standard or flux (a black-body) determined by its absolute temperature. It is the development and testing of these assemblies of components which will demand the major effort.

# (4) Activities -- Infrared Background Studies

In reconnaissance "vision" is involved. With the eye as the detector, the significant bandwidths used in vision are 0.4 to 0.7 microns. "Vision" in the ultraviolet involves a detector in the range 0.2 - 0.4 microns. In the infrared, "vision" comprises wavelengths from 0.7 to 25 microns. It is obvious that "vision" is the discrimination of an object viewed with a given bandwidth against a "background" also "seen" by the detector. Further, radiation scattered toward the detector by material between the object and the detector obscures vision (cf. visibility through fog).

Reconnaissance by use of far infrared introduces another factor not unlike the scattering effect in visibility through fog. That is, the radiation from the object and its background will be veiled by the energy emitte by the strata of atmosphere between object and detector. In the region from





2 April 1957 Proj 1764

4 to 24 microns knowledge of temperatures, spectral emissivities (equal absorptions) of the specific gases of the atmosphere are required. Much is known about the pressure dependence of the absorption but easy calculation is not yet possible.

Both experimental and theoretical phases under this infrared background study are planned:

### Experimental:

- (1) The design and construction of a far-infrared spectrometer to be borne aloft by balloon capable of measuring the terrestrial thermal flux, spectrally resolved from 4 to 24 microns, etc. The work to be contracted.
- (2) Design and construction of balloon borne equipment to measure attenuation of the infrared solar flux in the region of 0.8 to 9 microns at various altitudes from 5,000 to 100,000 feet, with sun at low altitudes to increase the path length through the atmosphere. The work to be contracted.

#### Theoretical:

(3) The thermal emission from model atmosphere corresponding as closely as possible to the terrestrial atmosphere will be calculated using the latest available and suitable modified laboratory transmission functions. The emission will be computed for various heights to be later specified in the atmosphere. The work to be contracted.

Possible contractors, and the possible Principal Investigators are:

Johns Hopkins University, Prof. John F. Strong
University of Utah, Prof. J. V. Hales (with Prof.
W. Elsasser, Consultant, Scripps Institute of
Oceanography)
Aerotronics, Glendale, Calif., Dr. Gilbert N. Plass

University of Colorado, Prof. W. S. Rense
University of Denver, Mr. David Murcray
Ball Bros. Research Institute, Dr. David Stacey

# (5) Activities - By-Products Directly Applicable to ARS

The main groups of by-products of the program of work on the Thermal Radiation program may be anticipated for ARS. One group is the reduction in the uncertainty in the three sorts of radiation intensities



2 April 1 Proj 1764

noted as important -- the solar constant, the albedo associated with various physiographic features of the earth (both the earth surfaces itself and cloud cover meteorologically and physiographically determined), and the infrared emission. During the testing of the thermal radiation sensors during ballon and rocket flights data will necessarily accumulate which may reduce the error in present estimates of the intensity of these radiations.

The studies undertaken during the assessment of the radiation environment of the satellite will produce new knowledge about the energetics of the planet earth and its atmosphere. The new knowledge, as well as the sensors and accessory equipment from the task on thermal environment, will be of advantage to the contemplated Weather Reconnaissance Project in the event that is undertaken. Hard and fast lines cannot be drawn separating the work on thermal flux sensors from the work on the sensors which could be used on the Weather Reconnaissance Project. To the extent that work on this task (T-39794) advances the work on the Weather Reconnaissance Project, this later progress may be considered a by-product. However, under the Weather Reconnaissance Project would be required the production of sensors specifically adapted for installation in aircraft, and following the flights, reduction and study of the data. Such work is not contemplated in the budget proposed for this task.

# 5. (a) Task 39795 - Rocket and Instrumentation Support

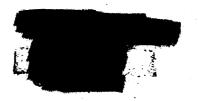
- (b) This task will be accomplished through a combination of "inhouse and contractual effort. The type of effort required by this task is
  being carried on by AFCRC under GRD P-7659. In P-7659 several contractors
  have been used and have attained a competence in their respective areas
  (See Approach) In view of this competence, many of the same contractors will
  be used to accomplish the objectives of this task. Contemplated contractors
  include:
  - 1.) Aerojet General Corporation
  - 2.) Wentworth Institute
  - 3.) Oklahoma A and M
  - 4.) New Mexico A and M
- (c) The task objective is to instrument and launch research rockets in support of the objectives of the other tasks in this project.

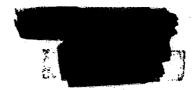
### Requirement and/or Justification

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The requirement for this task is delineated in the approach of each of the other tasks of the project.

#### (d) Approach





2 April 195 Proj 1764

The instrumentation and launching of research rockets require

- (1) The provision of vehicles and launch facilities suitable to each experiment.
- (2) The instrumentation of the nose cone. This effort may vary from simple attachment to the rocket to adaption of the experimental equipment to the vehicle and its support instrumentation.
- (3) Collateral instrumentation for tracking, telemetering, range safety, data recording, parachute recovery, special sequencing and command of experiments, orientation of sensing devices (biaxial pointing control) and others.
- (4) The provision of suitable ground data recording equipment.

Techniques and procedures have been established under GRD P-7659 to accomplish the desired results in the above areas of effort. In order to meet the requirements of the other tasks of this project, the same techniques and procedures will be followed under this task. In particular, the same contractors and facilities will be used, where applicable, and coordination with necessary test facilities will be carried out in the same manner as under P-7659.

In order to efficiently and effectively make use of system test vehicles close coordination will be established with the prime contractor. Such liaison is necessary to adapt the experiment to system test vehicles from the standpoint of size, weight, available telemeter, power, etc.

d. Other Information

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Not applicable

e. Background History

System Requirement No. 5 dated 17 October 1955 subsequent letter directive from WDD placed on AFCRC the responsibility of providing environmental data effecting the design and test of ARS vehicles. Studies by the Geophysics Research Directorate, AFCRC, the design study contractors and the ARS Weapons System office determined that in certain areas the state of the art was such that additional data would be required to satisfy the design requirements of ARS. In December 1955 and January 1956 Tasks 76971, 76972, 76973 and 76974 under Project 1115 were prepared by Geophysics Research Directorate, Air Force Cambridge Research Center. These tasks were, with certain exception approved by WDD 3 July 1956. This project constitutes a rewrite of these tasks under Project 1764 in support of WS 117-L.



**美数数数**点 5.

Short Title: ARS Environment

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#### f. Future Plans

This project is for the specific purpose of providing environmental design data for the Advanced Reconnaissance System, therefore, the various task and subtasks will be terminated, with concurrence from the WS 117L WSPO, when it is apparent that sufficient data has been obtained in a particular field to satisfy design requirements or to determine a no hazard condition to the ARS vehicle and operational subsystems.

Conversely close coordination will be maintained with the WSPO and prime contractor so that new tasks can be timely instituted to meet requirements generated by the introduction of new design conception.

#### References g.

ARDC System Requirement No. 5 dated 17 October 1955 Secret Letter WDD to AFCRC sub: Support of Advanced Reconnaissance System (U) dated 23 December 1955.

WS 117L Advanced Reconnaissance System Development Plan dated 2 April 1956.

ARDC System Development Directive Advanced Reconnaissance System dated 17 August 1956.

# SIGNED

MURRAY ZELIKOFF Project Scientist Photochemistry Laboratory

# SIGNED

MILTON GREENBERG Director Geophysics Research Directorate

# **SIGNED**

GEORGE P. JONES, JR. Lt. Colonel Ballistic Missile Liaison Officer Air Force Cambridge Research Center

Colonel, USAF Assistant for WS117L



 Special Annex for Mission Support Funds 2. Reports Control Symbol

Page of page

3. DATE: 2 April 1957

4. TITLE

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5. Initial

6. NUMBER - 1764

(UNCLASSIFIED TITLE) Geophysical Environment for ARS, WS 117L

SHORT TITLE: ARS Environment

1a. \$4255. of P-690-02 funds will be required in the performance of task 39721 in FY 57.

(1) 6 trips to Los Angeles and Palo Alto, Calif. at \$400. \$2400.

(2) 3 trips to Chicago, Ill. at \$125.

375.

(3) 12 trips to New York, N.Y. at \$40.

430.

(4) Miscellaneous travel

 $\frac{1000}{4255}$ .

\$5400.

- b. This travel will be essentially to monitor contracts and coordinate with other Centers. The requirements for FY 57 will continue through FY 58 and FY 59.
- c. In FY 58 six (6) additional trips to HADC at \$400. each will be required to arrange rocket tests.
- d. In FY 59 twelve (12) additional trips to HADC or Patrick AFB at \$400. each will be required for rocket tests on apparatus.
  - e. Therefore, for FY 58 P-690-02 \$6655.

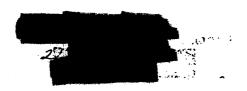
FY 59 \$9055.

- 2a. \$8000. of P-690-02 funds will be required in the performance of T-39792 during FY 57. Specifically it is contemplated.
  - (1) 12 trips to Holloman Air Development Center, N.M. at \$450. each

(2) 4 trips to San Francisco, Los Angeles area, Calif. at \$400. each 1600.

(3) 3 trips to Philadelphia, Pa. at \$50. each 150.

(4) Miscellaneous travel; \$850 850.
TOTAL \$8000.



Special Annex for Mission Support Funds (cont.)

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2 April 1957 Project 1764

- b. Travel to Holloman Air Development Center will be performed in carrying out high altitude rocket experiments. Each rocket experiments. Each rocket firing requires at least two (2) personnel for a period of a week to ten (10) days.
- c. It is contemplated that some of the shaped-charge experiments may be performed by the Poulter Laboratories in the San Francisco area. Research on High Speed Impact Phenomena will be coordinated with Rand Corporation in Santa Monica. Temple University in Philadelphia has developed acoustical apparatus for the detection of meteoric impacts.
- d. The travel requirements for this task thru FY 59 will probably remain at about \$8000. per year.
- 3a. \$5970. of P-690-02 funds will be required in the performance of Task T-39793 in FY 57.

(1)	2 trips to Los Angeles, Calif. at \$400. each	\$800.
(2)	4 trips to Ann Arbor, Mich. at \$125. each	<b>500.</b>
(3)	8 trips to HADC, N.M. at \$400. each	3200.
	2 trips to Chicago, Ill. at \$125. each	250.
	8 trips to New York area at \$40. each	320.
	Miscellaneous travel	1000.
• •	Total	\$6000 00

- b. This travel will be essentially to monitor contracts and coordinate with other Centers. The requirement for FY 57 will continue through FY 58 and FY 59.
- c. In FY 58, 7 additional trips to HADC at \$400. and 2 additional trips to Los Angeles at \$400. will be required to participate in rocket data gathering flights and monitoring contracts.
- d. In FY 59, 4 additional trips to HADC at \$400. will be required to participate in rocket data gathering launchings.
- 3. In FY 60 travel will be required as follows:

(1) 2 trips to Los Angeles at \$400. e	ach	\$800.
(2) 2 trips to Chicago at \$125. each		250.
(3) 3 trips to New York at \$40. each		120.
(4) Miscellaneous travel		300
	Total	\$1470.

Therefore,	P690-02 '
FY 58	9570
FY 59	7570
FY 60	1470





# Special Annex for Mission Support Funds (cont.)

2 April 1957 Project 1764

 \$3,225.00 of P-690-02 funds will be required in the performance of task T-39794 during FY 57. Specifically we contemplate:

(1)	3 trips to Los Angeles, California at \$400. each	\$1200.
(2)	4 trips to Baltimore, Maryland at \$60. each	240.
(3)	3 trips to Chicago, Illinois at \$125. each	375.
(4)	2 trips to Holloman ADC, N.M. at \$400. each	800.
(5)	2 trips to WADC, Dayton, Ohio at \$100. each	200.
<b>(</b> 6)	2 trips to RADC, Rome, N.Y. at \$55. each	110.
(7)	Miscellaneous travel: \$300.	300.
		\$3225.

a and b Travel to the Los Angeles area and to the Baltimore area is predicted on the assumption that the contractors, at least for the vehicles for scientific measurements, will be in either or both areas. Also, at least one visit to WDD is contemplated.

- c. Travel to the Chicago area is included on the assumption that contractor for the temperature and radiative transfer sensors might quite probably be in Chicago or equally distant from Boston, Mass.
- d. Travel to Holloman ADC looks forward to preliminary testing of instrumentation in the upper atmosphere by balloons or rockets, or both.
- e. Travel to WADC and to RADC will be required to coordinate the various Center efforts. It is possible that the number listed is a minimum and that more will be required.
- f. Miscellaneous travel to discuss specific problems with experts at various Universities will be required.
- g. After FY 57 we anticipate that because of the increased activity the travel requirement will be increased to an average \$4,500. per year.
- h. An annual average of \$1000. of P-690-03 funds will be required to transportation of instrumentation units during FY 58 and FY 59.
- 5a. \$14,000 of P690-02 funds will be required in the performance of task T-39795 during FY 58.

(1)	12	trips	to	HADC at \$500. each	<b>\$6000.</b>
(2)	4	trips	to	Los Angeles, Calif. at \$400.	1600.
(3)	8	trips	to	Palo Alto, Calif. at \$450. each	3600.
(4)	4	trips	to	Patrick AFB, Fla. at \$200. each	800.
(5)	Mis	scella	neo	us	2000.
				Total	\$14,000.



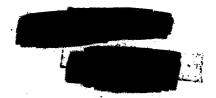
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## Special Annex for Mission Support Funds (cont.)

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2 April 1957 Project 1764

- b. Travel to HADC will be performed to participate in launching of high altitude rockets.
- c. Travel to Los Angeles will be performed for coordination of program with WSPO.
- d. Travel to Palo Alto will be performed for liaison in obtaining technical information on use of system test vehicles.
- e. Travel to Patrick AFB will be performed for coordination and participation in launching of system test vehicles.
- f. The travel requirements in this task are expected to remain essentially the same for FY 59 and FY 60.



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2.	The manpower requirements on the basis that three physici initial phase of the program du an additional mathematician (GS be reduced to three (3) through This group will be responsible satellite program. The applica significant experimental labora up by this group also. The pretoring of contractual research handled by this team. It is be collision theory, meteor physic of at least five (5) people. A first phase of the research has	sts and on ring the r -11) will the compl for the overion of si cory data, paration a and develous ieved that and other	e electronemainder of the require etion of the erall plane gnificant and the end prosecutoment, the the scoper basic stee, the mag	ic engin f FY 57. d in the he task. ning of experime stablish tion of prepara e of the udies sh	As test analysis the programmal laborate of the general strong of sproblem ould be the second	l to GS- firing of this am and t ratory d heoretic cientifi ummary a involving andled b	increases data. The experiata, and al design plans, and technical acousting a team	be requi in FY 5 his rese mental r the esta criteri coordina cal repo cs, elec with a	red during and FY arch team ocket and plishmen a will be tion, more transitional tronics alnimum:	g the 59 n will of made i- be



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R&D Manpower Annex (Cont.)

- 3. Manpower to perform research on Task 39793 will be divided into the following listed three (3) experimental teams:
  - a. Falling-Sphere Density Experiment Team

This team will consist of one task scientist (GS-12), one physicist (GS-11), and one engineer (GS-9)

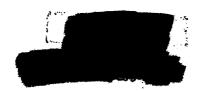
b. Pressure Gauge Density Experiment Team

This team will consist of one deputy task scientist (GS-12), one physicist (GS-11), and one engineer (GS-9).

c. Data Reduction Team

This team will consist of one secretary (GS-3), and one computer (GS-9).

- 4. Responsibility of the 3 experimental teams will be as follows:
  - a. Falling-Sphere Density Team
- (1) The responsibility of the Falling-Sphere Density Team will be to modify the existing Falling-Sphere Density Measuring Technique and scientifically develop, test and launch a modified instrumentation for density measurement at altitudes up to 500 Km.
- (2) The responsibility of the task scientist is to plan and direct the over-all task program. In addition, he will directly administer the program of the Falling-Sphere team. He will consult with and advise the physicist and engineer in the theoretical study, design, development, laboratory testing, and contractual procurement of the flight model instrumentation; and will serve as Field Director at experimental test grounds.
- (3) The physicist will be responsible for carrying out the team program of theoretical work on the applied and background research pertaining to the Falling-Sphere Density Experiment. He will be concerned with the evaluation of the theoretical aspects of the experiment, and all experimental progress in related fields of research. He will consult with, advise and assist the engineer in the laboratory experimental phases of the team program, and the electronic and mechanical design of instrumentation. He will be responsible for the preparation of scientific reports and papers as required in the experimental program.
- (4) The engineer will be responsible for the team laboratory experimental program, the electronic and mechanical design and construction of instrumentation. He will initiate procurement of instrumentation. He will





(UNCLASSIFIED TITLE) Geophysical Environment Data for ARS, WS117L Short Title: ARS Environment R&D Manpower Annex (cont.)

2 April 195 Proj 1764

initiate procurement of and will monitor a contractor construction contract to build the final instrumentation for rocket installation. He will serve as field engineer during proving ground experimental tests.

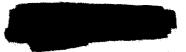
# 5. Pressure Gauge Density Experiment Team

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- a. The responsibility of the Pressure Gauge Density Team will, in consideration of present methods limited to altitudes of about 130 km, scientifically plan, develop, test, and launch a rocket borne pressure gauge instrumentation for density measurement at altitudes up to 500 km.
- b. The responsibility of the deputy task scientist will be to plan, direct and administer the program of the team. He will consult with and advise the physicist and engineer in theoretical study, design, development, laboratory testing, contractual procurement of the flight model instrumentation and will serve as Field Director at experimental test grounds.
- c. The Physicist will be responsible for carrying out the team program of theoretical work on applied and background research pertaining to the Pressure Gauge Density Experiment. He will be concerned with the evaluation of the theoretical aspects of the experiment, and all experimental progress in related fields of research. He will consult with advise and assist the engineer in the laboratory experimental phases of the team program and in the electronic and mechanical design of the instrumentation. He will be responsible for the preparation of scientific reports and papers, as required in the experimental program.
- d. The Engineer will be responsible for the ream laboratory experimental program, the electronic and mechanical design and construction of instrumentation. He will initiate procurement of, and will monitor a contractor construction contract to build the final instrumentation for rocket installation. He will serve as field engineer during proving ground experimental tests.
- 6. Data Reduction Team The responsibility of the Data Reduction Team will be to reduce telemetered, photographic, and other transmitted data that may be supplied from airborne density instrumentation; and to present this data in useful form for geophysical interpretation.
- 7. The Task 39794 Planning and Supervision will be under the direction of a Task Scientist. Throughout the period of the task, he will be responsible for the preparation and prosecution of the general scientific plans and for the coordination of work of the contributing agencies of the entire program. He will be responsible for all the phases of the program, including selection of contractor, approval of proposals, supervision of both contractual







R&D Manpower Annex (cont.)

2 April 1957 Proj 1764

and in-house efforts contributing to design, fabrication, test, calibration and data reduction and interpretation -- in short, the integration of the results of the contract program and the in-house programs. The Task Scientist is currently available.

- 8. a. The manpower requirements for T-39795 for Rocket and Instrumentation Support are estimated on the basis that four Research Engineers, (GS-11 to GS-13) will be required during FY 57 to accomplish instrumentation for the required program. During FY 58 an additional two Research Engineers will be required to absorb the load of frequent field trips to rocket launch sites and to maintain the heavy schedule of rocket preparation and firings. In FY 59 two additional Research Engineers will be required to conduct liaison on instrumentation of orbiting and non-orbiting test vehicles.
- b. This group will be responsible for the instrumentation of all rocket experiments in the program for coordination with launch sites, for collection and recording of data from rocket flighs and for liaison and planning with prime contractor in use of system test vehicles.

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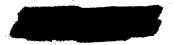
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20. REQUIREMENT AND/OR JUSTIFICATION Requiremen	nt for this project	was establi	shed	by ARDC System
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WS117L. This project is designed to yield optimum information needed by planning agencies concerned with the personnel and training aspects of weapon system 137L.

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# 21a. Brief of Project and Objective:

The development of this project will utilize the technical and operational capabilities of the Air Force Personnel and Training Research Center in the production of systematic information relevant to the personnel and training requirements of the total weapon system 117L development plan.

# 21b. Approach:

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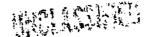
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This project will require both contract and inservice efforts to facilitate correlation between personnel subsystem development and equipment development. Initially, great reliance will be placed upon the prime contractor to develop and systematically integrate information derived from conceived equipment design. Information will be prepared by the contractor with consultative and technical monitoring effort on the part of the AFPTRC project officer. Contract work in support of task efforts and in-service effort are indicated below.

# 21c. Tasks of the Project:

- (1) Task 87151-IMPLICATIONS OF DESIGN.
- (a) Contractor: Work under this task will be accomplished primarily by the prime contractor, with consultative and technical guidance furnished by Project Officer, this Headquarters.
- (b) Objective: To provide the preliminary data needed to prepare an early report, or reports, which will forecast the general personnel subsystem requirements and the personnel and training problems that adoption of the system may generate.
- (c) Approach: Since this weapon system does not readily lend itself to the concept of control by a major air command or primary interest by a single agency of the Air Force, consideration will be given to the thorough exploration of the personnel implications under various operating-controlling conditions. Basically, the report(s) will attempt to define problems which will be generated by both operational plans and equipment design In so doing, consideration will be given to the relationship of WS-117L to WS-107A-1 and possibly WS-107A-2 and the findings of previous research in support of these latter systems.





- (2) Task 87300-QUALITATIVE PERSONNEL REQUIREMENTSJINFORMATION.
- (a) Contractor: Data will be collected and assembled by the prime contractor for the production of reports which will be phased with equipment design and development.
- (b) Objective: To provide manning document information, position descriptions, and personnel selection information regarding the total personnel subsystem of WS117L.
- (c) Approach: Effort in this area will be directed toward the development of information which can be used to describe technical jobs associated with the operation and maintenance of the system. From these descriptions, forecasts of required skills and knowledges will be made. Early identification of skills and knowledges and subsequent classification, if possible, within the Air Force personnel system will permit forecast of training requirements. Information derived in the development of the foregoing area will be used for manning information when operational and maintenance concepts are stabilized

The QPRI report will comprise four sections: General Information, Manning Document Information, Training Equipment Requirements Information, and information on Special Problem Areas. The format of the report will be patterned after AFPTRC QPRI reports which have been published for ballistic missile systems.

Section one, General Information, will describe the general purpose and function of the system, as well as stated or assumed concepts of operation and maintenance.

Section two, Manning Document Information, will: identify all equipment-associated operator and maintenance positions; indicate tasks performed within each job-pesition; indicate skill levels required for those positions requiring new personnel skills; and reference Air Force specialties which most nearly identify the job-positions.

Section three, Training Equipment Requirements Information, will identify in general terms the special training devices which will be needed to impart new skills required for the operation and maintenance of the weapon system. Further action in this area is defined in a subsequent task.

Section four, Special Problem Areas, will include an expansion of the problem areas (identified in the "Implications of Design" report) which can be isolated under a specific set of conditions. This portion of the report will identify personnel problems of an organizational and/or command nature.



Page 3 of 7 Pages

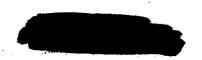
- (3) Task 87152-TRAINING PROGRAMS AND PROCEDURES.
  - (a) Contractor: None.

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- (b) Objective: To make recommendations for the training program and training procedures to be used to obtain skills required by operator and maintenance personnel of the system.
- (c) Approach: Recommendations for specific training procedures will be made in consonance investigative findings from prior tasks. Emphasis will be given to those areas in which the training of skills may prove particularly significant and difficult.
  - (4) Task 87153-TRAINING EQUIPMENT CHARACTERISTICS.
  - (a) Contractor: Preparation of a report on the training characteristics of required trainers will be an in-service effort. Previous contractual efforts will be used, if applicable.
  - (b) Objective: To identify the special training devices required for the WS-117Ir training program and define the characteristics of the individual trainers.
- (c) Approach: Consideration will be given to the adaptation and/or modification of research instruments into prototype training devices. Also, attention will be given to the possible use and/or adapting of special training devices, developed for the ballistic missile training program, which possess characteristics identified by this task effort, e.g., Radar Tracking and Guidance Computer Trainer.

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Page 4 of 7 pages



- (5) Task 87154-PROFICIENCY TEST DEVELOPMENT.
- (a) Contractor: To be determined. Partial in-service effort by Personnel and Maintenance Laboratories monitored by this Headquarters.
- (b) Objective: To provide valid tests of the job knowledge, skill, and achievement varity for measuring the progress and/or proficiency of operating and maintenance personnel.
- (c) Approach: This activity will consist essentially of establishing, monitoring and evaluating the test materials to be produced on a contract basis.
  - (6) Task 87155-HANDBOOKS AND JOB AIDS

Further detail on this task will be provided as the system progresses.

(7) Task 87156-TRAINING EQUIPMENT TESTING

Further detail on this task will be provided on this task as system development progresses.

#### 21d. Other Information.

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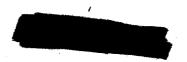
(1) General. The information basic to the preparation of reports required by Task 87151 and Task 87300 efforts will be obtained through contractual effort. Publication of these reports on a contractual basis may be accomplished with this Headquarters acting in a consultative and monitoring acapacity. It is anticipated that contract funds in the amount indicated in ARDC Form 110 will be programmed through funding action to be taken by the Weapon System Project Office for WS 117L.

Tasks 87152, 87153, 87154, 87155, and 87156 have been included under the assumption that Tasks 87151 and 87300 will produce information which indicates further effort should be expended to meet an Air Force requirement for information in the areas covered by these tasks. However, further development effort will not be expended in those task areas in which the associated final activities are purchased by the Air Force as a contract-service, e.g. Task for development of handbooks and job aids will not be undertaken if it is determined manning on a contractual basis is required or desired.

(2) Survey of Existing Standardize Equipment or Techniques.

None except as discussed in Task 87152 and Task 87153.

Page 5 of 7 pages



# UNCLASSIFIED

(UNCLASSIFIED Title) a. PERSONNEL OPERATIONS SUBSYSTEM FOR THE ADVANCED RECONNAISSANCE SYSTEM (SYSTEM 117L) b. (SYSTEM 117L POSS)

(3) Survey of Similar Equipment in Progress of R&D.

Survey will be made to determine possible adaptation of research instruments into special training devices. Similar exploration will be made in the area of trainers being developed for ballistic missile systems.

- (4) Replacement Recommendations. None.
- (5) Statement of Effects.

O

This project will yield information useful to the agencies responsible for programming the personnel and training programs required to properly man WS 117A.

21e. Background History and/or Progress.

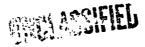
Since the writing of the initial project card, several visitis have been made to WSPO to determine funding status and to obtain general information on status of system development. As previously mentioned, representatives from this Center participated in preparation of statement of work for contractual negotiations. WSPO clearance was obtained to make initial contacts at contractor facility to discuss development plan relevant to the personnel subsystem. System contractor personnel were familiarized with the QPRI program and the nature of tasks involved in the development plan for personnel and training problems. Visit to contractor revealed that competent staffing has been accomplished to perform the caliber of work desired. Arrangements have been made to furnish contractor with format guides for reports to be published under this development project.

21f. Future Plans. Tentative arrangements were discussed with prime contractor for publication of Task 87151 report during June 1957. Also discussed were plans for publication of initial QPRI report (Task 87300) during December 1957 or early January 1958.

The project officer will maintain close contact with WSPO to establish proper phase relationships of project effort with equipment development status which is, in turn, largely dictated by funding action.

21g. References.

- (1) ARDC System Requirement No. 5, dated 17 October 1955.
- (2) Project Development Plan No. 8728 (DD Form 613), 28 February 1956.
- (3) WS 117L Development Plan (WDD), 2 April 1956.



Page 6 of 7 pages

- (4) ARDC System Development Directive No. 117L, 17 August 1956.
- (5) Amendment No. 2 to ARDC SDD No. 117L, 1 October 1956.
- (6) Project Development Directive No. 8728, October 1956.
- (7) Letter WDTR, Hq ARDC, 18 December 1956, subject, "Meeting of Technical Advisors to WS 117L".

# 21h. Coordination and Signature Block.

Responsible Center, AFPTRC.

FIEL Roberts, + col

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Major USAF

QPRI Project Officer

THOMAS WILDES

Col USAF

DCS/Operations

FREDERIC C. E Colonel, USAF

Assistant for WS 117L Technical Operations (WDD)

Page 7 of 7 pages

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re: GM67.3-49

#### INTEROFFICE CORRESPONDENCE

Col. E. N. Hall

CC: H. R. Lawrence

DATE: 3 May 1957

Subject: Transmitting copy of GM67.3-49

FROM: R. F. Mettler

Attached to this transmittal memo is a copy of R-W Document GM67.3-49 entitled "Proposed Use of IRBM as Booster for Multi-Stage Vehicles" which you requested.

Please note that this is a preliminary document, the technical content of which has not been checked or reviewed by Dr. Dunn's office. I would suggest that questions on the technical content of this memo be referred to Mr. H. R. Lawrence.

R. F. Mettler

Enclosure:

GM67.3-49, Secretary Copy #1 this under date 1 apr 1957

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80-57-63988

FORM NO. 180-15

SUBJECT: AFPTRC Support of WDD Systems Development

- 1. In response to your comments and suggestions, further investigation reveals the Missile Research Unit, Maintenance Laboratory Field Extension Number 3, under Lt Colonel Beers is presently in being at AFBID. QPRI Project Officers for the various missile systems will begin reporting for duty 29 July 1957. Tentative scheduling calls for the WS 117L Project Officer to report during August 1957.
- 2. The establishment of the Field Extension Unit and the scheduled manning of that office is in response to paragraph 2 of General Schriever's letter of 10 April 1957. A copy is inclosed for your reference.
- 3. Responsibility for AFFTRC conduct of the WS 117L QPRI was made by SR #5, dated 17 October 1955. Major Stanley Valcik of AFFTRC has been active as the WS 117L QPRI Project Officer for the past year. Some of the current difficulties in other missile programs, in the QPRI area, may be directly traced to a lack of appreciation of the importance of early attention to QPRI problems. Assessments of the anticipated work load in this area as meriting a resident Officer, and the timing of such an assignment was left to the discretion of the Commander, AFFTRC.
- 4. We have not concurred in any proposed action which has not already been implemented in AFBMD, nor which is contrary to present planning within the Field Extension Unit.
- 5. If manning the QPRI Project were to be made with AFBND personnel, I personally would place higher, immediate priority on manning other projects within WS 117L. In view of the fact that manning is to be done by AFPTRC from AFPTRC personnel rescurces, I request your signature to the letter.

l Incl
Cy letter to AFPTRC
subject as above
with inclosures

**(**}.

Where the returned to Coloder 25 Jul 67.

Colonel, USAF Director, WS 117L ATR FORCE BALLISTIC LISSILE DIVISION
HEADQUARTERS
AIR RESLARCH AND DEVELOPMENT CONTAND

WDTT: - WDOTA

19 November 1957

MEMORANDUM FOR WDT AND WDO

SUBJECT: (U) Joint WDTN and WDOTA Staff Visit Report to Hq ARDC on Elimination of AFPTRC as a Separate Center of ARDC

- 1. General: Col H. L. Evans, WDTN, and Capt A. A. Gomes, WDOTA, visited Hq ARDC on 14-15 November 1957 for the purpose of attending a conference on the elimination of the AFPTRC, and distribution of the AFPTRC functions and manpower spaces within the ARDC structure.
- 2. Persons Contacted: Brig Gen Flickinger, Col McKerley, Lt Col Ritter, Kaj Wilcox, Maj Stobie, Maj Wertz, Dr. Gayne and Mr. Christensen.
- 3. Discussion and Comment: Lt Col Ritter, Hq ARDC, presented the proposed elimination of AFPTRC as a separate Center of ARDC, and the ARDC actions necessary to integrate the AFPTRC functions and manpower spaces within the ARDC organization structure. The significant items covered by It Col Ritter and a statement of required AFRMD actions are presented below:
- a. Hq USAF has directed that the AFPTRC be eliminated as a separate ARDC Center.
- b. ARDC will retain responsibility for the functions presently assigned to AFPIRC with certain reductions in the present program and manpower spaces as follows:
- (1) Hq AFFTRC is to be eliminated, and the office for QPRI will be added to the human factors program at WADC.
- (2) The Personnel Laboratory will remain at Lackland Air Force Base as a detachment of Hq ARDC. All future programs and projects for the Laboratory will be validated and approved by the DCS/P and DCS/D, Hg USAF.
- (3) The programs and projects of the Operator Laboratory will be integrated with the work of other ARDC centers most directly concerned. The laboratory will vacate the space now occupied at Randolph Air Force Base.
- (4) The progress end projects of the Meintenance Laboratory will be integrated with the Personnel Laboratory and other ANDC conters. That support furnished the ATDAD will be integrated into the ANDD crionization. The laboratory will vested the space now occupied at Lowey Air Force Fase.
- (5) Hq USAF has proposed a reduction of 275 manpusous spaces from the 704 spaces prosently authorized AFPIRO. This will

P. P. LAN.

result in a net manpower authorization of 158 spaces for the Personnel Laboratory and 271 spaces for the efforts in support of W/S development. These new manpower levels are to be effective 1 January 1958.

(6) The recommended distribution of the 271 spaces within the existing ARDC structure are as follows:

Manned Space Vehicles 30
AFAC, W/S Support 12
AFCRC, W/S Support 20
AFBMD, W/S Support 46
AFMIC, W/S Support 7
AFSWC, W/S Support 10
AFADC, W/S Support 7
RADC, W/S Support 26
WADC, HF Laboratory ) 113
W/S Support)

Total Spaces 271

(7) The ARDC proposed breakout of the 46 spaces assigned to AFBND are indicated as:

BALLISTIC SYSTEMS SUPPORT

HF Group at AFEMD:

Job 1	Design &	Engineeri	ng -	-	-	-		1
1.	Design	Specificat	ions		<b>9-4</b>	~	-2-	
2.	Design	Analysia -	-	-	-	•	3	
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Hardware Development
Monitoring - - - - - - 5
Personnel Evaluation - - - 2

5. Safety and Protection - - 2

Manning Information - - - - - - - 10

Operational QPRI

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Job Aids - - - - - 6

Training Equipment Requirements

Total 30

EMD-HF Field Extension at Cooke AFB:

Evaluation - - - - - - - - - - - 16

- TCC Site Design - - - - 3
  Functional checks (Man-Machine) - 3
  Reliability and System Tests - 10
  - 1. Personnel Sub-system - 8
    2. Safety and Protection - 2

Total

16

- (8) The following items are noted regarding the 46 total spaces listed above:
  - (a) The recommended AFHMD spaces include:

26 - officers

18 - civilians

2 - airmen

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- $_{\rm c}$  (b) ARDC indicated that the spaces are separate from the emergeny augmentation and FY 58 manpower requirements heretofore stated by AFEMD.
- (c) ARDC indicated that the spaces are to provide for normal human factors support required for the present AFRAD mission and no additional missions in the area of human factors technical programs will be imposed on AFRAD.
- (d) Two medical officers One Occupational Health, and one Industrial Hygiene Engineer are included in the officer spaces.
- (e) The total civilian spaces include support types, cherical, etc.
- (f) A total of 70 human factors officer spaces exist in ARDC of which 25 or 37% have been allotted to AFRAD. ARDC requested that AFRAD consider replacing some of our officer spaces with professional civilians, if possible, in order to relieve the shortage of human factors officers in the other ARDC centers.
- (9) It was agreed that AFBMD would provide Hq ARDC with the following information by 25 November 1957:
- (a) Organization structure or distribution of the 46 human factor spaces into the existing AFBAD organization.
  - (b) Manning Information:

Functional area descriptions
Rank and civilian grade aprecd
Job titles
Job description

# 4. Required Actions:

a. WDTN and WDOT will develop the information indicated in paragraph 9 above for delivery to Hq ARDC on 25 November 1957.

b. WDTN and WDOT will propers appropriate internal AFBMD policy on the integration of the human factors support function within AFBMD.

HAPRY LI EVANS Colonel, USAF

WDIN

AMTHONY A. COMES Captain, USAF WDOTA SUBJECT: Telephone Call from Colonel Nunciate to General Rithard

I Year Progress on Astronomics. Colosel Numeiate advised that yesterday. ARDC sent in a package on the astronomics progress in which everyone was quite disappointed — in the approach and everything class. As a result, Colosed Numeiate stated that unfortunately we have a crash progress new to come up with something by Manday for General Pull as a supplemental package to the FY 56 and 59 programs. The ARDC package was not considered adoptate because it disa't cover the necessary things. It disn't start from where we are at present, and it can not projected eat. Some new guide lines will be given ARDC right avery.

Colemal limitation said they were faced with coming up with some thing within which would be a quick solution, for enemains, the special project and any others resided as the bestien part of that each for an ICBM. They is work to take the 117L, and portuga caking the "quicky" for a test we will the most to do with it and now come. ARCC with the works togother and except and that will have the systems approach -- the complete vehicle with the enception of the 11-16 and the Dissesses the complete with the the development and research package.

The figure for FY 53 is \$650M for FLD and for FY 19, \$717M RAD. They want to know how much we need ever and shows that and what one he done with \$15 additional million beward the highest priority proportion he the produced development and research above. If we get from \$15 to 25 highest in FY 95, what would be the highest priority things we would to.

Concret Pett mode the above information by blenday for the february bearings along the ARDC material is not notife. They went to been what we would be with the additional enemy and serve of the characteristics -- in other words, what could be accomplished each no the implication part of the openial project for an ICDM, the special project with vertices kinds of hands on them, accomplished at the observation of the track continue, and purisons a twelvest of the IATM, construction of the track continue, and purisons a twelvest vehicle program. It is not received that the above he in great divide. It makes no real that there are a lot of other things we would be in left to the time and the project of the project of the interest the time the time of the project of the project of the above weath. The project of the above weath. It is the character which we weath. The project of the above weath.

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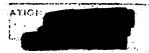
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PRECEDENCE ACCOUNTING ORIG. OR REFERS TO CLASSIFICATIO TYPE MSG (Oheck) SYMBOL PRIORITY ACTION MULTI BINGLE INFO FROM: COMMANDER AIR FORCE BALLISTIC MISSILE DIVISION SPECIAL INSTRUCTE: INGLEWOOD, CALIFORNIA TO: (SECRET) FROM WDG-1-2 (CONTD) AN ORBITING TEST COULD BE ACHIEVED BY AUGUST 1958 WITH TELEMETRY EQUIPMENT BUT NO CAMERA. THE FIRST RECOVERABLE PHOTO DATA FLIGHT COULD BE ACHIEVED BY SEP 1958 FOLLOWED BY FOUR ADDITIONAL FLIGHTS THE REMAINDER OF FY 59, A TOTAL OF SIX VEHICLES. THESE EARLY FLIGHTS ARE TECHNICALLY FEASIBLE UTILIZING THE BOOSTERS AND RECOVERABLE DATA CAPSULE TECHNIQUES THAT ARE ALREADY DEVELOPED. AN IMMEDIATE GO-AHEAD IS NECESSARY HOWEVER. B. RECOVERABLE ANIMAL SATELLITE USING RHESUS MONKEYS. THE FIRST FLIGHT WITH ANIMAL RECOVERY COULD BE ACCOMPLISHED BY JANUARY 1959 FOLLOWED BY THREE ADDITIONAL FLIGHTS DURING THE REMAINDER OF FY 59. LUNAR MISSIONS COULD ALSO BE DATE TIME ACCOMPLISHED WITH A HIGH PROBABILITY OF SUCCESS BY MONTH YEAR

ADDING THE VANGUARD THIRD STAGE TO THIS VEHICLE. TWO SYMBOL TYPED NAME AND TITLE (Signate of grand) FAGE PHONE SECURITY CLASSIFICATIONS

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SECUP PALL ACCOUNTING SYMBOL ORIG. OR REFERS TO PRECEDENCE TYPE MSG (Oheck) ACTION PRIORITY

FROM: COMMANDER AIR FORCE BALLISTIC MISSILE DIVISION INGLEWOOD, CALIFORNIA

SPECIAL INSTRUCT

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TO:

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(SECRET) FROM WDG-1-2 (CONTD)

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FIRST FLIGHT COULD OCCUR BY JANUARY 1959 FOLLOWED BY THREE

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FY 58 \$3.0 MILLION, FY 59 \$7.6 MILLION. MISSION C - 4 VEHICLES

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FY 58 \$ 6.4 MILLION, FY 59 \$ 3.7 MILLION. MISSION D - 4

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FROM: COMMANDER AIR FORCE BALLISTIC MISSILE DIVISION INGLEWOOD, CALIFORNIA

SPECIAL INSTRUCT

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TO:

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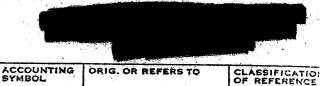
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BOOK MULTI INFO COMMANDER AIR FORCE BALLISTIC MISSILE DIVISION FROM:

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TO:

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COMMANDER HO ARDO BALTIMONE, MARYLAND

INGLEWOOD, CALIFORNIA

(SEGRET) FROM WEG-1-Z

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CN 31 DEC 57, COLORED TAMPITMONER TO, HO USAN, REQUESTED AFUND RECOMMENDATIONS FOR AN EARLY ASTRONAUTICS CAPABILITY, INCLUDING COSTS AND SCHEDULES. THE INFOR-MATICH IS TO BE USED BY GENERAL PUTT ON 8 JANUARY IN COMMECTICM WITH THE JOHNSON MEANINGS. IN ORDER TO ACHIEVE SIGNIFICANT PERFORMANCE RESULTS DURING CALENDAR YCARS 1958 AND 1959. ALREADY DRVELOPED DOOSTERS AND GUIDANCE COMPONENTS WILL BE REQUIRED. THOR PLUS THE VANGUARD SECOND STAGE IS PROPOSED AS THE BASIC BOOSTEK unit. With this vehicle, the following type missions

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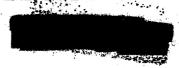
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SECURITY CLASSIFICATION

REPLACED DE FORM 173, 1 OCT 49, WHICH WILL BE LEED UNVIL EXHAUSTED

6 January 1958

Subject:

Contract AF 04(647)-97

Proposal for Acceleration of WS-117L Program

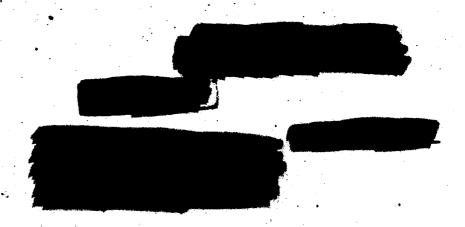
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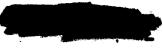
Major General Bernard A. Schriever Commander, Ballistic Missile Division Air Research and Development Command P. O. Box 262

Inglewood, California

Reference:

- (A) Letter from Gen. B. A. Schriever to Mr. L. E. Root, dtd 23 Dec 1957, WDTR 57-455 (S)
- (B) WS-117L Revised Contract Cost Proposal, LMSD-2786, dtd 28 Oct 1957 (8)
- Enclosure: (a) Report LASD-2832, WS-117L Development Plan for Program Acceleration, dtd 6 Jan 1958, Cys 1-10 (8)
- 1. By enclosure (a) the Lockheed Missile Systems Division submits herewith a development plan and cost estimate of acceleration of the WS-117L Program using the Atlas booster plus the augmentation of this program using the Thor booster.
- 2. The cost, including fee, as presented in this proposal is that cost necessary to accomplish the additional work proposed in the augmentation and acceleration of the program of reference (B), the Definitive Cost Proposal negotiated between Lockheed Missile Systems Division and the Air Force during the month of November, 1957.
- 3. Attention is directed to the fact that the schedules presented in this proposal require immediate authorization to proceed with the items listed in the proposal as "Priority Items" and that full effort on this





Ref: LMSD/36599

6 January 1958

Subject:

Contract AF 04(647)-97

Proposal for Acceleration of WS-117L Program

To:

Major General Bernard A. Schriever

program be authorized by February 1, 1958. The Contractor will be pleased to proceed immediately with the work necessary for so important a program upon receipt of this formal authorization.

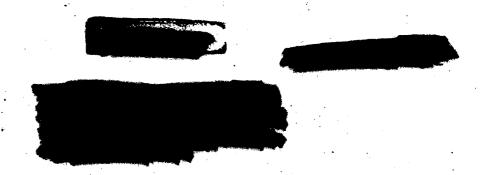
LOCKHEED AIRCRAFT CORPORATION MISSILE SYSTEMS DIVISION —

Original signed by L.E. Root

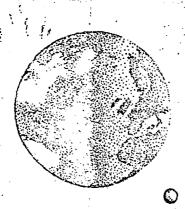
L. Eugene Root Vice President and General Manager

LER: cm

cc: Asst. Air Force Plant Representative Sunnyvale, California



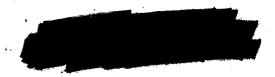
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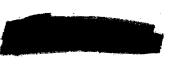
# WS 117L

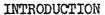
DEVELOPMENT PLAN
FOR PROGRAM ACCELERATION

CONTRACT AF 04(647)-97



LOCKHEED AIRCRAFT CORPORATION MISSILE SYSTEMS DIVISION SUNNYVALE, CALIFORNIA

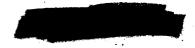




The WS-117L program now under development has as its objective the provision of complete reconnaissance systems utilizing satellite horne sensing devices. The material here represents a development plan for accelerating this program, and has been prepared by the Lockheed Missile Systems Division in its role as the WS-117L Weapon System Contractor.

In the course of negotiations on 12 to 19 November 1957 for the WS-117L definitive contract, it was requested by AFBMD personnel that Lockheed consider modification of the program for a potential acceleration. Included was consideration of increasing the tempo of vehicle firings to assure greater probability of program success and to reduce the development time scale of a first Pioneer Visual flight capability by one year to March 1960. Subsequently it was requested that consideration be given to developing the Pioneer Ferret system to a time scale comparable to that of the Visual.

In view of recent emphasis on missile weapon systems, it appeared appropriate to the Contractor to consider the inclusion of two alternate approaches in the development program: (1) The use of an IREM missile as a booster, and (2) The physical recovery of reconnaissance photographs from the orbiting vehicle. Both approaches have been a part of the Contractor's over-all program concept from its inception but had been shelved due to initial funding limitations. The combination of the two approaches will provide a system attaining very early reconnaissance capability. This is quite similar to a method proposed recently by the RAND Corporation using the Thor as a booster and a panoramic camera, in a spin-stabilized recoverable capsule, on orbit.



The over-all program presented here is essentially the same as that presented to AFBMD on 27 November and 5 December 1957, but incorporates the RAND concept for early Thor-boosted reconnaissance flights.

The Contractor believes strongly that should additional funds be available for enhancement of the U.S. military program, consideration should be given to augmentation of the present WS-117L program in the manner and amount shown in Figure 1. This would allow capitalization of the established broad WS-117L base toward expeditious accomplishment of its military objectives. Expanding the vehicle firing rate from four to 14 by Feb. 1960 will allow a more efficient utilization of the system, increase ultimate reliability, and bring about earlier reconnaissance capability.

PLEASE CALL COLONEL HUGHES, 2224, OR LT COL BOGERT, 2224
AND ASK ONE OF THEM TO COME TO THIS MACHINE. WE WILL SEND
YUR MESSAGE WHILE YOU ARE CONTACTING THEM, AND THEN STAND BY FOR THEIR
REPLY. THEN WE HAVE A SECOND MESSAGE FOR MAJOR ZELLAKA OR HIS
ASSISTANT /INWDTR/. YOU MIGHT ALERT THEM TO BE READY AT THE
MACHINE.

THE DUPUTY COMMANDER/WEAPON SYSTEMS IS PREPARING THE ARDC FIVE YEAR PROJECTED ASTRONAUTICS PROGRAM/ WEAPON SYSTEM/ FOR DELIVERY TO GENERAL PUTT WITHIN THE NEXT FEW DAYS. THE AFBMD HAD ALREADY FURNISHED MATERIAL FOR THIS PAPER. ATTACHED TO THE PAPER WILL BE A SET OF SUMMARY SHEETS SHOWING WHAT WEAPON SYSTEMS ARE IN BEING, OR PLANNED, WITHIN THE ASTRONAUTICS AREA. EACH PAGE COVERS ONE WEAPON SYSTEM, COTLINED AS FOLLOWS CLN

A. BRIEF

- 1. DESCRIPTION / TWO LINES OR LESS/
- 2. CAPABILITY /TWO LINES OR LESS/
  - 3. EXISTING TECHNOLOGY USED / TWO LINES OR LESS/
- 4. PRINCIPAL TECHNICAL PROBLEMS / TWO LINES OR LESS/
- B. R AND D SCHEDULE
  - 1. DEVELOPMENT PERIOD / SHOW END DATE/
    - 2. FLIGHT TEST PERIOD / SHOW END DATE / Little
- . 3. OPERATIONAL SYSTEM DELIVERY DATE
- C. FUNDING /FOR FY 58 AND FY 59/
  - 1. P-600
  - 2. NON-600
  - 3. TOTAL

WE HAVE BEEN ASKED TO PREPARE FOUR OF THESE SHEFTS ON A CRASH BASIS FOR PRESENTATION TO GENERAL ANDERSON THIS AFTERNOON. THESE SHEETS COVER THOR

TLAS

WE HAVE ALL THE INFORMATION WE NEED ON THOR, ATLAS, AND TITAN EXCEPT FOR THE R AND D SCHEDULE DATES. WE NEED END DATES, FOR EACH WEAPON ON DEVELOPMENT, FLIGHT TEST, AND OPERATIONAL SYSTEM DELIVERY.

IN ADDITION, WE NEED ALL THE LISTED DATA ON THE SOLID IRBM. CAN YOU MIKE THIS AVAILABLE TO US ON THIS TELETYPE WITHIN THE NEXT FEW HOURS OVER

(AMJOR FIEKER, RDZPI, HAS BEEN DIRECTED TO PREPARE INFORMATION SUMILAR TO THAT CITED ABOVE, IN OUR MESSAGE TO COLOUEL BUCKES. HERE ACT MAJOR FIEKERS QUESTIONS CLE

1. WHAT IS PRESENT BY PLAN FOR WS 1171 RUKS

2. PROVIDE ESTIMATE OF CODIS FOR ACCALABATED ALAM, IT ACCIDED IN PRESENT FLAM FOR WS117L

3. WHAT ARE YOUR FLANS FOR A RECOVERABLE CARRYLE SATELLITE THES LOSS THE CARRYLE FOR BECOME ABOVE AND A THE THIRD PROPERTY OF A CONTROL OF A CONTROL

RE THE OFFICERS THERE YET TA PLS EGATIVE 201

GR

OR ITEMS B 1 AND 2 YOU ARE REVERRED TO VOLUMN 1 OF THE DEVELOPMENT LANT DAEEER PLANT LATED 1 OCT.

ITH RESPECT TO THE INFORMATION REQUIRED ON THE SOLID INOM 'E WILLANSWER IN 2 HOURS

THAT IS ALL FOR HERE STAND BY FOR MAJ ZENENKA

OR COL HUCKES

HAVE CHECK VOL IN OF THE DEVELOPMENT FLAK AND IT IS CLEAR THAT THE ATLAS AND TITAN SYSTEM OFFICERS USED DIFFERENT DEFINATIONS FOR THE WORD DEVELOPMENT. FOR EXAMPLE USING VOL 1 IT WOULD AFPEAR THAT ATLAS DEVELOPED WILL BE FINISHED ABOUT A YEAR LTE XXXX LATER THAN TITAN . C HESITATE TO SHOW THIS ON A SCHEDULE, AND THATS WHY I JOULD APPRECIATE UR VERISION OF THE DATES. . I HAVE THE TAME PROBLEM WITH THE TEST DATE. CAN U HELL ME. QUES

A FLS

TRAY WILL ALSO HAJE IN A PRICENT IN TWO REFER AVAILABLE IN A FOLKE

IN THANKS A LOT WE WILL STAND BY FOR MAJ ZENENKA



UCF

6 JAN 1958

SUNTER: They Progrem Acceleration

TO:

Chief of Staff United States Air Force ACCO: AFOM Washington 25, D. C.



In accordance with My VAAF wix directives, among paking Cutof 2 December 1957 and Apple 13700 Cated 9 December 1957, this distriction has taken action to accelerate prediction in indicated material (application of the 6-pertacety (AM also less less pertacted of I located 15.7. The notething energy of pietres in publication of these directives are obtained on lower well and differ allightly Into those presented to the decretary of the Air Porce on a December es '. 2 %, III. ' the princy live; a four Plan III in reflected in the et avaluating predication of Grandles per conflictations of reducing. the rest for its and the contractive and the contraction of the contractions and the contractions are the contractions and the contractions are contracting to the contraction are contracted as a contracting to the contraction are contracting t bounces: (1) the operational right-con are fully equipped pt. equiter dates than was possible unity than III, and (a) embituation of the C-yer-month rate Value to soldered in aid 19 d represents w more economical and efficient two is the industrial expecity annilable to the Air Ferre. Funding requirements for this progress and extended es Dudoswe 2 and reflece the tena totals es preserved on 8 Nevember.

pregran does not provide for any following effort at the lay missiles are considered to be an obsolute minters for the IOC and the development, test, and including necessary to nebleve this 4-squaren especiality. At the LAY missiles programmed, only 64 can be easilized to May as 83 are considered an absolute minimum for the IOC. The program previously recommended by AFLAD and approved by Mg ICAF considered of I/5 missiles; 70 for Rad tests and 97 for training and IOC. Laus, concurred with the acceleration of the Thom IOC dates, 20 missiles very deleted from the sported program. If additional against are desired or if a continuing product improvement program is declared, an adequate number of test vertices are not provided. Further, the 147-missile program does not provide test vehicles for extension of the 1500-mile range.



NESSEL SATS



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to proceed, the country to proceed with the choice profitting to principle constants are the constants. As proceed with the thick that the constant is provided to constant.

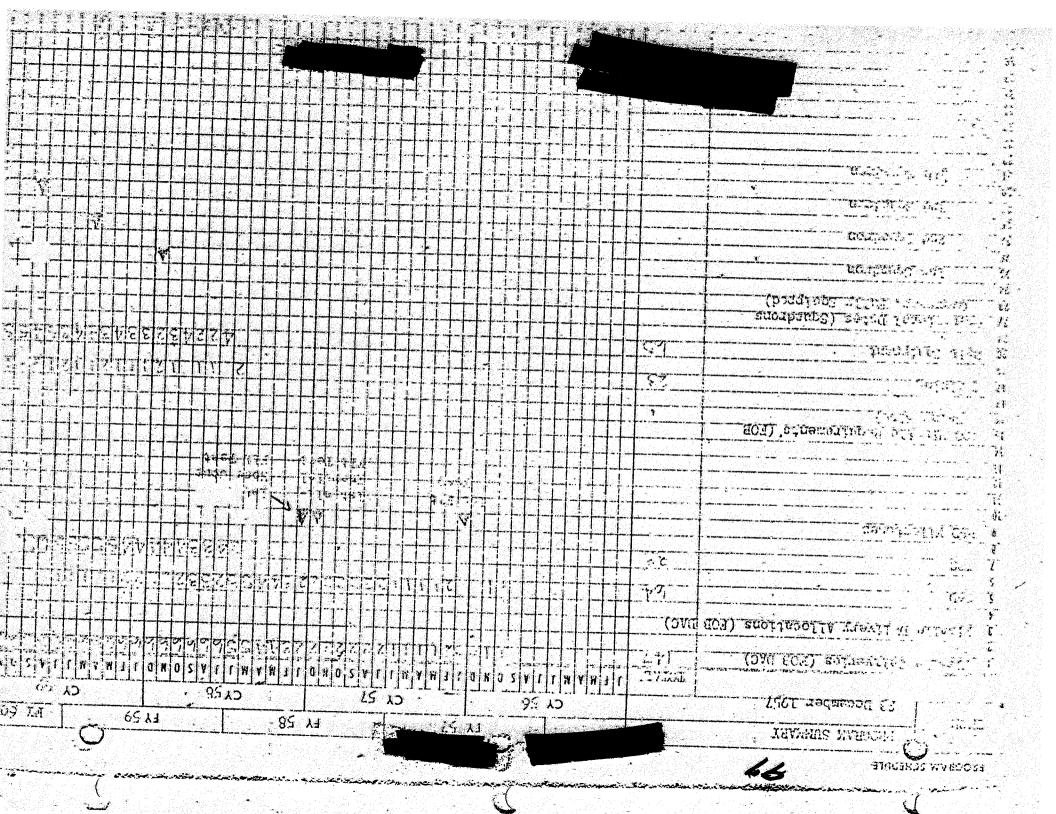
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FUED SUMMANY
TOTAL Progress Costs BY 1958-1960

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F-200	55.4	ÿ <b>1.</b> ?	Q	1003
P-300		6.0		11.5
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P-500	3.7	5.1	10.0	2.7
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# HEADQUARTERS AIR RESEARCH AND DEVELOPMENT COMMAND

UNITED STATES AIR FORCE Post Office Box 1395 Baltimore 3, Maryland

ADDRESS REPLY TO COMMANDER, ARDC; ATTN:

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RDTHW

13 JAN 1958

SUBJECT: Elimination of AFPTRC and Assignment of Specific Human

Factors Functions to AFBMD

TO:

Commander

Air Force Ballistic Missile Division

Headquarters ARDC

Inglewood California

- 1. By direction of the Chief of Staff, USAF, the Air Force Personnel and Training Research Center is being eliminated. Specific Human Factors functions in support of Weapon System development are being assigned to existing ARDC Centers for accomplishment.
- 2. Those functions assigned to the Air Force Ballistic Missile Division are listed in Inclosure 1 to this letter. Also listed therein are the numbers and types of spaces to be transferred to AFBMD to accomplish the described functions.
- 3. By direction of Headquarters USAF, the spaces assigned to AFBMD will be utilized for the accomplishment of those Human Factors functions being transferred to AFBMD.
- 4. Transfer of activities, spaces, and personnel will be accomplished as directed in the letter from this Headquarters, Subject: "Elimination of AFPTRC as a Separate ARDC Center," dated 10 January 1958.
- 5. The AFBND plan for Integration of AFPTRC functions, dated 25 November 1957, will be returned under separate cover with appropriate comments.
- 6. The Confidential classification on this subject has been removed, authority Headquarters USAF DCS/D letter, Subject: "ARDC Plan for Integration of AFPTRC Weapon System Support Functions into Other ARDC Centers," dated 23 December 1957.

FOR THE COMMANDER:

Info Cy Furn Comdr, AFTTRO



AREA		OFF	SPACES AMN CIV	TOTAL	FUNCTIONAL DESCRIPTION
UTI LIZAT	ion:				
	b Design & Engineering stems Application	6	· 4	10	To participate in development of design specifications for new weapon systems, to conduct equipment-task analyses on new weapon systems, and to monitor system development plans to insure optimal design for the operator or maintenance man.
	cupational Information stems Application	6	14	10	To identify all and to describe previously undefined Duty Positions and Air Force Specialties, to perform Qualifications Analyses for new Duty Positions and Air Force Specialties, and to prepare Proposed Manning Guides, for new Weapon Systems.
3. Joh Sys	o Aids stems Application	3	3	6	To determine Class 28 Training Equipment characteristics for, to develop Position Oriented Technical Manuals and Position Oriented Performance checks for, and to apply training devices test procedures to, new weapon systems during development.
EVALUATIO	ON:				
	nctional Checks stems Application	2	2	Ļ	To monitor hardware development through design evaluation of initial designs, "breadboard" models, attendance at mock-up inspections etc. and to perform evaluations of assigned personnel functions to insure man-machine compatibility during system
\					development.

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A To	D344	
IN N	RMIT	

AREA	OFF	SPA.CES AMN CIV	TOTAL	FUNCTIONAL DESCRIPTION
EVALUATION Cont'd:			· .	
2. Peliability Studies System Application	3	1	4	To perform personnel sub-system evaluations at appropriate points in system development and testing deriving necessary orientation and training data to insure adequate reliability of personnel in the operational environment, reporting those instances where equipment or system design imposes demands inconsistent with the degree of personnel reliability required.
3. System Tests System Application	3	<b>4</b>	. 7	(1) To accomplish man-machine testing and personnel sub-system testing of completed weapon systems to determine how effectively the system design meets human factors requirements.  (2) To evaluate missile accidents and incidents to determine the extent to which human engineering in system design or personnel procedures in operation was the causal factor. From these investigations, to recommend appropriate redesign in hardware or revised procedures for operation.
4. Protection	1	2	* 3	To insure that adequate personnel safety and protection is provided through the incorporation of appropriate methods, procedures and safety equipment in systems and site design.
TOTALS	<u>5]</u> ;	20	44	

WDTD

13 January 1958

MEMORANDUM FOR THE RECORD

SUBJECT: Long-Distance Call from Colonel Attwood - ARDC - re "Recoverable Package"

Colonel Atwood called this date with the instructions that AFBMD was to make the source selection and get the technical direction ready for the subject project and bring the story in to ARDC on 3 February as had been discussed previously. This was as a result of Generals Schriever and Anderson's discussions in Baltimore; also, the authority is being sent to AFBMD today. Colonel Norton suggested that perhaps AYBMD should wait to receive the authority from General Anderson since this was the usual method of hardling such new assignments to AFBMD.

HAROLD W. NORTON

Colonel, USAF

Asst. Deputy Commander

Weapon Systems

GRODEN SHIP ROY MUTALICIZED

SUBJECT: Flas for Acceleration of the WS 117L Program

Location and later Room 135, Building 2, 14 January 1958

Persone Attended:

COM COM OSM SITUTM MICH MDIM MOSSW MIXIM MILE

DINED

Mr. William Nolmes Mr. Hobert Saltan bragati to .u .u. hir. Andi Carborn illog M. M. Kelenka ezmi o a an Cadr. K. Ci Proox Lt Colonel J. S. Sesy Coronel F. C. E. Oder Colonel C. H. Termine

: two rap on post out

.CZQI Tremnai, as see forth in letter imad/36099 dated ly namery 1959. the purpose of the meeting was to discuss the account of the

Icars of Discussion:

that of Preliminary Action Items for Arswin for Mine Accelerated

M. Carter proceeded rath the discussion of this item by found

Item "I Attroument []: . Il remandation of throi tos as a Chair by horizon and the contract of the co

scheduled for 15 January with regard to this trems. as a preliminary measure, IMSD representatives could bold discussions vity. Instrument as a preliminary measured to the MB 515A project. A meeting was tentatively problem with INC at the certifest possible monder. . Colonel Terbune felt with coeffective of the earliest of elderteeb Light ask it ised beter reduced . The sgreenert between Dougles Airoraft Company and Lockhoed Airoraft Corporation: hetween 1221D and Converty which would suffice as a bests for drafting an cathustareday to tabinstous a sutline of begins of Understanding

Item (S) Attachment (L):

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MCFIN

MEMORANDUM FOR THE RECOPD (Conta) SUBJ: Plan for Acceleration of the WS 117L Program.

#### Item #3, Attachment #1:

Colonel Terhune requested that this item be deferred until such time as a schedule could be agreed upon for the accelerated program.

#### Item 件, Attachment f1:

Colonel Terbune stated that he did not feel it was either feasible or practical to authorize blanket sale-source procurement authority by IMSD with respect to subcontracts. In those areas where the technical approach dictated only one source available, no problem was foreseen in obtaining sole-source authority. Hr. Carter, as well on Mr. Vingaul, stated that it was the contractor's objective to use competition whose required. However, they felt that limited solicitation should be used.

#### Tiem (9, Attachment (2,

. Lt Colonel Seay stated that the overtime restrictions for the WS 117L Program had been lifted and it could be assured that a bisharp whole could be sutherized.

## Item jo, Attacheent jo:

It was pointed out that a request for DI priority had been submitted to Hq USAF. Lovever, of proved could be given only by the President after review by the letional Security Council. A ruting of No. 2 on the Master Urgancy List had been recommended by Hq AMC and it was expected that this action would be acted upon in the very year future and would provide the necessary priority required to accomplish this accelerated progress.

#### Item #7, Attacheent /1;

No comment

Item #3, Attachment #1:

No coment

#### Items #9 and #10, Attachment #1:

Colonel Terbune had reservations regarding the actions requested in these two items. He stated that ANO was working on this problem with respect to quality control in order than the term concept, as used in the balliotic missile progress could be developed for the he life contents.



MOPTA

MEMORANDUM FOR THE RECORD (Conta)

SUBJ: Flan for Acceleration of the WS 117L Program

Colonel Scay remarked that AMC has already recommended that the MS 117L. Progress utilize the quality assurance approach which would in turn facilitate inspection and acceptance of the contract items.

Item #11 - Attachment #1:

No comient

Item #12, Attachment #1:

Action would be taken by AMC to issue a letter contract to.

IMSD no later than 17 January 1958.

Item (13, Attachment (1;

No coment

5. Note: No discussion was held with respect to the list of secondary items for  $\Lambda^{*} HD$  for the accelerated program.

#### 6. Facilibles Juguired:

LEED proposal which required the Air Force to furnish the contractor with facilities accessory to accomplish the progress. Mr. Certer stated that the contractor facilities accessory to accomplish the progress. Mr. Certer stated that the contractor felt that there would be certain items of special test equipment and mechanicy which would be required in order to accomplish the accelerated progress. The question was asked: "Did the facilities include brick and mortary" Mr. Certer's answer to this was that he felt that Localmed ments would request some type of brick and mortar facility. Colored ferhane's reaction to this statement was that facilities of the brick and mortar type would be very difficult to obtain. However, the contractor should submit a list of the facility items required. It colonel Seay stated that his point in discussing this question was to remind the contractor that acceptance of the proposal did not infer that all facilities requested would be granted.

#### 7. Funds Required:

The contractor stated that the funds required to accomplish the acceleration, as well as the program already in effect, would be as set forth in Attackment (2. Colonel Termino reviewed the abset and asked the emount of prior year funds on this program and was given the entered that approximately \$12,000,000 had been funded to this contract through the o 1977. In Colonel form stable that it was his opinion that there were crouse funds processly available on the to high from the court were contract funds processed and the to high from the court between the current program and the

The FOR MES RECORD (Contd)

accolerated program until approximately 1 May. At that time, well funds yould probably be necessary. Colorel Termune discussed the contractor yould be villing to fund the contract at a contact in the last month of the fiscal year, he felt that I Men yould be villing to fund the contract at some point between the consistent

#### i. Plight Schedule:

The flight schedule, as proposed by the contract in INFO Proposed 13 accepted with respect to the four Thor flights beginning in 1955. The flight, using an XSI-69 booster, was changed clightly. In resulted in moving the April Hight back to May 1959 and while the James the James the James firing. It was agreed, however, that the balance is in the schedule would be discussed in a meeting to be held on 1958 with the SI-65 Project Cirics.

# SIGNED

JAMES G. SEAY
Lt Colonel, USAF
Chief, WS 1174 Branch
Deputy Director/Publication Himsles
Directorits/Procusedant & Production

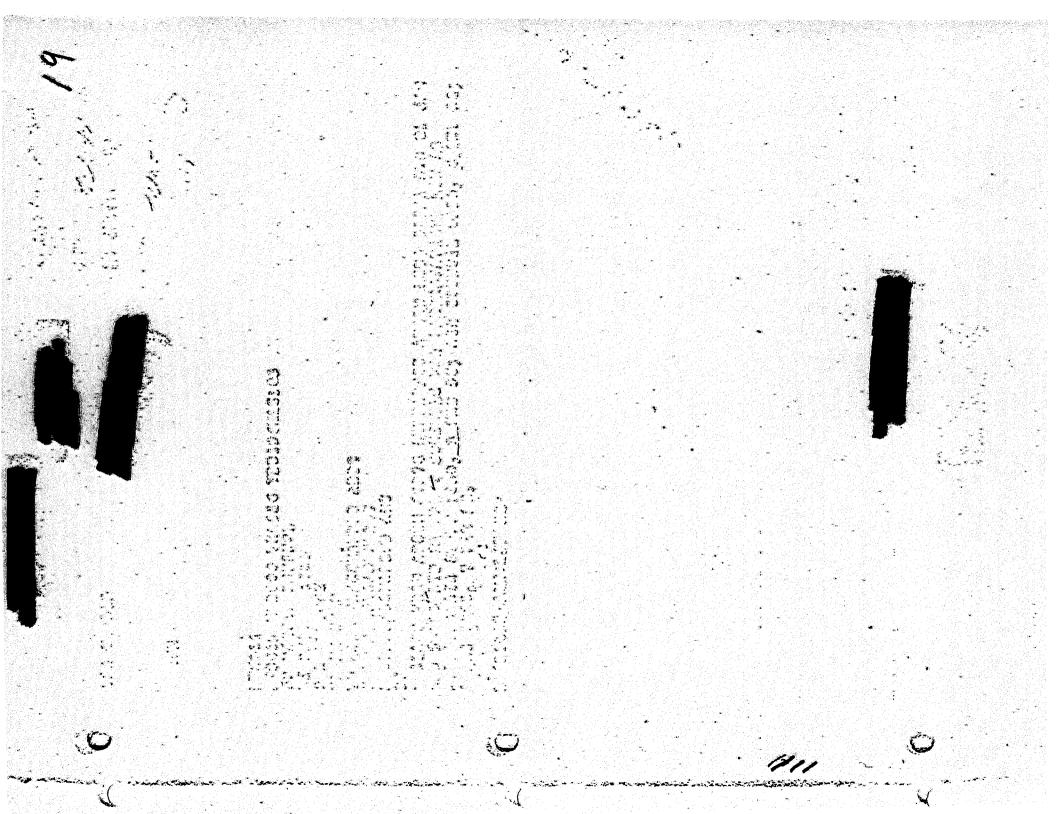
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24 JAN 1853 104 (1)

Colories /C O N F I D E N T I A L/CITE AFDDC-SP 55521. THE CHIEF OF STAFF HAS FURNIED THE ACCELERATION OF 117L PROGRAM. IT IS THE INTENTION OF THIS HQ TO PROGRAM THE NECESSARY FY-53 FUNDS FOR THIS ACCELERATION WHEN THEY ARE ACTUALLY REQUIRED. IT IS UNDERSTOOD THAT 5.2 MILLION REQUIRED FOR FY-58 WILL BE FOR LOCKHEED. SINCE LOCKHEEDS CONTRACT HAS BEEN WRITTEN FOR 18 MONTHS STARTING. EARLY 1958, IT IS PRESUMED THAT ACCELERATION CAN BE ACCOMPLISHED WITHOUT IMMEDIATE RE-FROGRAMMING ACTION. IT IS, THEREFORE, DIRECTED THAT YOU ACCELERATE THE PROGRAM WITHIN THE ABOVE FUND REQUIREMENTS, AND THAT THESE FUNDS WILL BE PROGRAMMED AT A LATER DATE. BT

THIS "AC" HSG 23/06262 JAN KJWPNF



NF AOO

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FILE NO.

SUBJECT

TO MCPT

FROM MCF2A DATE 23 January 1958

DATE 22 THE 58 CO

DATE 23 Jun 58 COMMENT NO. 1

54 (ii anii

WS 117L Frogram

#### Lockheed Aircraft Corporation - L/C AF 04(647)-97

#### 1. Definitization of Letter Contract: (UNCL)

This letter contract has been forwarded to MCFO for final review and manual approval. It is anticipated that this contract will be fully executed approximately 1 February 1958.

## Lookined Afrench Corporation - L/O AP 04(647)-161

A new letter contract has been issued to Lockheed Aircraft Corporation to provide for the acceleration and augmentation of the WJ 117h Frogram. This letter contract is still subject to acceptance by the contractor. The contractor's proposal contained a request for carcain facilities which were not authorized by the letter contract. This is the only area where some difficulty may occur, although none is anticipated.

#### Cvertible and Premium Wage Compensation (UNCL)

Under date of 10 January 1958, Secretary Sharp, in a matrix with to the Director of Production and Production, Ma USAN, directed that such overtime as may be necessary to neet the approved objective of the TO 1175 Program was authorized. This cuthorization was conveyed to the ACO to be placed into effect immediately.

# Staffing of the Office of the AFPAO, Sunavvale, for MS 117L: (UNGL)

Discussions are in progress with the AFERO toward establishment of an adequate staff to handle the accelerated WS 117L Progress. It is apparent that this office will require strengthening at an early date. In connection with this topic, NCFTR-1 has taken steps to provide specially qualified Quality Control personnel for the Lockheed plant, and for the major subsystem areas at subcontractors plants.

#### Operational Planning: (SECRET)

WS 117L EXAMPLE Project Cirics personnel convered with Storman groups in Building 8 on 22 January to formalize a grelladeary as 100.

24....

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JAN. 14. (4)

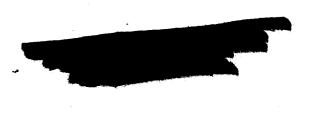
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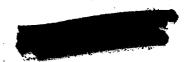
operational plan. This action is pursuant to Hq USAF TWX dated 20 January 1958 directing that SAC prepare an operational plan in accordance with the operational concept, as approved December 1957. This essentially involves the SH-65 missile as a principal booster to be launched at Cooke AFB with three possible acquisitioning and tracking stations in support. It is tentatively scheduled that the operational plan will be completed and presented to Commander in Chief, SAC during the week of 3 February 1958.

JAMES S. SEAY Lt Colonel, USAF

Chief, WS 117L Branch

Deputy Director/Pallistic Missiles Directorate/Procurement & Production







WITM

23 January 19,0,

MERCHANDER FOR RECORD

SUBJECT: Lockheed/Douglas KS-1171 Co-ordination Macting, 27 January 1950

1. The initial lockheed/Douglas MS-1171 co-ordination meeting was held at Douglas Aircraft Company, Santa Monica on 27 January 1950. The purpose of the meeting was to explore the interface protect between MS-315A and MS-1171 income as the missiles, facilities, and base operations are concerned. The senior lockheed engineer was Mr. Millian O'Greens. The Douglas group was chairmaned by Mr. Mal Thomas. Coloral Clar was the senior representative from MS-1171, and Colonal Greens was the senior representative from MS-315A. Mr. Mart Putt represented STL.

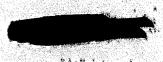
The medicy started with a brief description of the LITL vehicle by Lockbeed which was inllowed by the description of the current status of the 315A program by Douglas. The following rejor error were delineated:

- a. Macile Interface:
  - 1. Structural Problems
  - 2. Electronic Problem
  - 3. Quidauce Problems
  - 4. Destruct Problems
  - 5. Design Criteria
  - C. Separation
  - 7. Accessories
- b. Ground Bandling and Facilities Modifications
- c. Dass Operations

Project engineers were appointed by Dougles (No. Betler) and Local and (No. Youngborry) to arrange for detailed discussions in these areas for the recommender of this week. It was recommended, and arrangements were no make, for AC Spark Plus to meet with Dougles and Local and the guidance publishes.

2. During the indial discussion it was arread by Lourise and Resulted that lockness by Lourise and Resulted that lockness by Lourise and Resulted that lockness by Lourise and Lourise and Resulted the Lourise and Lourise an







Und were to inspect jija idinch recipities in was decrea caries that Loudock and Dougles cost at AFRIV to review the facilities excifiention pleture.

3. Accomposants were made for an additional marting to take piece at AFBOD on the 4th of February to determine if any unresolved technique areas exist and to also establish as expect achesule for the Western of the February a neuting will be held at AFFOD to reading problems in the area of base operations.

SIDNEY GREENE

Cyp librar DI, Col Corbuno (COC UNIA, Col Con H-W, Hol Thur SIDERY CREAT IN Coloral, Dear Chief, Mesilo Newloyment Idvision



TO THE THE COURT OF THE PROPERTY OF THE PROPER DO THE THE THE STATE OF THE STA median relation of point 40.11. In the terms of the THE ANGS IN THE HEED PERKENCE IF DATE THAT GROUP IS QUOTED." ir inul 7456 Ex FJEFFF CK 6 Feb 58 C515432 or heli usat bashlic ic comun afrad. /ardc/inglewood -INIC COM ATEMO /AMO/ INGLEBOOD Z.H/CUM, ANDC ANDRESSAFB 13 & C H & TICITE AFCGH 36224. REFERENCE AFEND LETTER, HDP. 6 JAH 58, SUBJECT CLN THOR PROGRAM ACCELERATION. THE 171 MISSILE PROGRAM CUTLINED THEREIN IS APPROVED AS REQUESTED. ADDITIONAL BY 58 FULL ALCULKEMENTS ARE APPROVED IN AMOUNTS AS FOLLOWS CLM P-153 \$16.5 MILLION, Y-159 2.0 MILLION, P-300 3.5 MILLION SPOLN TOTAL \$22.0 MILLION. OF THE ABOVE, THE P-100 FUNDS AND TRING MADE AVAILABLE BY PROCUREMENT AUTRORIZATION, ACTION ON THE P-300 FUNDS WILL BE INITIATED UPON RECEIPT OF DEFINITIZED PUDGISHENENTS. The fy so klouise for an \$18.0 pillion increase in south finds is ACKRUBLEDGED. WALNEST AT IT YEAR INTERVALS! IFIS IS AN AC MESSAGE De/23272 Feb HJbphf COLUMN TO MINTER 12 YEARS. SCOP DIFF CROSS year on Table 12 7 Feb. 58 FY 58 Rita missiles Furt. 6/mm. 2 Par.TWX 147, -147 188 (new told with in 6/mm 18 Row. Thx 147 Ø of 40,6) s/mo (22 oxoner) 6 Jan. And leter 171. . . 8/ mo. 7 Feb. TWX 210 171 The A's of the 22 million required on 7 the how Many to my day of the million no this are provided the perpulsion test wheat his mit get hem appeared of his in

12 February 1958

MEMO TO FILE

SUBJECT: THOR-117L Integration

1. A meeting was held 24 January 1958 to discuss the above subject. The following personnel attended:

Lt. Colonel R.E. Robertson MCPTD
Lt. Colonel J. Seay / MCPTA
Major D.M. Billick Go. MCPTA
Capt. W. Jeancon
Mr. S. Lovas MCPTD

- 2. The discussion concerned the use of a THOR missile as a booster to be used in conjunction with the 117L. Under the present plan of activating THOR squadrons, it is contemplated that five THOR missiles will be available in CY-58 over and above squadron requirements. These can be used for special projects. It was thought that perhaps four of the five missiles would be used for the project relating to the 117L. It appeared that four missiles would be made available for the proposed program on a non-reimbursable basis. Four more and possibly six more would be provided from the THOR production line, and the 117L Project Office would arrange to reimburse the 315A Project Office for this second group of missiles. Since the (six) missiles will be bought for production at the tail end of present contracts, it appears that funds need not be furnished to the 315A Project Office until the beginning of FY-59. The first four missiles will be of the 120 series.
- 3. It is contemplated that there will probably be five firings at Patrick and five at Cooke.

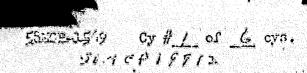
  NESCUED as (10) at Cooke A
- 4. It will be necessary to determine what GSE will be required to support Cooke and to identify the items for which the 117L Project will give us money. Col. Seay indicated they would use one of the stands at SAC. We need to know what stand will be used.
- 5. It was agreed that only a matter of allocation is involved at the present time and no funds need be transferred this fiscal year. Ten missiles can be diverted from our contracts as needed.
- 6. We will need money in FY-59 and will add the six additional requirements to our third contract probably.
- 7. We can issue a CCN to Douglas to tell them what they must do to adapt the missile to the 117L. Col. Seay will give us a note stating exactly what is required. We will then ask Douglas what they need and when in the way of CSE.

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Cy # / of 6 eys.

- 8. On 4 February another meeting was held, attended by personnel from Lockheed, Douglas, END and E.O. The meeting was called for the purpose of setting up some kind of work statement in connection with the THOR-117L program. A Memorandum of Understanding was desired, setting out who was to do what on the setting up of schedules. The group, excluding BEO, had had a meeting previously, and some of the items unsettled at that time were to be discussed and resolved in this meeting. It was desired to obtain certain facts which would be the basis for instructing Douglas contractually to accomplish their portion of the program. Lockheed was concerned about the weight of the missiles to be allocated for this project. They wanted the lightest missile possible . and felt that the approximately 19,000 pounds of instrumentation, which would be incorporated into the missiles they were to receive, might prove to be a significant and excessive weight which might jeopardize the program. They wanted to know the exact number of the missiles to be used. and the exact weight of these missiles rather than the generalized weight and balance statement for the typical missiles involved. After considerable discussion on this point, it was agreed this information would be furnished to Lockheed. However, the missiles would be pre -138 missiles. Lockheed desired to know how many missiles would be involved. It was indicated there would be five at Patrick and five at Cooke. The ten missiles would be fired through July 1959. This represented launching time, and deliveries would have to be carlier. Only one stand would be used at Patrick consecutively for the five firings.
- 9. With respect to the wind tunnel program responsibility, Lockheed thought this would be their responsibility, although they would furnish the results of their efforts to BMD as well as Douglas. Douglas was satisfied to see the results of the test.
- 10. Douglas wanted to know if a work statement could be set up in the matter of a few days. Col. Greene and Major Wilson were to get together on this matter. Douglas was to give us its comments on a work statement right away so that these could be studied and an agreement reached. There was thought the work statement would be available and coordinated with Lockheed by the end of this week. It would be a preliminary document but fairly definitive.
- II. With respect to the modification of facilities at Patrick,
  Lockheed proposed to furnish design data to Douglas who would work out
  with the Base the provisioning of the required facilities. Douglas was
  cautioned to insure that the Base would in fact provide these needs, because it would be extremely difficult to charge the cost against a supply
  contract.
- 12. With respect to the work statement, Douglas was also informed that if it proceeded without contractual coverage to implement the probable requirements, this would be done at its own risk. Contractor was not discouraged from doing this but simply informed of what it





already knew - that without contractual coverage Contractor was proceeding at its own risk. It was suggested to BMD that, since this appeared to be an urgent project, a Purchase Request setting forth the requirement be hand-carried to BMD so that a letter supplement could be issued without delay. It was indicated a PR had been started covering studies which included, but were not limited to, the project under discussion. Moreover, the PR made no reference to hardware requirements. Douglas indicated it needed coverage within a week for work which would encompass production of hardware. BMD was asked to modify the PR now in process, or initiate another one which would permit BMO to act expeditiously.

13. Lockheed was interested in knowing whether they could work with AC in a manner parallel to the way they were working with Douglas. This appeared to be satisfactory to the group except that BID would be informed of all matters under consideration so that it could take a hand as appeared. appropriate. Col. Seay indicated he would like to amend the AC contract as Lockheed's contract has been amended. The same situation exists between Ri-AC as between Ri-DAC. A question was raised as to whether a call contract could be used covering R-W's work with Lockheed. Col. Seay was to check on this. Lockheed indicated they might need a nose section of the missile in connection with the designing of the interconnector above the interface. This matter is to be resolved. It was understood that Douglas would not investigate heat problems as this is the primary responsibility of Lockheed. AC has responsibility in connection with the guidance system. Lockheed wondered whether BMD wanted Lockheed to know what material GE is working with. They indicated Lockheed had a limited "need-to-know." It was indicated this was a slightly different area because we planned the work GE did on re-entry configuration would be subcontracted from Lockheed to GE.

It. Lockheed again stressed that weight was a serious problem.

Several suggestions were discussed for reducing weight, including elimination of fins and reduction of weight in connection with the shock mount on the guidance sections, which is to be the subject of a reduction program in the future. The 100-200 pounds weight saving in connection with this latter item appealed to lockheed. There was some question about the desirability of making this change for the sake of saving weight without trying out the modification on missiles fired prior to the time needed for this program. It seems like a considerable gamble might be involved for the weight saving gained. This was to be a matter for further discussion by the group.

15. Lockheed advised it had had a meeting at Patrick in connection with GSE. It was their opinion that there would be no particularly difficult problems which could not be solved. They outlined five or six key matters which they had had under consideration. The height problem with respect to stand 17A had been essentially licked. Lockheed had discussed GSE problems with the Base and had reached agreements on most items. They will talk to Douglas this week so that they can reach joint agreement on the items involved. Lockheed considered that Douglas would take care of any work required at the Base. It was indicated that as of yesterday no official word to AMTC had been given regarding this program. Field advised, it expects to have a meeting next week at Patrick with test people to

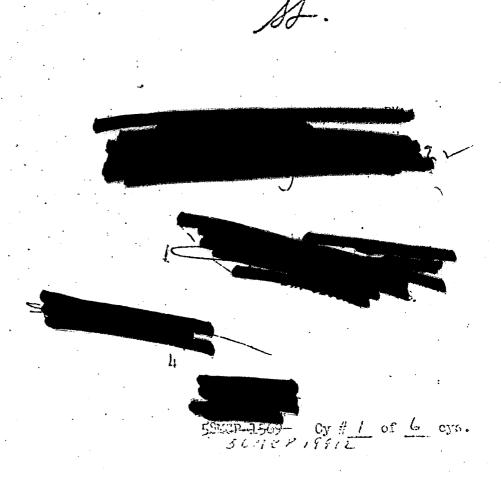
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3

present the entire program. BMD would also work out in conjunction with them the method of base operation, getting a Memorandum of Understanding presenting to them the specific nature and the type of modification, and determining how the Base can handle this project. Lockheed indicated they planned to go back to Patrick two weeks from tomorrow to review the particular problems they had. BMD wanted to enlarge the scope of the meeting at Patrick to cover the whole program. It was suggested that if the facility material was not available for discussion a later meeting could be set up for that. The management meeting should come soon and separately if necessary. Lockheed indicated it would design a tower as well as the lines, and Lockheed will subcontract the tower and related work. With respect to the lines running from the block house to the pad, Lockheed agreed tentatively they would order the cable and provide criteria and then Douglas and the Base would arrange for installation.

16. As a result of some discussion, Lockheed will do away with fuel and acid dump trailers. The amount of space to be made available to Lockheed was discussed. It appeared that h square feet required in the blocks might not be available. Lockheed thought they might be able to cut back sufficiently to fit into the space available.

17. Lockheed desired to discuss the program at Cooke but the personnel best informed in this area are currently in England. Lockheed's concern revolved around the problem whether they should re-orient or build new launchers, and whether the launchers available could be turned 60°, thereby eliminating the need for new ones. There will be enother meeting tomorrow at 9 o'clock at Douglas to discuss this matter further.



A LOS

February 14, 1953

HEROPANDUM FOR THE SECPLETARY OF DEPENSE

SUSSECTA THOM and WE-1171 Program

The Closely related to Air Force THCR and ES-1171, prout a undertaken projects, all of which, I belleve, should be undertaken promptly by the Air Force, THCR boosters can be made available for these projects from 1959 authorized production without adversely affecting the IRBM program.

towollor as axa atoatord adl. . S.

Vance 103% nose comes is based on using project to test act vance vance 103% nose comes is based on using 140% and a VANCOVARD second stage. This sombination will also provide a two-stage missile could be provided for uver 5,000 miles. This missile could be provided for inventory relatively chouply and at a cost of about 50 million more than the cost of a Thick and at a cost of about 50 million then the cost of a Thick adulation. No firm recommends—then the project of a Thick it is believed on the field missiles could be secured at a very early date to supplement LOSM capability, is desired at a very early date to supplement LOSM capability, is desired.

b. Television Salellite. A small television transmitter of the instance 

The THOR would be combined with the HUSTLER engine to becerthe solution to orbite. I om advised the first flight of this extent its to orbit. I om sevient the first flight of this expense.

c. Recoverible satellite. This system could carry ting devices. The Thom The The combined with a WARGMARD second sted to boos: the satellite to orbit. Present thatcations are that the satellite to orbit. Present thatcations are that the light can be made in July that the satellite to orbit.

the HUSTLER engine would enable the Air Force to Launch and 300 lb. setentifie sutellite by October 1958.

Air Porce can leunch a myace, As previously recommended, the and VANGUARD 3 with an appropriate payload by Cetober 1950. In addition to the scientific data that can be obtained from nettonal prychological years could make a major internetional prychological years could make a major internetional processing the process to the nettonal processing the processing to the nettonal processing the processing the the the nettonal processing the processing the confidence of the nettonal processing the proc

Mean for Seey of Defense, Subje THER and MS-1174 Fregram(b)

3. Regarding items 2d and a above, the Air Force cap undertake their accomplishment or participate in such projects as may be deemed appropriate. I believe the dates used above should be regarded as targets and are necessarily subject to adjustment as programs proceed.

(Signed) JAMES H. DOUGLAS Secretary of the Air Force

APPROVED (Within All Force Resources for 1958);

18 FEB 5

ATTN: COLONEL F C E ODER, WDTR

FROM: F. W. O'GREEN, LOCKHEED MISSILE SYSTEMS DIV PALO

ALTO CALIF

SUBJ: WS 117L - RECONNAISSANCE CAPSULE

/UNCLASS/ LMSD/37545 --- PRESENT STATUS OF TECHNICAL AND CONTRACTUAL APPROVAL OF REENTRY CAPSULE IS AS FOLLOWS -

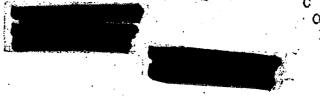
- 1. G E HAS BEEN SELECTED AS BEST SOURCE FOR DEVEL-OPMENT OF REENTRY CAPSULE.
- 2. FAIRCHILD HAS BEEN SELECTED AS BEST SOURCE FOR CAMERA UNIT.
- 3. TECHNICAL APPROACH AND CONTRACTUAL DOCUMENTS
  COVERING G.E. AND FAIRCHILD WORK STATEMENT WERE TRANSMITTED
  TO ASST A/F PLANT REP ABOUT 7 FEB, WHO IN TURN FORWARDED ABOVE
  INFORMATION TO BMD FOR TECHNICAL APPROVAL.
  PROGRAM SCHEDULE REQUIREMENTS NECESSITATE IMMEDIATE
  CONTRACTUAL ACTION FOR SUPPLIERS. IT IS BROUGHT TO YOUR

ATTN THAT PROGRESS IS ALREADY DELAYED BY ONE WEEK, AND IT

IS URGENTLY REQUESTED THAT BMD FURNISH LMSD VIA CONTRACTING

OFFICER THE NECESSARY APPROVAL OR ACTION REQUEST.

C O P



Feb 21 1958

#### MEMORANDUM FOR THE DIRECTOR OF GUIDED MISSILES, OSD

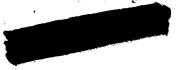
I would like to refer to the memorandum addressed to you on 31 January 1958 from the Under Secretary of the Air Force concerning R&D Augmentation for the SN-75 (THOR). This memorandum is to provide more detail concerning the development effort indicated in the referenced memorandum.

It has been recognized for several years that development of a more sophisticated nose core for the ballistic missiles would permit a higher yield-to-weight ratio and a higher degree of invulnarability. Theoretical and experimental work that has been accomplished to date by contractors to the U.S. Army and the U.S. Air Force have brought us to the position where full-scale testing is necessary to bring to fruition the advancedre-entry body. This testing can most readily. be accomplished by using a THOR booster with a second stage made up of the second stage of the VANGUARD satellite Inuncher. This test vehicle vill carry a 600-800 lb. ablation type re-entry body over trajectories whichwould be realised by growth versions of present ballistic missiles, or by follow-on developments such as the solid propoliant ICBMs. In carrying cut this development work, it should also be recognized that the necessary techniques and hardware will be developed whereby an ICIM adaptation of the THOR missile may be provided. It is not intended that a decision should be made now to. provide IDEM versions of the THOR but, assuming successes in this development effort, a later decision may be made to provide a potentially earlier ICBM capability or a retrofit for THOR squadrons if overseas deployment is limited by base rights negotiations or if it becomes desirable from an economic point of view.

To accomplish this develo ment program, it is necessary to increase the THCR production rate to eight missiles per nonth and procure modest amounts of other test material. This requires the expenditure of \$22 million in FY 58 and these funds will be provided from currently available Air Force resources. Current planning indicates that approximately \$18 million additional funds will be required in FY 59. We are currently preparing a revision to the Eallistic Missile Program to include this effort and will be ready to submit it to the CSD Eallistic Missile Committee in the near future. Your endorsement of this program is requested.

cot lin. Desglas

Mr. Horner Con Thocomis TERM s/ MHECON A. MocINYING Under Escaphing



WDGEH

NUMBER

II)

# HEADQUARTERS AIR RESEARCH AND DEVELOPMENT COMMAND United States Air Force Andrews Air Force Base Washington 25, D. C.

Andrews Air Fore Washington 25, GENERAL ORDERS)

27 February 1958

SECTION

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- I. DISCONTINUANCE OF HEADQUARTERS, AIR FORCE PERSONNEL AND TRAINING RESEARCH GENTER.
- 1. Headquarters, Air Force Personnel and Training Research Center is discontinued at Lackland Air Force Base, San Antonio, Texas, effective 15 April 1958. Concurrently with discontinuance, this unit will revert to the control of the Department of the Air Force.
- 2. Fersonnel rendered surplus by this action will be absorbed in other units under control of the Commander, Air Research and Development Command.
- 3. Equipment rendered surplus by this action will revert to stocks to fill present and future requirements. Unit Authorization Liet Number 9137J-0000 is voided on date of discontinuance.
- 4. Organizational records will be disposed of in accordance with paragraph 23 of Air Force Manual 181-5.
- 5. Funds will be disposed of and final reports will be submitted in accordance with current regulations.
- 6. Authority: Department Air Force Letter, AFOMO 728K, dated 25 February 1958, Subject: Discontinuance of the Headquarters, Air Force Personnel and Training Research Center.
  - II. DISCOMPINUANCE OF USAF UNIT AMENDMENT.
- 1. So much of Section IV, General Orders Number 7, this Headquarters, this station, current series, as reads,
  - \*1. Headquarters, 6590th Support Group (Headquarters) is discontinued at Ealtimore, Maryland, effective 2 March 1958.

Pis amended to read,

OFFICE OF THE SECRETARY OF DEFENSE

WASHINGTON 25, D. C.

Brebruary 1958

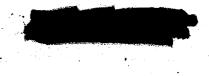
MENORANDUM FOR: SECRETARY OF THE ALR FOLCE

SUBJECT: RECORDAISSANCE SATELLITES AND MARKED SPACE EXPLORATION

- 1. Reference is made to the Air Force Proposal for accelerating military reconnaissance satellites and outer space vehicle projects discussed in your removendum dated 12 Hovember 1957, and your memorandum of 1 February 1958 requesting that continuation of the Air Force military reconnaissance project be clarified.
- 2. I have reviewed your proposal in consultation with the Director of Guided Missiles, The Special Assistant to the President for Science and Technology, and the Director of Central Intelligence. In our review we have been guided by the following general policy considerations:
- a. The Department of Defense must be elect to avoid within and between the services any unnecessary duplication of military and scientific space projects even though some degree of risk is thereby involved, in order that funds and other resources may be available for the large variety of absolutely essential programs.
- b. The scientific and engineering capabilities of each of the military departments must be used with maximum effectiveness and efficiency. No single military department should be overloaded with too many high priority, crash programs.
- c. In addition to its missile programs, the Air Force is responsible for the 117L divenced Recommaissance System and has a recognized long term development responsibility for manned space flight capability with the primary objective of accomplishing satellite flight as soon as technology permits. It is important to achieve an adequate concentration of effort and energy within the Air Force on these programs with a minimum diversion of attention and of resources to lower priority projects.
- 3. On the basis of the foregoing general considerations as well as of more specific technical judgments, I have arrived at the following conclusions on the points raised in the two above referenced memorands.
- s. The ATLAS 117L project should be accelerated and carried forward under the highest national priority in order to attain an initial operational capability at the earliest possible date.
- b. The proposed interim recommissance system mids up of a Thow booster condined with a second stage which convice a lightweight payload in the form of a recoverable capacite, duplicates rather than complements the ATLAS LITE capability. The interim system would give only a mail improvement in time over the ATLAS LITE. Moreover, the successful and

\* 177 Albert



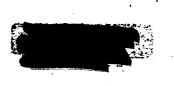


continuous operation of a recoverable reconnaissance system, with the attendant requirement for search, appears infeasible from a practical and useable military point of view. Accordingly, the development of the interim system should not be pursued.

- c. In order to attain early flights of the Lockheed vehicle to be employed as the second stage in the 117L system, it may be desirable for the Air Force to plan for test firings of this vehicle utilizing a THOR booster, since an adequate number of these less expensive boosters can be made available for this purpose sooner than the ATLAS booster will be available.
- d. I understand that a THOR booster with a suitable second stage vehicle may be the most promptly and readily available device for experimental flights with laboratory animals. The development of such hardware is authorized, including provision for the recovery of the animals, in furtherance of the objective of manned satellite flight.

S/ Roy Johnson

DIRECTOR, ADVANCED RESEARCH PROJECTS AGENCY





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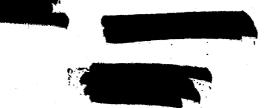
12 MARCH 1958

COMDR, AFBMD, INGLEWOOD, CALIFORNIA

TO: LOCKHEED AIRCRAFT CORPORATION PALO ALTO, CALIFORNIA

SECRET FROM WOTR 3-18-E-FORMR. J. H. CARTER. REFERENCE
TWX LMSD/37305 AND LMSD/37019. HQ USAF HAS DISAPPROVED THE
WE 117L RECOVERABLE RECONNAISSANCE PAYLOAD PROGRAM. YOU
ARE NOT AUTHORIZED TO INCUR ANY FURTHER COSTS WITH GE OR
FAIRCHILD ON WE 117L PROGRAM II A. YOUR EFFORTS IN THE USE
OF TEOR BOOSTED WE 117L SHOULD BE REORIENTED IMMEDIATELY.
DISTRETOU FREFARE A PLAN FOR ACCELERATION OF THE BASIC
WE 117L PROGRAM THRU USE OF THOR BOOSTED FLIGHTS FOR EARLY
TEST OF WE 117L. COMPONENTS INCLUDING ORBITAL FLIGHTS FOR
EXERCISE OF THE GROUND SPACE COMMUNICATIONS NETWORK.
PLAN SHOULD INCLUDE CONCEPT FOR RECOVERABLE CAPSULE
FLIGHTS FOR AERO-MEDICAL RESEARCH PURPOSES. EVERY EFFORT
SHOULD BE MADE TO ORGANIZE THIS MATERIAL FOR PRESENTATION
TO ME AT THE EARLIEST POSSIBLE DATE. SIGNED SCHRIEVER.

O. J. RITLAND BRIGGER, USAF-VIGE COMMANDER



3 ,

Wor

MECRALICUM FOR THE RECORD

13 March 1958 1630

SUBJECT: Call from Colone! Oder in Washington to Colonel Hamilton

Last Thursday, Colone, Cdar stated, the question came up as to what EMD should do with the Johnson memorandum which terminated certain parts of his program. A TWM was written in General Schriever's office rather late in the evening going to Lockhood telling them to incur no more costs toward this end. This was transmitted from a rough copy which was subsequently typed in final form and signed by Comeral Ritland. Both Generals and Colonel Oder were present.

The problem has arisen experently that in the EMD side of the house they are brying that Lockhard cannot be resistureed for these costs. Colonel Oder had understood and folt cortain that the EMD office he had been working with fully understood that the intent was to reisburge Lockhard for costs up to the time of the TM notification.

Colonel Equiton was asked to contact Kajor Zelenka of Colonel Oder's office and get him to prepare a size to General Funk which Colonel Hamilton could slyn out the first thing Friday morning (14 Karch). The many chould say that General Schriever has reviewed this matter and it is his desire that Lockheed be covered for costs incurred up to the time of receipt of the wire; a copy of the wire should be

Apparently the ACO is not going clong on this and as a result, Mr. Carter has called General Ritland several times in Washington. The amount involved is around \$50,000. General Scariover had told Carter so so shead on this thing enticipating sort of favorable decision which has not been fortherwing.

Colonel Hemilton assured he would follow up on this as Colonel

ci



NEXORACIDUA FOR MAJOR GENERAL FUNK

SUBJECT: Reorientation WS 1171 Progrem IIA:

- 1. Recent decisions by DOD have resulted in a reorientation of the W3 117L Progress IIA, which utilizes Ther boosters for the early phase of W3 117L. It was reclined that Lockheed, Ceneral Electric, and Fairchild may have incurred costs prior to notification of the reorientation of the progress.
- 2. Notification of the reprientation was transmitted by teletype to Lockheed on 10 March 1953. A copy of that teletype is inclosed. General Schriever has reviewed the entire matter and wishes that Lockheed, General Slectric, and Fairchild be reimbursed for costs incurred up to and including the date of teletype notification.

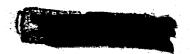
1 Incl: ۱ Incl: I (9)

J. L. HAMILTON Colonel, USAF Executive Officer

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. World dr Major Colombia 2751,





March 19, 1958

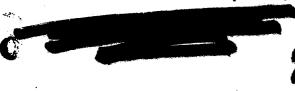
# MEMORANGUM FOR THE DIRECTOR, ADVANCED RESEARCE PROJECTS AGENCY, OSD

#### SUBJECT: Air Force Man-in-Space Program

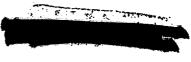
1. The total Air Force "Man in Space" Program toward a mid-1960 operational date is estimated to be as follows:

		FY 59
P-100	(Aircraft & Missilae)	82.0
P-200	(Support)	11.5
P-300	(Construction)	2.5
P-600	(PAE)	27.0
	•	133,0

- 2. If the Air Force does not receive the full fund support for the above progress the following projects could be progressively undertaken with a resultant delay of the first manned capsule launch from mid-1960 to some future date:
  - c. \$16.0 Eillien For development of small-enimal carrying consules and components for use in ora-junction with TEO2-boosted US-117L launches, starting in Nevember 1958.
  - b. §5.0 Million For assembly buildings, and launch pad and instrumentation modifications.
  - c. \$30.0 Hillion For men-size capsule and second stage booster design, development and test, as well as the procurement of support test vehicles.
  - d. \$15.0 Hillian For fabrication of a small number of capsules, including second stages and bosspars.

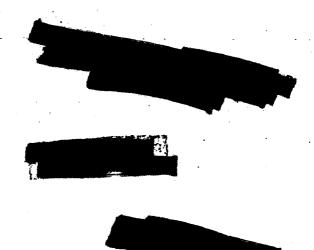






e. £67 Million - For design, development, test and procurement of capsules, second stages, becaters, and support test vehicles leading to the earliest possible manned space flight.

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cepsules and components for mes in conjunction with Time-broated in Jaja Leunches, starting in November 1958.

- b. 55.0 Milion For aspecbly buildings, and launch ped and instrumentation modifications.
- c. \$70.0 Million For mon-size consuls and second stare booster design. development and test, as well as the procurement of support test vehicles.
- d. \$15.0 Million For fabrication of a small memor of capables, including account stages and boosters.

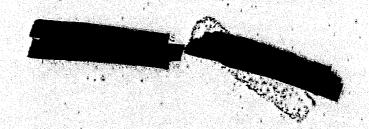
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ARDRD-SX coord by LATERD APDES



WDTSR

MEMORANDUM FOR COLONEL TERHUNE

SUBJECT: Reply to Inquiry

1. According to the Lockheed letter of transmittal, their report was prepared at the request of General Schriever. It was not initiated by the 117L office. The three-phase program referred to is described in the report, a copy of which is inclosed. The presentation at ARDC was made as a result of a direct invitation from General Flickinger to IMSD.

2. The trip discussed in Part II is being made by Major Wienberg as a member of the Long Range Planning Committee on Intelligence.

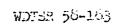
2 Incl: 1MSD 2907 (S) atd 11 Ner 58

Colonel, USAF Director for WS 117L

Cy No. 45 - returned 1011 DT 5 R

TWX - Cite No. 03-42-06 (8) WDSAT 58-751

When indesures are withdrawn that classification of this consequently will be downgraded to ASI Countries accordance with AFR 205-1.



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THE COMBR ARDIC ANDREWS AFR HE PROZPE LT COL ATMOOR!
TO COMBR AFRING INCLEVED CALIF /COL ODER AND MAJ WIENBERG! P 2420152

5 .51 A E CR E T/CITE THE OJ-24-06. PAD TELECON 24 HAR SE. PART I FOR COL ODER /SECRETI/. THIS MORNING I ATTEMBED A MEETING IN CIR FLICKINGER'S OFFICE SUBJECT WAR IN SPACE. KELLOG OF LOCKHEED PRISENTED A TARGE PRASE PROGRAM AS DUTLINED IN THEIR 'VS 11TL ADVANCE APPLICATIONS STUDY NO I LESS-2507, II WAR SO. REQUEST YOU GETAIN 10 COPIES OF THIS REPORT WARD TORWARD TO ME SOONIST /BY COL APPOLD IT POSSIELE/.

MAJ DAVID SIMEN IS CENERAL PLICKINGER'S PROJECT OFFICER ON PRANK I WHICH CONTEMPLATES PUTTING A SHALL ANTHAL ABOARD THE DIG 58 AND THE TUL BY THOS - HUSTLES COMPISATION FIRED PROMICCORE. HE WILL

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24/2016Z MAR RJEPFF

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### WS 117L PROJECT OFFICE

#### New Phone Extensions

17 Apr 1958

#### WDTSR

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Oder, Frederic C. E.; Colonel			•
Director for W8 117L	2751	234	2
Truax, Robert C., Captain (USN)	2751	232	2
Asst. Director for WS 117L		· · ·	•
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<u> MOTSRP</u>		•	···.
Zelenka, Raymond E., Major Chief, Plans & Programs Division	2751	200	2
Bradburn, David D., Captain	<b>2</b> 767	<b>23</b> 8	2
Pietz, John Jr., Major	<b>27</b> 67	140	2
Walecka, Norbert J., Captain	2767	237	2
WDTSRE			•
Battle, C. L., Lt Colonel			
Chief, System Engineering Division	.2751	232	2
Austin, George E., Major	2741	223	2
Blum, Edward F., Lt Col	2741	137	2
Buzard, Frank S., Major	2594	223	2
Conway, Edward J., Major	2741	144	2
Copley, John O., Jr. Captain	<b>25</b> 94	223	2
Fiebelkorn, John A., Captain	2098	147	2
Jones, George P., Lt Colonel	2741	136	2
Phillips, Francis O.	2594	223	2
Prentiss, Don C., Captain	2594	223	2
Schmitt, John J., Jr., Captain	2741	146	2
Troetschel, William O., Captain	2594	223	2
Wear, Thomas O., Major	2741	223	2
Wienberg, Harold F., Major	2741	135	2
WDTSRF			
Riepe, Quenten A., Lt Colonel	2781	138	2
Chief, Facilities & Test Division			
Buck, Guy P., Captain	2781	141	2
Hicks, Ben F., Captain	. 2781	143	2 2
Houghten, Richard A., Major	2781	142	2
Patton, William M., Captain	2781	143	2 2
Runge, Fritz C.	2781	139	2 .
Smith, Harry L., Kajor	2781	143	2
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Attachment No. 1 to D. B. #76, page 1

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#### WS 117L PROJECT OFFICE

#### New Phone Extensions

#### SECRETARIES FOR WDTSR

	*	EXT.	ROOM	BLDG
Hawkins, Elizabeth, Mrs.		2751	236	2
DiStefano, Jackie, Mrs.	•	2767	<b>2</b> 02	2
Dunn, Edith, Mrs.		2781	143	2
Gardner, Joyce, Mrs.		2767	201	2
Gilchrist, Laura, Mrs.	ارائ قام گيه دين جي ايال جي ايالي	2741	145	<i>0</i> -1, <b>2</b> .
Greiert, Dorothy, Mrs.		2767	203	2
Hollins, Dorothy, Mrs.		2751	236	2
Zimmer, Ione, Mrs.	••	2751	<b>23</b> 6	2

23 April 1953

SUBJECT: Nan in Space Responsibilities

- 1. General Schriever called me Sunday concerning the Man in Space responsibilities in ARDC. He mentioned General Flickinger would be given authority to act as though he were assigned to PLD in order that his influence would be felt in the Man in Space program in the future.
- 2. We need a memorandum for General Anderson outlining the responsibilities we are willing to give to Flickinger so he can carry out his role. Will you please draw up same. This is not so frantic that it must be done immediately then you get back but we obviously wish to complete it in time to put the operation into effect.

Ruch a withing

Colonel, USAF

Deputy Commander Technical Operations Retyped in WIGV

CCCM

MENORALDUM FOR COLONEL TERRITORY.

SUBJECT: Blo-Medical, THOR Boosted WS 117L Program

- 1. This effort brings with it many problems of coordination with external activities new to our programs and procedures. Chief energy these are coro-medical organizations (e.g., the School of Aviation Posiciae), portious of ARDS, interested elements of Headquarters USAF, and ARMS.
- 2. I have directed that Colonel Speciard Inchro on a continuing basis that appropriate coordination is effected and that the diverse inderests of these activities are not interfering with the pase of the cubject program. There is no intent by this action to did not or about the ordinary responsibilities or outhority of any office in the complex in directing approved programs.

Cyd Marmichel: Colonel Evans Colonel Cder

Signed

O. J. RITLAND Brigadier General, USAF Vice Commander 5 May 1953

In Reply Refer to: IMSD/56989 WS117L/32

Subject:

Contract No. AF Oh(647)-181 Biosztellite Flight Program Plan

To:

Commander
Air Force Ballistic Missiles Division
Hdotrs., Air Research and Development Command
Attn: Col. F.C.E. Oder (WDTSR)
F. O. Dox 262
Inglewood, California

Reference: (A) AFFMD TWX to LMSD, dtd. 11 Karch 1958, (LMSD/37894)

- (B) Letter Contract AF C4(647)-181, ctd. 25 January 1958, (IMSD/37125)
- 1. The Mid of Ref. (1) from AFEID to IMSD redirected the efforts of the light progress under the letter construct Ref. (2) to include blocatablist flights as secondary objectives of the IIA (Thor Boosted) portion of the progress. This redirection has eliminated the requirement for development of a system suitable to the recovery of photographic film from an orbiting vehicle and replaced it with the need for developing a modified recovery technique appropriate to the support of the seromedical explorations to be conducted in consonance with the new secondary objectives of the progress.
- 2. Prior to the redirection of Ref. (1) a division of responsibility between prime and subcontractor had been established and a work plan approved by the USAF for accomplishment of the film recovery program. The change in the recovery aspect of the program has required a redstermination of responsibilities for the prime and subcontractors in accomplishing the redirected work and has been defined by IMSD, based on discussion with members of the USAF, as follows: IMSD will assume over-all system responsibility for all biosatellite flights incorporated into the flight program. As weapon system contractor IMSD will determine the general specifications for the subsystem, the general memor in which the subsystem will be developed, the integration of the subsystem into the program, and will select for approval of USAF subcontractors to be used. Supporting studies and developmental investigations will be made as necessary to establing studies and developmental investigations will be made as necessary to establing studies and developmental investigations will be made as necessary to establing studies and developmental investigations will be made as necessary to establing studies and developmental investigations will be made as necessary to establing program as the dant to the operational recovery are considered the responsibility of intended to number the program as the dant to the operational recovery are considered the responsibility of intended to number the program as the dant to the operational recovery are considered the responsibility of intended to number the program as the dant to the operational recovery are considered the responsibility of intended to number the program as the dant to the operational recovery are considered the responsibility of intended to number the program as the dant to the operational recovery are considered the responsibility of intended to number the program as the dant to the program as the dant to the program as the dant of the days of

tractors so as to permit the most expeditions achievement of the program. Subscittractor efforts will be:

(a) Design and construction of the re-entry shell.

(b) Design and construction of the bicatellite sealed capsule including all necessary environment control and life-support components.

c) Experimental animals and training as approved by

the Air Force.

(d) Biomedical data sensors, processors, and on-board recorders as approved by the Air Force.

(e) Design and construction of recovery devices on or

in the bicardical capsule.

 (f) Yest program for proving satisfactory performance of the bicmedical capsale.

(g) Design and construction of ground support trailers for biomedical capsule.

3. The weapon system contractor recognizes General Electric's paranount position in this field and concurs with the Air Force direction that General Electric be made sole source subcontractor to assist in accomplishment of tasks (a) through (f) listed above. A separate subcontract will be established for accomplishment of task (g).

It has been requested by the UEAF (meeting at MEED tettion represent tives of AFE/D, HOPME, and IMSD) that the aeromedical popload be included in the 2nd flight of the IIA (Thor Booster) program scheduled for December 58. It is recommended that the incorporation of this AM payload be withheld until the Ird flight scheduled for January 59. It is further recommended that the total member of biosatellite flights be five with a possible sixth with a flight position as shown by the following schedule.

This recommendation is based on the indication by USAF that Thore broated flights in addition to the ten presently programmed will be required to complete the USAF objectives and therefore would permit later scheduling of the catallite flights. This will permit better utilization of the early flights in the accomplishment of the program's primary objectives, namely "proof of the basic 117h vehicle". The schedule proposed would be as follows:

	Flight	1. 2	3	4	5 6	7 , 8	9 10
	Kenth	11/58 1	2/58( 1/	59 2/59	3/59 4/59	5/59 6/59	7/59 6/59
14 1 1 18 1	Obj	1171 1	17L AM	. 1171	117L AM or	M M	M B
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Engine (- - - - JP4- = - - - - ) (- - - - - - - - - UDMH-

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5. On the basis of previous discussions with members of AFEAD and on the assumption of your concurrence, LMSD is proceeding to establish subcentracts in accord with the definition of responsibilities as stated above. Early approval

of the schedule shown berein is requested to permit its immediate incorporation

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

J. H. Carter, Manager
XA Weapon System Branch

JHC: FWO'G: sg

into the program.

cc: Deputy Air Force Plant Representative Sunnyvale, California



## AIR RESEARCH AND DEVELOPMENT COMMAND

UNITED STATES AIR PORCE Activus Air Fatos Base Washington 25, D. C.

Bio

ADDRESS BEPLY TO COMMANDER, ABOC: ATTN:

RDZGW

2 2 MAY 1958

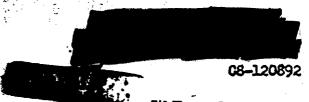
SUBJECT: (U) Support of Bioastromeutics Program

TO

Commander
Air Force Ballistic Missile Division (ARDC)
P. 9. Box 362
Inglewood, Dalifornia

- 1. In partial implementation of the authority granted under paragraph 3d, Mamorandum for the Secretary of the Air Force from the Director, Advanced Research Projects Agency, OSD, 28 February 1958, subject, "Recommaissance Satellites and Manned Space Exploration," and in the interests of an expeditious start to the investigation of the bicmedical aspects of manned spaced flight, it is desired that steps be taken to include bleastronautics support as a secondary objective in from three to five of the planned THOR-boosted WS-117L flights which are scheduled to begin in November ——1958. (SECRET)
- 2. To provide you with an in-house primary biomedical technical competence and authority, Brig. General Dom Flickinger is now assigned the additional duty of Special Assistant to the Commander, AFRO for bioastronautics and as such will be responsible for the direction and coordination of all the biomedical aspects of projects assigned to your organisation. In addition, two biomedical project officers are being permanently assigned to your Space Systems Division to provide necessary technical competence on a continuing basis. It is expected, of course, that you will also make use of other competent individuals and groups in the Air Research and Development Command and elsewhere in an advisory role, as needed. (SECRET)
- 3. In order that this biomedical work will interfere as little as possible with MS-117L development and testing, control of all aspects of this work will rest with your organisation.

  It is further desired that in the interest of conserving time and resources, the AFRMD will, insofar as possible provide support to this work within the existing WS-117L contractual structure. (SECRET)



WD-58-03427

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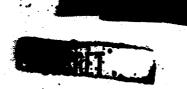
- 4. I am directing the necessary action to provide an additional budget authorisation and allotment of \$449,000 of FY 1958 P-500 funds to your organisation to cover the biomedical aspects of the efforts already underway in the WS-117L Program. In addition, \$100,000 has been transferred from the School of Aviation Medicines' resources (line 780A-7851) to your organisation. (UNCLASSIFIED)
- 5. It will be mecessary for you to take action to insure that ARPA programs additional FI 1959 funds of all types (P-600 R&D; P-600 Operation and Management; and non-P-600 funds) to cover the cost of continued affort in the WS-117L Biomedical Recoverable Capsule activity. The FY 1959 P-600 R&D funds to be programmed for this purpose total \$6 million and will cover the cost of development, design and fabrication of the recoverable capsule, animal container, instrumentation and telemetry, associated recovery equipment, conduct of the recovery operation, etc. The FY 1959 requirements for P-600 Operation and Management funds and mon-P-600 funds have not been established as yet. (SECRET)

S.E. anderson

S. E. ANDELSON Lieutenant General, USAF Commander

Cypto WOT/NOP "Action".

Info cy WOS.



WD-58-03427

41

# HEADQUARTERS AIR RESEARCH AND DEVELOPMENT COMMAND United States Air Force Andrews Air Force Base Washington 25, D. C.

GENERAL ORDERS) NUMBER 18)

22 May 1958

SECTION

INSTALIATIONS		•	•	I
MISSILES, ARDO		•		II
AWARD OF COMMENDATION MEDAL				
REDESIGNATION OF USAF HOSPITAL	e	۰	•	IV
GENERAL		٠	8	V

#### I. INSTALLATIONS.

1. Announcement is made of the disposal of space comprising ARDO Head-quarters Office Number 1 (Installation Number 1946) located at 9-15 West Baltimore Street, Baltimore, Maryland. Two entire buildings (64,222 square feet) held under General Service Administration lease Number GS-G3-B-4121 were released effective 5 March 1958.

## II. ANNOUNCEMENT OF DESIGNATION AND ORGANIZATION OF OFFICE OF SPECIAL ASSISTANCE FOR BIO-ASTRONAUTICS TO DEPUTY COMMANDER FOR BALLISTIC MISSILES, AREA.

I. Effective 1 May 1958, the Office of Special Assistant for Bio-Astronautics to the Deputy Commander for Ballistic Missiles, ARDS is designated and organized, and BRIGADIER GENERAL MON D. FLICKINGER is appointed as Special Assistant on an additional-duty basis.

#### III. AWARD OF COMMENDATION MEDAL.

l. By direction of the Secretary of the Air Force, under the provisions of paragraph 29, Air Force Regulation 900-7, the Air Force Commendation Medal is awarded to the following named officers and airmen for meritorious service rendered during the periods indicated:

LIEUTENANT COLONEL JOSEPH E. KRYSAKOWSKI, 19791A 1 September 1955 thru 10 March 1958

LIEUTEMANT COLONEL JONAH LEBELL, 19786A: 1 August 1955 to 7 February 1958

MAJOR CHYDE S. BENSEY, 36579A 17 October 1955 to 1 March 1958

MASTER SERGEANT NATMOND A. REYMOLDS, AF32949062 1 July 1957 to 31 December 1957

#### MASTER SERGEANT ARTHUR IASKCMSKI, AF16046522 17 December 1954 to 6 May 1958

#### IV. REDESIGNATION OF USAF HOSPITAL.

- 1. Effective 1 July 1958, the 3201st USAF Hospital at Eglin Air Force Base, Florida, is redesignated the USAF Hospital without change in strength, assignment or location.
- 2. UAL Numbers 3201 2947A and 3201 2947B are voided on date of redesignation. Equipment is authorized under UAL Numbers 0000 4857A and 0000 4857B effective 1 July 1958.
- 3. Authority: Letter from Headquarters USAF, dated 29 April 1958, Cite: AFCSG-31.2, Subject: Redesignation of 3201st USAF Hospital.

#### V. GENERAL.

1. Authority: Air Force Regulation 87-5, 3 December 1957.

FOR THE COMMANDER:



J. W. SESSUAS, JR. Major General, USAF Vice Commander

W. J. ATKINS Colonel, USAF

Director Administrative Services

#### DISTRIBUTION:

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AFFTU	(20)	RDJA	(1)	RDIA	(1)
AFMDC	(15)	RDD	(1)	ROTH	(1)
AFSIN	(37)	RDB	(2l <sub>1</sub> )	RDTS	(4)
AEDC	<b>(6)</b>	RDS	(2)	RVIR	(2)
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AFCISH	(1)	RUCK	(11	ATM STR	(1)

Dir Admin Serv, The Pentagon, Wash 25, D. C. (2)

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RDIEL RDJA J. W. SESSUMS, JR. Major General, USAF Vice Commander

W. J. ATKINS Colonel, USAF Director Administrative Services

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  Comdr. AFF&TRC, Lackland AFB, San Antonio, Tex (5)
  He, 6590th Sup Gp (H1), Balto, Md (5) Attn: Capt Holmes
  RDSPMP (18)
  Comdr, AD Systems Management Off, L. G. Hansoom Fld, Bedford, Mass (5)
  L/Col Elrod (RDSO) (5)
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JUNE 12, 1958

MEMORANDUM FOR THE DIRECTOR, ADVANCED RESEARCH PROJECTS AGENCY

In confirmation of our discussions on 11 June 1958, you and ourselves are agreed that the FY 59 development program for Weapons System 117L will be programmed at a level requiring financial support in the amount of approximately \$197 million. It is understood that the \$152 million currently identified in the ARPA budget for the support of the project will be augmented as follows:

The Air Force will provide to ARPA, for application to the 117L program, \$12 million currently programmed to buy THOR boosters. These boosters will be used in the early experimentation for Weapons System 117L development. An additional \$8 million will be allocated to the Weapons System 117L development from resources available to ARPA. This leaves \$25 million which the Air Force will provide to ARPA through reprogramming of resources in the Air Force budget and transfer of funds. Specific funds will be earmarked for this purpose prior to the time of finalization of the FY 59 spending program.

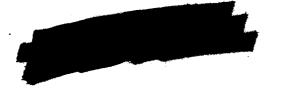
The net result, if such a program is approved by the Secretary of Defense in the request for which we will be glad to join with you, is that the program previously set forth in detail to your office and labeled as a \$185 million program would be the one formally adopted. The difference between the \$197 million referred to above and the \$185 million is that in presenting in the past this latter program it had been overlooked that the \$12 million of THOR boosters available in our budget were included. The Air Force believes that it is of the highest national importance that the program on which we have now agreed be approved and appreciates that if the program continues well it should be reviewed during the year to consider whether it might be desirable or feasible for you to request emergency funds to enable the program to be accelerated further.

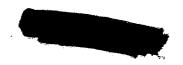
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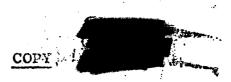
Signed

Malcolm A. MacIntyre Under Secretary

Process 3014. 75722000 WD-58-03099







## DEPARTMENT OF THE AIR FORCE Washington

Office of The Under Secretary

JUN 24 1958

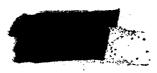
MEMORANDUM FOR THE CHIEF OF STAFF, USAF

On the basis of recent discussions of the program to be undertaken within the Department of Defense in furthering our knowledge of space, it has come to my attention that the availability of basic propulsion units might be a limiting factor in selecting the most desirable program. I believe it desirable that the selection of the program to be followed not be circumscribed by such a limitation. Therefore, without any commitment as to the utilization of these additional boosters, you are authorized and directed to increase the procurement of THOR and ATLAS boosters as follows:

- a. Add four (4) THOR boosters, to the currently approved THOR programs; delivery to begin in December 1955 at the rate of one a month.
- b. Add four (4) ATLAS-D boosters to the currently approved ATLAS procurement; delivery to begin in May 1959 at the rate of one a month.

Make additional funds of \$8,000,000 available to ARPA so as to permit the immediate procurement of four (4) additional 1171 Lockheed vehicles to be used in the support of the 1171 program previously approved for FY 1959 at \$197,000,000; delivery to begin in January 1959 at the rate of one a month.

At such time as the space program for FY 1959 is firm, a determination will be made as to financing responsibility for these additional boosters and they will be allocated to the appropriate program. If the situation should prove that these additional units are not required in the space program they will be absorbed within the Air Force approved program.



Signed

Secretary of the Air Force

AFCON Cont. #582794

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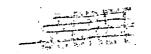
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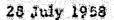
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MEMORANDUM FOR COLONEL RIEPE

SUBJECT: Schedule Slippage 117L Program IIA Deceme Discovered

Despite the fact that I have signed this, it seems to me this paper just outlines problems with an solutions. If we are in trouble, let's act up a data for the week of 28 July to brief Gen Echriever. Do not send this memorandum if a briefing is set up. Check with Gol Curtin on this.

l hicl hiemic for Gen Schriever subject CHARLES H. TERMUNE, IR Colonel, USAF Deputy Communics Technical Operations



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GDr.s.

MANAGEMENT POR CULTARE MORIZATER

SUMBOTA Schedule Supers 11Th Progress IIA

- 1. A conference was held on th fully between Douglas, Lockeed, WOTHI and WING. The purpose of the conference was to repositive the consulter that consults difference between the WS 11% Development fine for trapped IM. at Cooke Air Force Dase wit the Douglas Liveraft Corporative Iruce's schedule.
- 2. The DAN Legar DN-97705 Varport and Frolifeies Requirements of CARI for Explorated Actions of E., is 315/AF 1176 Propers 4001 DN Nove 1955, instrains a Viriag specific the Field laws of the end in regional relations and committee the Dancesta, which a six well inversal between lawyies, period convertables to our provise of the forest the Cart debugger of the six property of the convertables the convertable of the convertable
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4. Douglas Aircraft representative stated this is their best schedule for WS 117L. Only two possibilities exist for improving it:

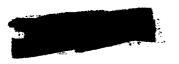
a. Launch the 117L prior to the UN 315 demonstration. (This is not recommended because it is advantageous to the 117L to properly check out the stand ahead of time with a Thor demonstration and secondly, the availability of a 117L unit is critical if the time period is shortened too much.)

b. Look additionally into the possibility of shortening the delay into the launching of the WR 315 and the 117L, which at present time is six weeks.

c. Solicit top management at Douglas Aircraft to provide additional support to the DAC effort.

CHIRING H. THEOME, JR. Colonel, USAF Deputy Commander Technical Operations

What's 50-373



## DISPOSITION FORM

FILE NO.

SUBJECT Authorization for Type of Contract

TO MOPT

FROM MCPTA

DATE 30 Jul 58

W G Wiehoff/km/2712

- l. The subject procurement is for nine (9) additional flights of WS 1171 vanced Reconnaissance System using Thor boosters under L/C AF 04(647)-181. To proposed to procure the four (4) flights as directed by HEDUSAF immediately, a remaining five (5) flights upon receipt of the appropriate directive.
- 2. The original D&F was based on a flight schedule at an estimated cost, 595,000,000.00. It is proposed to amend the existing letter contract to prove additional flights for test purposes in a manner which will be appropriate. planned to negotiate the procurement with Lockhoed Aircraft Corporation, Nascon Systems Division, 3251 Hamover Street, Palo Alto, California.

3. A Determination and Finding, as attached, is requested pursuant to a 3.303(c).

l Incl
D/AF D&F Authorization
for Type of Contract

EUGEVE S. SILBERMAN. Contracting Officer

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ACCOMMENDATE THE BIG-ASTROMAUTIC EFFORT TO BE ACCOMPLISHED IN CONJUNCTION WITH THE 117L PROCEAN. THIS INTERNAL CREANIZATIONAL

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MANPOWER AUTHORIZATIONS IF IT FIRMS UP AS PRESENTLY ENVISIONED. THE

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PICTURE AND SO I CAN GET YOUR PERSONAL INTRESSIONS. I FREE SURE

THIS BRIEFING WILL SATISFY YOU THAT WE ARE CONTINUENG TO TAKE A

VERY HARD LOOK AT OUR MANPOWER REQUIREMENTS AND HAVE CONSTANTANT

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BY

//S E C B & T//ERON AFCGM 54161 EECENT INSTRUCTIONS PASSED TO DEPT OF THE AF FROM ARPA EC VS-117L PROGRAM ARE PROMULGATED FOR YOUR COM-PLIANCE.

MSG IN YOUR (A) PARTS.

PART I. FRECHRENENT OF LODG-LEAD TIME ITEMS FOR ADDITIONAL THOR-VESITAL VEHICLES.

C. IN VIAM OF LONG LEAD-VINE REDUIREMENTS, IT APPEARS DESIGNEE TO AUGMENT PLANNED THOR-VS117L VEHICLE FIRING SCHEOULE AT THIS TIME. AUGMENTATION WILL COMMINT

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OF 9 VENICLES IN ADDITION TO THE 10 CURRENTLY AUTHORIZED.
NEW MARIS FIRING SCHEDULETO BE 1 PER MONTH DEVINNING MOVELER 1958 AND 2 PER HONTH DECIMENC APRIL 1958.

2. YOU ARE AUTHORIZED AND DIRECTED TO TAKE SUCH ACTION AS NECESSARY TO PROCUPE LOVE-LEAD TIME ITEMS TO SUPPORT THIS FIRING SCHEDULE. HINOR ADJUSTMENTS OF THE TOTAL AND CHANGES OF ALLOCATION OF FIRINGS PETWEN PROGERMS PAY BE EXPECTED AS THESE REQUIREMENTS ARE REVIEWED FURTHER. BASIC INTENT FOR UTILIZATION OF ADDITIONAL VEHCILES IS BIO-MEDICAL EXPERIMENTATION, ALTHOUGH NOT AT THIS TIME LIMITED TO BIO-MEDICAL USE. SEVERAL SPECIAL

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24 JUNE 1958.

B. GEN FLICKING FILL PROGRAM CSUM, STEN L -

ESTIMATED A. \$7.8 MILLION).

C. \$18.0 MILLION WORTH OF LONG-LEAD TIME

ARTICLES NECESSARY TO ACCOMPLISH THE PROGRAM ITA AUGMENTATION PLAN REFERENCED IN PART I, THIS MESSAGE.

(\$13.8 MILLION IS BEING PROGRAMMED BY ARPA IN TY 1968 TO COMPLETE THE PURCHASE OF THIS AUGMENTATION PROGRAM.)

J. HR. GISE OF ARPA HAS REQUESTED THAT THE REVISED

DEVELOPMENT PLAN REFLECT THE SAME P-326 COSTS AS PRE-SENTED TO ARPA ON 24 JUNE 1958 (\$23.4 MILLION). 4. DESIRE YOU EXPEDITE SUBMISSION OF MCG DEVELOP-MENTAL AND FUNDING PLAN IN AMOUNT OF \$215 MILLION TOGETHER WITH AN ASSESSMENT OF THOSE ELEMENTS OF THE PROGRAM THAT

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COULD PE COMPUCTED ON A KORE OPTIMUM BASTS IF ADDITIONAL
FUNDS WERE MADE AVAILABLE, AND THE AMOUNT REQUIRED THEREFOR.

PART III. REQUEST THIS HEADQUARTERS BE ADVISED DE 1. FEASIBILITY OF MEETING NEW THOR-VSITTL FIRING ... SCHEDULE OUTLINED IN PART I.

2. EARLIEST DATE ANTICIPATED FOR SUBMISSION OF NEW PEVELOPMENT PLAN.
PART IV. BUDGET HAS COORDINATED.
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CORRECTION PAGE THEM LINES 1-6

PART II. VI -1187. CLVILOPARA PLAN.

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2. The total of \$215 million is incomed to

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//SECRET//FROM AFCOM 54161

RECENT INSTRUCTIONS PASSED TO DEPT OF THE AF FROM ARPA RE WS-117L PROGRAM ARE PROMULGATED FOR YOUR COMPLIANCE.

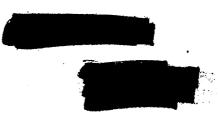
MSG IN FOUR (h) PARTS.

PART I. PROCUREMENT OF LONG-LEAD TIME ITEMS FOR ADDITIONAL THOR-WS 117L VEHICLES.

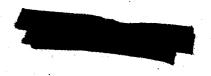
- 1. IN VIEW OF LONG LEAD-TIME REQUIREMENTS, IT APPEARS DESIRABLE TO AUGMENT PLANNED THOR-WS 117L VEHICLE FIRING SCHEDULE AT THIS TIME. AUGMENTATION WILL CONSIST OF 9 VEHICLES IN ADDITION TO THE 10 CURRENTLY AUTHORIZED. NEW BASIS FIRING SCHEDULE TO BE 1 PER MONTH BEGINNING NOVEMBER 1958 AND 2 PER MONTH BEGINNING APRIL 1959.
- 2. YOU ARE AUTHORIZED AND DIRECTED TO TAKE SUCH ACTION AS NECESSARY TO PROCURE LONG-LEAD TIME TYEMS TO SUPPORT THIS FIRING SCHEDULE. MINOR ADJUSTMENTS OF THE TOTAL AND CHANGES OF ALLOCATION OF FIRINGS BETWEEN PROGRAMS MAY BE EXPECTED AS THESE REQUIREMENTS ARE REVIEWED FURTHER. BASIC INTENT FOR UTILIZATION OF ADDITIONAL VEHICLES IS BIO-MEDICAL EXPERIMENTATION, ALTHOUGH NOT AT THIS TIME LIMITED TO BIO-MEDICAL USE. SEVERAL SPECIAL PAYLOADS MAY BE SPECIFIED AT A LATER DATE TO INVESTIGATE AND MEASURE CERTAIN SUSPECTED SPACE PHENOMENA.
- 3. AFHMD AND LOCKHEED MISSIL SYSTEMS DIVISION WILL PROVIDE SECURE ARRANGEMENTS SO THAT THESE CLOADS CAN BE HANDLED ON A SENSITIVE BASIS.
- 4. IN CONNECTION WITH SOME POSSIBLE PAYLOADS, IT APPEARS THAT THE LOAD CARRYING CAPABILITY OF THE VEHICLE SYSTEM WILL BE TAXED. THIS IS TURN WILL DICTATE LOW ALTITUDE ORBITS.

PART II. WS117L DEVELOPMENT PLAN.

- 1. THE ARPA HAS PROGRAMMED \$215 MILLION FOR OBLIGATION IN FY 1959 ON BEHALF OF THE WS 117L PROGRAM.
- 2. THE TOTAL OF \$215 MILLION IS INTENDED TO COVER THE FOLLOWING:



VDSW00-53-2109 Series R Cy / of 2



106h95 REC'D WDDARDC ACTION WDTSR 6 Aug 58

PAGE TWO
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FM HQ USAF WASH DC
TO RJWZBK/COMAFBMD ARDC INGLEWOOD CALIF

#### PART II. (CONTINUED)

- A. THE 117L PROGRAM PRESENTED TO ARPA ON 24 JUNE 1958.
- B. GEN FLICKENGER'S PROGRAM (SUBSYSTEM L ESTIMATED AT \$7.9 MILLION).
- C. \$18.0 MILLION WORTH OF LONG-LEAD TIME ARTICLES NECESSARY TO ACCOMPLISH THE PROGRAM IIA AUGMENTATION PLAN REFERENCED IN PART I, THIS MESSAGE.
- (\$13.0 MILLION IS BEING PROGRAMMED BY ARPA IN FY 1960 TO COMPLETE THE PURCHASE OF THIS AUGMENTATION PROGRAM.)
- 3. MR. GISE OF ARPA HAS REQUESTED THAT THE REVISED DEVELOPMENT PLAN REFLECT THE SAME P-300 COSTS AS FRESENTED TO ARPA ON 24 JUNE 1958 (\$23.4 MILLION).
- 4. DESIRE YOU EXPEDITE SUBMISSION OF NEW DEVELOPMENTAL AND FUNDING PLAN IN AMOUNT OF \$215 MILLION TOGETHER WITH AN ASSESSMENT OF THOSE ELEMENTS OF THE PROGRAM THAT COULD BE CONDUCTED ON A MORE OPTIMUM BASIS IF ADDITIONAL FUNDS WERE MADE AVAILABLE, AND THE AMOUNT REQUIRED THEREFOR.

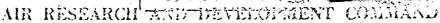
PART III. REQUEST THIS HEADQUARTERS BE ADVISED:

- 1. FEASIBILITY OF MEETING NEW THOR-WS117L FIRING SCHEDULE OUTLINED IN PART 1.
- 2. EARLIEST DATE ANTICIPATED FOR SUBMISSION OF NEW DEVELOPMENT PLAN.

PART IV. BUDGET HAS COORDINATED.

WDSMCC-58-2109 Series 5 Cy / of \_\_\_\_





UNITED STATES AIR FORCE Andrews Air Force Base Washington 25, D. C.

A SHARES PERSON TO COMMANDIA ARTH ATTE

(

RDTH

. £2 August 1958

Responsibilities of School of Aviation Medicine in the SUBJECT:

ARDC Biosatellite Program, Subsystem L WS-117L

TO:

Commander

. Air University

Maxwell Air Force Base

Alabama

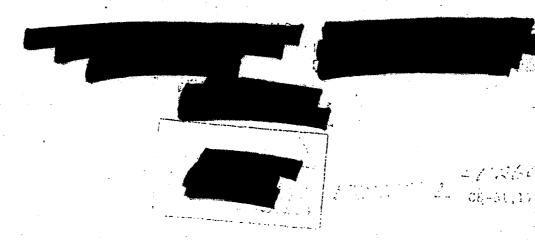
- 1. Pursuant to the directive of the Commander, Air Research and Development Command that all USAF biomedical resources be used in support of subject program, agreements have been reached between representatives of Headquarters Air Research and Development Command, Headquarters United States Air Force, Air University (Headquarters School of Aviation Medicine), Air Force Missile Development Center, and Wright Air Davelopment Center, concerning technical responsibilities to be assigned to the School of Aviation Medicine.
- 2. As the result of the meeting referenced in paragraph 1, the inclosed statement of policy is hereby published as Supplement No. 1 to the letter from this headquarters, EDTHA, dated 6 June 1958, subject: Biomedical Aspects of the Eallistic Missile Program. Provisions of paragraph 4, referenced letter, in conflict with policy letter for subsystem L, will be disregarded.

FOR THE COMMANDER:

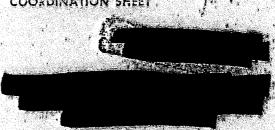
l Incl Supplement No. 1, Hq ARDC Letter, 6 Jun 1958, subj: Biomed Aspects of Bellistic attached to Missile Program, 8 Aug 1958

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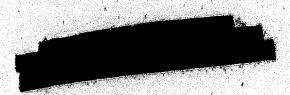
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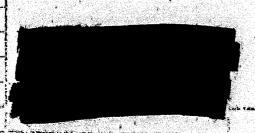
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Conies furnished: AFFR, LYSD . ATTN: Mr. J. NcLachlin Sunnyvale, California

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#### ADVANCED RESEARCH PROJECTS AGENCY WASHINGTON 25, D. C.

ARPA Order No. 17-59

18-59-7

170 ct 58

Sept. 4, 1958

Date

TO:

Commanding General

Ballistic Missiles Division, ARDC Reducted BondR ARDC

Los Angeles, California 29 lep 58

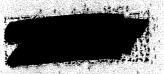
- 1. Pursuant to the provisions of DoD Directive 5105.15, dated February 7, 1958, you are requested to proceed at once on behalf of the Advanced Research Projects Agency with the project specified below. Additional details and directives will be issued by ARPA from time to time and will become a part of this Order when so specified,
- 2. You are directed to provide two complete Thor Able 1 configuration vehicles for space project launchings in January and Febru- Sec. Unice any 1959: The estimated cost for these two vehicles excluding payload, is \$4,840,000.

3. You are also directed to initiate additional procurement of two second stages and two third stages for use as later directed by See amend. #2

- 4. You will submit as soon as possible for review and approval by the Advanced Research Projects Agency a detail development and related financial plan covering the program. These data shall include a time-phased schedule of work and estimates for work to be performed (a) by BMD, (b) by contract, and (c) at other Government facilities. In preparing the development plan, the relative emphasis on the segments of this work should be discussed with ARPA.
- 5. This Order makes available \$4,840,000 under appropriation and account symbol "97X0113,002 Salaries and Expenses, Advanced Research Projects, Department of Defense" for obligation by the Ballistic Missiles Division on behalf of the Advanced Research Projects Agency only for purposes necessary to accomplish the work specified. herein. These funds are immediately available for direct obligation and for use in reimbursing the BMD for costs incurred under this Order. Upon approval of development and financial plans, as required herein or in accordance with amendments to this Order, these funds will be increased as appropriate. 26 nov 58

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INTO FOR COL CURTIS, FOR. THIS DEFORMATION IS SUBSTITUTED TO SUBSTITUTE DATE FOR HUTTIAL SN-75 TYOR LAURCH FROM CAPE AND TO SUBSTITUTE DATE LAURCH PARAMETERS AND OBJECTIVES OF THIS LAURCH. CURTIST SCHOOLINED DATE FOR FIRST YOUR LAURCH FROM CAPE IS 30 NOV 58. CURTIST PLAINING CALLS FOR THE MICSING TO BE CARTISTED ON THE LAURCHER OU AN ARMIUTI OF RAIL DESCRIPT TRUE AND AN INTELLAL LAURCH AREAUTH OF RAS DECREES THERE. DEPART WILL OCCUR AT 25 DECREES AS MINUTES FORTH LAURCHER AND 123 MONTHS 35 MINUTES.

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AND VERY A RANGE OF APPROXIMATELY 1273 HAUFICAL MILES. FRIMARY
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FERFORMANDS OF THE THOR WEAPON SYSTEM UPILIZING OFFRACIONAL
PROCEDURES AND EQUIPMENT TO THE MAXIMUM EXCENT POSSIBLE. ANY
OCCUPIEDS OR RESERVATIONS YOU MAY HAVE MELATIVE TO PROVIDED FACE
REQUIRED BASES SUFFORM TO THE MERCHELLE OF THIS MELITAM DIVISION,
ASSESSMENT, WITH,

Coules furnished: NETT, Attn: Col Porter DNI (SAC-IIII) Attn: Col Woodward

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ARPA Order No. 17-59 Amendment No. 1

Sept 29., 1958 Date

TO: Commander
Air Research

Air Research and Development Command Andrews Air Force Base Washington 25, D. C.

ARPA Order No. 17-59, dated September 4, 1958, is hereby amended to redirect the responsibility for its execution from the Commander, Air Force Ballistic Missiles Division, ARDC, to the Commander, Air Research and Development Command.

Roy W. Johnson

cc: Secretary of the Air Force Commander, AFBMD, ARDC

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#### NCED RESEARCH PROJECTS AGENCY WASHINGTON 25, D. C.

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ARPA Order No. 17-59

Amendment No. 2

October 17, 1958 Date

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Commander Air Research and Development Command Andrews Air Force Base Washington 25, D. C.

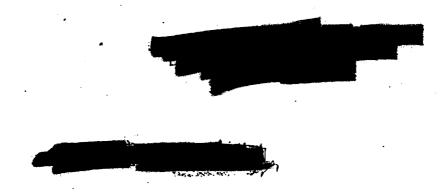
Paragraph 2 of ARPA Order No. 17-59, dated September 4, 1958, is hereby changed by deleting the words "in January and February 1959." Paragraph 3 of this Order is deleted in its entirety.

The purpose of this amendment is to permit the vehicles scheduled in January and February to be made available to NASA. It is understood that they will place their own order for those vehicles.

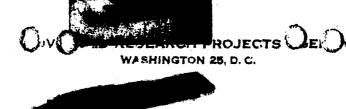
ARPA Order No. 17-59 as herein amended provides for the delivery of two complete vehicles to ARPA and includes the funds therefor.

You are requested to submit as soon as possible a schedule of availability of the vehicles herein ordered,

cc: Secretary of the Air Force







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NOV-2 5 1958

Sir:

In confirmation of my recent conversation with General Schriever of AFBMD, it is ARPA's desire, and you are hereby requested, to revise that portion of the DISCOVERY test series which deals with biomedical payloads. Of the five originally programmed launchings, it is now planned to eliminate two of the small primate shots. This leaves two mouse containing payloads and one small primate payload. The two vehicles freed by this change shall be reassigned to the launching schedule requested in our ARPA Order 17, as amended.

Additional changes in the DISCOVERY program are being formulated in accordance with budget level considerations. These changes will be brought to your attention as soon as they are finalized by issuance of an approved scope of work.

Sin<mark>ocrel</mark>y,

Boy W. Joynson Director

Commander
Air Research and Development Command
Andrews Air Force Base
Washington 25,D.C.

cc: Secretary MacIntyre
General Schriever

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## ADVANCED RESEARCH PROJECTS AGENCY WASHINGTON 25, D. C.

OM 58

ARPA Order No. 17-59

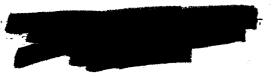
Amendment No. 3

November 26, 1958 Date

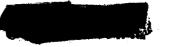
TO: Commander
Air Research and Development Command
Andrews Air Force Base
Washington 25, D. C.

ARPA Order No. 17-59, dated September 4, 1958, as amended, is hereby further amended as follows:

- 1. Provide for the delivery of an additional eight Thor-based vehicles and two Atlas-based vehicles. The attached inclosure depicts the desired vehicle capacity for these vehicles as well as the capacity for the two Thor-Able vehicles (Nos. 1 and 3) purchased under Amendment No. 2, dated October 17, 1958. The latter two vehicles are assigned to the navigation and cloud cover programs of ARPA.
- 2. Submit within 30 days a development and related financial plan for the above program for review and approval by ARPA. A separate development and financial plan shall be submitted for the two vehicles procured under Amendment No. 2. The development plans should include the earliest possible launching dates as well as your recommendations and estimated costs for systems integration assuming that payloads will be provided.
- 3. Study the necessity for constructing a new Thor launching stand in support of the above program in the general area of the present Vanguard site (Launch Stand 18A). The receipt of this study prior to the receipt of the financial and development plans would be desirable.
- 4. Pursuant to paragraph 7 of ARPA Order No. 17-59, dated September 4, 1958, reporting on this Order will be accomplished by



UPON REMOVAL OF ATTACHMENTS THIS DOCUMENT DECOMES UNCLASSIFIED



08-125683

submission of monthly progress report. This report, which is to be submitted in accordance with procedures outlined in Attachment No.1, represents ARPA's total foreseeable requirement for recurring reports based on this Order.

5. The fund availability under ARPA Order No. 17-59 is hereby increased from \$4,840,000 to \$5,090,000 under appropriation and account symbol "97X0113.002 Salaries and Expenses, Advanced Research Projects Agency, Office of the Secretary of Defense." This increase will provide partial funding for the work assigned above.

fr Ref W. Johnson
Director

2 Incls.: (Address only)
Attachment No. 1
Veh. Requirements List

cc: Secretary of the Air Force

Attachment No. 1 to Amendment No. 3

#### .PREPARATION OF MONTHLY PROGRESS REPORT

This report will be submitted in two parts, a Narrative Section and a Milestone Progress Section.

Narrative Section. A letter report will be prepared each month by the addressee of the above numbered ARPA Order, giving a narrative account of work performed under the Order. The initial report will cover the period through December 1958. Subsequent reports will cover work performed during each month thereafter. The report will be submitted in quadruplicate to the Director, Advanced Research Projects Agency, and is due within 10 days following the close of the month reported. The ARPA Order number and subject of the project should be stated in the heading of each report.

The report will be in letter form and generally not exceed three pages in length. It will present a narrative summary of work performed, including technical status, major accomplishments, problems encountered, future plans, and any action required by ARPA. The initial report should include an introductory preface outlining the background, objectives, and assignment of responsibility for the project. All reports should include photographs and illustrations as appropriate.

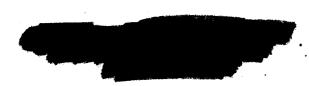
Milestone Progress Section. Instructions for preparation of this section, which requires use of a standard format in reporting actual progress against planned progress in accomplishing major milestones, will be issued at a later date.

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#### VEHICLE REQUIREMENTS

<u>v</u>	ehicle	Desired Launch Date	Payload Gr. Wt. (lb.)	Orbital Altitude (NMI)	Launching Azimuth (°)	Stabiliza - tion Type
1.	Thor-Able*	May '59	225	500	44	<b>Spin</b>
2.	Thor-based	Aug/. 159	350	300	44	<b>S</b> pin
<b>'</b> 3.	Thor -Able*	Sep. 159	225 - 350	500 - 300	44	Spin
-4.	Thor-based	Oct. 159	2 <b>4</b> 0	250	180	Complete
5.	Thor-based	Oct. '59	350-650	<b>300 - 400</b>	45	Spin
6.	Thor-based	Nov. '59	650	300	<b>4</b> 5	<b>S</b> pin
7.	Atlas-based	Dec. 159	500	19,000	90	Rough
8.	Thor-based	Jan. '60	650	300	45	Rough
<del>-9</del> .	Thor-based	Feb. 160	350	500	180	Rough
<del>-1</del> 0.	Thor-based	Mar. 160	300	250	180	Complete
<b>-1</b> 1.	Thor-based	Mar. '60	240 - 300 (350)	<b>25</b> 0 (500)	180	Complete
	Atlas-based	Apr. '60	• •	r 6, 7, or 8		Rough

<sup>\*</sup>These vehicles were ordered by ARPA Order No. 17-59, Amendment No. 2; No. 1. is designated for navigation satellite and No. 3 is designated for a cloud cover satellite.





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ACTION WDGE

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YS E C R E T/ FROM RDZGW-11-39-E.

FOR WDGE, COL HAMILTON SMCLN INFO WDZ, COL CURTIN, WDZD, COL SHEPPARD, WDZW, COL EVANS. THE FOLLOWING LETTER FROM MR JOHNSON, ARPA, TO COMDR ARDC IS FORWARDED FOR YOUR ACTION. ADDITIONAL COPIES ARE BEING SENT TO YOU BY MAIL. QUOTE CLN SIR, IN CONFIRMATION OF MY RECENT CONVERSATION WITH GENERAL SCHRIEVER OF AFBMD, IT IS ARPAS DESIRE, AND YOU ARE HEREBY REQUESTED, TO REVISE THAT PORTION OF THE DESCOVERY TEST SERIES WHICH DEALS WITH BIOMEDICAL PAYLOADS. OF THE FIVE ORIGINALLY PROGRAMMED LAUNCHINGS, IT IS NOW PLANNED TO ELIMINATE TWO OF THE SMALL PROMATE SHOTS. THIS LEAVES TWO MOUSE

PAGE TWO RJEZFF 19C CONTAINING PAYLOADS AND ONE SMALL PRIMATE PAYLOAD. THE TWO VEHICLES FREED BY THIS CHANGE SHALL BE REASSIGNED TO THE LAUNCHING SCHEDULE REQUESTED IN OUR ARPA ORDER 17, AS AMINDED. PARA. ADDITIONAL CHANGES IN THE DISCOVERY PROGRAM ARE BEING FORMULATED IN ACCORDANCE WITH BUDGET LEVEL CONSIDERATIONS. THESE CHANGES WILL BE BROUGHT TO YOUR ATTENTION AS SOON AS THEY ARE FINALIZED BY ISSUANCE OF AN APPROVED SCOPE OF WORK, SINCERELY, ROY W. JOHNSON UNQUOTE LETTER IS DATED 25 NOV 58.

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4 December 1950

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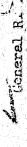
SUBJECT: WE-117L Program

As summanded yesterday, ARPA has insuppreted a progress to develop a busion of systems and tempoliques which will be employed in the operation of systems and tempoliques which will be employed in the operation of systems whiches. This progress, known as DISCOVERES, will, in somerisms with the wishes of the Administration, include now only the TATA launchings previously associated with the ET 117L progress, but will be continued to include similar projects that are not operationally oriented.

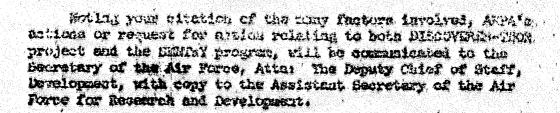
The first much project consists of the TRA ventricus and associated comes proviously carried as a part of the William project and it will be the project will be known as introversal that project and it will be required to establish the identity of this project expenses from the William project expenses from the William Program. It is recognized that such a division will involve and that the division of cost will have to be made on a stabilitical rather than the division of cost will have to be made on a stabilitical rather than the control backs. Further, it will be necessary that reported and ATM (when to will effect to in process.

Consistent with the emperation of these programs, we are took tutively re-elicensing our FT 1900 monion so as to show approximately 100 million elicensis to DICATASTA-THE project and \$107 million elicensis sto the Salving program. Similarly, for PY 1960 we have blicked at \$100 million to DISCOVERS-THE project and \$100 million to the Salving program.

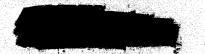
In response to your services of lovester 17, and in sculingtion of our service convergations on the subject, the increasive?
Defence and ANN agreed to the subjects by the Alf jorce of the
operational responsibility for the SINITY progres on the ANN for the
next coveral years and until final objectives are obtained. It is
also exceed that the tentative basic center to be established as all
next course Air force base of some future face, and my release of pertinent to the progress, will be operated by AND.



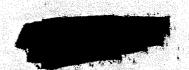




/s/ May II. Johnson NOT W. JOHNSON Director



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ktommeta autommeta indeesta agency . Vashington 23, D. C.



### MEMORANDUM FOR THE UNDER SECRETARY OF THE AIR FORCE SUBJECT: DISCOVERER-THOR Project and SENTRY Programs

In accordance with our agreement of yesterday, it is requested that the following instructions be forwarded to BMD concerning the DISCOVERER-THOR project and SENTRY programs:

"Recant fiscal determinations incident to the formulation of the 1960 Rudget have reconstated the modification of the SENTRY Development Program. Furthermore, the inception of the DISCOVEREN Program as it is constituted from elements also creates a requirement for program management determinations.

"in response to these influences, the ARPA staff has proposed a reorientation of the two programs. The details of the proposal have been furnished to Program Management personnel of the Air Force Ballingic Minetile Division. Acknowledging the tempera nature of this proposal until further detailed study can be made by the Project Perisonnel, it is the purpose of this memorpheum to request such a study and present the findings for our joint consideration on the 15th of December. It is our objective to reach a final determination as to the content of the programs for FY 1960 and balance of FY 1959 in their major elements by 17 December.

"The actions suggested in the ARPA proposal should each be reviewed with the objective of determining fiscal and project timing implications. Where contract cancellations are involved, an assessment of industrial impact should be made. In general, the goal should be to determine the practicality of making the downward adjustments suggested, the cost in time and money for implementing the new program elements suggested, and alternative suggestions where program elements suggested by the ARPA staff are determined to be impractical:

"For the purposes of this review, it should be assumed the development rescurces available will amount to \$213.3 million in FY 59 and \$160 million in FY 60. Intelligence requirements as they might influence the evaluation should be based on the best information that can be made available in the time period provided. It is recognized that fully refined information cannot be made available by the dates augusted between



However, it seems likely that subsciently excurate determinations can be made as to permit major desirious which are necessary for the formulation of a final development plan.

"In the interim period, until the major program decisions are finalized, the Air Force Ballistic Kiesila Division should be directed to withhold any major fund commitments that go beyond the ecope of the ARPA proposal. In those areas that might be designated for cancellation, no material precurements should be authorized beyond the absolute minimum necessary for preserving the continuity of engineering effort."

/s/ Roy W. Johnsen

Roy W. Johnson Director

cc: Mr. Low Mayer, AFABF

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87573 THIS COUPLING TELEPHONE CONVERSATION RETYERN SENERAL BOUGHZY. THE CECSOLARTERS AND COL. COER, AFRID OF 5 DEC 36, COL LOVE YOUR MEADLURETERS AND LAYERY INSTRUCTIONS FROM AREA RELATIVE TO PROPERTY OF THE ALR PORCE, SUBJECT OF COLLOWE IS GARRYING & COLVE OF CONCERNATION FOR THE UNDER SECRETARY OF THE ALR PORCE, SUBJECT, REQUISION CONCERNED BY HESSARR YOUR ABILITY TO HEET 13 DECENDED DATE.

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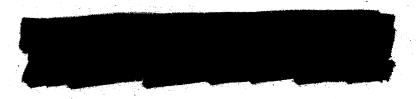
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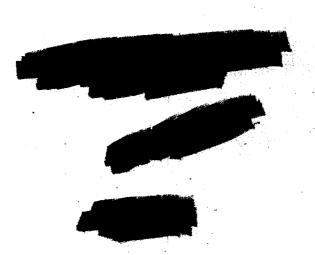
PP INGL 2382 DE RJWZNF 18F P 052223Z FM OSD', DEP ARMY, WASH D C TO COMDR ARDC ANDREWS AFB INFO COMDR AFBMD INGLEWOOD

/S E C R E T/DEF 951903. FROM OSD ARPA SGD JOH NSON. REF NY LETTER OF NOV 258 58 CONCERNING BIOMEDICAL PAYLOADS FOR DISCOVERER. IT. IS OUR INTENT TO ACCOMPLISH 1 SUCCESSFUL PRIMATERECOVERY. UP TO A TOTAL OF 3 ATTEMPTS SHOULD BE PLANNED; WITH THE 2 ADDITIONAL ATTEMPTS IF NECESSARY AND DESIRED TO BE IN LIEU OF PAYLOADS IN THE SERIES OF 13 FLIGHT VEHICLES. YOU SHOULD THERFFORE PLAN TO HAVE AVAILABLE INTERNAL COMPONENTS FOR 2 PRIMATE BACKUP PAYLOADS.

THISAC MSG 06/0754Z DEC RJWZNF

NNNN





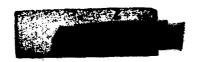
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ARPA's total foreseeable requirement for recurring reports based on this Order.

- 6. The utilisation of equipment and materials procured in connection with this project for other projects is subject to the direction of ARPA. Notwithstanding, final disposition of such equipment and materials shall be made in accordance with standard procedures. Any technical and scientific information relating to work under this Order which may be published from time to time shall give appropriate credit to the ARPA project. No scientific and technical progress and status reports on ARPA's projects or final completion reports prepared specifically at ARPA's request shall be made available to other agencies or individuals without approval of ARPA.
- 7. Sec/Air shall be responsible for preserving the security of this project in accordance with the security classification assigned and the security regulations and procedures of the Department of the Air Force.
- 8. Notwithstanding any other provisions of this Order, the Secretary of the Air Force shall not be bound to take any action in connection with the performance of this work that would cause the amount for which the Government will be obligated hereunder to exceed the funds made available, and the obligations to the Secretary of the Air Force to proceed with the performance of this work shall be limited accordingly. The Secretary of the Air Force shall be responsible for assuring that all commitments, obligations, and expenditures of the funds made available are made in accordance with the statutes and regulations governing such matters, provided that whenever such regulations require approval of higher authority such approvals will be obtained from or through the Director, ARPA, or his designated representative.

l Incl.:
Attachment No. 1



#1, 16 Jeh 59

#2, 24 mar 59

#3, 1 apr 59

#43, 20 may 59

#6, 23 Jun 59

#6, 20 Jul 59

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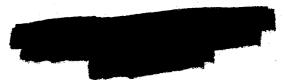
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ARPA Order No. 48-59

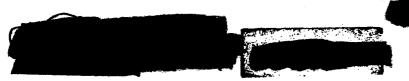
December 16, 1958 Date

TO: The Secretary of the Air Force Washington 25, D. C.

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- 1. Pursuant to the provisions of DoD Directive 5105. 15, dated February 7, 1958, you are requested to continue on behalf of the Advanced Research Projects Agency with the project specified below. Additional details and directives may be issued by ARPA from time to time and will become a part of this Order when so specified.
- 2. The study, development, and launch operations associated with the Thor program, heretofore included in ARPA Order No. 9-58 for the Sentry Program, are to be continued as an independent project identified as the Discoverer-Thor Project (U).
  - 3. At the conclusion of the present program review, the costs allocable to this project since July 1, 1958, which have been charged to ARPA Order No. 9-58, shall be identified and transferred to this Order, at which time the funds shall be adjusted by ARPA as appropriate. You are requested to submit to ARPA by January 15, 1959, a financial plan which will be the basis for determining the division of funds.
  - 4. The Director, Advanced Research Projects Agency, will provide policy and technical guidance either directly or through designated representatives. The Secretary of the Air Force will be responsible for arranging for the detailed technical directions necessary to accomplish the specified objectives and to comply with ARPA policy and technical guidance. This general relationship may be specified in greater detail by amendment to this Order if such action is necessary.
  - 5. The Director, Advanced Research Projects Agency, and the Office of the Secretary of Defense will be kept informed of the status of work assigned under this Order by a monthly progress report and a semi-annual technical report to be prepared and submitted in accordance with procedures outlined in Attachment No. 1. These reports represent



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Attachment No. 1

ARPA Order No. 48-59

#### PREPARATION OF REPORTS

#### I. Monthly Progress Report

This report will be submitted in two parts, a Marrative Section and a Milestone Progress Section.

Marrative Section. A letter report will be submitted for the first and second months of each calendar quarter by the addressee of the above numbered ARPA Order, giving a narrative account of work performed under the Order. A special report to be prescribed as an Amendment to ARPA Order No. ? will be substituted in lieu of the letter report for the final month of each calendar quarter. The initial letter report will cover the month of January 1959. Each monthly letter report will be submitted in quadruplicate to the Director, Advanced Research Projects Agency, and is due within 10 days following the close of the month reported. The ARPA Order number and subject of the project should be stated in the heading of each report.

The report will be in letter form and generally not exceed three pages in Magila. It will present a marrative summary of work performed, including technical status, major accomplishments, problems encountered, future plans, and any action required by ARPA. The initial report should include an introductory preface outlining the background, objectives, and assignment of responsibility for the project. All reports should include photographs and illustrations as appropriate. In addition, an autopositive negative (kedalith master) for each illustration should be included, where practical, for use in presentations or reproductions.

Milestone Progress Section. Instructions for preparation of this section, which requires use of standard format in reporting actual progress against planned progress in accomplishing major milestones, will be issued at a later date.

#### II. Semi-Annual Technical Summary Report

A technical summary report will be submitted semi-annually for periods ending June 30 and December 31 of each year. The report will present a concise and factual discussion of technical findings and accomplishments during the period. The initial technical summary report will cover work performed during the period January 1 to June 30, 1959. The report will be submitted in quadruplicate to the Director, Advanced Research Projects Agency, and is due within 30 days following the close of the report period. Additional distribution may be specified by ARPA at a future date. Upon completion of the project, a final report will be submitted summarizing the entire project. The final completion report will be submitted in lieu of the regular semi-annual report to reach the Director, ARPA, within 60 days following project completion. The ARPA Order number and subject of the project should be stated in the heading of each report.

Lys: WOG, EV, EE, BEH
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JAC 65

WDZN

30 December 1958

#### MEMORANDUM FOR CENERAL SCHRIEVER

SUBJECT: Discoverer Leunchings

- 1. It is obvious that the polar orbits of the subject launchings might be a matter of international political concern.
- 2. We are assuming that the currently approved planning documents give general approval for the series and for each launch.
- 3. We further assume that action will be taken by yourself or by higher DOD agencies to suspend a particular launch through notification of WDZW if political factors so require. This assumption pertains to the first and all succeeding launches.

SIGNED

Copy furnished:

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WDZ

WDZ - Col Sheppard

HAFRY L. EVANS Colonel, USAF Director for WS 117L HOW NOW HOW

WBF/wac

30 DEC 1958: ... : 0

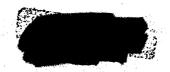
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FT

V/S E C R E T// FROM AFDAT 54519
SUFJECT IS ARPA ORDER 48-59 DATED 16 DECEMBER 1958
REFERENCE MEMO FOR UNDER SECRETARY OF AF SUFJ: REORIENTATION OF
SENTRY PROGRAM DATED 17 DECEMBER 1958 FROM DIRECTOR OF ARPA WHICH
LISTED POSSIBLE DETAILED PROGRAM CHANGES AND FUNDING SITUATION.
ARPA ORDER 42-59 STATES IN PART PAR 2 THE STUDY, DEVELOPMENT AND
LAUNCH OPERATIONS ASSOCIATED WITH THE THOR PROGRAM, NERETOFORE
INCLUDED IN ARPA ORDER NO 9-58 FOR THE SENTRY PROGRAM. ARE TO PE
CONTINUED AS AN INDEPENDENT PROJECT IDENTIFIED AS THE DISCOVER
THOR PROJECT.

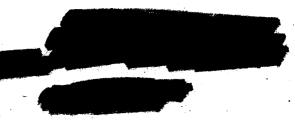


PAGE TWO RJEZHO 332

"PAR J. AT THE CONCLUSION OF THE PRESENT PROGRAM
REVIEW, THE COSTS ALLOCAPLE TO THIS PROJECT SINCE JULY 1, 1958,
WHICK HAVE PEEN CHARGED TO ARPA ORDER NO. 9-58 SHALL BE
IDENTIFIED AND TRANSFERRED TO THIS ORDER, AT WHICH TIME THE FUNDS
SHALL PE ADJUSTED PY ARPA AS APPROPRIATE. YOU ARE REQUESTED TO
SUPMIT TO ARPA PY JANUARY 15, 1959, A FINANCIAL PLAN WHICH WILL
PE THE PASIS FOR DETERMINING THE DIVISION OF FUNDS."

REQUEST THAT AFFND PREPARE THE FINANCIAL PLAN AS NOTED APOVE FOR SUBDISSION TO THIS HEAPQUARTERS ON 14 JANUARY AND AREA ON 15 JANUARY.

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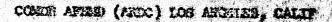
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DOUD DATE OF DOTA OF THESE PACILITIES WILL BE 15 MAY 59, AND THE
CHOIR HEAD UNCLOSED DATE IN 5 JUNE 59. THESE AND THE DATE INCLUSOR.

ATTAINABLE DATES FOR THESE FACILITIES. PART THESE: IN CHIRR TO
CHECKART SUPTICIPAT THE BOOSTONS TO BATTRY THE CAYSE LABRES
SCHEMALS, AN AGRESMENT DETARMS AFFOR AND THE FUNET MISSILE DIVISION
IN REQUIRED FOR EXTENSION USE OF DOUBLAS OF HIM CHECKART POSITION BO.

4. THE USE OF WITH CLIMENAL POSITION IN REQUIRED FROM 213
CHARGETLY PLANTED HIM THE MAY DATE OF I MAKES 59 USTIL ONE HIM
FACILITY DE IN OFFICIAL APPROXIMATION IN JUNE 59. I WINE TO
COMPTHIS WITH YOU AT THE THE USE OF HIM CHECKART POSITION BO.

4. MY DOUBLAG DESIRE THE TIME PRINCE INDICATED ABOVE.



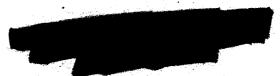
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TWX017 PP RJWXBK DE RJUXFK 10\_ P 05 2358Z ZFF-2

FM COMDR MISSILE DIVI TO RJWXBK/COMAFBND HQ ARDC

INFO ZEN/AFBMD FIELD OFFICE VANDENBERG AFB

/S E C R F T/C-55. PERSONAL FROM GENERAL WADE FOR GENERAL SCHRIEVERE INFO VDGEV AFBED FLD OFCE VAFB. REFERENCE YOUR SECRET MESSAGE WOTI 2-38-EE DATED 3 FEBRUARY 1959. THIS MESSAGE IN FIVE PARTS. PART I. WE AT IST MISSILE DIVISION ARE COGNIZANT OF THE NATIONAL IMPORTANCE OF THE THOR/DISCOVERER LAUNCHES SCHEDULED FROM VANDENBERG AFB AND RECOGNIZE THE NECESSITY FOR A RIM BAY POSTION FOR USE BY THE CONTRACTOR IN SUPPORT OF THE PROGRAM. PART II. I WILL INFORM MY PERSONNEL THAT RIM BAY POSITION NUMBER 4 WILL BE PADE AVAILABLE TO THE CONTRACTOR AS REFDED ON UNTIL I JULY 19592 TEMPORARY UTILIZATION OF BAY POSITION NUMBER 4 FOR THE TYCH/DIS-



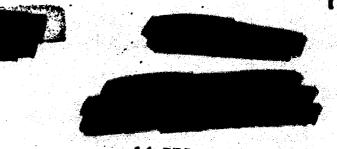
PAGE TWO RJWXFK 10 COVERER PROJECT CANNOT INCLUDE ANY OF THE CHECKOUT EQUIPMENT NECESSARY FOR SUPPORT OF THE SM-75 IWST PROGRAM. PART III. THE USE OF BAY 4 WILL NOT ALTER THE TURNOVER DATE AND 1ST MISSILE EX-ECUTIVE CONTROL OF THE RIM FACILITY PRESENTLY PLANNED FOR 1 MAR 1950. PART IV. REFERENCE SITING OF TEMPORARY BUTLER BUILDING AND ADDITIONS TO RIM, REQUEST THIS HEADQUARTERS BE CONTACTED IN INITIAL PLANNING STAGES. PART V. IT IS POINTED OUT THAT. THE WORKLOAD ASSOCIATED WITH SUPPORTING THE THOR/DISCOVERER LAUNCHES? COMBINED WITH SUPPORTING ON VANDENBERG AFB THE RECENTLY PROGRAMMED 72CTH GUIDED MISSILE WING HEADQUARTERS AND SUBORDINATE LAUNCH Squadron has certain definite manpower implications. A manpower ANALYSIS IS BEING INITIATED, THIS DATE. IN VIEW OF THE ABOVE IT MAY BE NECESSARY FOR ME TO SOLICIT YOUR SUPPORT IN DEFENDING ADDITIONAL MANPOWER REQUIREMENTS TO SAC AND USAF.

UG/0015Z FEB RJWXFK



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-11 FEB 1959

Director of WS 117L ATTN: WDZW

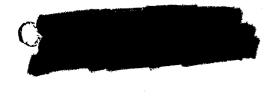
SUBJECT: (U) WS 117L Progress

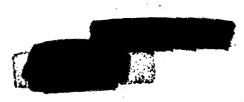
TO:

Commender
Air Research and Development Command
Andrews Air Force Base
Vashington 25, D. C.

1. Three (3) new development plans, DISCOVERER, SMETRY, and MIDAS, describing the repriented WH 117L Program, have been forwarded directly to the Assistant Chief of Guided Missiles, Headquarters, UBAF. This action has been taken in order to meet the requirements of the Headquarters, USAF, imposed presentation schedule for these plans.

- 2. Normal distribution will be made to your headquarters immediately upon completion of the reproduction of the plans.
- 3. These development plans propose joint ARPA-Air Force funding. In each plan Air Force and ARPA costs are separately identified. The separation of the total program cost into Air Force cost and ARPA cost has been made in accordance with available guidance.
- 4. Briefings on these programs were given to Headquarters, USAF and ARPA during the period 29 Jenuary to 4 February 1959. These plans have been drawn up to reflect the Air Force-ARPA agreed funding levels for SENTRY and DISCOVERER and the Air Force recommendations for funding of MIDAS. At the direction of Headquarters, USAF certain costs are not identified in these plans. Separate funding action will be required in some cases.
- a. Advence planning (design) funds for Military Construction Program (MCP) items have not been included. The required sums ere: FY 58 \$900,000. (already provided), FY 59 \$827,000. formerly on ARPA Order 41-59, and \$937,000. in P-313 for MIDAS.
- b. Operations and maintenance costs and other support items are not shown. These will be included in the appropriate Annual Financial Plans.





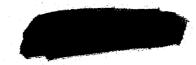
Transpelle Cy (2 of 2

- 5. It must be emphasized that DISCOVERIR and SENTRY Programs are interdependent programs and partial approval of either program will require reconsideration of both efforts. Further, in the interests of economy and efficiency, the MIDAS Program is based on the assumption that the proposed DISCOVERER and SENTRY Programs are approved in their entirety.
- 6. In the past year the WS 117L Program has been plagued with instability, inedequate or untimely decision, or the lack of a decision at all. This instability culminated in the reorientation of this program in December 1958, which is the primary purpose for the submission of these new plans. Additionally, a serious funding problem has been encountered particularly in the present fiscal year. This problem is related to the incremental funding of the WS 117L Program on a month to month basis. This funding condition has made an otherwise difficult job more difficult and has been the cause of considerable concern within AFBMD and its contractors.
- 7. In order to stabilize the program and initiate contractual actions for the continuation of the program, Air Force Headquarters has been requested to take expeditious action to accomplish the following:
  - a. Immediate release of the remaining fiscal year 1959 funds.
- b. Early coordinated Air Force and ARPA approval of joint progrems.

# SIGNED

O. J. RITLAND Brig. Gen., USAF Vice Commander

Copy-furnished:
Assistant Chief of Staff
for Guided Missiles, Hq USAF
WDP



WDZW

dl(11 Feb 59)

Maj Ford

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WOCH 59-149 Cy 5 or 8 ANCED RESEARCH SPOJECTS

ADVANCED RESEARCH PROJECTS AGENCY
WASHINGTON BE D. C.



ARA Order No.48-59 Amendment No. 1

We February 16, 1959 Date

TO: The Secretary of the Air Force Washington 25, D. C.

The program objectives and related funding for the DISCOVERER program as presented to ARPA February 4, 1959, are, in general, approved.

It is particularly noted that this approval pertains to the 13 rehicle program.

Accordingly, ARPA Order No. 48-59, dated December 16, 1958, is hereby amended to make available \$104, 300, 000 under appropriation and account symbol "97X0113.002 Salaries and Expenses, Advanced Research Projects Agency, Department of Defense."

The decrease of \$1,700,000 in the amount authorized from the \$106,000,000 requested in the Development Plan has been explained to your staff.

The Development and Funding Plan, dated January 30, 1959, pertaining to the DISCOVERER program, is being reviewed and specific comments relating thereto will be provided for further program guidance.

Roy W. Johnson

Director

Copy to: Commander, ARDC

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FROM:

SPECIAL INSTRUCTION

COMDR, AFBMD (ARDC), LOS ANGELES, CALIFORNIA

COFS, USAF, WASH DC.

INFO: COMARDO, ANDREWS AFB, MD

SECRET FROM WDPP-3-1.

HQ USAF FOR AFCGM. INFO FOR AFCGM-A PERSONAL FOR
GREER FROM RITLAND, HQ ARDC FOR RDZGW REFERENCE
MR. SWEETZER'S MEMO FOR RECORD DATED 23 JAN 59. SUBJ:

19 FEB 59 WHICH REQUESTED COMMENTS ON A MONTHLY

Boosters for space programs and twx afcgm 56822.

REPORT TO KEEP HQ USAF INFORMED ON A PERIODIC AND

TIMELY BASIS OF ALL AF COMMITMENTS IN SUPPORT OF SPACE

PROGRAMS. SUGGEST YOU DO ALL POSSIBLE TO PRECLUDE

ARPA/NASA IMPOSING DETAILED SCHEDULING AND PROGRAMMING

INFORMATION REQUIREMENTS ON THE AIR FORCE. THE

IMPLICATIONS OF A DETAILED SCOREKEEPING AT OSD LEVEL.

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REPLACES DD FORM 178, 1 OCT 49. WHICH WILL BE USED UNTIL EXHAUSTRU

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O FROM

COMDR. AFBMD (ARDC), LOS ANGELES, CALIFORNIA SUGGESTS INFLEXIBLE CONTROLS WHICH WILL MAKE IT Extremely difficult if not impossible to best accomplish EPACE PROGRAMS INVOLVING THE LIMITED RESOURCES Associated with highest priority ballistic missile Weapon Developments, our letter to the Chief of STAFF. USAF. DATED II FEB 59. SUBJ: NASA AND ARPA SPACE Program requirements indicates our concern over atlas missile and launch stand requirements for SPACE PROGRAMS DURING THE CRITICAL FY 1960 PERIOD. ar apred letter will pollow reortly which gives our BEST ESTIMATE OF OUR CAPABILITY TO SUPPORT CERTAIN SPACE PROGRAMS AT AME DURING THE CRITICAL PERIOD. OUR SUPPORT CAM BE PROVIDED AS ONLY IF THIS DIVINION is allowed to perform detailed allocation and BCHEDULING WITH SUFFICIENT FLEXIBILITY TO ALLOW MERHING OF EPACE LAUNCHINGS AND BOOSTER ASSIGNMENTS with other rad programs. If, as suggested by refer-ENCED TWX. WE ARE REQUIRED TO PROVIDE TO YOUR MEADQUARTERS. ARPA AND NASA PERIODIC DETAILED reported of booster allocations, stand loading. production vs requirements. Etc. Then hecessary

FLEXIBILITY IN OUR SELSCHEDULING IS DESTROYED AND

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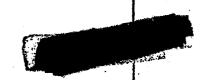
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A U. P. GOFEGEREST PRINTING OFFICE: 1020

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#### JOINT MESSAGEFORM - CONTINUATION SHEET

COMDR. AFBMD (ARDC), LOS ANGELES, CALIFORNIA ARPA AND NASA MUST RECOGNIZE A 16 MONTH LEAD TIME FOR ATLAS PRODUCTION PLUS AN 18 MONTH LEAD TIME FOR ADDITIONAL STAND CAPACITY AND MUST ESTABLISH FIRM SPACE PROGRAM REQUIREMENTS CONSISTENT WITH That lead team. This division has endeavored in the past and WILL CONTINUE TO KEEP HO USAF APPRAISED THROUGH MORMAL COMMUNICATIONS CHANNELS OF PROBLEMS CONCERNED WITH SUPPORTING SPACE PROGRAMS. IT IS RECOMMENDED THAT BO PERIODIC DETAILED REPORTING PROCEDURES BE IMPOSED. THE EXISTENCE OF SUCH REPORTS WOULD SOONER OR LATER BECOME KNOWN TO CED. ARPA AND HASA AND WE WOULD BE REQUIRED TO PROVIDE DISTRIBUTION WITH THE RESULTING PROBLEMS AND DIFFICULTIES DESCRIBED ABOVE.



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COMOR ARDO, ANDREWS AFB, 160.

LOCKHEED MISSILES AND SPACE DIVISION, PALO ALTO CALIF

CHILF, AFRAD FIELD OFFICE, PALO ALTO, CALIF

SECRET FROM WIZW 3-15-E. FOR AFCOM AND AFDAT AT USAY, FOR RECEW AT AFDE ADDRESS AT LAST, AT LAST, SHEDECT: DECOUPAGE IN 170-1000.

IN VIEW OF THE ADVERSE FUBLIC REACTION TEXT WOULD RESULT IN THE EVERT OF UNSUCCESSFUL RECOVERY OF SUCH VEHICLE, COMMANDER AFBAD HAS DECIDED THAT NO BIO MEDICAL PAYLOAD VILL BE FLOWN ON DISCOVERES II.

FURTHER THE TOTAL THAT HOSE CREET HAS BEEN THEREO.

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PP RJV2PK DE RJE7HQ 358 P 1814472 FM HQ USAF

TO AJVZP /AFPMD INCLEVED CALIF INFO RJEZFF/ARDC ANDREYS AFB MD ET.

//confidential//from Ayapf 57888 reference is made to appa order 48-59, amendment i, and your tax addr 3-2-e dtd 6 mar 59; referenced appa order reduced vehicle requirements for this program to 13 in Lieu of original is presently on procurement in accordance with nitial development plan, your division is directed to hold 6 focsters now cove ed by arpa orders of af requirements on procurement and in the production program until further notice from this ho, these focsters are pel reserved by the appmc for outher programs of appa on at as required. At such time as funds are required to be utilized for other facets of appa or ak-59; your division will notify this ho which will take necessary actions so that cancellation or termination of these foosters may be avoided.

18/14597 MAR RJE7HO

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# AIR FORCE BALLISTIC MISSILE DIVISION HEADQUARTERS AIR RESEARCH AND DEVELOPMENT COMMAND UNITED STATES AIR FORCE Air Force Unit Post Office Los Angeles 45, California

in raply address both communication and envelope to:

18 MAR 1959

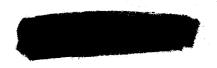
Director of WS-315A

Mr. Donald W. Douglas, Jr. President Douglas Aircraft Company, Inc. 3000 Ocean Park Boulevard Santa Monica, California

Dear Mr. Douglas:

A review of material recently presented to the Air Force Ballistic Missile Division concerning problems arising from failures and abnormalities in equipment which affect the reliability of the Thor Weapon System does not show in definable terms, the existence or the responsibilities of a reliability organization within the Douglas Aircraft Company. In your failure reporting system, primary emphasis rests upon your inspection group which has no functioning reliability organization. Although a reliability organization at the Douglas Aircraft Company exists for Thor, it has been apparent to us that this group does not have evidenced top management support and is located in a position of low responsibility in your management structure. Our true concern is that no reliability organization, nor the information derived therefrom, can be satisfactory unless it is properly manned and placed at such a level within the management structure of a company as to make it the controlling agency for the follow-up of failures and malfunctions in quality control, engineering, management, inspection, and technical writing agencies within the company. This role within your company is given to your inspection group and one cannot find real evidence that they, in fact, do accomplish this mission.

It is therefore proposed that you review the structure of your reliability groups insofar as their organization and stature is concerned that you can satisfy yourself that you are adequately prepared to meet the reliability challenge that faces us. The Thor Program has been outstanding in that as a major weapon system, it was deployed in the field only three years after its inception. In the wake of this accomplishment, we have the equally prodigious task of achieving overall system reliability of 80 to 90 percent by the end of this yeer.



AFRWD Ltr to Mr. Donald W. Douglas, Jr.

To insure that we will realize this goal, we request that the Douglas Aircraft Company take the necessary steps to establish a strong reliability group to serve as a controlling agency in this area; that it maintain a responsive failure reporting system that is consistent with our stated requirements and that it make maximum use of the facilities that are now available in order to conduct a thorough component and environmental test program.

We consider the entire subject of reliability as one that deserves the most detailed management attention on the part of Douglas and the Air Force, and we propose that a top management discussion be held on this subject during the month of Merch wherein your company can detail to us the steps that are proposed to meet our stated reliability objectives.

Sincerely

B. A. SCHRIEVER Major General, USAF

Commander

THE PARTY OF

### ADVANCED RESEARCH PROJECTS AGENCY Washington 25, D. C.

ARPA Order No. 48-59 Appendment No. 2

March 24, 1959 Date

The Secretary of the Air Force TO: Washington 25, D. C.

The Development and Funding Plan, dated January 30, 1959, for the DISCOVERER program, is hereby approved. This approval pertains to the 13-vehicle program.

Further program guidance will be in accordance with Paragraph 4 of the basic Order.

Director

Copy to: Commander, ARDC

# ADVANCED RESEARCH PROJECTS AGENCY, Washington 25, D. C.

ARPA Order No. 48-59 Amendment No.

April 1, 1959

Date

TO: The Secretary of the Air Force :
Washington, D. C.

1. Paragraph 5, ARPA Order No. 48-59, dated December 16, 1958, is superseded by the following. Attachment No. 1 to the basic Order is superseded by Attachment No. 1 to this Amendment.

The Director, Advanced Research Projects Agency, will be kept informed of the status of work assigned under this Order by a Monthly Progress Report, a Quarterly Progress Report, and a Semiannual Technical Summary Report, to be prepared and submitted in accordance with procedures outlined in Attachment No. 1. These reports represent ARPA's presently foreseeable requirements for reporting under ARPA Order No. 48-59.

2. Distribution of AFBMO reports required by ARPA on work performed under ARPA Order No. 48-59 to agencies within USAF will be decided by AFBMO in consonance with established USAF procedures. Requests for copies of these reports by agencies outside USAF will be referred to ARPA for approval.

Rof W. M

Director

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l Incl: Attachment No.

Copy to: Commander, ARDC

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Attachment No. 1

ARPA Order No. 48-59 Amandment No. 3

#### PREPARATION OF REPORTS

#### I. Monthly Progress Report

AFBMD giving a narrative account of work performed under ARPA Order No. 48-59. The letter report will cover work performed each month with the exception of the last month (March, June, September and December) of each calendar quarter. The quarterly progress report prescribed below will be submitted in lieu of the letter report for the last month of each calendar quarter. The initial letter report under this directive will be for the month of April 1959. Letter reports will be submitted in quadruplicate to the Director, Advanced Research Projects Agency, and are due within 10 days following the month reported.

The report will be in letter form, preferably not exceeding three pages, and will present a brief narrative summary of progress during the reporting period. Each report should make specific reference to the following topics: (1) technical status, (2) problems encountered, (3) work schedules, and (4) action required by ARPA. Photographs and illustrative material will be submitted as appropriate. The ARPA Order number, name of contractor, date of contract, contract number, amount of contract, and title of the project should be stated in the heading of each report.

b. Milestone Section. Instructions for preparation of a milestone progress report, which requires use of a standard format in reporting actual progress against planned progress in accomplishing major milestone, will be issued at a later date.

### II. Quarterly Progress Report

The purpose of the quarterly progress report is to provide the President and the Secretary of Defense and their staff with periodic summary information by which they may be kept informed of overall progress and results in certain of the satellite projects.

Frequency and Due Date. The quarterly progress report will be prepared for submission to the President each calendar quarter and will show a summary of progress and significant events assets, the

ARPA Order No. 48-59 Amendment No. 3

quarter. The report should reach ARPA no later than the 11th of the month following the close of the quarter reported. When the 11th falls on a non-workday, the report will be due the following workday. The initial report under this directive will be for the quarter ending March 31, 1959.

Content. The quarterly progress report will cover the progress, special achievements, problems encountered, schedules and overall status of the program. It is essential that the content be carefully organized and that the material is presented briefly, clearly and concisely.

#### Format.

PART A. Brief of Progress During the Quarter. The brief should not exceed one-half page in length and should present the outstanding highlights of progress and status of the program.

PART B. Topical Summary. The topical summary consists of a series of summary headings, each of which is followed by a summary paragraph or paragraphs. The summary paragraphs are not limited in number but generally should not exceed 15 lines in length. Each paragraph should be abstracted in a marginal heading appearing at the left margin opposite the first line of the paragraph. All elaborative detail should be relegated to Part C and reference noted thereto, as appropriate. Suggested summary headings for the DISCOVERER Project are:

DISCOVERER PROJECT

DISCOVERER FLIGHTS

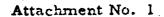
Flight I Flight II, etc.

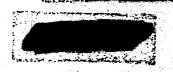
FACILITIES AND SITES

Launch Tracking

GENERAL

Satellite Airfrance Subsystem Satellite Propilitor Subsystem





ARPA Order No. 48-59 Amendment No. 3

#### GENERAL (continued)



Auxiliary Power Subsystem
Satellite Guldance and Control Subsystem
Data Handling Subsystem
Biomedical Recovery Program

These headings may be revised or added to by the preparing agency from time to time, as appropriate.

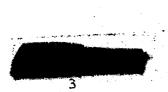
PART C. Bescriptive Detail. All detailed description and back-up information considered necessary to the completeness of the report will be confined to Part C. Examples are description and layout of tracking stations, map sketches of location of facilities, and details of design and testing of equipment. A glossary sheet listing standard equipment and systems terminology and specifications should be included.

Photographs and Sketches. Photographs and sketches selected to show progress of the work and depict development of equipment should accompany each report. To facilitate printing, photographs and sketches will be in black-and-white glossy finish on 8X10-1/2-inch paper. Each photograph should contain some commonly known object to indicate scale and be clearly captioned.

General. The quarterly progress report will be assembled with those of other satellite projects into a single Department of Defense Military Satellite Program Progress Report and transmitted to the President. It is desired that the format of the report to the President be carefully followed in preparing the report for your project to enable ARPA to print and transmit the consolidated report to the White House with minimum rewriting and editing delay.

#### III. Semiannual Technical Summary Report

A technical summary report will be prepared semiannually for periods ending June 30 and December 31 of each year. The report will present a concise and factual discussion of technical findings and accomplishments during the period. Six copies of the report will be submitted to the Director, Advanced Research Projects Agency, and are due within 30 days following the close of the report



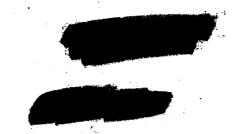








period. Upon completion of the project, a final report will be submitted summarizing the entire project. The final completion report will be submitted in lieu of the regular semiannual report to reach the Director, Advanced Research Projects Agency, within 60 days following project completion. The ARPA Order number, name of contractor, and title of the project should be stated in the heading of each report.





## ADVANCED RESEARCH PROJECTS AGENCY WASHINGTON 25, D. C.

CONTRACTOR STATE

SM 59

ARPA Order No. 17-59 Amendment No. 4

April 10, 1959

Date

TO: Commander

Air Research and Development Command

- . Andrews Air Force Base
- -Washington 25, D. C.

ARPA Order No. 17-59, dated September 4, 1958, as amended, is hereby further amended to specify the approved Tasks included therein.

Task No. 1 - Provide one THOR-based vehicle for the TIROS project. The specifications for this vehicle, its launch schedule, and other matters will be specified by NASA. Of the funds provided in this Order, \$2 million pertain to this Task for covering estimated costs already incurred. See American # 5,13 apr 5 ?

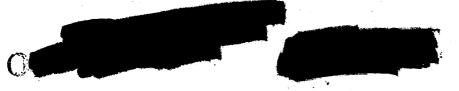
See arpa Cario 95-60 Task No. 2 - Develop an upper stage vehicle AJ10-104. Estimated cost, \$1,708,000.

See Carpa Order 96-60 Task No. 3 - Modify the Bell-Hustler stage to obtain dual burning capability, simplify guidance and control system, structural simplification such that payloads of arbitrary shapes may be carried, and increased propellant carrying capacity. Estimated cost, \$5, 150,000.

Sur ARPA Onder 47-60 Task No. 4 - Provide for the delivery and launching at AMR of a THOR-Delta and a THOR-104 suitable for the injection of the Transit payloads of about 215 pounds into 400 N. Mi. high circular orbits. Estimated cost, \$7,630,000.

Son Weby Out

Task No. 5 - Provide for the delivery and launching at AMR of two THOR-104 vehicles suitable for the injection of the 500 pounds Courier payloads into 650 N. Mi. high circular orbits. Estimated cost, \$7,994,000.



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Saw ARPA-Order 97-60 Task No. 6 - Provide for the delivery and launching at PMR of two THOR-Hustler (modified) vehicles suitable for the injection of the 215-pound Transit 2 payload into 400 N. Mi. high circular orbit. Estimated cost, \$7,660,000.

The desired launch schedule for Tasks Nos. 4, 5, and 6 is set forth in Attachment No: 1 to this Amendment.

The Tasks listed above supersede paragraphs 1, 2, and 3 of Amendment No. 3, dated November 26, 1958.

The estimated total cost of Tasks Nos. 2 through 6 is \$30, 142, 000.

The fund availability under ARPA Order No. 17-59 is hereby increased from \$5,090,000 to a new total of \$18,300,000 under appropriation and account symbol "97X0113.002 Salaries and Expenses, Advanced Research Projects Agency, Department of Defense." Additional funds for Tasks No. 2 through 6 will be made available upon the availability of FY 1960 funds.

It is requested that development and funding plans be submitted for Tasks Nos. 2 through 6 as soon as possible.

Jack#7 addel. ee amend #6, 18 may 89

W. Johnson

1 Incl.:

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Attachment No. 1 (Launch Schedule)

Copy to. Secretary of the Air Force
Administrator, NASA

### LAUNCH SCHEDULE, TASKS Nos. 4, 5, and 6

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Transit 1 b	400	215	A	(TE)	
Transit 2 a	400	215	P	TH	•
Transit 2 b	400	215	P		тн
Courier 1 a	650	500	A	TE	
Courier 1 b	650	500	A	TE	
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At A At P				TD TE TE TE TH	TH

TD - Thor Delta

TE - Thor 104-

TH - Thor Hustler (Mod.)

Each b is a backup. In case of successful first launch, the backup would be rescheduled,





ADVANCED RESEARCH PROJECTS AGENCY WASHINGTON 25, D. C.

ARPA Order No. 17-59
Amendment No. 5

April 13, 1959 Date

TO: Commander
Air Research and Development Command
Andrews Air Force Base
Washington 25, D.C.

Pursuant to an Agreement hatween the Department of Defence and the National Aeronautics and Space Administration (copy attached), the responsibility for the technical and management direction for the THOR-based booster for the meteorological satellite project, designated TIROS, as specified in Task No. 1 of Amendment No. 4 to ARPA Order No. 17-59, dated September 4, 1958, as amended, has been transferred to the National Aeronautics and Space Administration.

Accordingly, the ARPA reporting requirements pertaining to Task No. 1 of Amendment No. 4 to ARPA Order No. 17-59, dated September 4, 1958, as amended, are terminated. Title to facilities and non-expendable equipment procured under Task No. 1 will be determined upon completion of the work in accordance with the Agreement.

You are authorized to use funds remaining on Task No. 1 for the work as directed by NASA, in accordance with the Agreement, but ARPA assumes no responsibility for obligations and expenditures in excess of \$2,000,000.

Roy (T. Johnson

D. ractor

1 Dickerure (Medressee only)

WIX

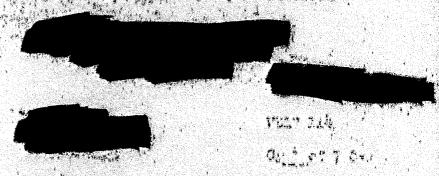
Mr. L. Engene Root
Vice President and General Manager
Lockheed Aircraft Corporation
Missiles and Space Division
3251 Henover Street
Polo Alto, California

I ser Mr. Rock,

Becomes of my deep concern over our ability to mest the established Discoverer launch schedule, the factors affecting launch rate have recently been curriedly examined. Inclusive No. 1 is a Study prepared by Colonel Cody at Vandenburg Air Force Base, while inclosure No. 2 is an earlier report to the Discover, Frieldia Systems. Noth studies around a number of established which could defeat the schedule. A recommission their free the Dengles Airgeoff Company saling for relief from their schedule is evidence that the situation is recognized by field activities.

The inclosed reports show especially that current planting for the application of memoryer, the achainling of tests and modifications end the occupation time of facilities, makes insufficient allowance for troubles which inevitably will arise. For example, Lockheed Missiles and Space Division mauning on Vancabers his force allows only for a cas-shirt operation working on only one vahials at a time. Vahials are arriving at the bace with an excessive number of modifications yet to be made. Successive webicle and test equipment malfunctions at Santa Cruz have imposed many unscheduled delays. No determined effort to correct these conditions is evident at the present time.

The purpose of this letter is to convey to you my sincere conviction that the current Lockheel Missiles and Space Division



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course of action will lead to schedule slippage. I am equally certain that your desire is as strong as mine to meet the Physicverer milestones, recognizing the great national importance of this project. The task then becomes one of determining what steps are to be them in order to assure success. I would greatly appreciate your flathe the problem your immediate attention and an early reply outlining the manner in which a solution can be reached.

Sincerely,

## SIGNED

2 11:-12:

- 1. (9) Study, (Mac coverer Launch Schedule), WIXEY 58-3-73, Cv 1 of 7
- 2. Report by (% 117), Project Office on Discoverer Leunch 1. Chadule 10, (%) 175-79 (1354, Cy 2 of 10 Controlled by WDZW 59-247

O. J. RIILAND Brig. Gen., USAF Vice Commander



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GEN. RITLAND OM

ONE (1) DAY AFTER THIS

DEVELOPMENT PLAN AND A COVER LETTER TO MR. MACINTYRE WAS DISPATCHED TO USAFF SOME SPEED!

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SYMBOL LBJP RELEAGUE TYPED (or stamped) NAME AND TITLE TYPED NAME AND TITLE (Signature, if required) E.S.SILBERMAN, CONTRACTING OFFICER JAMES S. SEAY, LT COLONEL, USAF DIRECTOR OF SATELLITE SYSTEMS SECURITY CLASSIFICATION

60 45 23-78

REPLACES DD FORM 173, 1 GGT 49, WHICH WILL BE USED UNTIL EXHAUSTED -558 Discou Folder 2 Magadierin

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